STEERPIKE

BBD *Delay Ensemble*

v3.0.0

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Re Rack Extension

Steerpike BBD Delay Ensemble

Steerpike is a multi-tap delay providing up to six delay lines, based on the classic Bucket Brigade Delay integrated circuits of the 1970s and 1980s, found in many a classic delay pedal.

BBD Delay

A BBD is a type of Integrated Circuit (IC), which is a Sample & Hold device with a fixed number of stages, known as a delay line; an audio input would be held as if it was a bucketful of water being passed along a line of people (hence, "bucket brigade"). For a chip such as the SAD512D, think of it as if there were 512 people in the line. Other BBD ICs had differing lengths, up to 4096 stages.

Although *Steerpike* is not designed to be a literal recreation of a specific BBD—they have different dynamic ranges, SNR and THD figures etc, not to mention sound differences caused purely by changes in operating temperature—or a particular delay module, this super-BBD-ensemble-delay has been designed to give you the flexibility to sculpt your delay by giving access to a breadth of parameters you would not normally be able to access: it can be as subtle or insane as you choose!

Steerpike overview

Six BBD delay lines are available in *Steerpike*, Delay Lines 1 to 6. Each BBD can have independent delay times, set by number of stages (**#**), time (**ms**) or tempo synced to the Reason transport. For the first time in Reason, tempo sync ranges are no longer entirely determined and limited by the designer: you can select any beat division from /2 (minim) to /16 (semiquaver) and all halved and triplet steps up to /256 using the **Subdivision** control, and any the number of delays to that division using the **Duration** control, from 1 to 16. Thus you can create flexible and creative tempo synced delay times such as 3/7, 13/5, 3/2, 5/3, 2/15 as well as the Reason standard 3/16, 1/8 and so on.

Each Delay Line supports up to eight seconds of delay time, regardless of the sample rate or song tempo, and each Delay Line can be independently set as a reverse delay without feedback.

The delay time is linked to the global BBD clock rate, and so the delay time will be correct for whatever the clock rate is set to.

Steerpike features three LFOs for modulation, an envelope, low and high pass filters, an FX section with a resonant filter, distortion and reverb, a 3-channel EQ, and a pan control for the dry input. Each Delay Line also has a Tap Out and Tap In audio

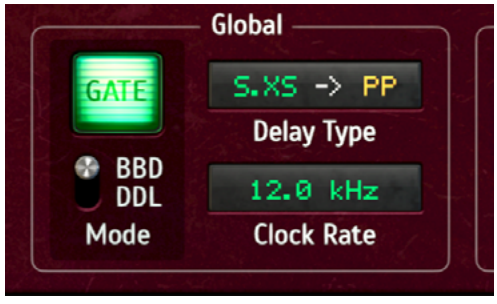
connection, breakout jacks for feedback loops and inserting external effects. Audio can be input directly before the BBD of each Tap, and can be sent out directly after the BBD Tap level adjust. The Tap In has its own level adjust on the front panel.

GLOBAL Section

Bypass/On/Off Switch

This is an important control! In an emergency, if the delay audio is doing things you would rather it not be doing, set this to **Off** to immediately stop audio output. This will also purge all the delay lines. Setting to Bypass will not clear the delays.

Delay Type



Steerpike 3 features nine alternative topologies, including ***X-Stereo***, ***Serial X-Stereo***, ***Parallel***, ***Serial***, ***Feedback***, and ***Ping-Pong***. Select the desired type by clicking the **Delay Type** display and selecting from the pop-up menu.

Some types make use of pairs of BBDs, in which case a "Link" indicator will light up between Delay Lines 1 and 2, 3 and 4, and 5 and 6. Each **Delay Type** is explained later in this guide (page 14).

Gate (Audio to Delay Line In)

This useful oversized button turns the delay line gate off and on. If turned off, no audio enters the delay lines, and is only passed to the Dry/Wet mixer in the Dry output. When on, the audio is also passed to the delay lines.

What is particularly useful about the **Gate** function is that turning it off *doesn't* clear the delay line, so it allows you to shut off new audio into the delay line while still allowing the already delayed audio in them to progress and finish playing. With infinite delays—where feedback set to 100%—this is especially important, as you can effectively record the delay like a loop, letting it play indefinitely, while shutting off the delay line input to prevent it swamping the dry signal as you continue playing a unique input over the top with the dry signal.

Try mapping **Gate** to your sustain pedal for delay-sustain.

Mode

Use this button to switch between **BBD** and **DDL** (Digital Delay Line) modes. Use BBD for a vintage analogue pedal delay. **DDL** is the interpolated digital delay typically used in plugins. With **DDL** mode you will avoid aliasing entirely (see Clock, below). More usefully it will allow you to have longer feedbacks, even infinite feedbacks, without the sound degradation that would occur when using **BBD** mode, or with tape delays, even with **THD** at minimum. As with **Bypass/On/Off Switch** Off, switching BBD mode will also instantly clear the delay line of all active channels.

Clock Rate

Set the clock rate to a value between 1.5kHz and 100kHz when **BBD** mode is enabled. There is a strong relationship between clock rate and aliasing: the lower the clock rate the more you should reduce the low pass filter (**LPF**) frequency if you want to prevent aliasing. Some BBD delays, especially those using the Panasonic chips, had a minimum clock rate of 10kHz. At this rate the aliasing is noticeable until you reduce the **LPF** down to around 4kHz, but we provide a full range down to 1.5kHz for the creating of lo-fi, aliasing effects. In normal operation for a traditional BBD guitar pedal delay we recommend keeping the clock rate above 20kHz with the LPF control set to around 10–12kHz.

The **DDL** mode on *Steerpike* uses the host sample rate and therefore the clock rate cannot be changed: the display will show "—". Note that due to an unexpected Rack Extension GUI behaviour where the clock rate is adjustable in **BBD** mode, unfortunately this value in **DDL** mode using the same control must equally be automatable otherwise it won't work at all, and thus

it will show up on the Combinator programmer or sequencer (listed as "Internal Rate"), *despite* the fact you can't actually adjust it! In this mode you can safely leave the delay output unfiltered, unless you wish to do so purely for creative purposes.

6-DELAY LINE BBD/DDL CONTROL Section

The main area adjusts the parameters for each Delay Line output. Note that in several **Delay Types** some controls, such as **Pan** will have no effect.

Delay Time

At the left of each Delay Line is the most important control: the **Delay Time**. Drag the mouse up and down directly over the value to adjust the delay time. There are three different ways you can set the delay time, by clicking on a button to the right of the display to change the delay time mode.

- **Stages (#):** Use this mode to set the fixed number of stages the BBD uses, from 2 to 16,384. The hold time between each stage can be changed via the **Clock** rate in the Global Section.
- **Time (ms):** This mode allows you to set the delay time in milliseconds (0.01–999ms) or seconds (1.0–8.0s). In **BBD** mode *Steerpike* internally sets the number of stages to provide the correct time based on the current **Clock** rate setting.
- **Tempo Sync (Duration/Subdivision):** These two controls allow you to independently set duration and subdivision for tempo sync values. In **BBD** mode *Steerpike* converts these to a number of Stages based on the current **Clock** rate setting. (*Note: version 2 had two tempo sync selector buttons to maintain backwards compatibility with Steerpike version 1; for version 3 the extra button has been deprecated from the GUI. If no button is lit on a legacy patch, it is still correctly set to Sync mode. It is not necessary to reset it to Sync, other than for aesthetics or OCD*). Use the left side of the display to control the Duration value, the right side to adjust the Subdivision.

Why two Tempo Sync values?

Normally in Reason devices you are given a fixed list of tempo synced values by the designer of the device. This list usually has to be fairly short so as not to be overwhelming, but has the disadvantage of providing a limited range of rates, at a limited range of BPMs with which to use them.

In *Steerpike*, while we do still have a preset list for tempo syncing the built-in envelope, the BBD delay itself can be freely set to a massive range of creatively tempo synced delay times by adjusting the **S**ubdivision (the right hand number, the beat division) and the **D**uration (the left hand number, the duration, or number of beats at the set subdivision). While some are settings are going to be the same as others, (e.g. 2/128 is the same as 1/64), you can simply dial in the precise number you want rather than have to work out what is equivalent to what. You can select from 1 to 16 beats over 36 subdivisions: that's 576 possible tempo synced delay lengths, per BBD. With some thought, in the ***Serial*** **Delay Type** that's 3,456 possible tempo synced delay lengths!

For displaying the length we have, for consistency, used US-style numeric subdivision values, from /2 (Half Note) to /256 (Two Hundred and Fifty-Sixth Note). The most important ones you may wish to be aware of are /16 (Sixteenth Note/Semiquaver), /12 (Triplet quaver), which is often listed in Reason as 8T, and /24 (Triplet semiquaver), aka /16T.

Steerpike Duration	Steerpike Subdivision	Equivalent to:
1 to 16	/256	
1 to 16	/192	/128T
1 to 16	/128	Demisemihemidemisemiquaver
1 to 16	/96	/64T

Steerpike Duration	Steerpike Subdivision	Equivalent to:	
1 to 16	/64		
1 to 16	/48	/32T	Thirty-Second Note Triplet
1 to 16	/32		Thirty-Second Note / Demisemiquaver
1 to 16	/24	/16T	Sixteenth Note Triplet
1 to 16	/20		Sixteenth Note Quintuplet
1 to 16	/16		Sixteenth Note / Semiquaver
1 to 16	/15		
1 to 16	/14		
1 to 16	/13		
1 to 16	/12	/8T	Eighth Note Triplet
1 to 16	/11		
1 to 16	/10		
1 to 16	/9		
1 to 16	/8		Eighth Note / Quaver
1 to 16	/7		Quarter Note Septuplet
1 to 16	/6	/4T	Quarter Note Sextuplet
1 to 16	/5		Quarter Note Quintuplet
1 to 16	/4		Quarter Note / Crochet
1 to 16	/3	/2T	Half-note triplet
1 to 16	/2		Half Note / Minim

Naturally /16 is the most useful at typical BPMs, so /16 is the default for the **S**ubdivision value. If requiring just /16 values, you'll only ever need to change the **D**uration figure. At slow BPMs however, you might find it's easier to use /32 or even /64, while at very fast BPMs /8 or /4 become useful.

But we only have a delay buffer of eight seconds! Well actually eight seconds is a *very* long time for a delay. It's likely to be rare you'd need a delay time that long: if you have a *really* long delay time, such as 16/2 and your song is 58 BPM, or perhaps you have set a delay time of 16/4 and a song tempo of 27 BPM, in both cases the required buffer size for that delay to be achievable is too big when in **DDL** mode and will trigger the **MEM** warning lamp to the left of the **Delay Time** display. The delay time for that Delay Line will still be limited to eight seconds. If you need that 16/4 delay time at lower than 28 BPM, then you can still use ***Serial*** or ***Feedback*** **Delay Types**, which use each delay as part of the delay time, and split the delay over multiple Delay Lines.

Delay Line Enable

This the master enable button for the entire delay line. Leave delay lines you do not require turned off. Switching a delay line off will also instantly clear its own delay line.

Level

Centre is zero output level. Increase the value positively to the right to set the individual delay level into BBD Mixer. Increase the value negatively to the left to phase invert and high pass filter the output. Note the HPF on the inverted level is a fixed frequency and independent of the global HPF in the Filter/EQ section. The **Level** knobs snap to zero; other invertible knobs do not.

Pan

Set the stereo position of the delay line output. Be aware that in ***Serial*** or ***Feedback*** **Delay Types** the pan is only applied using the **Pan** control of *the last active channel in the chain*, while in ***Serial X-Stereo***, the pan into 3/4 and 5/6 matches the main Input, i.e., the pan settings of 1/2 are only applied to the output of 1/2 into the BBD Mixer Output, where present.

Feedback

Use this control to the feedback amount of the delay. *Steerpike*'s **Feedback** control provides up to 100% Feedback for infinite delay. In **BBD** mode destructive interference because of sample & hold will still cause the delay to fade, so **DDL** mode will

normally be the preferred option when you require a continuous, non-fading repetition that will continue until you clear the delay line, but even then in **DDL** mode for infinite delays you will likely not want to use internal EQ/filtering or LFO modulation.

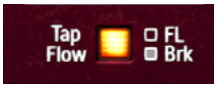
To the left of the **Feedback** control is a small indicator lamp to notify of whether this control is available. Different **Delay Types** have different needs: in ***Serial*** all the channels can add **Feedback**, but in ***Feedback***, only the last active channel can use **Feedback**. For ping-pong types only the left channel of each pair needs this functionality, while setting any channel to reverse delay disables the **Feedback** control.

THD [Total Harmonic Distortion]

Harmonic distortion is introduced by BBD circuits. The more stages in the BBD the more distortion is introduced. The **THD** knob controls the Total Harmonic Distortion produced. Typically you might expect approximately 1% of THD per 1,024 stages. In *Steerpike* you can drive the THD from zero right up to 36% independently of the number of stages, although that 36% figure is fairly arbitrary: it's based on a sine wave of 80Hz at a particular input level, so the *actual* THD amount, as you would therefore expect, will not necessarily reflect what is set by this control.

The effect of this control will be most obvious on signals with less harmonics to begin with.

Tap and **Tap Flow**



Tap knobs adjusts the input level of the **Tap In** audio jack. In *Steerpike 3* you can additionally toggle the tap routing with the **Tap Flow** button on the front panel or a switch on the rear. "FL" is the *Steerpike 1* behaviour, returning the signal to the delay line, and thus back into the feedback loop. The new default, however, is "Brk", or "Breakout", to return the signal directly the output chain, and thus the tap only goes through the feedback loop once, avoiding some of the feedback issues. **WARNING: There is a serious risk of loud feedback loops with high Feedback and Tap In levels. Use Tap with caution and reduce levels first and increase gradually!** For safety reasons, to prevent accidentally switching from "Brk" to "FL", each mode has its own set of **Tap** knob level values. For "Brk" these default to maximum, which in typical use should be fairly safe, though exercise caution, while for "FL", they default to zero.

Mod

Adjust the depth/amount of delay time modulation, whether from *Steerpike*'s internal Mod section or from an external LFO.

Env

This controls the amount of effect the envelope has on the output level of that delay. Remember that an ***external gate is required to trigger the envelope***, so you won't hear any delay if this control is greater than 0% and there is no active gate.

In *Steerpike 3*, to view and edit the envelope controls, press the **Envelope Edit** button, next to the "Env" heading. This button does not need to be pressed to enable the envelope itself, it merely toggles the display of the Envelope and LFO 2/3 pages.

Rev [Reverse]

Each channel can be independently set as a Reverse delay by enabling the **Rev** button. This disables the **Feedback** of that channel. See the next section for more information on this feature.

EQ

Enable the EQ button to route the output of that delay through the EQ section. The EQ is outside of the feedback loop to prevent nasty things happening. Be aware that this button does not affect the EQ Filter section, which the delay lines are always routed through.

Reverse Delay

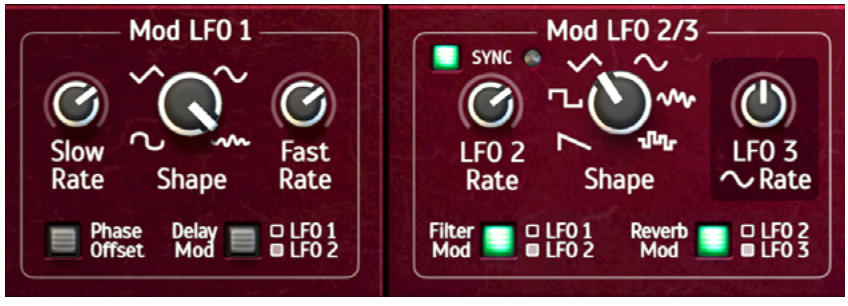
Reverse delays are complex to produce, since of course we cannot predict the future: everything we want to reverse must be in the delay buffer *before* we can reverse it! To get a reverse delay with feedback is even more complex, as it requires two buffers, one for the delay and feedback, and another to reverse it. For example, to reverse delay a one second block of audio with feedback requires up to three seconds of delay: the first to delay and add feedback, and up to two seconds for the reverse (since the reverse recording is free-running, its point of recording the loop may not be where you need it). You also cannot, for most practical scenarios, have the reverse in the same buffer as the feedback or else you will get a forward-reverse-forward-reverse effect.

So due to memory requirements, we don't offer feedback on channels when enabling Reverse. Fortunately, we can easily achieve reverse with feedback, even in stereo, by simply by putting *Steerpike* into a serial topology such as Type II, and enabling **Rev** only on channels 1/2, then add feedback as normal on channels 3/4 (or even 5/6 as well!). If needing only mono, Type IV will give you the classic "Backtalk"-style reverse delay pedal effect, as shown in this example patch from the Reverse Delay patch folder {**"Feedback Reverse 16ths"**}. With another four BBD delay lines available, you could even have forward-reverse-forward-reverse-forward-reverse if you wanted!

While *Steerpike*'s reverse delay is available in all **Delay Time** modes, there's no doubt the preferred usage will be when tempo synced, as that largely avoids the free-running behaviour. It may even help to not think of reverse delay as a "delay" at all, but simply as the length of a record loop. You can use the keyboard trigger, as described in the next section, to "arm" the recording, play the material, then retrigger the channel to play the reverse buffer immediately.

Channels with Reverse delay enabled feature a blue metronome lamp in the upper right of their **Delay Time** display to help you time triggering and recording of the loop. As you may find you need to predict the future, it is likely there will be scenarios where to get the reverse ending at precisely the correct moment, such as at the end of a bar, you will have to manually move the required clips until the timing is correct.

MOD LFO Section



This section sets the internal LFO used for modulating each BBD, the FX Filter and the Reverb.

Steerpike 3 features four LFOs.

Mod LFO 1 is the original Mod LFO from *Steerpike 1*, featuring two mixable, free-running LFOs.

Shape

Use the **Shape** control to adjust the LFO waveform shape from a Rounded Square (0%) to Triangle (33%), Sine (66%) and lastly Drift (100%). Use the latter for a random "wow & flutter" tape speed modulation type effect. These LFOs output a ±0.5 CV range to the delay lines, but ±1 to the filter.

LFO Slow/Fast Rate

The **Slow LFO** rate can be set between 0.01 Hz and 4.0 Hz. Default is "Off". The **Fast LFO** can be set between 1.0 Hz and 11 Hz, the default is 6.0 Hz. If both are set to a Hz value then the output of both is mixed, but you can use just one internal LFO by setting the other to the "Off" position at the extreme left of its control range.

Phase Offset

This button adds phase offsets for the internal LFO to the delay lines. Unlike in sister product *Chenille*, there is no significant

benefit to multiple phase modes, so here we have a fixed relationship using *Chenille*'s CE-1 mode. With **Phase Offset** off, the same LFO is sent to each BBD.

Delay Mod Source

Select Mod LFO 1 or Mod LFO 2 as the source LFO for delay time modulation **Mod**. By default this uses LFO 1, where the output of Slow Rate and Fast Rate are added together. The amount of modulation applied is set per Delay Line using its individual **Mod** control. Selecting LFO 2 allows you to use the shapes and ultra-high LFO rate provided by Mod LFO 2.

Mod LFO 2 has a six-way adjustable **Shape** selector, Ramp, Square, Triangle, Sine, Random Smooth (which has a faster rise and fall than LFO 1's Drift), and Random Square, while the **LFO 2 Rate** is a single control providing a massive modulation rate range from 0.1Hz to 100Hz. This LFO outputs the full ±1 CV range, and also has a **Tempo Sync** mode. To maintain waveform synchronisation you can reset the cycle of the LFO 2 waveform by pressing any black note above C3 from a sequencer track/MIDI input to the device. The phase automatically resets at the song start position, even when looping if the L marker is at the song start position, but it is *not* reset at other L marker positions unless you manually reset it with a trigger at the loop L marker. This ensures the phase is only reset when you need it, and not arbitrarily when you didn't.

Filter Mod Source

Use this button to switch the FX Filter modulation between LFO 1 or LFO 2. LFO 2 is the default source for FX Filter modulation.

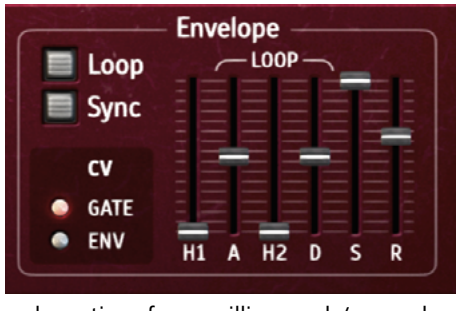
Mod LFO 3 outputs only a free-running Sine wave. **LFO 3 Rate** also has a rates from 0.1Hz to 100Hz at full CV ± 1 range.

Reverb Mod Source

Use this button to switch the Reverb modulation between LFO 2 or LFO 3. LFO 3 is the default source for Reverb modulation. For a springy-sound, trying using LFO 2 with a square/triangle mix.

To view and edit Mod LFO 2 and Mod LFO 3, ensure the **Envelope Edit** button is **off**. This button does not need to be unpressed to enable these LFOs, it merely toggles the display of Envelope and LFO 2/3 pages.

Envelope and Keyboard Triggering



Steerpike includes an internal envelope that can be used to fade the delays in and out. It is a six-stage envelope with pre-delay (**H1**), **Attack**, hold (**H2**), **Decay**, **Sustain** and **Release**. **Sustain** sets the final **Decay** level; all other stages are time-based. You will find it works best if the **Attack**, **Decay**, **Sustain**, and **Release** values are not zero, otherwise you may notice unwanted "clicking" artefacts. Stages **Attack** to **Decay** are loopable by enabling the **Loop** button. This particularly of use for infinite delays.

Some thought is required to ensure that, for example, the **H1** and/or **Attack** time of the envelope is less than the decay of the feedback repetitions, otherwise the delay will have finished before you hear it! So the envelope is likely to be used only on delays with high to infinite feedback amounts. Enable the **Sync** button to change the envelope time from milliseconds/seconds to tempo sync.

While only one actual envelope shape is available, each Delay Line can have its own envelope "voice", or you can trigger all at the same time. The keyboard is split at C3: B2 and below will trigger the channel/s that have **Rev** disabled, while C3 and above will trigger the channel/s where **Rev** is enabled. ***Any*** black note below C3 will trigger the FX Filter Envelope, while any black note above C3 will reset the LFO 2 phase to 0°, restarting the waveform cycle from the beginning.

If you create a dedicated Sequencer track for your *Steerpike* (right-click the device panel as usual and select "Create Track for Steerpike") and now you can trigger the envelope directly with your keyboard:

Note C: Triggers Delay Line 1 Amp envelope
Note D: Triggers Delay Line 2 Amp envelope
Note E: Triggers Delay Line 3 Amp envelope
Note F: Triggers Delay Line 4 Amp envelope
Note G: Triggers Delay Line 5 Amp envelope
Note A: Triggers Delay Line 6 Amp envelope
Note B: Triggers all Delay Lines' Amp envelopes simultaneously.
Black notes: Triggers FX Filter Envelope (below C3) or LFO 2 Phase reset (above C3)

These note triggers are mapped across all MIDI octaves, so *any* C from C-2 to C2 will trigger Delay Line 1, *any* B from B-1 to B2 will trigger all Delay Lines and so on, if they are not Reverse-enabled. With Reverse enabled, same principle applies but the range is C3 and above.

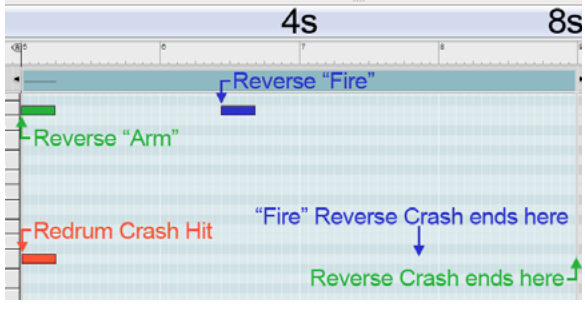
This means you could also create a Combinator instrument with any octave keyboard range, such as C1–B1, dedicated to triggering *Steerpike*, with C2–C8 triggering the instrument notes as usual. Remember that if using *Steerpike* in a Combinator, you will need to manually arm its "Receive Notes" option.

Since you are in the Combinator, you could hook your sustain pedal to trigger the **Gate** function for additional control!

Next to the envelope faders are a pair of radio button LEDs marked **CV Gate** and **CV Env**. If triggering *Steerpike* from an external source this allows you to set whether to merely use the external gate to trigger the internal envelope, by selecting **CV Gate**, or over-ride the internal envelope completely if using an external envelope such as *Charlotte Envelope Generator*, in which case select **CV Env**.

Channels triggered via MIDI will display a green "note on indicator" in the bottom right of their **Delay Time** display.

Reverse triggering example



In the following test case we trigger a crash cymbal and then play it back in reverse, ensuring it triggers at the correct moment.

In this Combinator (and you don't need a Combinator for this, you can simply provide a separate sequencer track for each) we have arranged a default RedRum kit and a default *Steerpike* patch, mapping the former to the low half of the keyboard, and the latter to the upper half. We enable the Rev button on Delay Line 1 and set the time delay to four seconds.

Because the reverse delay is always "recording" it is free-running, so we need to ensure that it starts recording at the correct time. Our song tempo is 120bpm, which means 4 seconds is two whole bars in 4/4. In the sequencer we program the reverse delay to start by entering a C3 (or any C above C3, to reverse trigger just Delay Line 1), and for the drum hit, here we're hitting the crash cymbal on A1. We programmed the drum hit just slightly later than the "Arm" trigger.

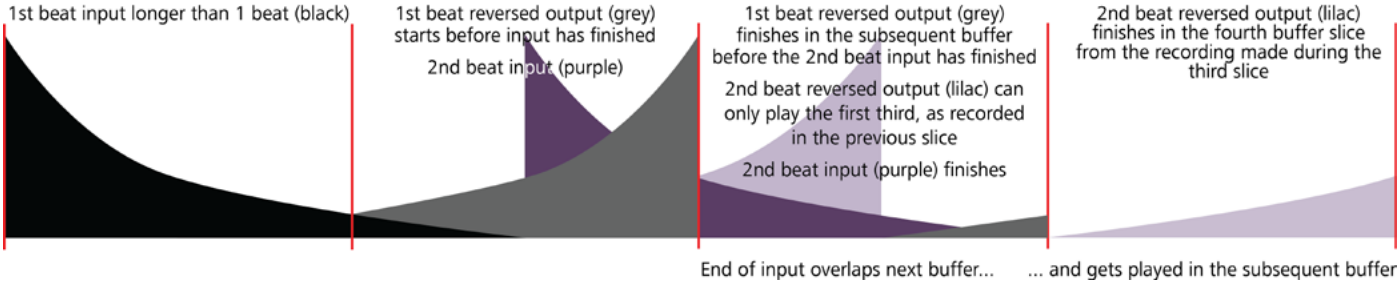
If you now play the song you hear the regular crash, then the 4 second reverse recording should start to play back after four seconds, with the reverse crash finishing with the initial crash transient at 8 seconds, shown in green.

But by programming a second "Fire" trigger on C3, the reverse delay will re-align to the beginning and thus immediately play whatever is in its buffer and not wait the full four seconds. You will find the end position of the reverse is now more arbitrary, shown there in blue.

The same principle is available in tempo sync delay time modes as well. The key to understanding and using reverse delay is to remember that the reverse delay should end at twice the delay time you have set. So for a 1 bar delay the first transient of the input signal should arrive at the end of the second bar. As suggested earlier, when especially requiring "one-shot" reverse, think of reverse delay as the length of a record loop: 1/4 delay = 1/4 record time. This recording length needs to be at least as long as the input:

Snare drum sample that is exactly 1/4 (2/8) in length at 120bpm
Reverse delay set to 1/4

Snare drum sample that is exactly 1/4D (3/8) in length at 120bpm
Reverse delay still set to 1/4



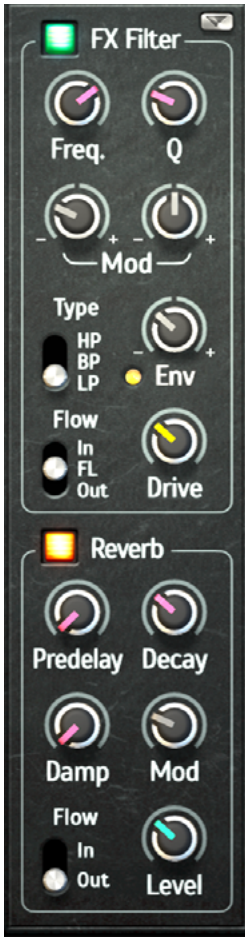
The graphic shows how setting a reverse time of 1/4 creates recording "slices" of 1/4, that are replayed consecutively while recording a new slice in another buffer. The entire slice is reversed, so something at the beginning of the record buffer will be played at the end of the playback buffer.

The first example works as the length of the snare is equal to or less than the recording time of the slice. In the second example, to play the reverse correctly you should increase the delay time to 3/8, to ensure the entire drum hit is still recorded in the same slice, otherwise the end of it will be in the subsequent slice, and the start of the reverse might be truncated. This is still a useful effect in its own right, but be aware of the pitfalls of having reverse times less than the input!

FX Sections

Steerpike 3 contains a modulate-able resonant filter and an algorithmic reverb, as well as an EQ section with steep cutting filters, and a compressor. Use the **FX Page Select** button at the top right of the FX section to toggle between viewing the FX Filter/Reverb, and the EQ/Filter/Compressor pages.

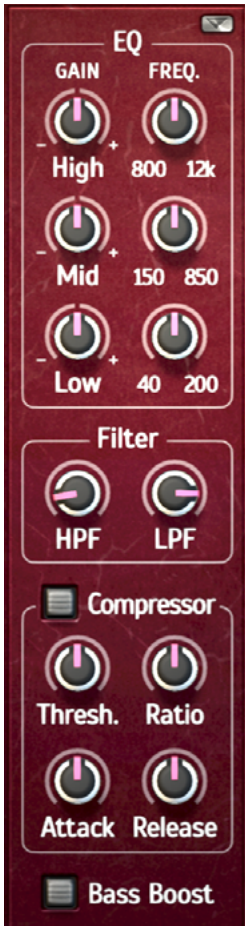
FX Filter/Reverb Page



Turning the FX Filter on or off with its **FX Filter Enable** button, you can adjust **Frequency**, **Q** (Resonance) and an additional distortion, **Drive**. **Frequency** and **Q** can be modulated by either Mod LFO 1 or Mod LFO 2. Their respective **Mod** control adjusts the depth of the modulation. **Frequency** can also be controlled via the Envelope with the **Env** knob. There is an indicator lamp to the left of the **Env** knob

to visually notify you the envelope has been triggered. Unlike the Delay mod, all Filter mod controls are invertible (useful for turning the down Ramp into an up Ramp). The **Type** switch sets the filter to Low-, Band- and High-Pass modes. Lastly, the **Flow** switch sets the position of the FX Filter in the signal chain. "In" places the FX Filter in stereo at the start of the chain, before the split to the delay lines; "Out" puts the FX Filter also in stereo after the delay lines have been mixed together.

The middle value, "FL", enables you to select a mono filter within the feedback loop of individual delay lines. With both "FL" mode selected *and* the FX Filter enabled (otherwise this option is greyed out) an additional parameter becomes available in the displays for each delay line. A dark green square labelled "F" for Filter. Click this square to enable the FX Filter on that channel. It turns bright green to indicate it is turned on for that channel.



Adding Q/Drive in "FL" mode can create **extremely** loud feedback loops: we strongly recommend leaving channel **Feedback** and/or FX Filter **Q** and **Drive** values low, or preferably zero, and then increase slowly, if required, to find a stable peak level.

Below the FX Filter is a stereo Reverb with adjustable **Predelay**, **Decay** and **Damp**. It can also be modulated using its **Mod** control. The dry/wet of the reverb to the rest of the FX signal can be set with the **Level** knob. *The Reverb requires at least one Delay Line to be active*, and also has a selectable signal **Flow** position, although only on the Input (which may result in a mono reverb) or Output.

EQ/Compressor Page

At the top of the EQ/Compressor section is a 3-band parametric EQ with adjustable frequency and gain (±18dB). Ranges available are: **Low** (centre frequency 40–200 Hz), **Mid** (150–850 Hz) and **High** (800 Hz – 12kHz). Only delay lines with their **EQ** button enabled are passed through the EQ section.

Below these, the 48dB/octave **LPF** filter is primarily used as the low-pass anti-aliasing/reconstruction filter for the **BBD** mode, but can be used as a creative effect or cutting filter in its own right, by leaving it high in **BBD** mode to make use of the aliasing, or as a traditional, if steep, filter in **DDL** mode to reduce the high frequencies that might be swamping the dry signal, allowing the latter to cut through more cleanly. The 36dB/octave **HPF** is a global and adjustable high-pass filter that you can use to cut low-end so that the delay does not muddy your mix. This HPF control does not affect the separate fixed frequency HPF applied using the phase inverted left-side range of the delay line's **Level** control: it is an additional filter.

Bass Boost

Turn this on for small low shelf boost which can add some low-end "warmth". Note that this boost is on the wet signal only and will be removed entirely if you increase the **HPF** above 200 Hz.

Compressor

This switch enables an extra internal compressor. They were prevalent in early analog/digital delay devices as part of a compander (compressor-expander), used to reduce internal noise by effectively boosting the SNR signal-to-noise ratio; as *Steerpike* is a noise-free software device, low SNR is not an issue, but the compressor is included in *Steerpike* for experimenting with delays where you may like to model more accurate response, especially those that are quite aggressive on transients, which guitar pedals frequently were.

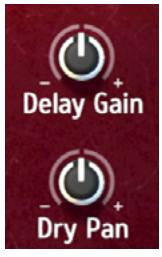
Unlike *Chenille*, we don't include the expander as the internal topology of *Steerpike* is far more complicated and it was not viable include it, but on the plus side you can additionally set the **Threshold**, **Ratio**, **Attack** and **Release** of the compressor as required.

Master Section

Dry/Wet

Predictably, this knob controls the amount of Dry and Delayed signal in the output. Unlike the equivalent control on *Chenille*, where the value is an important component in patch designing, on *Steerpike* this parameter is *not* saved with the .repatch file, as the ability to patch browse with the same wet level is more beneficial. The value is of course saved in Combinator (.cmb) and song files.

Delay Gain



Use this control to trim or boost the overall delay level from all the delay lines into the **Dry/Wet** mixer. It is effectively the "master fader" for all the delays, with a ±24dB range.

Dry Pan

An incredibly useful feature, this allows you to set the pan position of the Dry signal. Reason's Main Mixer does not handle insert delays particularly well, as if you have, for example, a delay on the left channel and want the dry on the right, it can't actually be done via Main Mixer at all. Pan the Main Mixer channel right and you lose the delayed left signal. So traditionally one has typically needed to add insert delays using the extra hassle of setting up a Line Mixer or ReMix and bypass the Main Mixer panner entirely to allow for both wet and dry to be panned differently.

If the input is mono this control will pan the dry signal left or right. If the input is stereo the control adjusts the balance between left and right.

Ducking

Increase the **Amount** amount to reduce the delay audio level when there is incoming dry audio, the higher the setting the greater the wet level reduction. As the dry audio level drops, the delay output increases to full level as set by each delay line **Level** and the master **Delay Gain**. You can also use a separate sidechain input instead of the dry signal by connecting the sidechain input on the back, which over-rides the internal dry input. You can adjust the recovery time of the **Duck** compressor (10–400ms) using the **Speed** control. For near-instant recovery of delay output level as dry signal level drops, set this to a low value; to fade the delay back in gradually as the dry signal level drops, set this to a high value. The **Duck Speed** is also applied if you are using external **Sidechain In** to trigger the compressor instead of the dry signal.

Steer

All alone on a page of its own, the Steer knob is a massively bipolar control that adjusts the delay times of all six channels simultaneously, up to 16 times slower or faster. Use it for strange speed-up/slow-down effects!

Delay Types

There are nine delay topologies available in *Steerpike 3*. The following section explains the application of each type.

One issue that can occur with delays, especially when using ping-pong, is the timing at which the first repeat is heard after the dry signal, i.e., one often finds it comes in too soon, but changing the delay time itself results in the wrong rhythm. Sometimes the solution can be to reverse the delay times of the two channels, or one could fiddle around trying to get an extra insert FX delay. Or, and for extra creative options, you could simply use *Steerpike*'s stereo serial types, II, VII, VIII or IX, to suspend ("predelay") the delayed signal by an extra fixed amount.

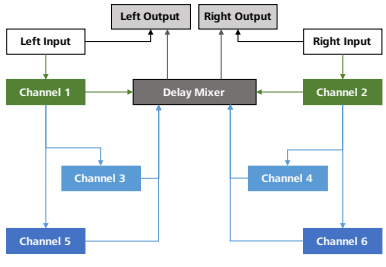
I. X-Stereo

Cross Stereo is *Steerpike*'s true stereo mode, and is the preferred option when using a stereo input. ***Cross Stereo*** is a Link mode: in this **Delay Type**, the left channel input is sent to Delay Lines 1, 3 and 5, and the right channel input is sent to delay lines 2, 4 and 6.

For "real" cross stereo, delay lines 1, 3 and 5 should be panned right, and Delay Lines 2, 4 and 6 panned left. You can of course pan the Delay Lines as you see fit and leave the output pan the same as the input. A mono input is sent to the delay line of each pair. The **Delay Type** selector text and the Link Lamps are green.

II. Serial X-Stereo → X-Stereo[1]

This type is a stereo mixed serial/parallel setup and provides an easy method to suspend the delayed output for a predetermined time using the first two channels.



Stereo audio is input only to Delay Lines 1 and 2 and then forwarded to the other pairs of Delay Lines at 100% level post-feedback loop after the original input delay time has elapsed. Channels 1 and 2 are also sent in parallel to the output. In this way you can delay the start of either or both left or right, and control whether or not you hear this first pair delays in the Output using the **Level** controls of 1 and 2. So for a true ***Serial Cross Stereo*** with a predelay, set Channels 1 and 2 **Level** to zero. And unless requiring an offset for creative purposes, set the delay times of Delay Lines 1 and 2 to match.

The **Delay Time**, **Delay Type** selector text and the Link Lamps are split between green for the cross stereo on Delay Lines 1 and 2, and blue for subsequent cross stereo on Delay Lines 3 and 4, and 5 and 6.

III. Parallel

Parallel uses a mono (left) input, or summed mono for stereo inputs. The mono or summed mono signal is sent to each Delay Line at the same time, processed separately, then mixed to a stereo output. The **Delay Time** and **Delay Type** selector text is white and the Link Lamps are unlit.

IV. Serial

Serial is a mono/summed mono setup can be used for extra long delay times, creating a single output of multiple mono delays. Each BBD output is still serial to its own monophonic Tap Out after the **Level** adjust, so you can get the current output state at any of five intermediate delay points. Each BBD also receives its own monophonic tap in, so audio can be added at any of the additional tap points.

Note that **Pan** is only applied in the final active BBD stage. You can use any number of Delay Lines, just remember that the final *active* channel is the one that is output to the Stereo Mixer. **Feedback**, however, is applied per channel.

1. For legacy compatibility purposes, automation tracks and Remote operation require that Serial Cross Stereo is last, in position 9. In the GUI selector, however, where it will usually be selected from, we felt it was better listed straight after Mode I.

As well as extra long delay times, Type IV is also useful when using a Delay Line with Reverse, as you can use the preceding—or subsequent—Delay Line to the one that's doing the reversing to add feedback. The **Delay Type** selector text is white, the **Delay Time** text is white for the first channel and light grey for the serial channels, while the Link Lamps are unlit.

V. Feedback

Feedback, like ***Serial*** can be used to extra long delay times, creating a single output of multiple mono delays. The difference here is that the output of the *last active* Delay Line in the chain is fed back to the input of the *first active* Delay Line. The Feedback Lamp will indicate which **Feedback** knob is currently active. The **Delay Type** selector text is white, while the **Delay Time** text is white for first channel and light grey for the serial channels. The Link Lamps are unlit.

VI. Ping-Pong

Ping-Pong is a Linked setup, so Delay Lines 1 and 2, 3 and 4, and 5 and 6 operate in pairs, but unlike ***Cross Stereo***, the input is always monophonic/summed mono, while the output is stereo (provided the Delay Line pair has opposing pans).

Ping-pong delays alternate two delay lines. For a *non-offset* delay, the **Delay Time** of each Delay Line in the pair must be the same. For example, if using a tempo sync delay, trying setting both Delay Line 1 and Delay Line 2 to 3/16 for a non-offset ping-pong. You will hear an even "bounce" between each Delay Line output. For an ***offset*** ping-pong set Delay Line 1 to 3/16 but Delay Line 2 to 1/16, and now the "bounce" is uneven, with the second delay sounding quickly after the first.

Note that the "left" Delay Line of each pair, that's 1, 3 and 5, is always processed first. Each Delay Line output is also sent to its own monophonic Tap Out. Only the left **Feedback** control is required, so the right **Feedback** knob is disabled, but note that when the left **Feedback** is at zero, *only* the left Delay Line output will be heard. *This is normal and expected behaviour*. So increase the **Feedback** of the left Delay Line channel to hear the ping-pong effect. One trick you may find useful to improve the balance in some situations if the "right" pong Channel level feels a little low in its first iteration, is actually to reduce the **Level** of the "left" ping channel, but increase the **Delay Gain** to compensate: you'll now find the first pong is more defined, at a similar level to the first ping.

The **Delay Type** selector text and the Link Lamps are pink.

VII. Serial Ping-Pong → Ping-Pong

This topology is a mixed serial/parallel setup, the ping-pong equivalent to Type II. It's a useful option particularly if you need a parallel ping-pong signal from Channels 1 and 2 mixed into the output, otherwise you may find it easier to use Type IX and just have the ping-pong in serial from a straight stereo predelay.

Summed audio is input only to Delay Lines 1 and 2 and then forwarded to the other pairs of Delay Lines at 100% level post-feedback loop after the original input delay time has elapsed. Channels 1 and 2 are also sent in parallel to the output, so can be adjusted with those channels' controls. For a true Serial Ping-Pong, set Channels 1 and 2 **Level** to zero. Unless requiring an offset, set the delay times of Delay Lines 1 and 2 to match, although remember this is ping-pong, so the output is still alternating across two channels. Depending on pan positions, results where a channel output is "missing" is can occur.

The **Delay Time**, **Delay Type** selector text and the Link Lamps are split between pink, for the original ping-pong on Delay Lines 1 and 2, and orange for the serial ping-pong on Delay Lines 3 and 4, and 5 and 6.

VIII. Serial Ping-Pong → X-Stereo

Type VIII is a mixed serial/parallel setup. It's a useful option if you need want to add a cross stereo delay to a ping-pong. As before you can add the original ping-pong delay from Channels 1 and 2 into the output, or leave it silent to act just as a predelay.

Summed audio is input only to Delay Lines 1 and 2 and then forwarded to the other pairs of Delay Lines at 100% level post-feedback loop after the original input delay time has elapsed. Channels 1 and 2 are also sent in parallel to the output, so can

be adjusted with those channels' controls. Unless requiring an offset, set the delay times of Delay Lines 1 and 2 to match, although again, the output is still alternating across two channels.

The **Delay Time**, **Delay Type** selector text and the Link Lamps are split between pink, for the original ping-pong on Delay Lines 1 and 2, and blue for the serial cross-stereo on Delay Lines 3 and 4, and 5 and 6.

IX. Serial X-Stereo → Ping-Pong

This topology is the inverse of Type VIII, providing a mixable ***Cross Stereo to Ping-Pong***, and is likely the preferred choice for delaying a ping-pong to improve the initial timing, as the input remains stereo.

Delay Lines 1 and 2 are cross stereo, and audio is input into this pair first and sent to the output (which can be adjusted with those channels **Level** controls) and also, post-feedback loop, to the remaining Delay Lines at 100% level, in their stereo pairs, which operate in ping-pong. In this way you can delay the start of either, or both, channels in the ping-pong, and control whether you hear the first cross stereo delays in the Output using the **Level** controls of 1 and 2.

The **Delay Time**, **Delay Type** selector text and Link Lamps are split between green, for the cross stereo on Delay Lines 1 and 2, and orange for ping-pong on Delay Lines 3 and 4, and 5 and 6.

In this example, the {03 Suspended Ping-Pong 3-16} starter patch in the Browser root folder for *Steerpike 3* has been shown. The ping-pong on channels 3 and 4 are set to a classic 1/8 and 3/16. If we just played two channels alone in ***Ping-Pong***, the first delay, depending on context, might be considered to come in too early for a suspended shuffle effect. Here we've used this ***Serial Cross Stereo to Ping-Pong*** type and set up both channels 1 and 2 with a 3/16 delay. This is then sent to 3+4, and provides a nice pause before the ping-pong is actually triggered at the correct rhythm.

By increasing channel 2 (as that has the correct pan position for this to work) to 100% **Level**, that initial hit is can be heard to, providing an easily automatable method of switching between suspended and the non-suspended forms. And try offsetting the values of the delay times of channels 1 and 2! In this example, set channel 2 to 8/16 and see how that changes the ping-pong down the line.

By now you'll surely have noticed how the various channel topologies are colour-coded. Essentially, you can consider it as:

Green	= Direct mono/stereo channel input
Blue	= Serial mono/stereo channel
White	= Direct mono/summed mono channel input
Grey	= Mono serial channel
Pink	= Direct mono/summed mono input to stereo ping-pong channels
Orange	= Serial stereo ping-pong channels

That is, *direct* stereo channels take their input from the Audio Input jacks, while *serial* stereo channels take their input from Channels 1 and 2, while for the mono serial types, IV and V, it's the first active channel gets the external mono/summed mono input, highlighted in white, and subsequent active channels are shown in light grey, taking their input from the preceding active channel.

Back Panel Connections

On the right are the main input/output jacks and an audio sidechain input, which overrides the dry signal level into the ducking compressor, allowing you to use a different signal (e.g. a kick drum) for the delay line ducking. Use the **Duck** knob on the front to adjust the intensity of the compression in the same way you would use the main dry input to duck the delay level. On the left are CV inputs for Clock Rate (BBD mode only), a CV trigger for the **Gate** button, and Steer control modulation. The **Env Gate** CV input will trigger all six channels and the filter envelopes simultaneously, when **CV Gate** is selected on the front (via the Envelope Edit page).

Each Delay Line features monophonic tap in and tap out audio jacks, as well as external CV inputs for envelope triggering, and modulation. The Gate/Env In row override the internal envelope on a per channel basis. Whether "global" or per channel, remember to set **CV Gate** or **CV Env** on the front as appropriate: **CV Gate** takes just the gate input and triggers the delay according to the internal envelope, while **CV Env** triggers the delay using an external envelope. Also available per channel is a Mod LFO input: this overrides the internal LFOs to that particular channel. The **Mod** and **Env** knobs on the front can be used as normal to adjust the external inputs amount. Delay Time, Feedback, Level and Pan round out the channel CV ins.

Finally, there are CV outputs for the Mod LFOs if you wish to modulate other properties in the delay channel, or other devices with the same LFO values.

BBD Delay Times

Clock Rate kHz	BBD Stages									
	2	10	50	256	512	1024	2048	4096	8193	16384
	ms	ms	ms	ms	ms	ms	ms	ms	ms	ms
1.5	0.6667	3.333	16.667	85.3	170.7	341.3	682.7	1,365.3	2,731.0	5,462.0
2	0.5000	2.500	12.500	64.0	128.0	256.0	512.0	1,024.0	2,048.3	4,096.5
3	0.3333	1.667	8.333	42.7	85.3	170.7	341.3	682.7	1,365.5	2,731.0
4	0.2500	1.250	6.250	32.0	64.0	128.0	256.0	512.0	1,024.1	2,048.3
5	0.2000	1.000	5.000	25.6	51.2	102.4	204.8	409.6	819.3	1,638.6
6	0.1667	0.833	4.167	21.3	42.7	85.3	170.7	341.3	682.8	1,365.5
7	0.1429	0.714	3.571	18.3	36.6	73.1	146.3	292.6	585.2	1,170.4
8	0.1250	0.625	3.125	16.0	32.0	64.0	128.0	256.0	512.1	1,024.1
9	0.1111	0.556	2.778	14.2	28.4	56.9	113.8	227.6	455.2	910.3
10	0.1000	0.500	2.500	12.8	**25.6**	51.2	102.4	204.8	409.7	819.3
11	0.0909	0.455	2.273	11.6	23.3	46.5	93.1	186.2	372.4	744.8
12	0.0833	0.417	2.083	10.7	21.3	42.7	85.3	170.7	341.4	682.8
13	0.0769	0.385	1.923	9.8	19.7	39.4	78.8	157.5	315.1	630.2
14	0.0714	0.357	1.786	9.1	18.3	36.6	73.1	146.3	292.6	585.2
15	0.0667	0.333	1.667	8.5	17.1	34.1	68.3	136.5	273.1	546.2
16	0.0625	0.313	1.563	8.0	16.0	32.0	64.0	128.0	256.0	512.1
17	0.0588	0.294	1.471	7.5	15.1	30.1	60.2	120.5	241.0	481.9
18	0.0556	0.278	1.389	7.1	14.2	28.4	56.9	113.8	227.6	455.2
19	0.0526	0.263	1.316	6.7	13.5	26.9	53.9	107.8	215.6	431.2
20	0.0500	0.250	1.250	6.4	12.8	25.6	51.2	102.4	204.8	409.7
25	0.0400	0.200	1.000	5.1	10.2	20.5	41.0	81.9	163.9	327.7
30	0.0333	0.167	0.833	4.3	8.5	17.1	34.1	68.3	136.6	273.1
35	0.0286	0.143	0.714	3.7	7.3	14.6	29.3	58.5	117.0	234.1
40	0.0250	0.125	0.625	3.2	**6.4**	12.8	25.6	51.2	102.4	204.8
45	0.0222	0.111	0.556	2.8	5.7	11.4	22.8	45.5	91.0	182.1
50	0.0200	0.100	0.500	2.6	5.1	10.2	20.5	41.0	81.9	163.9
55	0.0182	0.091	0.455	2.3	4.7	9.3	18.6	37.2	74.5	149.0
60	0.0167	0.083	0.417	2.1	4.3	8.5	17.1	34.1	68.3	136.6
65	0.0154	0.077	0.385	2.0	3.9	7.9	15.8	31.5	63.0	126.0
70	0.0143	0.071	0.357	1.8	3.7	7.3	14.6	29.3	58.5	117.0
75	0.0133	0.067	0.333	1.7	3.4	6.8	13.7	27.3	54.6	109.2
80	0.0125	0.063	0.313	1.6	3.2	6.4	12.8	25.6	51.2	102.4
95	0.0105	0.053	0.263	1.3	2.7	5.4	10.8	21.6	43.1	86.2
96	0.0104	0.052	0.260	1.3	2.7	5.3	10.7	21.3	42.7	85.3
100	0.0100	0.050	0.250	1.3	2.6	5.1	10.2	20.5	41.0	81.9

Remote Mapping

```
//Remote Map template for | Effects | Jiggery-Pokery Sound: Steerpike BBD Delay Ensemble
Scope   Jiggery Pokery     com.jiggerypokery.Steerpike
//      Control Surface Item        KeyRemotable Item       Scale      Mode
Map     _control_           Delay Mode
Map     _control_           Delay Line Gate
Map     _control_           Clock Rate
Map     _control_           BBD Enable

Map     _control_           Dry/Wet
Map     _control_           Steer
Map     _control_           BBD Mixer Gain
Map     _control_           Dry Signal Pan
Map     _control_           Delay Ducking
Map     _control_           Duck Speed
Map     _control_           Tap Flow

Map     _control_           Modulation Shape
Map     _control_           LFO Phase Offset
Map     _control_           Slow LFO Rate
Map     _control_           Fast LFO Rate
Map     _control_           Modulation 2 Shape
Map     _control_           LFO 2 Tempo Sync
Map     _control_           LFO 2 Hz Rate
Map     _control_           LFO 2 Sync Rate
Map     _control_           LFO 3 Rate
Map     _control_           Delay Mod Source
Map     _control_           Filter Mod Source
Map     _control_           Reverb Mod Source

Map     _control_           BBD1 Enable
Map     _control_           BBD1 Reverse Enable
Map     _control_           BBD1 Delay Time Mode
Map     _control_           BBD1 Stages
Map     _control_           BBD1 Time
Map     _control_           BBD1 Sync Duration
Map     _control_           BBD1 Sync Subdivision
Map     _control_           BBD1 Level
Map     _control_           BBD1 Pan
Map     _control_           BBD1 Feedback
Map     _control_           BBD1 THD
Map     _control_           BBD1 Tap Level In
Map     _control_           BBD1 Breakout Level In
Map     _control_           BBD1 Modulation Depth
Map     _control_           BBD1 Envelope
Map     _control_           BBD1 FX Filter Enable
Map     _control_           BBD1 EQ Enable
```

cont'd

Map	_control_	BBD2 Enable
Map	_control_	BBD2 Reverse Enable
Map	_control_	BBD2 Delay Time Mode
Map	_control_	BBD2 Stages
Map	_control_	BBD2 Time
Map	_control_	BBD2 Sync Duration
Map	_control_	BBD2 Sync Subdivision
Map	_control_	BBD2 Level
Map	_control_	BBD2 Pan
Map	_control_	BBD2 Feedback
Map	_control_	BBD2 THD
Map	_control_	BBD2 Tap Level In
Map	_control_	BBD2 Breakout Level In
Map	_control_	BBD2 Modulation Depth
Map	_control_	BBD2 Envelope
Map	_control_	BBD2 FX Filter Enable
Map	_control_	BBD2 EQ Enable
Map	_control_	BBD3 Enable
Map	_control_	BBD3 Reverse Enable
Map	_control_	BBD3 Delay Time Mode
Map	_control_	BBD3 Stages
Map	_control_	BBD3 Time
Map	_control_	BBD3 Sync Duration
Map	_control_	BBD3 Sync Subdivision
Map	_control_	BBD3 Level
Map	_control_	BBD3 Pan
Map	_control_	BBD3 Feedback
Map	_control_	BBD3 THD
Map	_control_	BBD3 Tap Level In
Map	_control_	BBD3 Breakout Level In
Map	_control_	BBD3 Modulation Depth
Map	_control_	BBD3 Envelope
Map	_control_	BBD3 FX Filter Enable
Map	_control_	BBD3 EQ Enable
Map	_control_	BBD4 Enable
Map	_control_	BBD4 Reverse Enable
Map	_control_	BBD4 Delay Time Mode
Map	_control_	BBD4 Stages
Map	_control_	BBD4 Time
Map	_control_	BBD4 Sync Duration
Map	_control_	BBD4 Sync Subdivision
Map	_control_	BBD4 Level
Map	_control_	BBD4 Pan
Map	_control_	BBD4 Feedback
Map	_control_	BBD4 THD
Map	_control_	BBD4 Tap Level In
Map	_control_	BBD4 Breakout Level In
Map	_control_	BBD4 Modulation Depth
Map	_control_	BBD4 Envelope
Map	_control_	BBD4 FX Filter Enable
Map	_control_	BBD4 EQ Enable
Map	_control_	BBD5 Enable
Map	_control_	BBD5 Reverse Enable
Map	_control_	BBD5 Delay Time Mode
Map	_control_	BBD5 Stages
Map	_control_	BBD5 Time
Map	_control_	BBD5 Sync Duration
Map	_control_	BBD5 Sync Subdivision
Map	_control_	BBD5 Level
Map	_control_	BBD5 Pan
Map	_control_	BBD5 Feedback
Map	_control_	BBD5 THD
Map	_control_	BBD5 Tap Level In
Map	_control_	BBD5 Breakout Level In
Map	_control_	BBD5 Modulation Depth
Map	_control_	BBD5 Envelope
Map	_control_	BBD5 FX Filter Enable
Map	_control_	BBD5 EQ Enable
Map	_control_	BBD6 Enable
Map	_control_	BBD6 Reverse Enable
Map	_control_	BBD6 Delay Time Mode
Map	_control_	BBD6 Stages
Map	_control_	BBD6 Time
Map	_control_	BBD6 Sync Duration
Map	_control_	BBD6 Sync Subdivision
Map	_control_	BBD6 Level
Map	_control_	BBD6 Pan
Map	_control_	BBD6 Feedback
Map	_control_	BBD6 THD
Map	_control_	BBD6 Tap Level In
Map	_control_	BBD6 Breakout Level In
Map	_control_	BBD6 Modulation Depth
Map	_control_	BBD6 Envelope
Map	_control_	BBD6 FX Filter Enable
Map	_control_	BBD6 EQ Enable

cont'd

```
Map   _control_   Envelope Page Edit
Map   _control_   Envelope Loop
Map   _control_   Envelope Tempo Sync
Map   _control_   Envelope Delay ms
Map   _control_   Envelope Attack ms
Map   _control_   Envelope Hold ms
Map   _control_   Envelope Decay ms
Map   _control_   Envelope Release ms
Map   _control_   Envelope Delay Tempo Sync
Map   _control_   Envelope Attack Tempo Sync
Map   _control_   Envelope Hold Tempo Sync
Map   _control_   Envelope Decay Tempo Sync
Map   _control_   Envelope Release Tempo Sync
Map   _control_   Envelope Sustain
Map   _control_   CV Trigger Mode

Map   _control_   FX Page Select
Map   _control_   FX Filter Enable
Map   _control_   FX Filter Type
Map   _control_   FX Filter Frequency
Map   _control_   FX Filter Frequency Mod
Map   _control_   FX Filter Q
Map   _control_   FX Filter Q Mod
Map   _control_   FX Filter Drive
Map   _control_   FX Filter Flow
Map   _control_   FX Filter Envelope

Map   _control_   Reverb Enable
Map   _control_   Reverb Predelay
Map   _control_   Reverb Decay
Map   _control_   Reverb Mod
Map   _control_   Reverb Damp
Map   _control_   Reverb Level
Map   _control_   Reverb Flow

Map   _control_   HPF Frequency
Map   _control_   LPF Frequency
Map   _control_   EQ1 Frequency
Map   _control_   EQ2 Frequency
Map   _control_   EQ3 Frequency
Map   _control_   EQ1 Gain
Map   _control_   EQ2 Gain
Map   _control_   EQ3 Gain

Map   _control_   Compressor
Map   _control_   Compressor Threshold
Map   _control_   Compressor Ratio
Map   _control_   Compressor Attack
Map   _control_   Compressor Release
Map   _control_   Bass Boost

//notifications
Map   _control_   Signal Level Notification

Map   _control_   Link Lamp 1+2 Notification
Map   _control_   Link Lamp 3+4 Notification
Map   _control_   Link Lamp 5+6 Notification

Map   _control_   BBD1 Memory Overload Notification
Map   _control_   BBD2 Memory Overload Notification
Map   _control_   BBD3 Memory Overload Notification
Map   _control_   BBD4 Memory Overload Notification
Map   _control_   BBD5 Memory Overload Notification
Map   _control_   BBD6 Memory Overload Notification

Map   _control_   BBD1 Amp Envelope Trigger Notification
Map   _control_   BBD2 Amp Envelope Trigger Notification
Map   _control_   BBD3 Amp Envelope Trigger Notification
Map   _control_   BBD4 Amp Envelope Trigger Notification
Map   _control_   BBD5 Amp Envelope Trigger Notification
Map   _control_   BBD6 Amp Envelope Trigger Notification

Map   _control_   BBD1 Reverse Trigger Notification
Map   _control_   BBD2 Reverse Trigger Notification
Map   _control_   BBD3 Reverse Trigger Notification
Map   _control_   BBD4 Reverse Trigger Notification
Map   _control_   BBD5 Reverse Trigger Notification
Map   _control_   BBD6 Reverse Trigger Notification

Map   _control_   BBD1 Feedback Active Notification
Map   _control_   BBD2 Feedback Active Notification
Map   _control_   BBD3 Feedback Active Notification
Map   _control_   BBD4 Feedback Active Notification
Map   _control_   BBD5 Feedback Active Notification
Map   _control_   BBD6 Feedback Active Notification

Map   _control_   Filter Envelope Trigger Notification
Map   _control_   LFO 2 Phase Reset Notification
```

Steerpike version history

3.0.0

- **New delay modes: "Serial Cross Stereo", "Serial Ping-Pong", "Serial Ping-Pong to Cross Stereo" and "Serial Cross Stereo to Ping-Pong", a suite of mixed serial+parallel modes, providing an easy method to suspend the delayed output for a predetermined time, or for further creative delay rhythm programming effects. It also provides, for the first time, a native way to have reverse delays with stereo feedback**
- **New: Tap position can now be switched to a true Breakout insert mode instead of back into the feedback loop** (please note Breakout is now the default mode; turn it off to re-enable the old-style feedback-loop tap mode for any existing tracks and patches)
- **New: added a resonant FX Filter with an envelope-trigger for special effects. It features adjustable positioning in the signal chain: either within individual feedback loops, on the input into the delay lines or on the output from the delay lines**
- **New: Added FX Drive to provide an alternative and more aggressive distortion model**
- **New: Added FX Reverb, which can be applied on the input into the delay lines, or on the output**
- **New: Two additional wide-frequency modulation LFOs are available: LFO 2 can modulate the FX Filter or the delay time with a choice of six waveforms, and can be tempo synced, with phase reset, while the sine-only LFO 3 can modulate the Reverb.**
- **The original dual-LFO can now modulate the delay time or the FX Filter**
- **Deprecated the "Subdivision" Tempo Sync button from the GUI, which was made redundant by the display format change in version 2.1; Tempo Sync is now simply one button** (NB: old patches or song instances may show no selector button lit if the deprecated button was the stored value at the time of saving, but internally Sync is still selected as the value itself remains under-the-hood, so this removal will not affect any existing tracks or patches, but it does make the GUI selector much neater. If the lack of a lit button really bothers you, just press "Sync"!)
- **Channel value displays now grey out when the channel is not active, and recolour according to the delay mode operation of the channel**
- **Fixed: EQ gain controls are now surrounded by the correct decals**
- **Fixed: Feedback lamps should now operate correctly when using Feedback Mode, and in subsequently switching to other modes**
- **Channel Level knobs are now zero-snap to improve zero-levelling in the new serial modes. All other invertible knobs remain snap-free**
- **The EQ High-Pass Filter (HPF) default is now 80Hz rather than 8Hz**
- **Remote™ list now includes all notification lamps**
- **150 new patches, with a re-organised folder structure**

2.1.0

- **Delay time selector displays updated to use custom displays; tempo sync mode can now display both duration and subdivision on the same screen for improved usability**

2.0.0

- **Beautiful new design by esselfortium**
- **Bass Boost, Compressor and Duck Speed controls are now available on the front panel, and automatable/Remote™-able**
- **Bug fixes**

1.0.1

- **Fixed error in compressor threshold**

1.0.0

- **Initial release**

Special thanks to the Steerpike *testing and patch crew.*

Steerpike BBD Delay Ensemble was designed and assembled by Jiggery-Pokery Sound, of London, England; DSP coding by Pitchblende Ltd, of Middle Earth.

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- **Ammo 1200BR Modulation Synthesizer** - Advanced 4-channel LFO generator and audio synthesizer adds S&H, Comparator and Electro-Switch
- **Anansi Mid/Side Mastering Router** - Mid/side audio router with mono compatibility check, 3-in merger and 3-out splitter
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- **JPS Harmonic Synthesizer** - Vintage additive synthesizer emulation, based on the ultra-rare RMI keyboard
- **Lolth CV Delay Splitter** - 4x4 channel cv splitter with independently adjustable gain and inversion controls, channel delay, and mirroring
- **Miranda CV Delay Merger** - 4x4 channel cv merger with independently adjustable gain and inversion controls, channel delay, and mirroring
- **Mordred Audio Bypass Merger** - 4 x 5 channel stereo audio merger with independently switch-able outputs and auto-fade control
- **Shelob Audio Bypass Splitter** - 4 x 5 channel stereo audio splitter with independently switch-able outputs, mirroring, and auto-fade control
- **Steerpike BBD Delay Ensemble** - Vintage style 6-tap BBD device, with multiple delay types including parallel, serial, and reverse
- **Titus BBD Delay Line** - A lightweight 1U delay device featuring a single Steerpike delay line, with reverse

ReFills

- **Guitars vol.1+2: Stratocaster & Telecaster** - Multi-sampled guitars with slides, mutes, signature L6 effects and keyswitching
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- **Moog Taurus Bass Synthesizer** v1.1**

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