Full Thickness Tear

What is it?

Full Thickness Tear is a flanger. Actually, it's four flangers. Inspired by a program on the Sony DPS-M7 from the early 90s, ideas and experimentation eventually evolved into this tweaker's dream (or nightmare). Flangers are fickle beasts. A bedlam of flangers (that's what a group of flangers is called in the wild) is even harder to tame. But hard work is often (or at least sometimes) rewarded. Off we go!

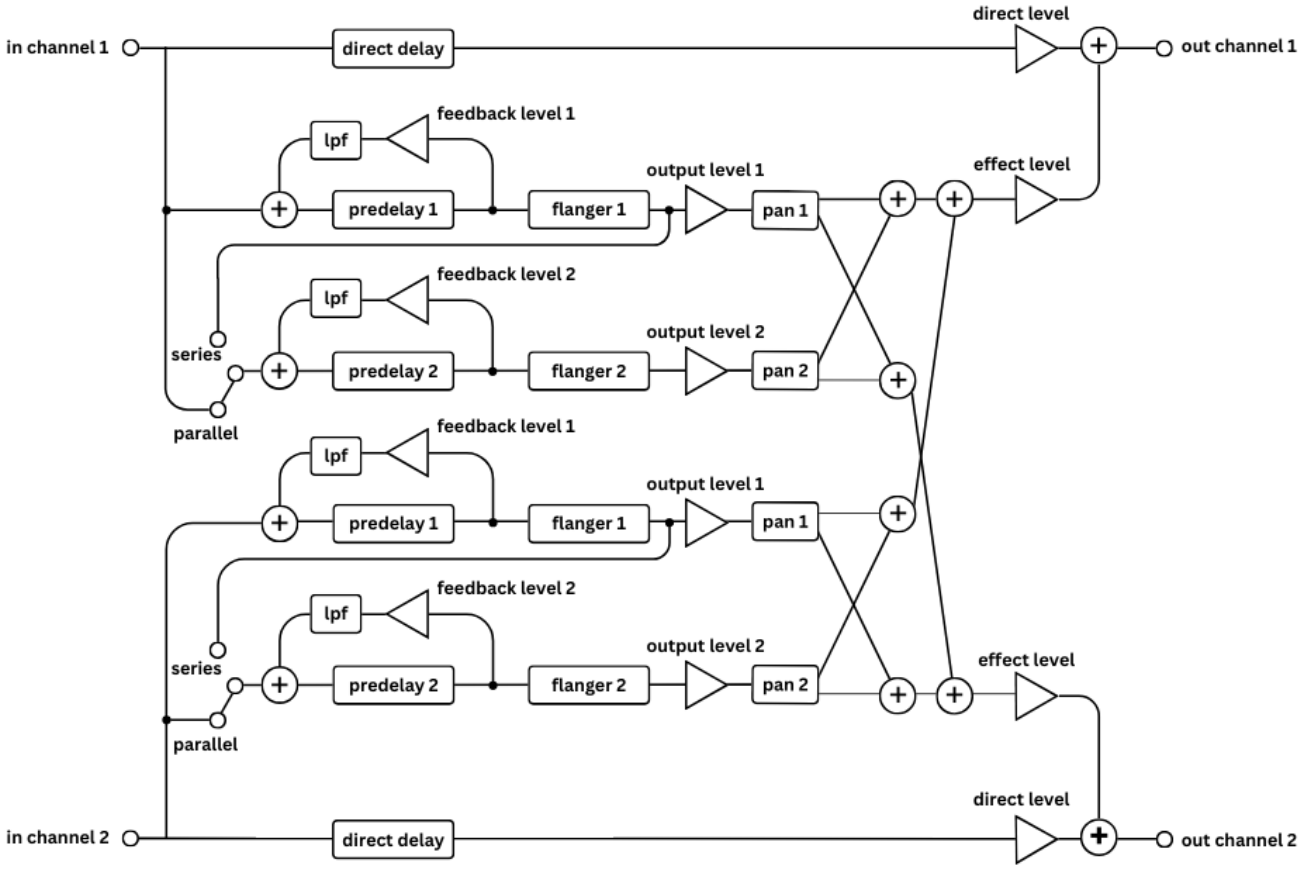
A Very Brief Explanation of Flangers

In case you aren't familiar with the innards of a flanger, they typically work by copying a signal and feeding it to a short delay whose delay time is modulated by an LFO. When this signal and the original are mixed, we have achieved flange!

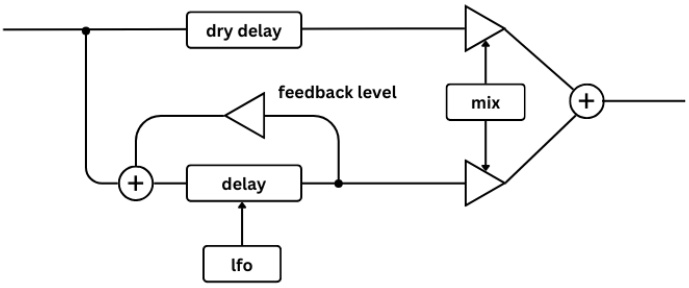
Inputs and Outputs

There are two input channels, each routing to two flangers. Each of the four flangers can send its output to one or both of two output channels. Use the channels as mono, stereo, or whatever you like. It's up to you.

Block Diagrams



Individual Flanger



Controls

The controls are divided into sections. The knobs, switches, and buttons along the left side operate on the individual flangers. Immediately to the right of each set of knobs is a set of modulation inputs and controls. Directly under the modulation section are inputs to reset internal LFOs and/or use external LFOs. The section of controls on the right side is mostly about signal path. Finally, the switches in the bottom right corner are overall settings changing how panning and mixing behave.

Flanger controls

Rate

> The frequency of the LFO modulating the delay time.

Depth

> The number of ms the modulated delay can travel. The max delay time is depth + manual.

Manual

> The minimum delay time in ms. Unlike many analog flangers, the lowest delay time is on the left instead of the right. Why do they do that anyway?

Feedback (Fdbk)

> The amount of modulated signal fed back into the delay.

Phase

> The phase offset of the modulating LFO in degrees.

Mix

> The amount of wet and dry signal in the output. For different mixing modes, see the Settings section.

Level

> The amount of mixed signal that is available to the output.

Pan

> The amount of output sent to channel 1 and channel 2. For different panning modes, see the Settings section below.

Dry Delay (Dry Dly)

> The amount of delay for the dry signal when summing with the wet. Useful for creating a through-zero effect without the use of time travel.

Shape

The shape of the modulating LFO. Either triangle (left) or sine (right).

Invert Wet

When activated, the wet (modulated) signal has its polarity inverted. When added to the dry signal, this results in subtractive flanging.

Invert Feedback

When activated, the signal is inverted before being fed back into the delay.

Modulation

The jacks to the right of the associated control allow for modulation of the set value. A range of [-5, 5] is expected for the input, with either side of 0 representing the full range of the control as either a positive or negative value. The knob next to the modulation jack sets the strength of modulation. Straight up is no modulation, all the way to the right uses the full value at the input jack, all the way to the left uses the negative of the full value, and the in-betweens follow accordingly.

Reset LFOs

A short pulse >= +5 or a button press causes the LFOs modulating the delays of all four flangers to reset together. If the rates are the same or mathematically related, this could be useful for syncing up the LFOs after modifying their rates.

Note that custom LFOs cannot make use of this functionality and will have to be reset at their source.

Custom LFOs

If you want something other than a triangle or sine wave to modulate the delay times, the custom inputs allow any signal to become the LFO for the associated flanger. By default, the input is expected to be in the range [0, +5] to represent the entire sweep of the delay time. For example, +5 would indicate the maximum delay time of manual + depth while 0 would represent the minimum of just manual. The range can be changed to [-5, +5] via the Range switch if that is more convenient.

Note that the Rate and Phase knobs have no effect on custom waveforms, as the frequency and phase are explicit in the waveform itself.

Signal path controls

Pre-Delay

The delay time of the input signal before feeding to a flanger.

Feedback Amount (Fdbk Amt)

The feedback for the pre-delay.

Feedback Lowpass Filter (Fdbk LPF)

The cutoff frequency for a lowpass filter in the feedback loop or all the way right to bypass.

Parallel/Series (P/S)

When in parallel mode (switched to the left), the two flangers for that channel each operate independently on the same input with each output being part of the overall output as determined by the other knobs, such as level, pan, etc. When in series mode, the output of the first flanger in a channel becomes the input to the second flanger in the channel with only the output of the second flanger contributing to the overall output.

Direct Delay

The delay time of the unmodified signal before being mixed into the output. If the direct level is 0, this has no effect.

Direct Level

The amount of unmodified signal that reaches the output.

Effect Level

The amount of modified signal that reaches the output.

unlabeled buttons immediately following Direct/Effect Level

When activated, the polarity of the associated signal is inverted.

Settings

Pan Mode

The specific math behind the Pan knobs can be set to your liking (assuming you like one of the three options). The range of x is [0, 1], with the knob fully left being 0 and the knob fully right being 1. The result is a signal multiplier from 0 (no signal) to 1 (full signal).

Sine law (default)

channel 1: $\sin\left((1-x)*\frac{\pi}{2}\right)$ channel 2: $\sin\left(x*\frac{\pi}{2}\right)$

Square law

channel 1: $\sqrt{1-x}$ channel 2: $\sqrt{x}$

Linear

channel 1: $1-x$ channel 2: x

Mix Mode

The details of how mix knobs work can be a heated topic of debate (in certain very specific circles anyway). Here are some options. (See Pan Mode for details on range of x and such.)

Transition (default)

Straight up is 100% of both dry and wet. As you turn to the right, less and less dry is added until the signal is fully wet. Similarly, as you turn to the left less and less wet signal is present until it reaches 0% wet/100% dry.

Sine law

dry: $\sin\left((1-x)*\frac{\pi}{2}\right)$ wet: $\sin\left(x*\frac{\pi}{2}\right)$

Linear

dry: $1-x$ wet: x

Some comments on usage

Don't feel compelled to use all four flangers. Maybe all flangers going at once is sublime. Maybe it's a mess. Sometimes one, or one per channel, is all you need.

By default, the flangers are all additive, where the modulated signal is added to the dry signal. For subtractive flanging, invert the polarity of the wet signal (Invert Wet toggle), effectively subtracting the modulated signal since the sign is now reversed. Inverting the polarity of the feedback (Invert Fdbk toggle) can be done with either mode.

Through-zero flanging is where the delayed signal (wet) meets and then passes in front of the undelayed (dry) signal. Since we haven't yet perfected time travel, one way to achieve this is by giving the dry signal a short delay (Dry Dly knob) and setting the minimum delay (Manual knob) to an even shorter delay. Or make the delays equal so the signals meet but don't cross (should this be called to-zero flanging?). You might try modulating the dry delay and/or minimum delay to add some interesting movement. Phase cancellation occurs if the signals are of inverse polarity, so invert the wet signal and hear the output get pulled into oblivion. Full cancellation only happens if the signals are identical other than polarity, so avoid feedback if you want full cancellation. Or try partial cancellation for a different vibe. Or don't invert the polarity at all.

Setting Depth to 0 and turning the Manual knob by hand (or automating the knob or modulating the value) is a way to override the internal LFOs handling delay modulation and go your own way. Using custom LFOs is another way.

There are multiple ways to control the mix. By default, the overall Direct Level is all the way down and the Effect Level is all the way up. This allows you to control the dry/wet ratios via the Mix knob of each flanger. Or you could turn the Mix knob of the flangers to all wet and use the channel Direct Level and Effect Level knobs to dial in the sound you are after, treating each flanger more as a voice than an individual unit. You can also control the output level and channel spread of each flanger, further affecting the final mix.

Phase offset can do interesting things when you have multiple flangers running at the same (or mathematically related) rates (and starting together – see next tip). Two otherwise identical flangers except for one having a 90 degree phase offset can widen a mono sound when each flanger is sent to a different output channel representing left and right. Or use a 180 degree offset to have two flangers travelling in opposite directions. Or modulate phase for some extra swooshiness. Let your imagination and your ear be your guide.

Don't forget to reset the LFOs so they start together after changing their rate if you are going for predictable, repeatable modulation between the flangers.

The delay times reach past what is typically called flanging. Sometimes flangers make good choruses.

For vibrato, set the minimum delay to 0 and the mix to all wet.

Most importantly, experiment and have fun!

Final thoughts

There is a lot going on with this thing. Too much? Maybe. Suggestions, comments, and criticisms are always appreciated. Feel free to post in my Cherry Audio forum if the mood strikes. As always…

Thank you!

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