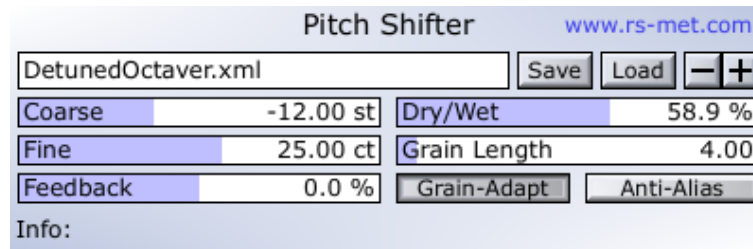


## Pitch Shifter - User Manual



### What is Pitch Shifter?

Pitch Shifter is a plugIn to shift the pitch of an incoming audio signal. By mixing the pitch shifted signal with the original signal via the dry/wet control, basic detuning, octaving and harmonizing effects are also possible. This shifter is based on a delayline with two crossfaded read pointers (as a metaphor from the analog world, think of a loop of tape with one recording head and two play heads mounted on a rotating head drum). Such an architecture allows for feedback - and feedback gives the potential to rather drastic, weird special effects like monster-voices, flanger-like effects and more.

### The Parameters

**Coarse:** Controls the pitch shifting amount coarsely in semitones.

**Fine:** Fine tunes the amount of pitch shifting in cents.

**Feedback:** The output of the pitch shifter is a delayed copy of a segment of the input signal, played back at a different speed - so it is 1.: delayed, 2.: pitch shifted. When such an output is fed back to the input, further delayed and further shifted copies come about, leading to weird effects like mentioned above. The feedback control determines the amount of feedback in percent.

**Dry/Wet:** Controls the ratio between the 'dry' (original) and 'wet' (effected) signal.

**Grain Length:** The unavoidable segmentation of the incoming signal into small pieces, called 'grains', introduces some artifacts - adjusting the grain lengths can therefore help to minimize (or optimize in some musical sense) those artifacts for the material at hand.

**Grain-Adapt:** For long grain lengths (above 50 ms or so), the artifacts from the granulation are barely audible, but when the grain lengths come into the range of audible pitch-periods (below 50 ms, corresponding to 20 Hz), they introduce some kind of audible side-bands in spectrum of the output signal. The harmonic relationship (or disharmonic non-relationship) between the signal and the artifacts depends on the ratio of the pitch period of the incoming signal and the length of the grains. Therefore, it is musically quite meaningful to adjust the grain length not as absolute time values but as some multiple of the pitch period. This is, what the grain adaption serves for: when switched on, you adjust the grain-length in units

of multiples of the pitch period rather than in milliseconds. This means that, under the hood, some pitch detection algorithm is running which continuously estimates the pitch of the incoming signal and adjusts the grain length accordingly. For this feature to work properly, the input signal should be some pitched, monophonic signal.

**Anti-Alias:** Pitch shifting is merely a scaling of all the frequencies which make up the signal. That's why shifting the pitch upwards may, in general, introduce aliasing (see the 'Digital Signals'-tutorial on the rs-met website for some details on this subject). This can effectively be suppressed by lowpass filtering the signal before shifting it up - the Anti-Alias button does just that. It is recommended to be used only for significant upward shifts - downward shifts do not introduce any aliasing at all and small upward shifts only an inaudible amount in the highest frequency range.

have much fun in making music, Robin