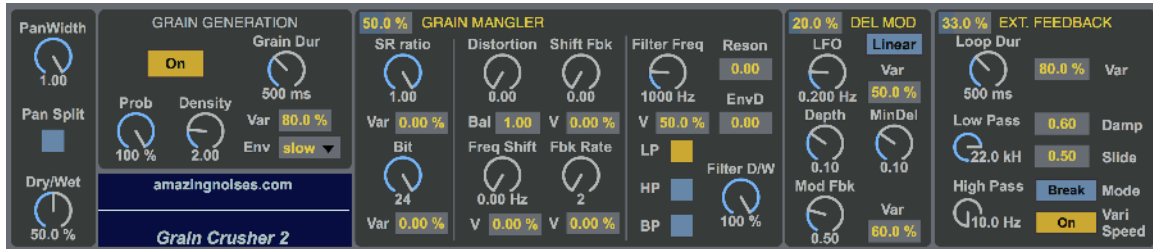# Grain Crusher 2

Grain Crusher 2 is a Max for Live device which performs "Extreme Grain Manipulation". It is a noise and glitch FSU audio effect: you can get a lot of strange and unique sounds from its 3 processing modules: the Delay Modulator, the Grain Mangler and the External Feedback Loop.

Grain Crusher 2 runs on **Ableton Live 9.6** (or newer) with **Max for Live (Max 7.2)**. Please note that you need both Ableton Live and Max for Live to use this device.
It is compatible with both Mac and Windows platforms.

Grain Crusher 2 parameters:

The device interface is divided in 5 sections: Input/Output, Grain Generation, Grain Mangler, Delay Modulator and External Feedback Loop.
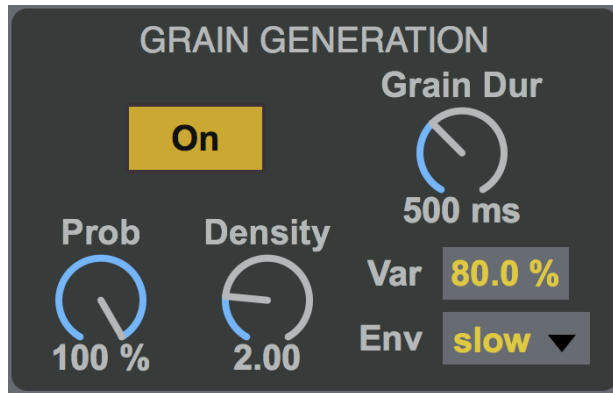
INPUT/OUTPUT
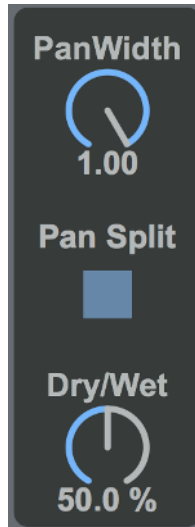
I/O PARAMETERS

PanWidth: sets the stereo spread of the grains.

Pan Split: when this switch is on the grains are panned only to the extreme right and left positions. Ho "extreme" they are depends on the PanWidth parameter.

Dry/Wet: sets the Dry-Wet balance.

GRAIN GENERATION

In this section you can activate and deactivate the grain generation, and set the grain density, duration and envelope.

PARAMETERS

**On/Off switch**: Start and stop grain generation.

Grain Dur: the duration of a single grain. The **Var** parameter below specifies a random variation of the duration (in this case each grain can be 0.5 seconds long ± 80%, i.e. any value from 0.1 to 0.9 seconds).

Prob: the probability a grain is generated.

Density: sets the average number of simultaneous grains produced.

Env: the shape of the grain envelope: *perc* is a percussive envelope with exponential decay, *slow* is a sinusoidal envelope, *and rev* is the percussive envelope reversed.

GRAIN MANGLER
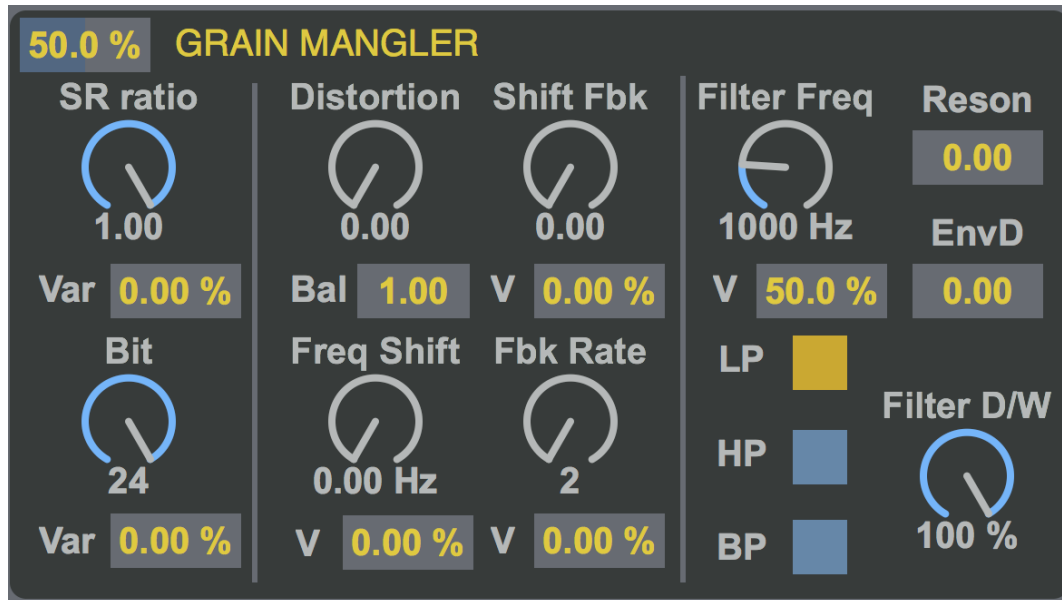
This section's parameters are divided into three subsections: a) Bit Crusher, b) Frequency Shift/Distortion, c) Filter.
The upper left numeric parameter sets the percentage of processing applied (it is a sort of local dry-wet).

PARAMETERS

a) Bit Crusher subsection

SR Ratio: this is an undersample parameter. When it is 1 the sample frequency is not changed, when it is 0.5 it is halved (i.e. if the actual sample frequency is 44100 hz, it is downsampled to 22050 hz), and so on. The **Var** parameter below specifies a random variation of the SR Ratio parameter.

Bit: sets the bit depth, from 1 to 24. The **Var** parameter below specifies a random variation of the Bit depth parameter.

b) Frequency Shift/Distortion subsection

Distortion: sets the amount of non-linear distortion for the grains.

Shift Fbk: a feedback factor for this module. The **V** (Var) parameter below specifies a random variation of the feedback.

Freq Shift: sets the frequency shifting for the grains. The **Bal** (Balance) parameter above sets the mixing between positive and negative shifting. When it is 1 it is 100% positive, 0 is 50% positive and 50% negative (i.e. it is similar to a ring modulation) and -1 is 100% negative. The **Var** parameter below specifies a random variation of the Freq Shift parameter.

Fbk Rate: how many times the audio is feed back during the grain generation. F. i. if the grain length is 1 second and this parameter is 10, the audio is feed back 10 times in 1 second, once every 1/10 of second. The **Var** parameter to the right specifies a random variation of the feedback-rate parameter.

c) Filter subsection

Filter Freq: cutoff frequency of the filter. The **V** (Var) parameter below specifies a random variation of the cutoff parameter.

Reson: resonance (Q) factor for the filter (from 0 to 1).

EnvD: the actual cutoff frequency can be modulated by an envelope follower. With positive values (up to 1) the frequency **increases** when the amplitude rises, with negative values (down to -1) the frequency **decreases** when the amplitude rises.

LP, HP, BP switches: select a low pass, high pass or band pass filter. When two or three switches are on, a different filter is randomly used for each grain.

Filter D/W: Dry-Wet balance for the filter section.

DELAY MODULATOR

This section shows the parameter for the Delay Modulator effect. The audio input is routed in an LFO controlled variable delay.
The upper left numeric parameter sets the percentage of processing applied (it is a sort of local dry-wet).

PARAMETERS

LFO: the frequency of the random LFO, which controls the delay time of the grain. The **Var** parameter on the right specifies a random variation of both the LFO frequency and the Delay Depth (see below).

Linear/Cubic switch: when *Linear* is selected, the random LFO generates a linear interpolated waveform; this gives a fixed variation of the grain pitch. When *Cubic* is selected, the random LFO generates a cubic interpolated waveform; this gives a continuous glissando of the grain pitch.

Depth: the maximum delay controlled by the LFO. The value is relative to the grain length.

MinDel: the minimum delay controlled by the LFO. It is a fixed value and is relative to the grain length.

Mod Fbk: Feedback value for the delay. The **Var** parameter on the right specifies a random variation of the feedback parameter.

EXTERNAL FEEDBACK LOOP
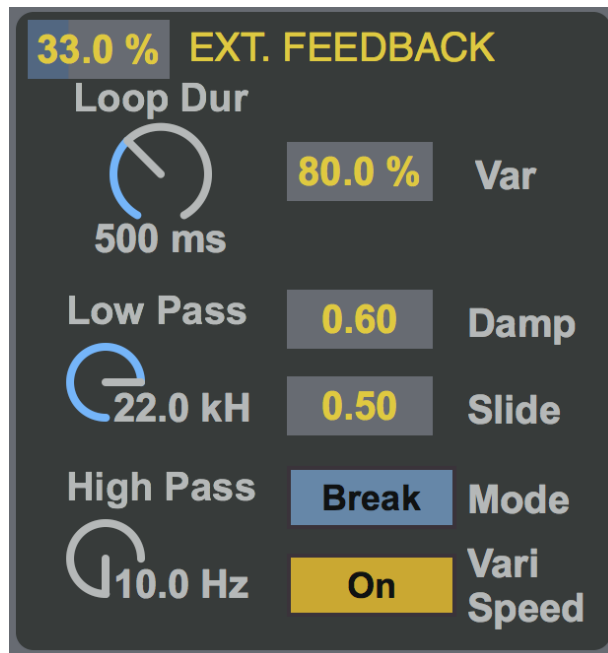
This circuit is not "inside" the grains, like the other two, but "outside": the audio produced by the grains is delayed and feed back into the effect input.
The upper left numeric parameter sets the percentage of external feedback applied.

PARAMETERS

Loop Dur: this is the delay length. The **Var** parameter on the right specifies a random variation of the delay. The rate of the variation is given by the parameter itself: i.e. if the duration is 2 seconds and the variation is 50%, the actual duration varies between 1 and 3 seconds, at a random rate between 1 and 3 seconds.

Low Pass, High Pass: the loop signal is processed by two filters in series.

Damp: this is a damp factor for the feedback when there is no input signal.

Slide: this parameter sets a slide factor in the transition between delay durations: when the parameter is 0 the change is instantaneous, when it is 1 is continuous.

Mode: two different effects for the delay variation. *Break* mode occasionally stops the audio in the circuit, *Smooth* mode does not stop the audio.

Vari Speed: when on, the delay variation changes the audio pitch, when off the pitch is not modified.

Grain Crusher 2

Requirements

Platform: Mac / Windows

Software: Ableton Live 9.6 with Max for Live (Max 7.2)