



Guitar Effects Chain



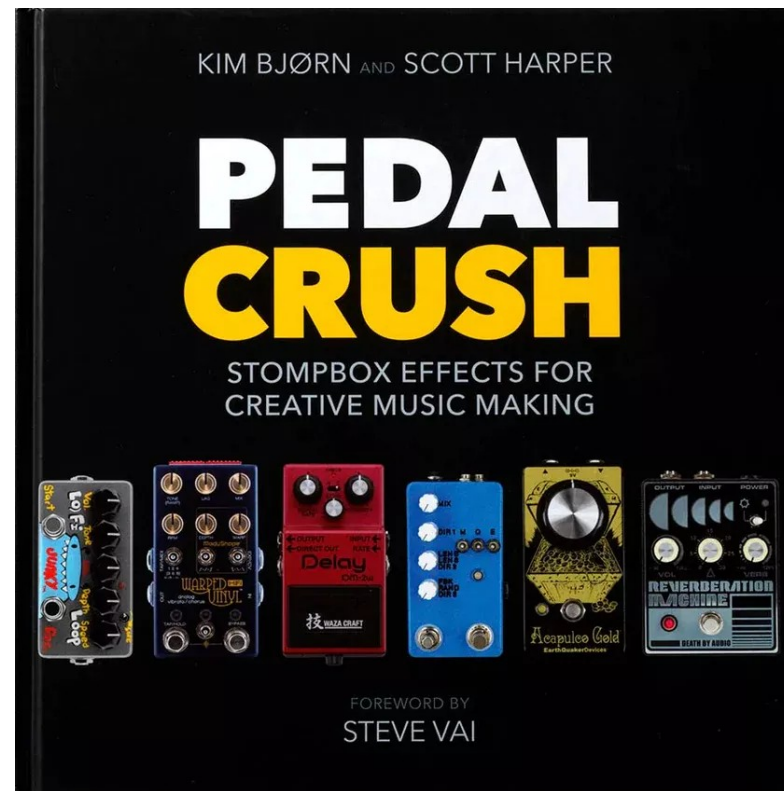


References

Book about pedals, pedals and people building pedals :

Pedal Crush

A lot of good information in this book



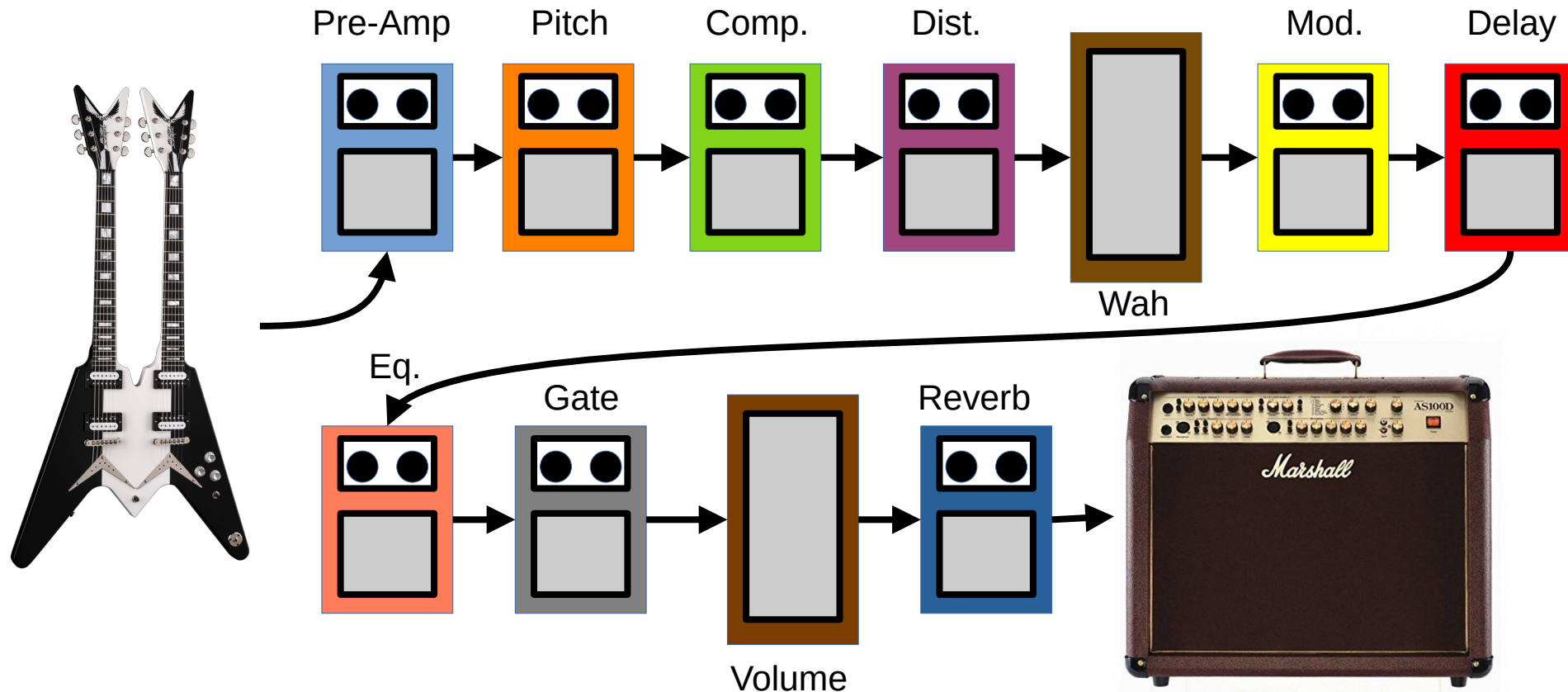


Plugins used

- **mod-pitchshifter / mod-gxpitchshifter** : pitch shifting plugins. The gx version is a modified version of mod-pitchshifter useable with Guitarix
- **spectra.lv2** : A spectrum analyser from x42 as a LV2 plugin
- **sisco.lv2** : an oscilloscope from x42 as a LV2 plugin
- **lsp-plugins-lv2** : some LV2 plugins. A nice spectrum analyzer is available in the package
- **guitarix** : a lamp amplifier simulator. A complete Guitar amplifier with nice effects
- **lv2-calf-plugins-gui** : some nice plugins. We will use the compressor.
- **raysession** : a jack session manager
- **audacity** : a powerful sound recorder
- **Carla** : a plugin rack. We will use carla to manage the oscilloscope and the spectrum analyzer



Guitar Effects Chain





Guitar Effects Chain

Defining a good guitar effects chains is hard :

- there is no general rule
- you can put the noise gate at the beginning or after the distortion
- you can put the wah pedal at the beginnig of after the distortion
- you can put the equalizer everywhere you can (but it has a good job to do at the beginning)
- the distortion you put before the head of the amplifier is just used as an amplifier, the drive level has nearly no effect

Follow a general schema, but try to move elements, it can be best for you



MIDI Pedal Board



Line6 FBV
Express MKII

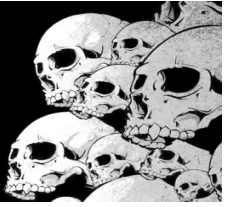


MIDI Mouse
Tech 21

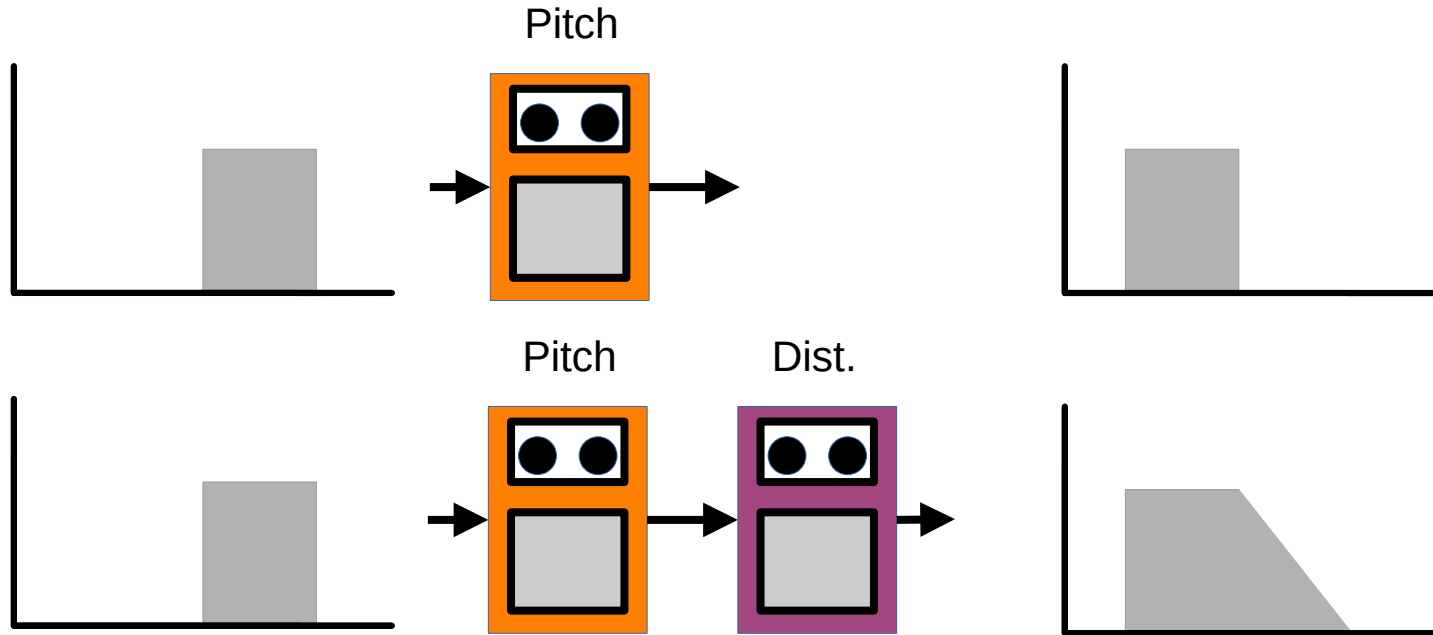


Behringer
Fcb1010

Some interesting MIDI pedal board
used to control Guitarix or other
applications



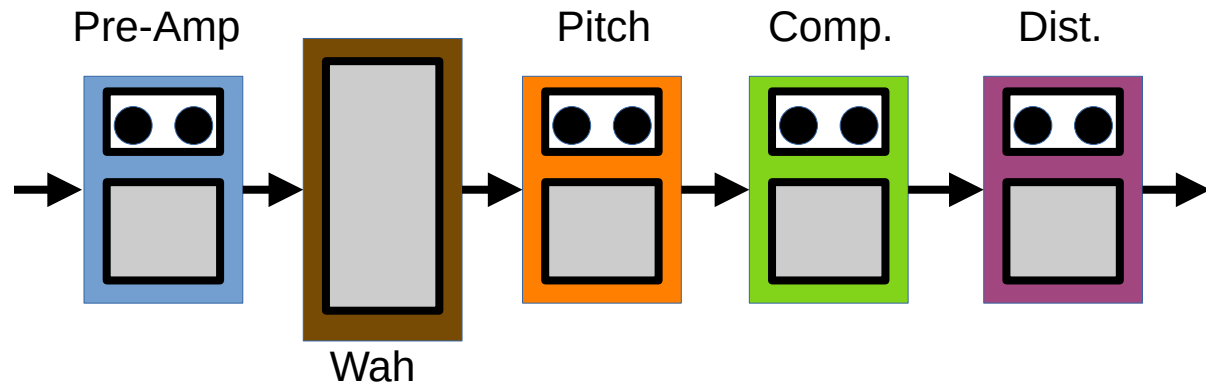
Pitch Shifter Effect



Adding a small level of distortion after a pitch shifter can add some missing pieces of frequencies

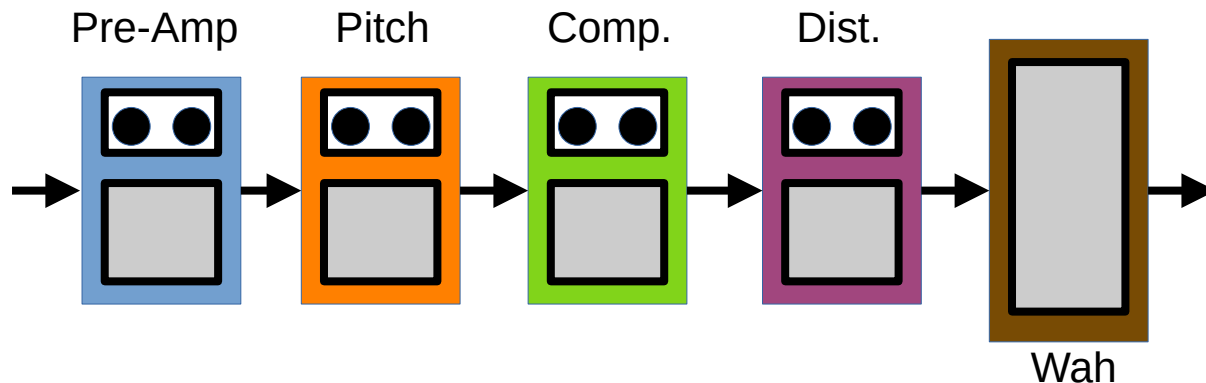


Wah Pedal Position



In the pre-amp we have a quasi-sinusoid from the guitar.

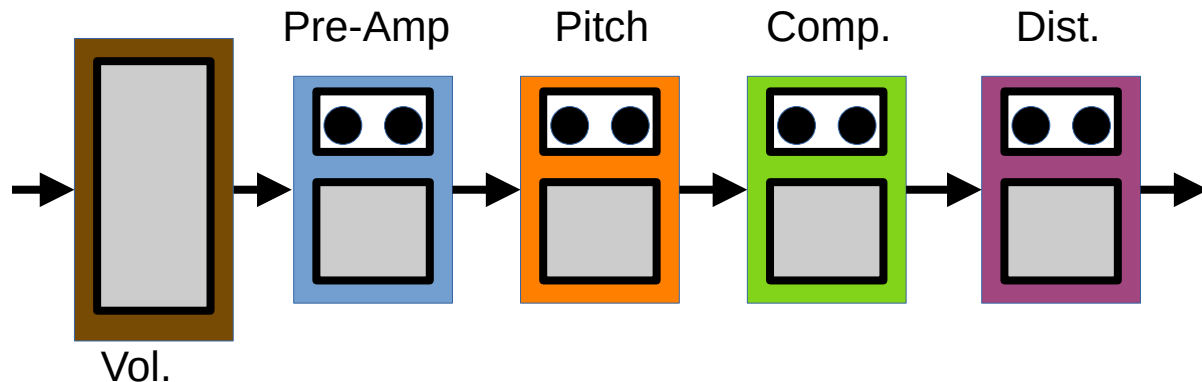
The wah pedal which is a filter will just filter a quasi-sinusoid and will behave more or less as a volume pedal.



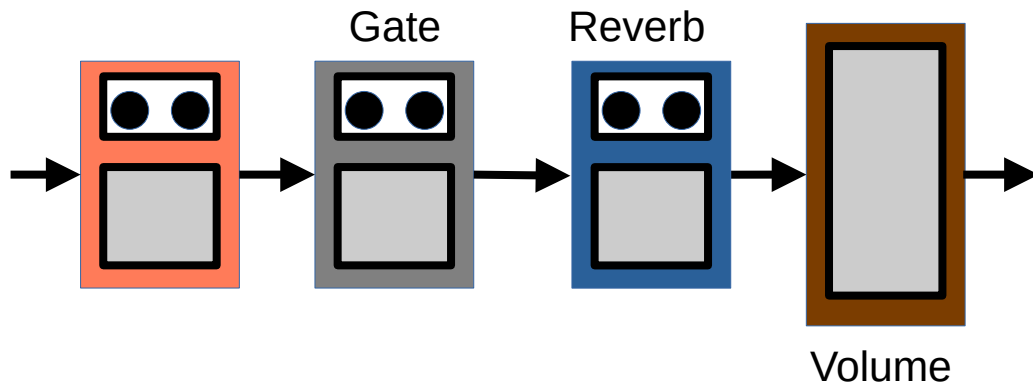
After the distortion pedal, the signal has a richer specter and when processed by the wah, the wah effect will be more pronounced.



Volume Pedal Position



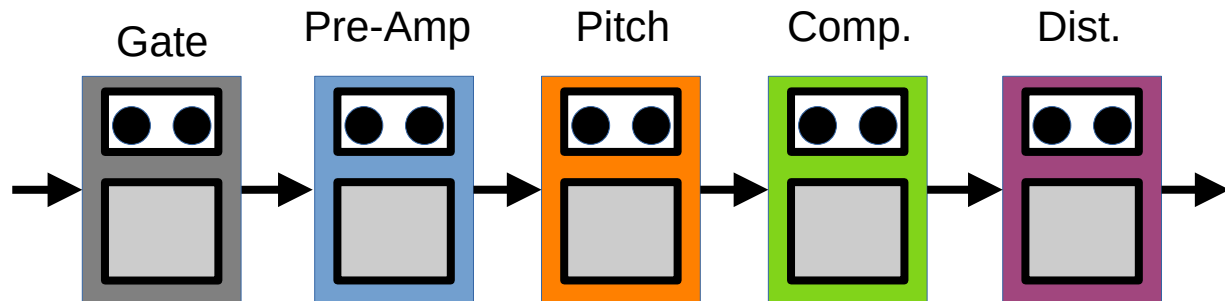
Placed at the beginning of the chain, the volume can have an impact on the sound. Compressor and distortion are tuned for a given level of signal.



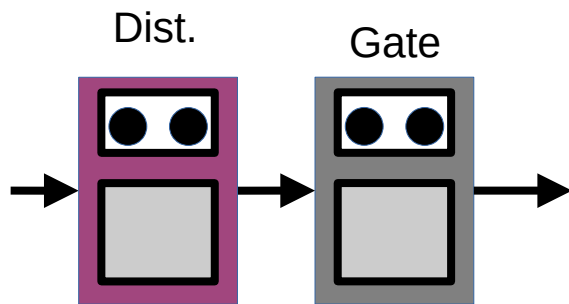
At the end of the chain, the identity of the sound will be preserved if we reduce the level of signal via the volume pedal.



Noise Gate Position



Placed at the beginning of the chain, the volume can have an impact on the sound. Compressor and distortion are tuned for a given level of signal.



At the end of the chain, the identity of the sound will be preserved if we reduce the level of signal via the volume pedal.

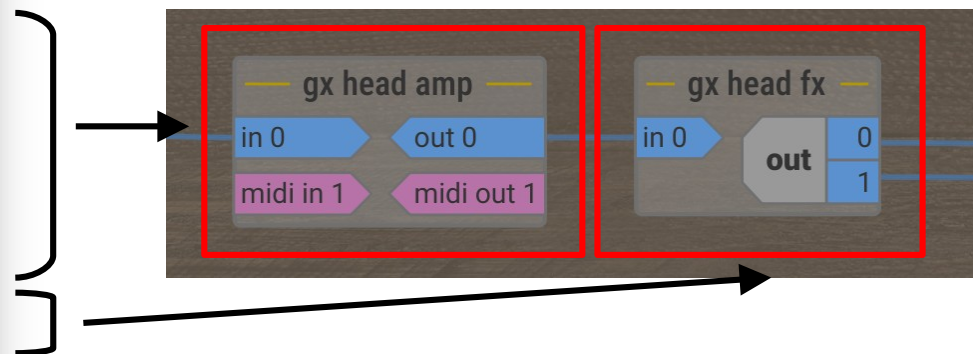


Guitarix Rack Structure



Mono Effects

Stereo Effects





Guitarix Default Racks

Level of the
threshold
compressor
at the top of
the rack

Clipping
level at the
bottom of
the rack



Level of the
noise gate
at the top of
the rack

Gain of the
preamp at
the bottom
of the mono
rack



Guitarix Default Racks

Gain
at amp
input

Gain
at amp
output

Lamp
configuration
selection

Allow freq
below 31 Hz



Mix
level

Gain
of the
lamp
stage

Bass
level

High
frequency
boost

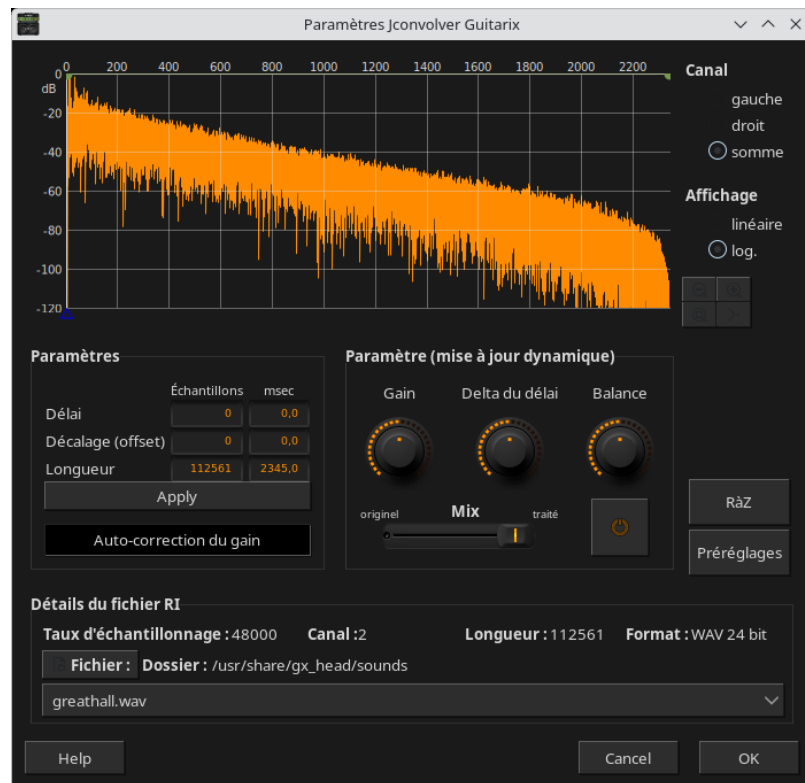
Amp
internal
reverb
level

Hiss
remover



Guitarix Default Racks

Convolver : to copy the style of a given band
Amp Impulse : to copy an amplifier style



Convolver Window
Setting



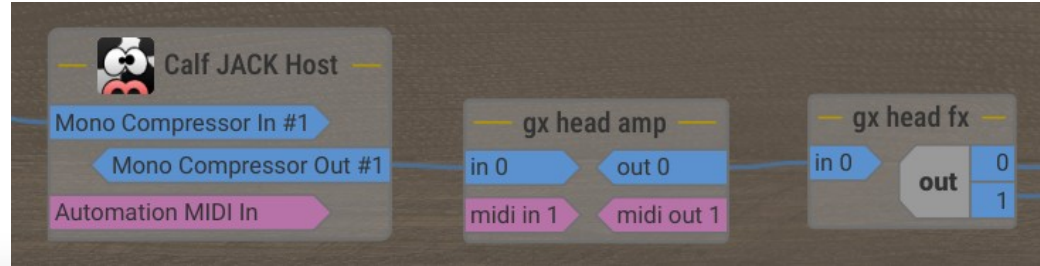


Compressor Experiment

We use the compressor from Calf plugins. This one has a nice GUI which eases the tuning of the compressor.

We then use audacity to generate a special signal using Generate -> Silence + Generate -> Tone to show the compressor behavior.

This signal is sent to calf / compressor and audacity records the audio of calf / compressor





Compressor Experiment

The first part of the signal is above the threshold and the second part is below. I set a huge release and a huge attack level.

With the attack set to a non nul value, the output signal start with the original level and then reach the level defined by the compressor at the speed defined by the attack level/

With the release set to a non nul value, at the amplitude change, the compressor keeps its gain and apply the gain to the low amplitude and slowly reach the unity gain and the speed defined by the release level.





Compressor : Tuning

How to tune the compressor :

- Play some tapping or legato notes and set the threshold so that the notes are above the threshold in the Calf compress graph
- Play some notes using the pick and set the compressor level to reduce the level difference between a legato or tapping note and the note played with the pick.

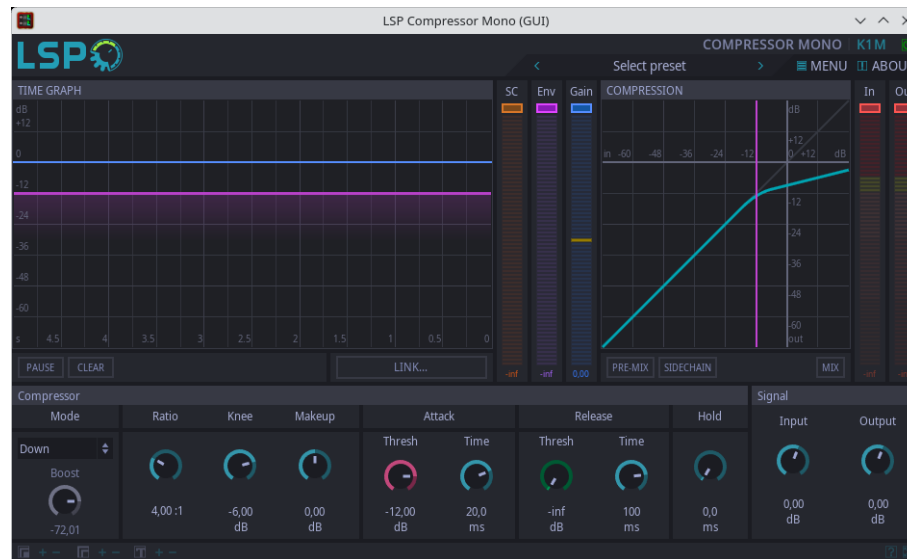




Compressor : LSP

LSP Compressors are good.
There are many available :

- Compressor LeftRight
- Compressor MidSide
- Compressor Mono
- Compressor Stereo
- Sidechain Compressor LeftRight
- Sidechain Compressor MidSide
- Sidechain Compressor Mono
- Sidechain Compressor Stereo





Distortion

Use scopes to see the shape of the signal as you add effects (compressor, distortion, an overdrive, etc ...)

Use spectrum analyzer to check the shape of the spectrum :

- Clipping
- Too much distortion may produce high frequencies
- 50Hz from power supply may produce parasitic frequencies like 200 Hz peak



Distortion

Here is a A (440 Hz) played on a guitar with a lot of distortion.

As you can see the first harmonic has a level above the fundamental.

The content of the spectrum as a lot of high frequencies and you may need to reduce a little bit the distortion to keep some limits on higher frequencies.



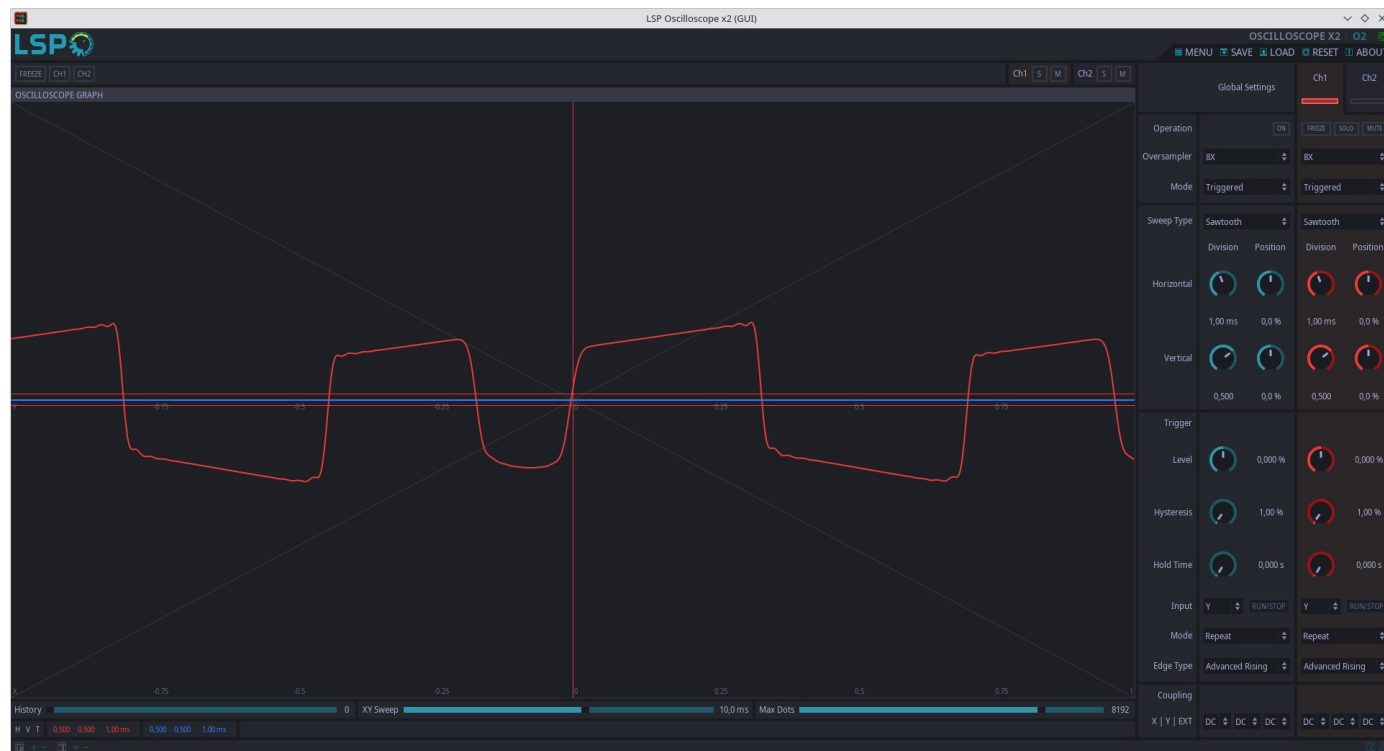
LSP spectrum analyzer





Distortion

Use a scope to check the shape of the sound and see how parameters can change the sound

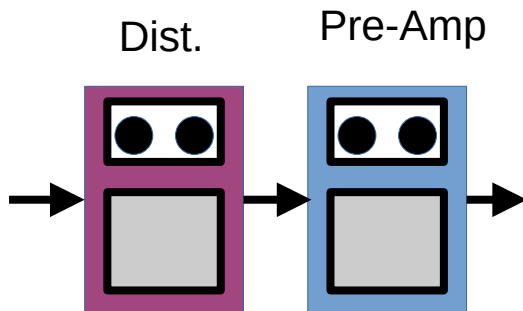


LSP Oscilloscope





Some Distortions tuning



When using a distortion before the pre-amp or the amplifier head, the first drive / tone distortion tuning has nearly no effects. Use a little drive in the first distortion. For the second one (the pre-amp or the amplifier head), use the level of drive you want, but after that, to limit the aliasing effects due to the spectre extension produced by the distortion, use a low pass filter to limit the frequencies after the Nyquist frequency.

Aliasing can produce some unwanted noises like ike crackling, harshness and metallic noises.



Example of Guitarix settings

Overdrive : 5.1 / 100 %

Compressor : 4.5 / -51.1 / 2 / 0 / 0

Rat : 0.86 / -4.8 / 0.75

Amp : See after

Wah : ColorSound Wah / 0 / 52

Echo : 150 / 15.0

Volume : 6.3

Freeverb : 0.78 / 0.50 / 40

Cabinet : 4x12 / -0.5 / 0.6 / 3.8





Example of Guitarix settings





AIDA-X



AIDA-X are neural amplifier models developed for the MOD Device. These models are lightweight enough to be used in real time.

You can load an AIDA-X model via the RTNeural Guitarix plugin.

The LV2-AIDA-X plugin is not yet compatible with Guitarix but can be loaded into Carla-Rack.

You can find some good AIDA-X models on :

<https://www.tone3000.com/>

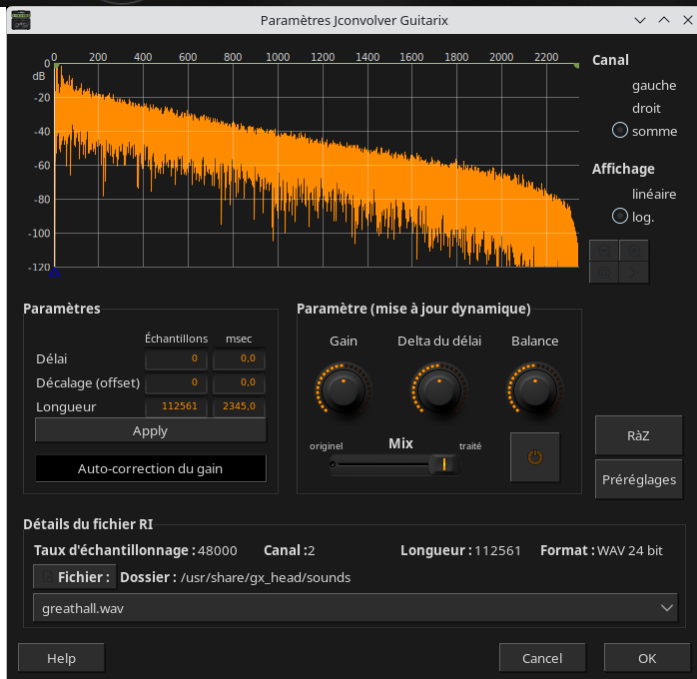
On this web site you can also find IR of cabinets.

The NAM model is quite big and when I tried it, the load was too high and produced X-runs.





Convolver



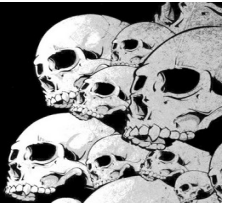
The convolver allows you to applied an Impulse Response (IR) on an input signal. The tool allows to 'copy' a given sound.

With guitarix, you can find a lot of preinstalled IR for bands and for amplifier.

Another usage of IR is to reproduce a reverberation. You can find a lot of IR for reverberation on the internet.

The last usage is to mimic a cabinet (and ensemble of speakers). Same as for reverberation, you can find a lot of IR for cabinets on the internet.





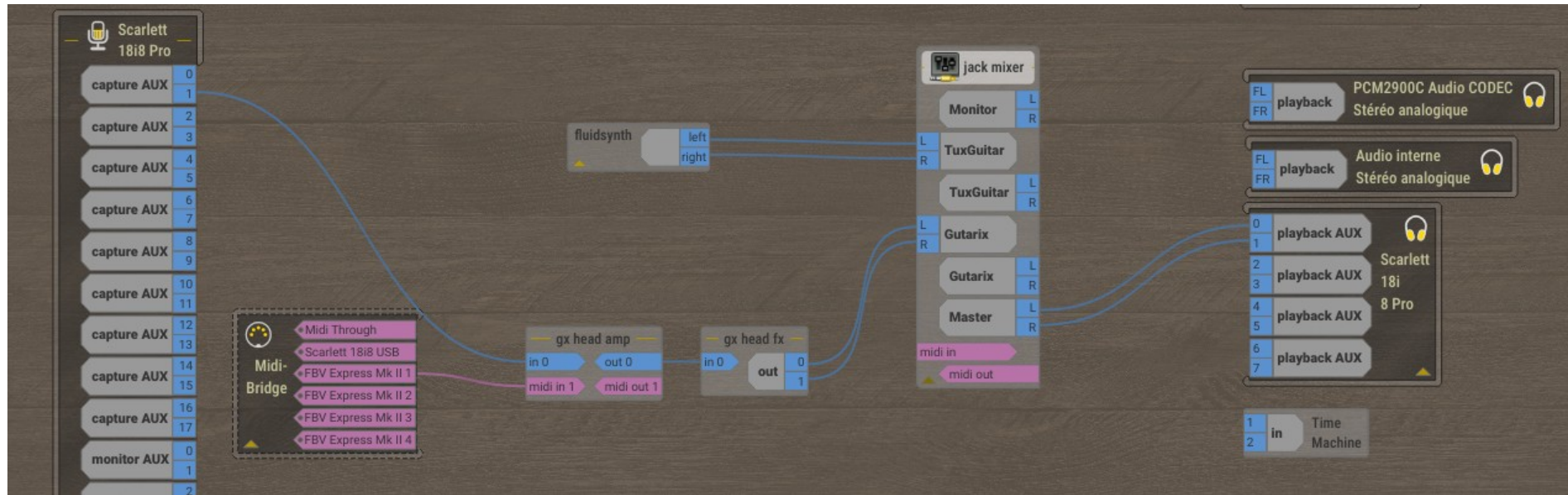
Rehearse with TuxGuitar

Applications used :

- **guitarix** : guitar amplifier simulator
- **tuxguitar** : to play GuitarPro scores
- **timemachine** : to record some audio
- **jack_mixer** : to fine tune the audio level between tuxguitar and guitarix
- **non-mixer-xt** : (another option to replace jack_mixer)
- **ray session** : to start all these applications and reconnect them

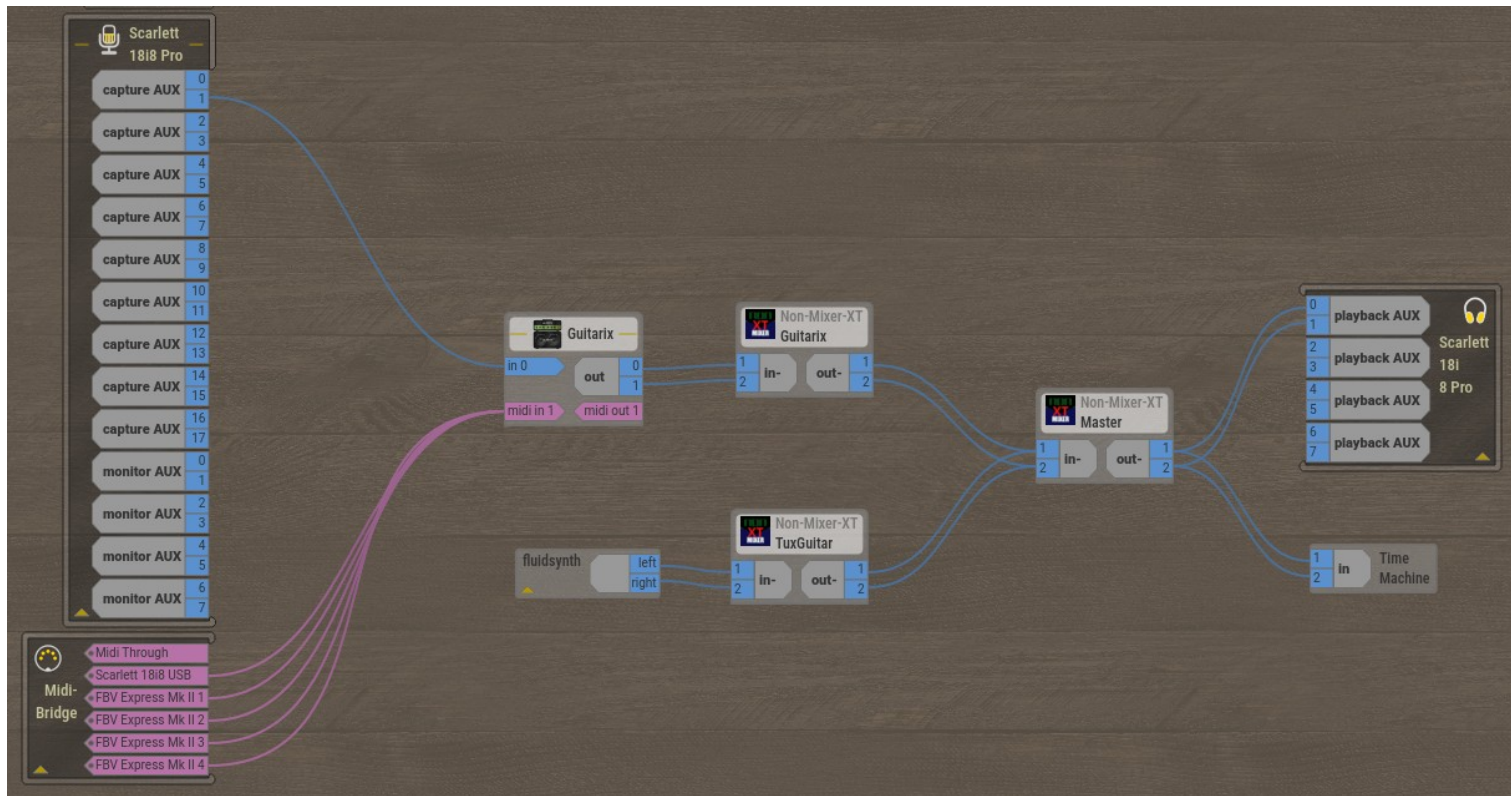


Rehearse with TuxGuitar





Rehearse with TuxGuitar - 2



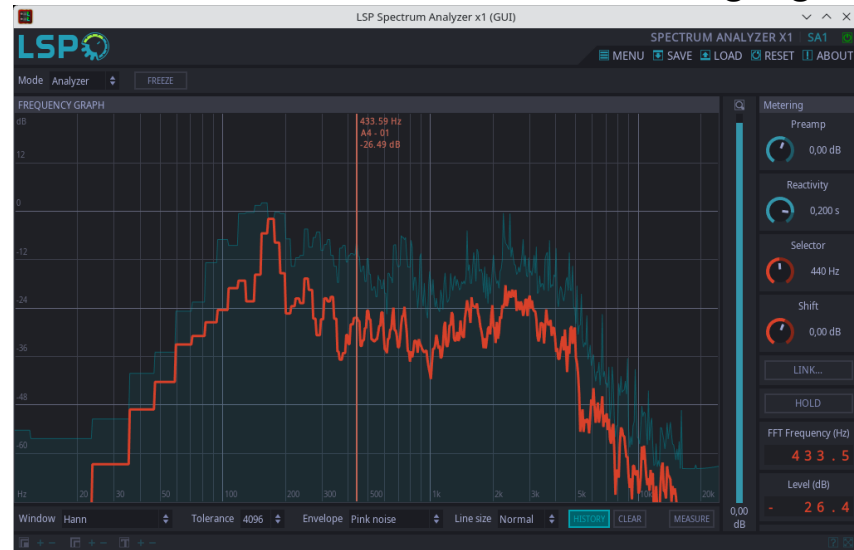


Spectral Comparison of Sounds

Sound with standard Guitarix distortion settings



Sound with AIDA-X model and high gain



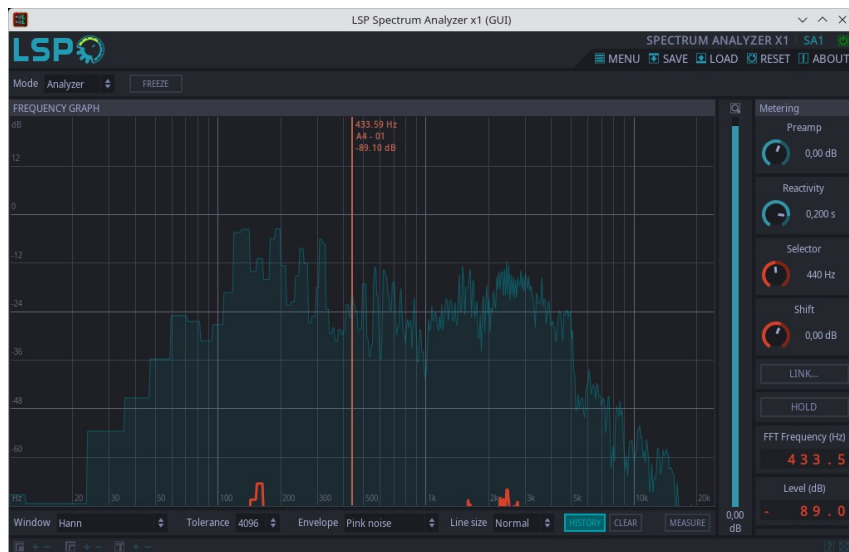
The spectral pic at 2500 Hz is due to the IR of the cabinet. Pic not present with another cabinet





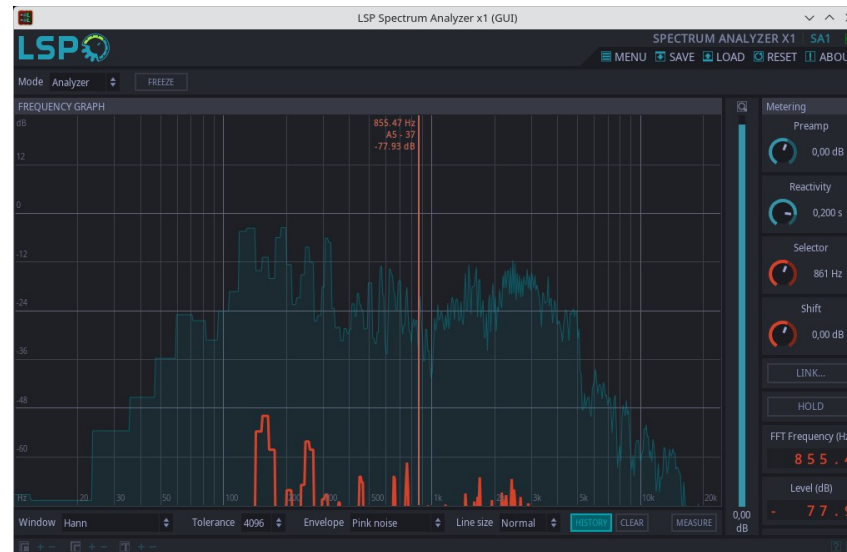
Spectral Comparison of Sounds

Spectrum with a humbucker coil



A small peak at 50 Hz and a small peak at 2500 Hz

Spectrum with a single coil



A big peak at 50 Hz with some harmonics and a bigger peak at 2500 Hz

The $n \times 50$ Hz harmonics are due to power supply + distortion



Additional effects for Solo

We can add to the current settings :

- a **volume** pedal adding +3 to +6 dB
- an **echo** with a delay between 300-450 ms or 120-250 ms for a subtil echo and add a feedback between 20-35 %. The wet/dry mix is around 15-25 %. The echo is placed before the reverb. ChatGPT suggest to add a high pass filter with a cutting frequency between 150-200 Hz.

For a compressor for tapping / standard play :

Threshold : around -20 dB (adjust to correspond to the signal level – lower this value until the tapping trigger compression).

Ratio : 3:1 to 4:1.

Attack : 10 to 20 ms → let pass the mediator attack to have a percussive sound.

Release : 80 to 150 ms → fast enough so that compression breathe between note.

Makeup gain : tune so that tapping and mediator play are at the same level.

Knee : soft knee if available → the compression acts softly and avoid pumping effect.

