Woodulator

Woodman's Immaculate Maple Syrup Studio

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1.What

The Woodulator is a delay and pitch shifter inspired by analog bucket brigade delays. It also includes 2 versatile modulators.
Pitch shifting is obtained by increasing or decreasing the clock in the delay line and not by FFT calculations.

- Has 2 pitch shifters which can go up or down according to a harmonic scale or in chorus mode

- Modulator source can be internal LFO or external side chain

- Modulator destination can be pitch frequency, pitch amplitude, delay amplitude, panning or feedback amount.

- Modulation of pitch frequency can be up, down or both.

- Delay line color can be set with LP/HP/BP filter and Saturation level.

- Includes HP and LP filters on the input signal

- Includes LP filter on pitch out signals.

- Pitch shifters have Reverse mode.

- BPM can be set, tapped or synced by the DAW host.

- LFO Square has slew-rate control. (control at 100% generates triangle waveform)

- LFO's have convenient beat/bar timing popup.

- Delay and pitch signals can be panned L-R on a stereo bus/track.

- Delay and pitch shifter timing can be synced to the bar or re-synced manually (playing live)

- Presets can be stored in iCloud Drive (makes them available on all your devices).

- Presets can be switched with Midi Program Changes.

- Major controls can be set with Midi CC messages.

1.1 Signal flow

Input → [HP Filter] → [LP Filter] → (+) → [Delay line] → [Saturator] → (X) →

Delay level

(+) ← (X) ← [Feedback Filter] ←

Feedback %

→ [Pitch unit 1] → [LP Filter] → (X) →

Pitch 1 level

→ [Pitch unit 2] → [LP Filter] → (X) →

Pitch 2 level
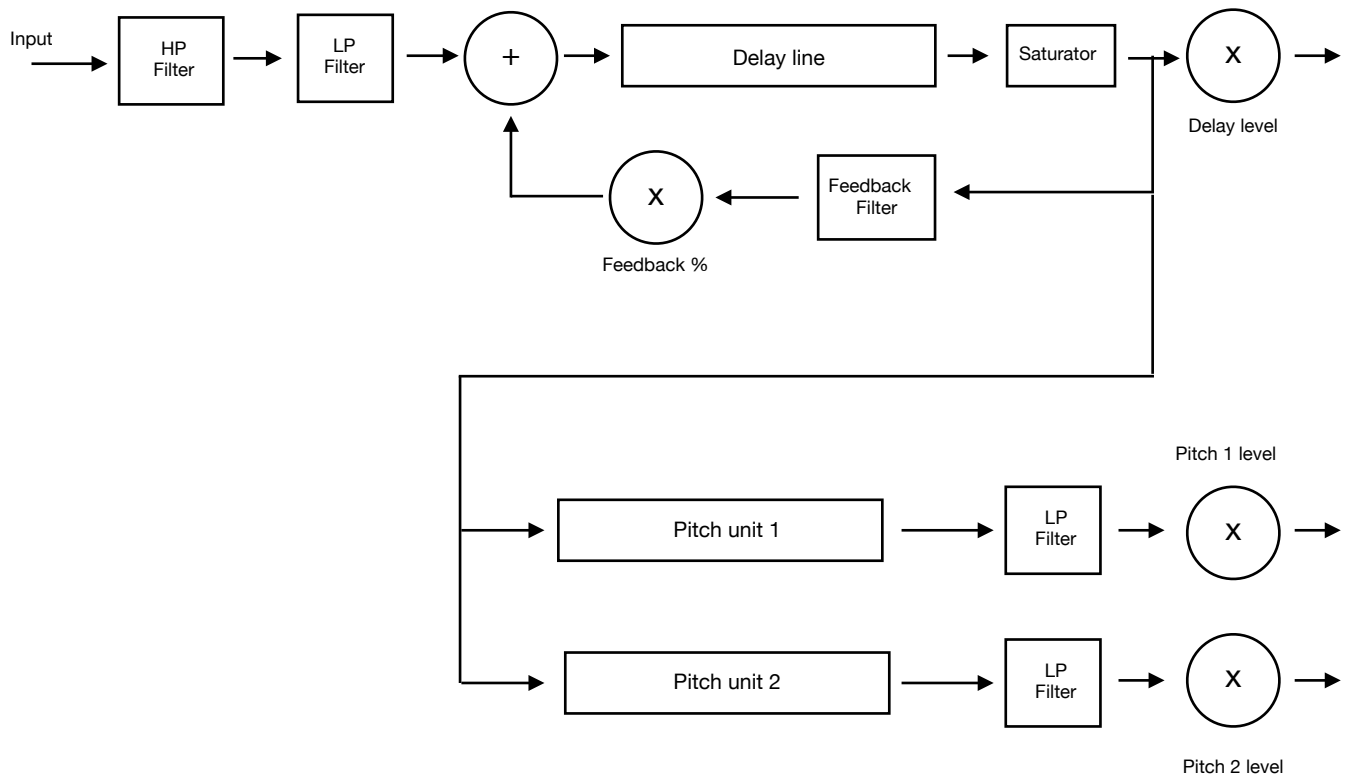
1.2 About Pitch frequency and Timing

The pitch shifting is obtained by changing the clock which samples the delay line.
This makes that the timing of the pitch repeats is dependent on the pitch frequency.

When the pitch is e.g. set to + 1 octave, there will be exactly 2 repeats in the normal (1 repeat) delay time. In this case the timing will always be in sync with the bar.

However for other pitch frequencies the repeat pattern will keep drifting and no 2 bars will have the same pattern.

This is exactly why there is a Resync provided (either manually or automatic after 1/4 … 4 bars). The resync will align the pitch repeat back to the bar.

In the figures below the upper signal is always the Delay out (set to 1/2 bar) , feedback = 100%

The lower signal is Pitch1 set to + "1 Octave"
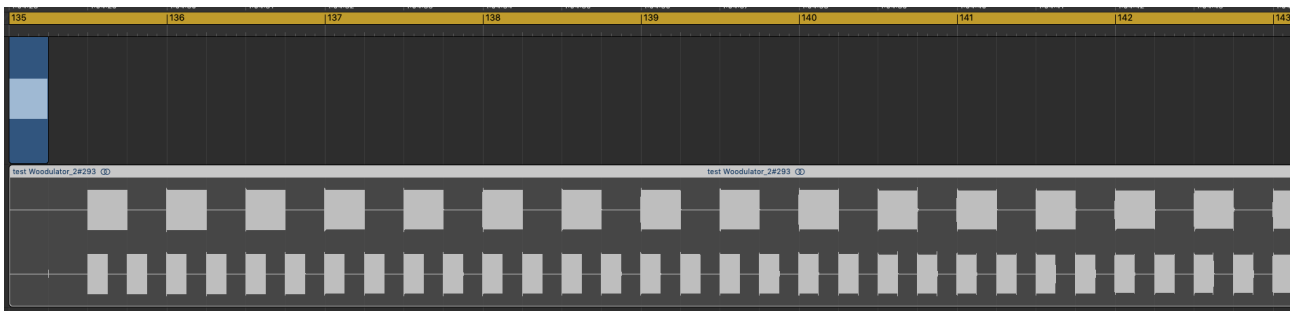
The lower signal is Pitch 1 set to + "Major 7th" with Resync Off

The lower signal is Pitch 1 set to + "Major 7th" with Resync set to 1 bar
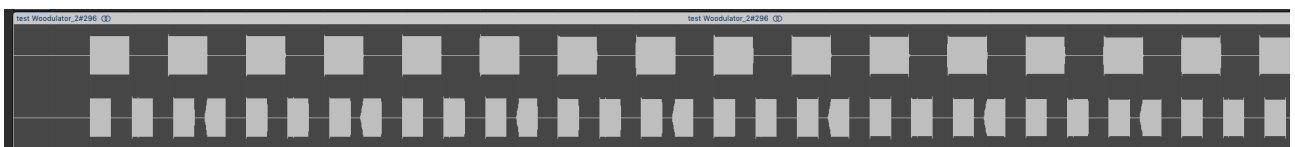
1.3 New

v1.1

- added Reverse mode to the Pitch shifters
- added Sawtooth Up and Sawtooth Down to the LFO modes
- LFO modes can now be seen and toggled from main window

v1.2

- factory presets can now be copied to User presets

v1.3

- added surround and 3D panning (MacOS only)

v1.4

- added AUv3 multi-bus (side chain) support.
- added Side Envelope mode to the Modulator Sources.

v 2.0

- added pitch1&2 feedback.
- added Moog filter to delay feedback, frequency can be modulated by the LFO's.
- added Moog filter to pitch out, frequency can be modulated by the LFO's.
- added extra modulation destinations :
 pitch feedback amount,
  delay Moog filter frequency,
  pitch Moog filter frequency,
  LFO2 can modulate LFO1 frequency
- added delay and pitch stereo controls.
- added more LFO waveforms (triangle, pulse, random S&H).
- added LFO waveform slider which allows to get mixed waveforms.
- delay filters can now be applied on the delay out as well.
- added In & Out gain controls.
- added signal & clipping leds.
- added next and previous preset buttons.
- fixed/reduced clicks.
- added new factory presets

v 2.1

Optimised for the M1 on MacOS.

v 2.2

Added NI (National Instruments) NKS integration in VST. (MacOS only)

v 2.3

- Added licensing via license code (MacOS plugins only).
- Factory presets not copied to user space any longer but read from the package.

2. Main window

Individual controls are explained below.

Most rotaries can be double clicked which will set a minimum value or toggle to the maximum value.
Rotaries displayed value can be clicked to enter the value numerically with the keyboard.

LFO waveform icons can be clicked to open a popup slider which allows to select the waveform or slide between 2 waveforms. The latter creates a mixture of the 2 waveforms which yields a whole lot of creative new waveforms.

You have pressed the Question-mark button already as you are reading this manual.

2.1 User Presets

User presets can normally be set via the DAW specific popup / controls. Those presets will be saved in a specific format and location dependant on the DAW.

User presets can also be set via Woodulator's own popup in the header bar.

The preset.json files are saved in your iCloud Drive (when enabled) or else in the app's local documents folder.
When saved to iCloud Drive the presets are automatically available (and synced) to all devices and all DAW's running Woodulator and are obviously backed-up as well.

When iCloud Drive is enabled, previously local saved presets will also be shown in the preset popup with ".local" appended to their name. And when for some reason a new preset still has to be written to the local folder, this can be done by appending ".local" to the name typed in the text edit box.

When a preset is selected and any parameter is changed afterwards, the name of the preset will be marked with a * at the end to indicate the settings are now different than those from the saved preset. When this preset is re-saved the * 's will disappear again.

Groups (drums, Vocals, …) can be created by typing the group name followed by a "/" followed by the preset name. Multi level groups are possible as well on OSX.
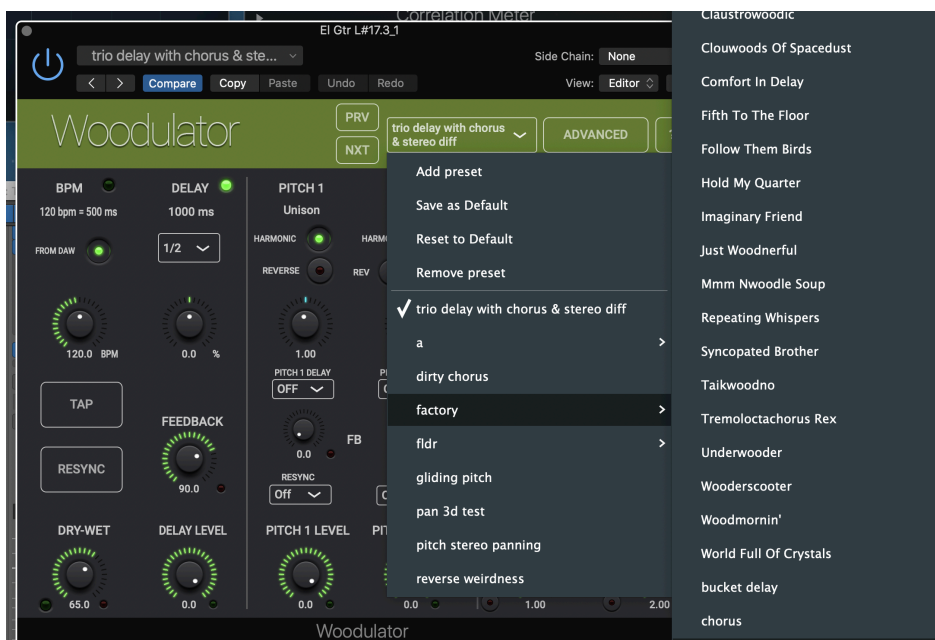
The current selected preset can be removed by selecting "remove" from the popup however NO "Are you sure" warnings/popups are given. (I am sure you are sure).

The User presets can also be selected by a Midi Program Change. In the Advanced panel the Midi channel and Program Change mode can be set :
- mode "Index" : program change number is the index in the preset list
- mode "Name" : add ".midiXY" to the preset name to select it with program change XY. (e.g. the preset with name "snaredrum.midi3" will be selected by program change 3.

Selecting the next (or previous) preset within a group can be done with the 2 buttons "NXT" and "PRV" at the top.

On the Mac the up and down arrow keys can be used as well.

MIDI CC 118 and 119 also allow to select the next or previous preset.

2.2 Factory Presets

From version 2.3 on, factory presets are stored and read from the app/plugin package.
This means they don't have to be copied any more to the User preset folder (with the "Copy Factory Presets") and that they can't be changed any more.

When changing parameters and choosing "Save Preset", a new User preset will be created with the same name in the User space.

Factory presets are shown on top of the User presets in the dropdown.

3. Advanced Panel (and 3D Panning Panel)

The Advanced panel can be made visible by pressing the "Advanced" button.

When inserted on a track with more than 2 channels (surround or 3D), a "PAN" button will appear which will show the 3D panning panel.

4. Controls

4.1 BPM

4.1.1 BPM rotary

4.1.2 BPM from DAW button

Captures the BPM value from the DAW. You may have to start play before the value is captured. When setting the BPM yourself (rotary or tapping), this button will be switched off as it is not tracking the DAW any longer.

4.1.3 BPM Tap button

The classic delay TAP button.

4.1.4 Re-sync button

Resets the phases (pitch units , LFO's).

When using the play transport this is done automatically when playing is started.
When playing is started the delay line content is erased.

In live mode this can be very useful to mark the beginning of the bar.
When the transport is NOT playing, this will also erase the current delay line content.

4.2 Dry-Wet rotary

0 … 100%

At 0% only the original audio is heard, at 100% only the delay and pitch signals are heard.

4.3 Delay time beat popup

Has all the common beat values (1/4 , 1/8, …) including dotted notes.
1/4 corresponds to the BPM time.

4.4 Delay offset rotary

-10% … + 10%

Allows to have a delay time slightly different than the bar/beat time.

4.5 Delay Feedback rotary

0 … 120%

Determines the amount of the signal coming out of the delay line, fed back to the input of the delay line.
The signal is first sent through the Feedback filter (Advanced panel) before entering back into the delay line.

Careful when setting the control to 100% or more ! This will lead to an ever increasing signal hitting the roof (at 0dB) and hence can be loud ! Values > 100% can be used to (temporarily) increase the feedback signal either manually or with Modulator 1 controlling the feedback.
When larger than 100% a red led will light to indicate the danger !

4.6 Delay Level rotary

-80dB … 0dB

The level of the signal coming out of the delay line. Without feedback this signal is filtered by the HP and LP input filters and sent through the delay line saturation unit (Advanced panel).

4.7 Pitch frequency rotaries and Harmonic buttons

When the Harmonic button is on, the rotary will snap to all harmonic scales between -1 octave and +1 octave.
Without the Harmonic button the pitch frequency is free in a limited chorus range.

4.7.1 Reverse Button

When enabled audio will be played in reverse order.

4.8 Pitch Feedback rotaries

0 … 120%

Determines the amount of the signal coming out of the pitch shifter, fed back to the input of the delay line.
The signal is first sent through the Pitch Moog lowpass filter (Advanced panel) before entering back into the delay line.

Using this feedback leads to a series of ever increasing (pitch up) or decreasing (pitch down) tonal values !
When the pitch is not an octave, this could (and will) lead to non harmonic notes not belonging to a scale anymore.

Careful when setting the control to 100% or more ! This will lead to an ever increasing signal hitting the roof (at 0dB) and hence can be loud ! Values > 100% can be used to (temporarily) increase the feedback signal either manually or with Modulator 1 or 2 controlling the feedback. A red led will indicate clipping due to the feedback.

4.9 Pitch Level rotaries

-80 dB … 0dB

The level of the signal coming out of the Pitch unit.
This signal can be filtered by the Pitch Moog filter (Advanced panel).

4.10 Pitch delay popup

The pitch signals can be delayed themselves relative to the main delay signal allowing a multi delay (stereo) effect. The delay is set in bpm fractions which makes it easy to keep the same musical (bar) pattern when changing the BPM.

4.11 Pitch Re-sync popup

Off, 1/4 bar … 4 bars

Normally Resync should be on in following cases :

- the pitch frequency is NOT octave (up or down) or Unison
- the modulator destination is set to pitch frequency AND is not chorus up & down

When Resync is off in those cases you will get an ever drifting pattern.

4.12 Modulation frequency / depth rotaries

When the modulation destination is set to Pitch frequency the rotary snaps to the harmonic scales (1.0 … 2.0) in the second half and is free in the first half for chorus frequencies (0 … 0.99).

For all other destinations this rotary is the modulation depth in % (0 … 100%).

4.13 Modulation destination popup

Destinations can be :

- Pitch Frequency
- Pitch Amplitude (Mod1) or Ring (Mod2)

- Delay Amplitude or Ring (Mod2)
- Delay Moog frequency
- Pitch Moog frequency
- Delay Panning
- Pitch Panning
- Delay Feedback amount
- Pitch Feedback amount

LFO2 can also modulate the LFO1 frequency.

When Modulation 1 and 2 are set to the same destination, the effect is combined.

For amplitude modulation destinations Modulator 1 is doing amplitude modulation (signal * (1 + mod)) while Modulator 2 is a ring modulator (signal * mod).

When the destination is set to pitch frequency an "up" and "down" button will become active to determine the direction of the modulation.
e.g.
pitch frequency is set to Unison, modulation frequency is set to "Octave"
up : will go from the original signal frequency to 1 octave higher and back
down : will go from the original signal frequency to 1 octave lower and back.

4.14 Modulation LFO frequency rotary

LFO frequency in Hz : 0 … 40 Hz   or 0 … 400 Hz (when the X10 button is on)

When the modulation source is set to "Side chain" this control becomes a Side chain gain (0 .. 60 dB)

4.15 Modulation LFO beat/bar popup

When set to a fraction of the BPM, the LFO frequency will automatically be calculated and be adjusted when the BPM changes.

4.16 Delay line Feedback filter (Advanced Panel)

Is applied on the signal which is fed back into the delay line.

Note that is not applied on the delay line output signal which makes it possible to have a different color on the first repeat and the next repeats.

The filter type and Q factor (for band-pass and notch filter) can be set for more creative effects.

4.16.1 Feedback Filter Frequency

50 Hz … 20 kHz

Sets the center (band-pass or notch) or cutoff (high-pass or low-pass) frequency.

4.16.3 "Q" rotary

0.1 … 10

4.16.4 Filter Type

Type can be set to band-pass, low-pass, high-pass, notch or 4pole Moog.

4.16.5 Low cut

when switched on an (independent from the filter above) low cut filter with cutoff at 120 Hz is applied on the feedback signal.
Can be very useful to avoid a very low frequency feedback build-up when using a high feedback value (and the saturator).

4.16.6 Delay Out button

When on the filter is also applied on the signal coming out of the delay line, otherwise the filter is only applied on the delayed signal fed back to the delay line.

4.17 Delay line Saturation rotary (Advanced Panel)

0 … 100%

When set to zero the saturation unit is bypassed.

4.18 Input HP filter frequency rotary (Advanced Panel)

50 Hz … 20 kHz

Applied on the input signal before it enters the delay line.

4.19 Input LP filter frequency rotary (Advanced Panel)

50 Hz … 20 kHz

Applied on the input signal before it enters the delay line.

4.20 Pitch output Moog LP filter frequency rotary (Advanced Panel)

50 Hz … 20 kHz

Applied on the Pitch output signal.

The setting is the same for the 2 Pitch units.

4.21 Modulation Source popups (Advanced Panel)

Sources can be :

- LFO Sine wave
- LFO Square wave (Triangle waveform can be obtained by setting the Slew rate to 100%)
- LFO Sawtooth Down
- LFO Sawtooth Up
- LFO Triangle
- LFO Pulse train
- LFO random S&H
- Side chain
- Side chain Envelope

When a Side chain mode is chosen the LFO frequency rotary in the main panel is replaced by a Side Gain rotary (0 .. 60 dB).

The LFO waveforms can also be set in the main panel by clicking on the waveform icon.
This will show a waveform slider which can even continuously move from 1 waveform to the next, yielding some mixed waveform.

4.22 Delay and Pitch output panning rotaries (Advanced Panel)

-100% … +100%

-100% is completely left, 100% is completely right, 0% is center.

When the plugin is inserted on a mono track these control will have no effect.

When you have a mono input signal and you want stereo out, put the plugin on a stereo aux track which is fed with the mono track.

4.23 True Stereo button (Advanced Panel)

When Woodulator is inserted on a stereo track, the L & R signals can either be true stereo (potentially totally different) or can be the same signal when a mono bus is sending to the stereo (aux) track.

True Stereo button On :

when the panning rotaries are set to 0 % (center) the processed L signal will be sent only to the L output and the processed R will be sent only to the R output.
In this case the stereo image is kept.

When the panning rotary is turned to the Left (-100%), the L processed signal will remain on the L output and the R processed signal will now also be sent to the L output (and vice versa).

True Stereo button Off :

when the panning rotaries are set to 0 % (center) the processed L signal will be sent 50% to the L output and 50% to the R output (and same for the R processed signal).
In this case the stereo image is made mono.

This can be useful when there is only a mono input signal routed to L (or R) only, for example in Live mode.

4.24 Delay and Pitch Stereo rotaries (Advanced Panel)

When not set to zero and the True Stereo button is on, some parameters will be changed slightly on the R channel compared to the L channel. This creates a wide stereo image.

4.24.1 More than 2 output channels (surround, 3D, …)

With the True Stereo button on, the stereo sliders will now be used with a different value (with a maximum value set by the slider) on each channel. This can create a nice surround sound.
This also works when the number of input channels is less than the output : e.g. a mono to 5.1 plugin.

4.25 LFO Square wave slew-rate rotary (Advanced Panel)

Adjusts the slope of the Square wave.

When set to 100% the waveform becomes perfectly triangular.

When using the Square wave LFO to modulate the pitch frequency, it is useful to set this to at least a few % (+- 5%) to avoid clicking.
In this case higher values will also result in a more gliding effect.

4.26 Glide rotary (Advanced Panel)

When the modulation is not used to modulate the pitch frequency (and hence the LFO slew rate can't be used to ge a gliding effect), this control will still add some gliding in the pitch units each time after a resync.
So this requires the Resync to be on.

The gliding effect will only be in 1 direction opposed to the LFO modulation gliding (which is always up & down).

4.27 Input and Output Gain (Advanced Panel)

-40dB … +40dB

The Input gain is applied also on the dry signal.

The output gain is applied only on the enabled effect outputs.

5. Running on iOS (iPad, iPhone)

The Woodulator app supports IAA (Inter App Audio) which allows audio host apps (supporting IAA) to use the Woodulator.
Without a host app the use case for the Woodulator standalone app could be to use your iOS device as a "hardware effect" sending and receiving audio via the mic/headphone connector or via some audio docking station.

The Woodulator app also contains the AUv3 audio unit plugin. Host apps using the AUv3 plugin will present the Woodulator UI in their own window which usually can be resized. The Woodulator UI will scale to follow the resizing.

The number of channels will normally be limited to stereo.

5.1 Presets

Presets can be loaded/saved via Woodulator's preset popup.
The preset.json files are saved in iCloud Drive when enabled or else in the app's local Documents folder.
When saved to iCloud Drive the presets are automatically available (and synced) to all devices running Woodulator and are obviously backed-up as well.

When iCloud Drive is enabled, previously local saved presets will also be shown in the preset popup with ".local" appended to their name. And when for some reason a new preset still has to be written to the local Documents, this can be done by appending ".local" to the name typed in the text edit box.

To Enable iCloud Drive you should be signed-in in iCloud (normally the case when you also want Contacts, Calendars, Mail, etc to be synced to iCloud) and the iCloud Drive switch should be on. Under iCloud Drive all apps using iCloud Drive are listed and obviously Woodulator should be on as well (which it is by default).

Groups (subfolders) are possible by typing the group name followed by a "/" followed by the preset name.

Presets for the AUv3 plugin can also be provided by the host app or can be saved/loaded via Woodulator's popup as described above.

The User presets can also be selected by a Midi Program Change. In the Advanced panel the Midi channel and Program Change mode can be set :

- mode "Index" : program change number is the index in the preset list
- mode "Name" : add ".midiXY" to the preset name to select it with program change XY. (e.g. the preset with name "snaredrum.midi3" will be selected by program change 3. This method is preferred as the selection will not change when presets are added or removed.

5.2 DAW Side Chain

Most DAW's allow to send audio from another track to the side chain input of Woodulator on another track.
In Woodulator you have to set the Modulator Source to "side" or "side envelope" to use this side audio as modulation signal.

Since v1.4 this is now also supported for AUv3 on iOS which only recently implemented this side chain (or more general multi-bus) functionality.

In AUM on iOS for example it looks like below : the second track is sending its audio to the side chain input of Woodulator on the first track. Note that the Woodulator seen in the second track is actually the same as the one in the first track.
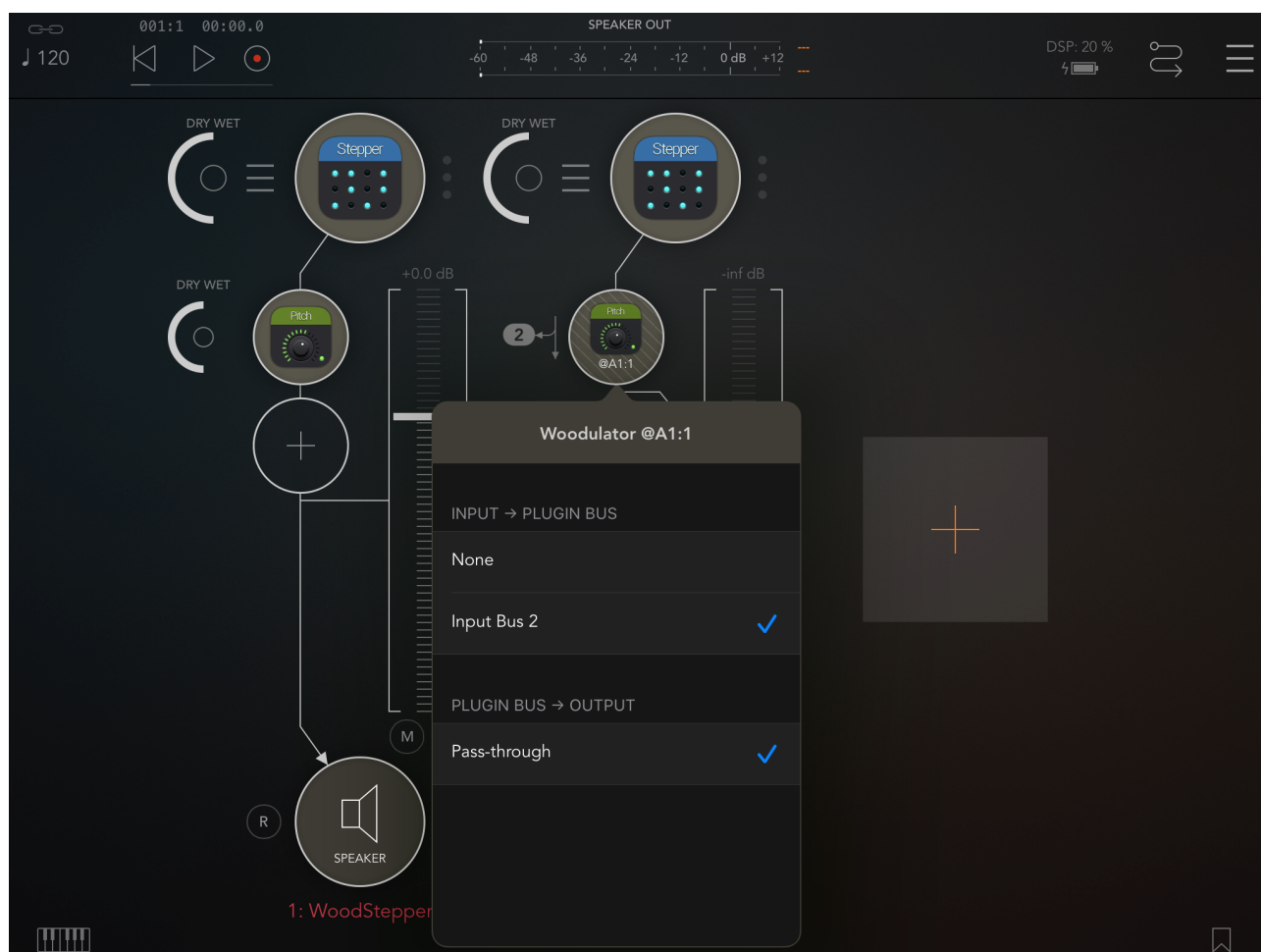
5.4 UI Zoom

Especially when used as AUv3 plugin in a host app, it can happen that the window in which the Woodulator plugin is presented is too small (and sometimes can't be resized)

Pressing the "Woodulator" logo (top left) will zoom in 3 steps to a maximum size.
Next press will cycle back to the un-zoomed state.

When zoomed the UI can be panned by dragging in any spot which is not a control.

6. Running on MacOS

The standalone Woodulator app downloaded from the Mac App Store can be used as such but mainly acts as the license for all Woodulator plugins (AAX , AU , VST3).

This means there is no limit to the number of Macs on which you can run Woodulator (as long as the standalone app is in the Applications folder).

Due to Mac App sandbox security, you have to download the plugin(s) from my website. The installer will move them to the normal plugin folders :
   - for AAX : /Library/Application Support/Avid/Audio/Plug-Ins
   - for AU   : /Library/Audio/Plug-Ins/Components
   - for VST3 : /Library/Audio/Plug-Ins/VST3

When the standalone app is not present, the plugins will run in trial mode : every 60s the audio will be silent for 3s.

From version 2.3 on, there is another licensing mechanism by using a license code obtained by registering a coupon on our website. Coupons can or will be sold for promotions, sales, etc on partner websites.
To enter the license code, click on the "No license found" label.

7. Midi CC controls (Advanced Panel)

When this button is on, CC commands received on the same channel set for Program Changes, will control following parameters.

Controller : Parameter

102 : Feedback amount
103 : Delay level
104 : Delay panning
105 : Pitch 1 level
106 : Pitch 1 panning
107 : Pitch 1 frequency
108 : Pitch 2 level
109 : Pitch 2 panning
110 : Pitch 2 frequency
111 : LFO 1 frequency
112 : Modulator 1 depth
113 : LFO 2 frequency
114 : Modulator 2 depth
115 : Saturation amount
116 : Delay line LP Filter frequency
117 : Pitch out LP Filter frequency
118 : Previous Preset
119 : Next Preset

8. Surround and 3D Panning

When Woodulator is inserted on a track with more than 2 channels (surround or 3D), a "PAN" button will appear which will show the 3D panning panel when pressed.

The panel has 3 distinctive sections :

- a 3D rotatable cube showing the 3 panned outputs
- the panning controls
- the output channel selection

8.1 Panning Controls

A popup selects the current output to be panned (Delay, Pitch1 or Pitch2).

The basic panning is done with the 3 rotaries X1, Y1 and Z1 :

X1 :
horizontal panning (aka left-right) : -100 is completely Left, +100 is completely Right (meaning the opposite of left, not the opposite of wrong :-)

Y1 :
front-back panning : -100 is rear , +100 is front (screen side)

Z1 :
height panning : 0 is at normal listening position (bottom) , +100 is the ceiling.

Although automation can be used to change those panning values, a second panning position can be set with the X2, Y2, Z2 rotaries and when the LFO is on the panning will automatically move between those 2 panning points.
This allows to easily create some dynamic movement to the mix.

When the button "Same for All" is on, the 3 outputs will get the same panning position(s).

When holding the "Shift" key while changing a rotary, only that specific rotary coordinate will be applied to the 3 outputs.

8.2 3D Panning view

The white dot in the cube indicates the Center (bottom) speaker (and hence the front plane).

The cube can be rotated by dragging horizontally and/or vertically in the 3D view.

Each panned output dot has it's own colour :

- cyan : Delay out
- yellow : Pitch1 out
- green : Pitch2 out

The dots will be modulated in size by the peak output signal (between -30dB and -5 dB).

8.3 Output Channels

Each output channel can be set to a speaker in 3D space. Following speakers are supported :

- L : left
- C : center
- R : right
- Ls : left side surround
- Rs : right side surround
- Lsr : left rear surround
- Rsr : right rear surround
- HL : height left
- HR : height right
- HLs : height left surround
- HRs : height right surround

notice that the LFE speaker is not used.

The selected channels also determine the panning space or type :

- when no height speakers are selected a surround panning will be done
- when Lsr and Rsr are not present a 5.0 (bottom) panning will be done, otherwise a 7.0 surround (bottom) panning is done.
- when C is not present a center panned signal will be sent with equal amounts to L and R

When Woodulator is inserted the channels will be set to the default DAW channel configuration.

Once a channel is changed by the user, the channel settings will be stored in the plugin state (and/or Preset).

9. NI (National Instruments) NKS Integration

(NKS is a registered trademark of Native Instruments GmbH.)

9.1 What

NI makes fancy keyboards which allow to browse for a plugin and for presets in the plugin.
The keyboard interfaces with the NI Komplete Kontrol or Machine app/plugin and these apps host the (synth) VST plugins.
See also the NI website : https://www.native-instruments.com/en/specials/komplete/this-is-nks/

Woodulator now fully supports NKS :

- Woodulator appears in the NKS browser (on the keyboard and in Komplete Kontrol or Machine)
- All factory presets can be set from the NKS browser.
- NKS keyboard rotaries are mapped to common Woodulator controls.
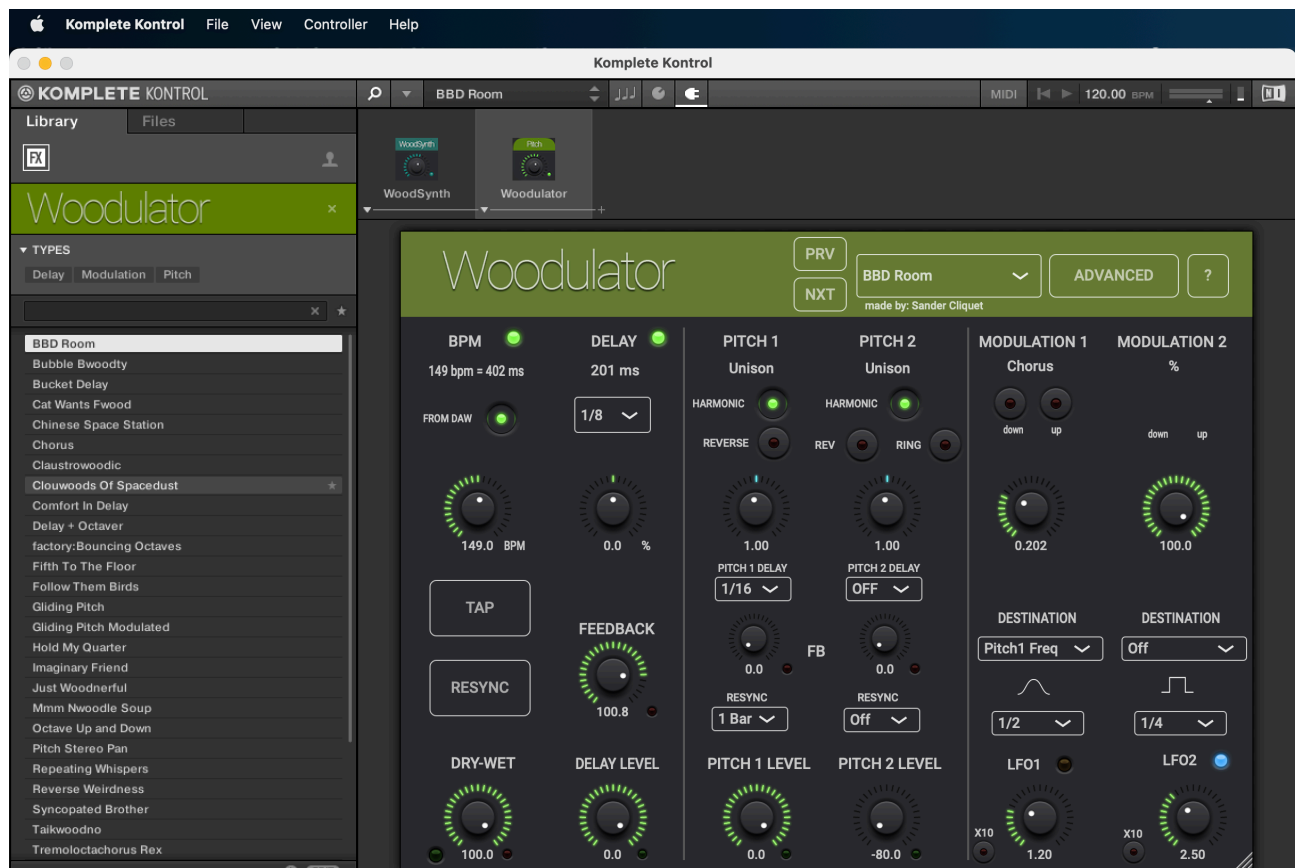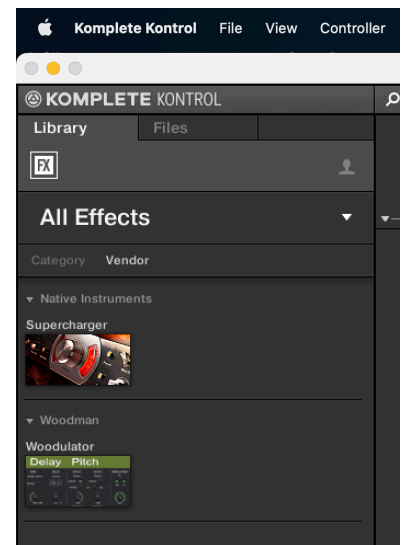
9.2 Woodulator NKS

The Woodulator VST plugin was slightly modified to handle the NKS integration.

The separate installer for NKS does not only contain this VST plugin but also the preset files used by NKS and some preference files needed to be recognised by NKS.

Although this VST will also work for other DAW's, it may be better to use the VST3 in the normal installer when not using the NKS system.

9.3 Presets

NKS uses its own files for the factory presets which you see in the NKS browser (and in the Woodulator preset popup).
So when changing a parameter in the Woodulator UI and saving it in the preset, the Woodulator preset file will be updated but NOT the NKS file.
It also means that adding a new preset via the Woodulator UI will NOT make it visible in the NKS browser.

New presets can be saved in NKS via the Komplete Kontrol save menu. They will appear under the "User" presets in NKS.
I would recommend to also save a new preset with the Woodulator UI so that the new preset is backed-up in iCloud and is also available on your other Woodulator plugins/devices.

The NKS factory preset files for Woodulator are stored in the folder : "/Library/Application Support/Woodman/Woodulator".

The NKS user saved presets are stored in the folder : "/Users/<your user name>/Documents/ Native Instruments/User Content/Woodulator".

A file can be moved/copied from the user folder to the factory folder to make it visible in the factory browser after doing a rescan of the presets in the Komplete Kontrol preferences.

9.4 Keyboard rotary mappings

The rotaries are mapped to a predefined Woodulator control (not by midi CC's but by using the DAW automation parameters).
Although those mappings could be set per preset, Woodulator uses the same mappings for consistency.