nave

advanced wavetable synthesizer

User Manual

English

waldorf

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Foreword

Thank you for purchasing the Waldorf Nave Advanced Wavetable Synthesizer. You now own a synthesizer with one of the most progressive sound synthesis. Nave raises the Wavetable synthesis to a higher sonic level which leads to completely new and fresh sounds.

If you decide to read the following manual, we promise you a lot of fun while reading about and working with the Nave.

Your Waldorf Team

Hint

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Waldorf Music GmbH, Lilienthalstr. 7, D-53424 Remagen, Germany

Nave Development Team

Software:	Rolf Wöhrmann, Stefan Stenzel
Design:	Stephan Gries, Axel Hartmann
Manual:	Holger Steinbrink
Version:	1.0, March 2015

Please visit our website **www.waldorfmusic.de**
Here you will find information of all our products.

We would like to thank

Christian Bacaj, Karsten Dubsch, Willie Eckl, Joachim Flor, Michael von Garnier, Daniel Krawietz, Frédéric Meslin, Oliver Rockstedt, Frank Schneider, Kurt "Lu" Wangard, 吴海彬.

About this Manual

This manual was written to help you to become familiar with the Nave synthesizer. It will also aid experienced users with routine tasks.

To avoid confusion, the terminology in this manual is based on the Nave parameter names. You will find the various terms explained in a glossary at the end of this manual.

We also used a uniform set of symbols to show you topics of particular interest or significance. Important terms are highlighted in bold letters.

Symbols

⚠ **Caution – The comments that follow this symbol will help you avoid errors and malfunctions.**

Info – Additional information on a given topic.

✻ **Example –** Real-world examples to try out.

Highlighted Control Features and Parameters

All of the Nave's buttons, controls and parameters are highlighted in **bold** letters throughout the manual.

example:

- Click on **Mod Source**
- Click on the **Cutoff** dial

The Nave's different parameter pages are illustrated in a depiction of the display.

Installation

Our software is no longer based on an eLicenser. No new installations of our software can be made with an eLicenser. Our new licensing system is completely software-based.

With one license, the software can be installed and used on up to 3 computers simultaneously. Older licenses can be converted into our new licensing system.

For older licenses purchased before 2016, please contact our support.

https://support.waldorfmusic.com

If you have a current license, it can be found in your "myWaldorf" customer account under: License keys.

Here you will find your activation mail and activation key as well as the download-links for MacOS and Windows to download the desired installer.

Download the version for your operating system, unpack the ZIP file and install the purchased plug-in.

Open your host program (e.g. Cubase, Logic, ProTools, Studio One etc.) and check the virtual instruments for your new software. Open it the same way you usually open virtual instruments in your host software. Here you can select the desired plug-in and open it.

The plug-in will start in demo mode. Enter the email and the key for the activation into the provided fields. This is usually done with copy/paste. If you cannot click in the second field, use the TAB key on the keyboard. Then press the Enter key to complete the activation.

Next time you will start the Waldorf Plug-In, it will start in full authorized mode.

If you have any questions, please have a look at the FAQ

www.waldorfmusic.com/produkt-faq

or write an email to: support@waldorfmusic.com

Basic Operation

General Operation

Nave has been optimized for a screen resolution of at least 1024x768 pixels (Small Size setting). If your resolution is smaller, you either have to scroll your window.

> You can change the size of Nave in the **System** menu. Please refer to the chapter "Top Section" for more information.

Preset Patch Selection

Click on the name of a preset in the center of the Nave Top section to open the Preset manager. Here you can choose your favorite Bank as well as the included Patches. Additionally you can filter sounds by category.

> More about loading and saving of Patches can be found on page 16 of this manual.

Control Elements

To edit a sound patch you have to change its parameters. Therefore, Nave offers different types of control elements:

Dials

To set a value, click on the dial, hold down the mouse button and drag around the dial in a circle or move the mouse up and down. A double click resets the parameter value to its default.

Buttons

A simple click on a button activates or deactivates its function. Buttons light up when they have been used.

Pop-up Menus

Click on the corresponding slot to open a pop up menu where you can choose the desired parameter. You can also click and hold on the parameter and move the mouse up and down to choose the desired parameter.

Fader

Click on the corresponding fader and hold it. Move your mouse to the left or the right to change the value. Some faders need to move vertically to change values.

Selection Symbols

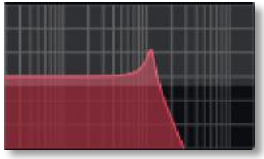
Selection symbols can be easily clicked. The corresponding symbol lits, when activated. Clicking on another symbol deactivates the first selected. The Filter and Drive types can be deactivated by clicking again.

Switches

Switches can be simply clicked. The switch of the corresponding function switches to the respective position. Keep in mind that some switches can have up to three positions.

Graphical Elements

Click on the corresponding graphic and move the mouse vertical or horizontal to change values. This is valid for the 3D representation of the wavetables, the envelopes, the filter graph as well as the equalizer.



Wheels

To change the value, click on the wheel and drag it up or down. The Pitch wheel snaps automatically back into its center position as soon as you release the mouse button.

The Virtual Keyboard

Nave provides a virtual keyboard with 128 keys. Click on a key to hear the corresponding note. The vertical position of the initial click of the key determines the velocity. You can also use different play modes. Please read more about this on page 50 of this manual.

The Blades

The Blade keyboard allows normal playing but you can click and hold a blade and move it vertically to release additional modulations.

This will be displayed by a yellow indicator bar.

X-Y Pad

Click on the illuminated button within the X-Y pad and move the mouse. A double click will center the button exactly in the middle of the pad. A single click on any position within the pad will set the button to this position.

The Nave Controls

Overview of Functions

Nave consists of numerous sound-shaping components.

> Is this your first synthesizer? Are you curious about sound synthesis? If so, we recommend to read the chapter "Sound Synthesis Basics" in this manual.

You should know that Nave consists of two different types of components for sound generation and sound shaping:

- Sound synthesis: (Wavetable-)Oscillator, Filter, Amplifier, Effects: These modules represent the audio signal flow. Sound generation actually occurs within the Oscillator. It produces wavetables and other waveforms. The Filter then shapes the sound by amplifying (boosting) or attenuating (dampening) certain frequencies. The Amplifier is located at the end of the signal chain. It setss the overall volume of the signal and can add some saturation. Additionally, effects can be added to the signal.
- Modulators: The Modulators are designed to manipulate or modulate the sound generating components to add dynamics to the sound. The Low-frequency Oscillators (LFO) are designed for periodic or recurring modulations while the Envelopes are normally used for modulations that occur once.

The Nave Sections

Nave is divided into different sections which are described in detail within the next chapters:

- The **Top Section** includes the System settings as well as the Preset manager.
- The **Wave Oscillator Section** includes all controls regarding the wavtable oscillators.
- The **Oscillator Section** includes all controls regarding the additional oscillator as well as the oscillator mixer.
- The **LFO Section** includes all controls regarding the two LFO.
- The **Filter & Drive Section** includes all controls regarding the multimode filter as well as the Drive controls.
- The **Envelope Detail Section** includes all controls regarding the Filter envelope, the Amplifier envelope and the Free envelope.

- The **Arpeggiator Detail Section** includes all controls regarding the arpeggiator.
- The **Effects Detail Section** includes all controls regarding the Phaser/Flanger/Chorus effects, the Delay effects, the Reverb, the Equalizer as well as the Compressor effect.
- The **Wave Detail Section** includes a 3D-graphical overview with advanced edit functions.
- The **Matrix Detail Section** includes a modulation matrix with 10 routing options.
- The **Control Detail Section** includes various controls for wheels, X-Y pads and further functions.
- The **Controls Section** offers a keyboard, the blade keys or two X-Y pads (depends on the settings in the Control Detail section).

The Top Section

The Top section includes the following options:

System

Click on the System button to open a pop-up menu with system settings. The following options are available:

- **About** opens a windows with information about the Nave team and the actual software version of Nave.
- **Waldorf Music** opens the Waldorf Music company website (if your computer is connected to the internet).
- **Manual** opens the Nave manual PDF form your hard disk.
- The size of Nave can be switches between **Small Size** and **Big Size**. On a Mac computer with retina display an additional size (**Medium Size**) is available. The big size is 1.3 times bigger than the regular small size. Set the size to your needs.
- **Velocity to Mix** - if deactivated, all velocity modulations are deactivated but you could still assign it ma-

nually from the mod matrix (or from the dedicated modulation pop-up menus like e.g. for Cutoff). For the velocity to amp modulation make sure, "Velocity to Mix" is deactivated before you set up a velocity modulation for Amp Env Gain in the Mod Matrix.

- **Gain** boosts the overall output for Nave. You can choose gain levels from 0 to 24 dB.

Preset Manager

Click on the Preset name to open the Preset manager. Here you find three columns for selection of sound banks (**Bank**), sound categories (**Category**) and sound patches (**Patch**).

- Click on the desired bank. The patch list will be updated automatically with the included sounds.
- Click on the desired sound category. The patch list automatically shows all sounds which belong to this category. To set back the category list click on *All*.
- Click on the desired patch to load it.

The right section of this window offers additional functions:

> Some patch functions are only available for User patches and User banks.

- *Rename Patch* (only for User patches) opens an input field for renaming the actual patch.
- *Delete Patch* (only for User patches) deletes the actual patch after a security confirmation.
- *New Bank* creates a new bank with the standard name "User Bank (number)".
- *Rename Bank* (only for User banks) opens opens an input field for renaming the actual bank.
- *Delete Bank* (only for User banks) deletes the actual bank with all included patches after a security confirmation.

- *Import* imports a patch (.nave) or a bank (.navebank) from your computer hard disk to Nave. A separate selection window opens automatically to proceed.

The patches and banks from the Nave iOS version are compatible to this version of Nave.

- *Export* exports the actual patch or the actual bank to your computer hard disk. A separate selection window opens automatically to proceed.

Click on *Close* at the bottom of the window to close it.

Compare (Comp)

Click on **Compare** to compare the actual edited patch with the original one (the **Compare** button will lit, when activated). Click the button to deactivate the compare function.

The Save Function for Patches

Click on **Save** to save the actual patch:

- Click on a *Bank* name to allocate the patch to the corresponding user bank.
- Click on *Category* to allocate the patch to a desired sound category.
- Rename the patch before finally saving it.
- Click on *Save* to finally save the patch.
- Click on *Cancel* to cancel the process.

Keep in mind the some host applications offers additional options to save and load sounds, espacially when working with VST 3 hosts. Please read the corresponding manual to become familiar with that saving and loading functions.

Init

Click on **Init** to initialize the actual patch. All parameters will be set to default values. To avoid accidently initialization you have to confirm this process.

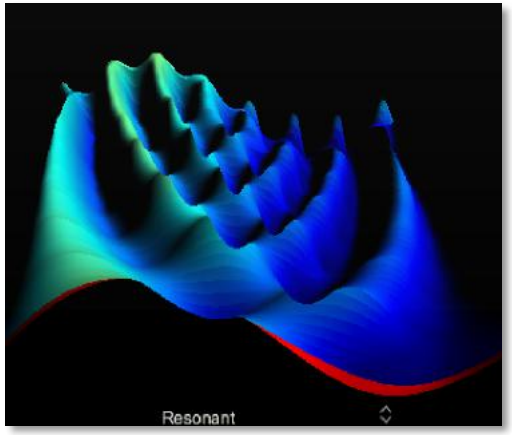
The Wave Oscillator Section

This is the heart of Nave. Nave offers two Wave modules as well as an Oscillator module. Click on "Wave 1" or "Wave 2" to switch between Wave module 1 and 2. The selected Wave oscillator will lit blue.

An explanation of wavetable synthesis can be found in the chapter "Sound Synthesis Basics".

The Wavetable Display

The Wavetable display shows a 3D representation of the selected wavetable. The position of the **Wave** parameter is shown by a thin red line.



You can use the following controls:

- Click and hold on the Wavetable display and move the mouse into the corresponding direction to turn the wavetable representation in all three dimensions.

- Use the mouse scroll wheel to zoom the 3D representation.
- Double click leads to the initial dimension and position of the representation.

The Wavetable display offers deeper controls. Please read the chapter "Wave Detail Section".

Wavetable Selection

diverse wavetables

Click on the wavetable name under the 3D Wave display to open a pop-up menu with all available factory wavetables as well as your own custom wavetables.

A list of all Nave wavetables can be found in the Appendix of this manual.

Detune

-50c...+50c

Fine-tunes the oscillator in steps of 1/100th of a semitone. The audible result of detuned oscillators is a chorus-like effect. Use a positive setting for one oscillator and an equivalent negative setting for another

- ✻ A low value of *±1* results in a slow and soft flanger effect.
- ✻ Mid-ranged settings of *±5* are perfect for pads and other fat sounding programs.
- ✻ High values of *±12* or above will give a strong detune that can be used for accordions or effect sounds.

Semi

-24...+24

Sets the pitch of the wavetable oscillator in semitone steps. The standard setting for this parameter is *0*, but there are cases where different values are interesting as well.

- ✻ Organ sounds often include a fifth, therefore one oscillator's semitone parameter must be set to *+7*.
- ✻ Lead and Solo sounds might sound interesting when you set one Oscillator to a fourth (+5 semitones).
- ✻ When making ring modulated sounds, try to use dissonant values, e.g. *+6* or *+8*.

Wave *0.0...64.0*

This parameter defines the startpoint of the selected wavetable. Click on the inner dial and move your mouse to change values. A setting of *0* selects the first wave, the maximum setting selects the last wave of the wavetable. The actual wave position will be marked as a thin red line within the display.

Spectrum *-1.00...+1.00*

The spectral envelope of a sound can be controlled independant from the pitch. Further the Wave oscillator can produce perfect a periodic sound up to noisy components. The Spectrum parameter transposes the spectrum of a sound, specifically the spectral envelope. Click on the outer dial ring and move your mouse to change values. Negative values move the spectrum down, higher values moves it up. The default setting is *0*, where no transposition happens. This is the behaviour of the classic wavetable synthesis.

Noisy *0.00...1.00*

This parameter adds a noisy sound character to the Wave oscillator. The spectrum is unaffected by the setting of this parameter.

Brilliance *0.00...1.00*

A setting of this parameter is only audible, when **Spectrum** is transposed relative to the original pitch of a sound. Higher settings result in narrow peaks. This can lead to the effect, that the perceived pitch comes from the sound spectrum instead of the oscillators pitch. Sometimes value changes of this parameter are partially subtle.

You can modulate **Noisy** and **Brilliance**. Please use the modulation matrix (see page 47).

Wave Modulation Source *diverse sources*

Activate this modulation by clicking on the button. Click on the pop-up menu to open the list with all sources. Then select an entry by clicking on the desired source. A common source for Wave modulation is an LFO or an envelope.

Wave Modulation Amount *-1.00...+1.00*

Determines the amount of modulation that is applied.

Travel *-1.00...+1.00*

Travel allows the cyclic moving through a wavetable. Positive values allow a forward movement, negative values a backward movement. Lower values slow down the movement speed, higher values speed it up. Cyclic means, that a wavetable starts automatically again from beginning when the end is reached. If you don't wish a cyclic modulation, use the **Wave** parameter modulated with an envelope, a LFO or any other modulation source.

✻ Use **Travel** with a value setting of *0.20* to become an impression of the sound diversity of the wavetables.

Clocked / Sync (Clck/Sync)

Here you can set up the synchronisation of the **Travel** parameter:

- There is no synchronisation in the center setting (*off*).
- If *Clocked* is activated, **Travel** is controlled by the host tempo. If so, you can set up **Travel** in musical values. The highest amount is *1024*, where one turn needs 1024 beats. Keep in mind that **Travel** can have positive or negative values. If *Clocked* is active, **Travel** reacts also as described below (*Sync*).
- If *Sync* is activated, all triggered notes of a patch behave as a single triggered note. **Travel** is started simultaneously for all triggered notes.

Spectrum Modulation Source *diverse sources*

Activate this modulation by clicking on the button. Click on the pop-up menu to open a list with all sources. Then select an entry by clicking on the desired source.

Spectrum Modulation Amount *-1.00...+1.00*

Determines the amount of modulation that is applied to the transposition of the spectrum.

Keytrack *0%...100%*

The default setting is *100%*, so that the spectrum is in conjunction with the pitch of a sound. The pitch doesn't affect the spectrum, when **Keytrack** is set to 0%. This setting is recommend for speech or singing, so that the formants are not influenced by the pitch. Based on this, we have included a speech synthesizer for wavetables. **Keytrack** can also be set to other values, so that the spectrum is transposed to the pitch.

The Oscillator Section

Beside the Wave modules, Nave offers an additional Oscillator module to create typical analog waveforms.

You can use this additional oscillator as sub oscillator in addition to the wavetable oscillators.

Shape Buttons *Tri/ Pulse/ Saw/ Noise Types*

Click on the corresponding symbol to select the desired waveform. The following waveforms are available:

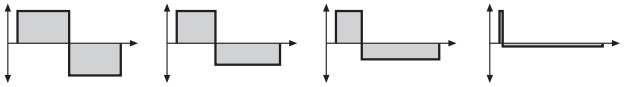
- *Triangle* selects the triangle waveform. The triangle mainly consists of the odd harmonics with very low magnitudes.
- *Pulse* selects the pulse waveform. A pulse waveform with a pulse width of 50% has only the odd harmonics of the fundamental frequency present. This waveform produces a hollow / metallic sound. If the Pulse waveform is selected, the parameter **Pulsewidth** is used to change the pulsewidth of the waveform.
- *Saw* selects the sawtooth waveform. A Sawtooth wave has all the harmonics of the fundamental frequency in descending magnitude.
- *White Noise* is a fundamental source for any kind of analog-type percussion. It offers the same level over the complete frequency range. Also, wind and other sound effects can be created by using noise.
- *Pink Noise* – This special kind of noise produces higher levels in the deeper frequency range. It matches more with the human hearing as the unfiltered white noise.

Semitone *-24...+24*

Sets the pitch of the oscillator in semitone steps. The standard setting for this parameter is *0*, but there are cases where different values are interesting as well, e.g. with values of *-12* or *-24* you can use the oscillator as a sub oscillator.

Pulsewidth *0.01%...50%*

Sets the pulse width of the Pulse waveform (when selected). The minimal value is equivalent to a pulse ratio of <1%, the maximum value is equivalent to 50% (square wave). Other values creates asymetric square waves which contain equal harmonics with different levels. The following picture illustrates the effect of the pulsewidth parameter:



Pulsewidth Modulation Source *diverse sources*

Activate this modulation by clicking on the button. Click on the pop-up menu to open the list with all sources. Then select an entry by clicking on the desired source. Common sources for pulsewidth modulations are a LFO or an envelope.

Pulsewidth Modulation Amount *-1.00...1.00*

Determines the amount of modulation that is applied.

✻ To create a thick oscillator sound, use a triangular *LFO* as **Modulation Source** with full **Amount** and a **Pulsewidth** of around *40*. This basic setting is useful for very big string and lead sounds.

Überwave Active *On/ Off*

Activates the Überwave function. This module can generate up to 8 oscillator signals simultaneously (for triangle, pulse or sawtooth shapes only).

Überwave Density *2...8*

Determines the number of played oscillators, when **Überwave** is activated.

Überwave Spread *0.00...1.00*

Detunes the oscillators, when **Überwave** is activated.

Glide *0.00...1.00*

Enables or disables the Glide effect. "Glide" or "Portamento" describes the continuous gliding from one note to another. This effect can be created on fretless stringed instruments or some brass instruments (e.g. trombone). It is very common on synthesizers and used throughout all music styles. Please note that Glide affects the pitch of all oscillators.

Glide works only with legato played notes.

Activate this parameter by tapping the corresponding button. Use **Glide** to determine the glide time. Low values will give a short glide time in a range of milliseconds that gives a special character to the sound. High values will result in a long glide time of up to several seconds which can be useful for solo and effect sounds.

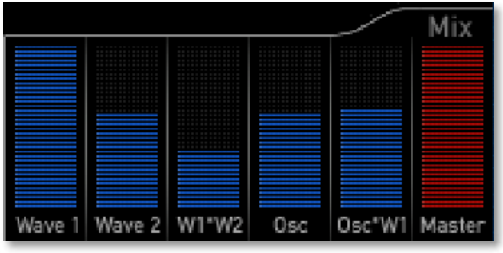
Pitch Modulation Source *diverse functions*

Activate this modulation by clicking on the button. Click on the pop-up menu to open the list with all sources. Then select an entry by clicking on the desired source. A common source for pitch modulation is an LFO.

Pitch Modulation Amount *-1.00...1.00*

Determines the amount of modulation that is applied.

Oscillator Mixer *-inf...0 dB*



The different Mix faders control the volume of each module as well as the ring modulation levels.

- *Wave 1* controls the volume of the first Wave module.
- *Wave 2* controls the volume of the second Wave module.
- *W1*W2* controls the volume of the ring modulation between Wave module 1 and 2. For more information about ring modulation please read the next page.

- *Osc* controls the volume of the Oscillator module.
- *Osc*W1* controls the volume of the ring modulation between Wave module 1 and the Oscillator module. For more information about ring modulation please read the following section.
- *Master* controls the overall volume of Nave.

In addition to the Master volume you can select different gain presets in the **System** menu.

What is ring modulation? From a technical point of view ring modulation is the multiplication of two oscillators' signals. The result of this operation is a waveform that contains the sums and the differences of the source frequency components. Since the ring modulation generates disharmonic components, it can be used to add metallic distorted sound characteristics. Please note that in a complex waveform all harmonic components behave like interacting sine waves, resulting in a wide spectral range of the ring modulated sound.

✻ Ring modulation can be very interesting when a slow pitch modulation is applied to one oscillator. This creates spacy effect sounds.

✻ For an E-Piano sound, you might apply ring modulation when one high pitched oscillator's **Keytrack** is lowered to i.e. *50%*.

✻ If you turn down the pitch of one oscillator markedly, you can get an effect very similar to Amplitude modulation. Use this for sounds with a periodic element if you wish.

✻ Crooked pitch intervals of both Wave modules generate very interesting ring modulation sounds.

The Filter & Drive Section

Nave offers a mutlimode filter with additional settings. There is also a flexible drive parameter.

Cutoff

12.25...19912 Hz

Controls the cutoff frequency for the low pass and high pass filter types and the center frequency for the band pass

- When a low pass type is selected via the **Type** parameter, all frequencies above the cutoff frequency are damped.
- When a high pass type is selected, all frequencies below the cutoff frequency are damped.
- When a band pass type is selected, only frequencies near the cutoff setting will be passed through.

You can bring more movement into the sound by modulating the cutoff frequency via the LFOs, the filter envelope or the **Keytrack** parameter of the filter.

Resonance

0.00...1.00

Controls the emphasis of the frequencies around the cutoff point. Use lower values to give more brilliance to the sound. At higher values the sound gets the typical filter character with a strong boost around the cutoff frequency. When the setting is raised to maximum, the filter starts to self-oscillate, generating a pure sine wave.

This feature can be used to create analog-style effects and percussion-like electronic toms, kicks, zaps etc.

Filter Response Graph

Click into the graphic display to simultaneously edit **Cutoff** (horizontally) and **Resonance** (vertically).

Filter Type *LP / BP / HP*

Selects the filter type. You can decide between filter types with a 24dB or a 12dB slope. Filter types can also deactivated by clicking again on it.

- **LP** *(Lowpass)* removes frequencies above the cutoff point.
- **BP** *(Bandpass)* removes frequencies both below and above the cutoff point. As a result, the sound character gets thinner. Use these filter types when programming effect and percussion-like sounds.
- **HP** *(Highpass)* removes frequencies below the cutoff point and is useful to thin out a sound's bass frequencies. This may also give interesting results in conjunction with cutoff frequency modulation. By doing this you can e.g. "fly-in" a sound starting at its high harmonics and then coming up to its full frequency range.

Keytrack *-200%...+200%*

Determines how much the cutoff frequency depends on the MIDI note number. The reference note for Keytrack is E3, note number 64. For positive settings, the cutoff frequency rises on notes above the reference note, for negative settings the cutoff frequency falls by the same amount, and vice versa. A setting of *+100%* corresponds to a 1:1 scale, so e.g. when an octave is played on a keyboard the cutoff frequency changes by the same amount.

> ✻ On most bass sounds lower settings in the range about *+30%* are optimal to keep the sound smooth at higher notes.

Filter Modulation Source *diverse functions*

Activate this modulation by clicking on the button. Click on the pop-up menu to open the list with all sources. Then select an entry by clicking on the desired source.

Common sources for filter frequency modulations are LFOs or envelopes.

Filter Mod Amount

-1.00...+1.00

Determines the amount of modulation that is applied. For positive settings, the filter cutoff frequency is increased by the modulation of the filter envelope, for negative settings, the cutoff frequency is decreased. Use this parameter to change the timbre of the sound over time.

Envelope

-1.00...+1.00

Determines the amount of influence the filter envelope has on the cutoff frequency. For positive settings, the filter cutoff frequency is increased by the modulation of the envelope, for negative settings, the cutoff frequency is decreased. Use this parameter to change the timbre of the sound over time. Sounds with a hard attack usually have a positive envelope amount that makes the start phase bright and then closes the filter to get a darker sustain phase. String sounds, on the other hand, usually use a negative envelope amount that gives a slow attack before the cutoff rises in the sustain phase.

Env Velocity

-1.00...+1.00

Determines the amount of influence the filter envelope has on the cutoff frequency, based on key velocity. This parameter works similarly to the **Envelope** parameter with the difference that its intensity is velocity based. Use this feature to give a more expressive character to the sound. When you hit the keys smoothly, only minimal modulation is applied. Hitting them harder, the modulation amount also gets stronger.

The overall modulation applied to the filter's cutoff frequency is calculated as the sum of both the **Envelope** and **Env Velocity** parameters. Therefore you should always bear this total in mind, especially when the filter does not behave as you expect. You can also create interesting effects by setting one parameter to a positive and the other to a negative amount.

Drive Curve

diverse functions

Determines the character of the drive. You can also deactivate the drive curves completely. The following drive curves are available:

- **PNP** generates a distortion based on a bipolar transistor.
- *Tube (***Tub***)* simulates the asymmetric distortion of a tube circuit.
- *Pickup (***Pu***)* simulates an electrostatic pickup. This drive type sounds very interesting, when the audio signal level is modulated.
- *Diode (***Dio***)* generates a typical diode distortion.
- *Crunch (***Cr***)* is a sinusoidal waveshaper. It generates FM-like sounds that can be distorted very extremly.

Drive Amount

0.00...1.00

Determines the amount of saturation that is added to the signal. If set to *0*, no saturation will be added or, in other words, the signal will remain clean. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will bring in more and more distortion, suitable for harder lead sounds and effects.

Location

diverse functions

Determines, where Drive is located in the audio signal path:

- **Pre Filter** routes the drive directly before the filter.
- **Post Filter** routes the drive directly after the filter.
- **Pre EQ** distorts the signal before it is routed in the equalizer. Because this is a sum distortion, the played voices create additional intermodulations, which leads to more sound sharpness.
- **Post EQ** routes the drive directly after the equalizer.

The LFO Section

In addition to the main oscillators, Nave is equipped with two low frequency oscillators (LFO) that can be used for modulation purposes. Each LFO generates a periodic waveform with adjustable frequency and shape. Click on **LFO 1** or **LFO 2** to select the corresponding LFO. The actual LFO will lit in blue.

LFO Shape *diverse waveforms*

Sets the type of waveform generated by the corresponding LFO.

- The *Sine* shape is best suited for Wave or pan modulations.
- The *Triangle* shape is perfect for smooth pitch, filter or volume modulations.
- The *Square* shape can be interesting for hard pan modulations or special effects.
- The *Sawtooth down* shape can generate interesting filter or volume changes.
- The *Sawtooth up* shape can generate interesting filter or volume changes.
- *S&H* (*Sample & Hold*) samples a random value and holds it until the next value is generated. If **Speed** is set to *0*, a random value is generated on each new note.

Speed *0...20 / 0.125...1024*

Determines the frequency of the corresponding LFO. At low values, it might take several minutes to perform a complete cycle while higher values are nearly in the audible range. When **Clocked** is activated, you can adjust the **Speed** in musical values. The lowest possible value is *1024 beats*. That means, that a complete LFO cycle would need 1024 beats.

Sync / Clocked *Sync / Clocked / Off*

This switch controls the synchronisation of the corresponding LFO:

- When set to *Sync*, the LFO phases of all voices are synced so that they sound as one LFO. This can be interesting when the LFO is applied to modulate **Cutoff** or **Pan**.
- If *Clocked* is activated, the LFO is controlled by the host tempo. If so, you can set up **Speed** in musical values. The highest amount is *1024*, where one turn needs 1024 beats. If *Clocked* is active, the LFO also behaves as in *Sync* mode.
- *Off* deactivates all LFO synchronisations.

Delay

0.0...10.0 s

Controls the speed in seconds, with which the LFO is faded in. With this parameter you can create slowly rising modulations that might create interest when routed to wave, pitch or volume.

Phase

0...360 deg, free

Controls the initial phase of the corresponding LFO when a new note is started. *Free* (maximum setting) means that the LFO isn't restarted on a new note but runs freely while other values set the LFO phase to the respective offset in degrees.

The Detail Sections

Click on the desired button (**Env**, **Arp**, **FX1**, **FX2, Wave, Matrix** or **Control**) to open the corresponding overview. The actual detail page button will be lit blue.

The Envelope Detail Section (Env)

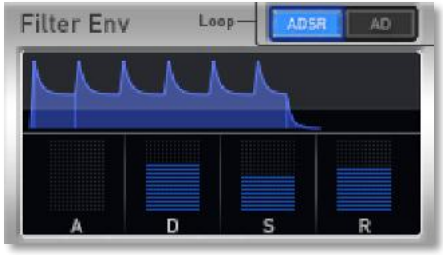
The Nave envelopes allow you to manipulate sound parameters via rate or time modulations. Nave offers three independent programable envelopes:

- Filter Envelope (**Filter Env**). This envelope is fixed to control the filter but can also be used for other modulations.
- Additional Envelope (**Free Env**). This envelope can be used freely to perform additional modulations on any module.

- Amplifier Envelope (**Amp Env**). This envelope is fixed to control the sound volume, but can also be used for other modulations.

The parameter controls of the envelopes are nearly similar. Only the **Free Envelope** comes without the Linear/Exponential switches for the envelope phases.

Filter Env / Free Amp / Amp Env

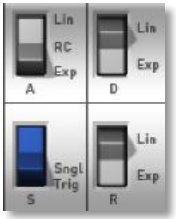


- **Attack** determines the attack rate or amount of time it takes for a signal to go from zero to maximum level.
- **Decay** determines the decay rate or amount of time it takes for a signal to reach the **Sustain** level.
- **Sustain** determines the sustain level which is held until a note ends.
- **Release** begins, when a note has ended. During this phase, the envelope fades to zero at the rate determined by the Release value.

The envelopes also contain a loop function:

- **AD** repeats the **Attack** and **Sustain** phases while a note is hold until it gets released and normal fade out starts. After releasing the note, **Release** phase of the envelope starts.
- **ADSR** is identical to **AD**. As soon as the **Release** phase starts, the loop will go on.

The Filter and Amp envelopes offer a switchable characteristic for every single phase. **Sustain** does not offer phase characteristic because it would not make sense for a rate based parameter.



- **Linear (Lin)** switches the corresponding envelope phase to linear.
- **RC** (only Attack phase) simulates an analogue circuit and delivers a convex attack envelope phase.
- **Exponential (Exp)** switches the corresponding envelope phase to exponential.

The envelopes offers a single trigger function (**Sngl Trig**). It works in Mono mode only, which can set up in the **Control Detail** section:

- When **Mono** mode is deactivated, every note starts the envelope of its own voice, also when played legato.
- When **Mono** mode is activated, the envelopes of all voices of a selected patch behave like a single envelope. This is the perfect setting for playing legato. The common envelope starts as soon as the first note is played. The sustain level remains until the last note is released. Afterwards the release phase is active.

The Arpeggiator Detail Section

An Arpeggiator is a device that splits an incoming chord into its single notes and repeats them rhythmically. Different sequence modes can be defined for the Arpeggiator to cover a wide range of applications. In addition to the synthesis features, Nave offers a programmable arpeggiator. It can play a wide range of different rhythm patterns.

The following parameters are available:

- **Arpeggiator Active** – click on this button to activate or deactivate the arpeggiator.

- **Direction** sets the direction that is used to play back the arpeggio. This parameter works in conjunction to **Octave Range** and **Sort Order**:

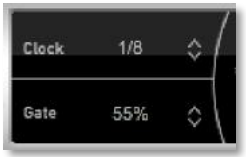
- If *Up* is selected, the note list is played forward and the octaves are transposed upward. The arpeggio starts in the original octave and goes up to the highest octave (determined with **Octave Range**). Then the arpeggio is repeated.
- If *Alt Up* is selected, the note list is first played forward and the octaves are transposed upward. After reaching the last note of the note list in the highest octave to play, the note list is played backward and the octaves are transposed downward down to the first note of the note list in the original octave. Then the arpeggio is repeated
- If *Random* is selected, the note list will be played randomly.
- If *Down* is selected, the note list is played backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octave Range**) and goes down to the original octave. Then the arpeggio is repeated.
- If *Alt Down* is selected, the note list is first played backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octave Range**). After reaching the first note of the note list in the original octave, the note list is played forward and the octaves are transposed upward up to the last note of the note list in the highest octave to play. Then the arpeggio is repeated.
- If *Funnel* is selected, the note list will be played alternately from the highest and the lowest note of the note list.

- With the **Sync** function you can determine the synchronisation of the arpeggiator notes to the beat. If **Beat** or **Onset** is activated, the Nave tempo is automatically synchronized to the tempo of the host application.

  - If **Beat** is activated, arpeggiator notes are automatically set on the downbeat position of the host tempo.
  - If **Onset** is activated, arpeggiator notes are automatically set to the metric position of the incoming trigger notes.
  - If neither **Beat** nor **Onset** is activated, Nave creates its own tempo based on the settings of the **Speed** parameter.

- With the pop-up menu **Pattern** you can select one of the internal rhythm and accent patterns.

- With the settings of the pop-up menu **Clock** you can determine the note value for the steps of the rhythm pattern in a range from whole notes to triplet notes.



- With the settings of the pop-up menu **Gate** you can determine the note length depending on the original length. The lower the value, the shorter the played notes.

- **Speed** sets the basic tempo of the arpeggiator in BPM (beats per minute). Settings from 40 up to 320 BPM are possible. **Speed** takes also affect of the **Clocked / Speed** functions from Travel, both LFOs and the Delay effect. If either **Beat** or **Onset** is activated, the Nave is automatically synchronized to the host tempo. In this case, **Speed** has no influence.

- **Timing** determines how much the timing affects an arpeggio step. If **Timing** is set to *50%*, the arpeggio is played back without any shuffled timing. Settings from *51%* to *95%* increase the shuffling of the notes and creates a typical swing.

- **Octave Range** determines the range of the single notes in octaves. When it is set to *0*, the note list will be played back in the same octave as originally entered. Greater values mean that the note list is repeated in higher or lower octaves. The octave in which the arpeggio starts is determined by the **Direction** parameter. If you play notes that span more than one octave, they are still kept in the note list and played back before the note list is transposed.

- **Reset** can set up a limit for the played notes. This is useful to create inclined measures. Set **Reset** to *8* or *16* to start an arpeggio at the beginning of a measure.

- The **Mode** switch sets the way the Arpeggiator works:

- If *Normal* is selected, the arpeggiator works as follows: When you press a note or a chord on the keyboard, it is split up and repeated rhythmically. As soon as you release a note, it is removed from the arpeggio rhythm. Conversely, as soon as you add another note to the existing chord, it is inserted into the arpeggio. When you release all notes, the arpeggiator stops.

- If *1 Shot* is selected, the arpeggiator splits up all played notes and plays back one arpeggio. After the arpeggio rhythm is played once, it is stopped automatically unless you hit a new chord. This mode is especially useful in a live performance where you might have to "synchronize" yourself. Just hit a chord at each new bar.
- Wenn *Hold* is selected, the arpeggiator splits up all played notes and generates a continuous arpeggio even when the chord is released.

- With the settings in the pop-up menu **Sort Order** you can determine, how the notes you originally play are split up for the arpeggio:

  - If *As Played* is selected, the notes are sorted in the exact order you played them.
  - If *Reversed* is selected, the notes are sorted to the reverse order in which you played them. If you e.g. press E1, G1 and C1, the note list is sorted to C1, G1 and E1.
  - If *Key Lo>Hi* is selected, the notes are sorted from the lowest note to the highest note. If you e.g. press E1, G1 and C1, the note list is sorted to C1, E1 and G1.
  - *Key Hi>Lo* is the opposite of *Key Lo>Hi*. The example would be sorted as G1, E1 and C1.
  - If *Vel Lo>Hi* is selected, the notes are sorted from the softest to the loudest velocity.
  - *Vel Hi>Lo* is the opposite of *Vel Lo>Hi*.
  - If *Chord* is selected, the arpeggiator plays a chord based on all notes oft he note list.

- With the settings in the pop-up menu **Velocity Mode** you can determine, how velocity is interpreted in the arpeggio:
  - If *Each Note* is selected, each note of the arpeggio is played back with the velocity that you originally played.

- If *First Note* is selected, the first note you played sets the velocity for all arpeggio steps.
- If *Last Note* is selected, the last note you played sets the velocity for all arpeggio steps.

The Effect Detail Section (FX1 & FX2)

Nave offers two extensive effect units with an additional Equalizer and Compressor.

Click on one of the corresponding button (**FX 1** or **FX 2**) to activate it. The corresponding button will lit blue.

Mod EFX (FX1 Section)

This effect unit can produce either a Phaser, a Flanger or a Chorus effect.

Based on the choosen Mod EFX effect, different editing parameters are available.

Phaser

A Phaser effect is generated by adding a second signal with a different phase. This generates an effect with equally spaced frequency peaks or throughs. The phase changing is controlled by a LFO.

Speed *0.01...5.0*

Sets the LFO speed of the Phaser effect.

Depth *0.00…1.00*

Sets the modulation depth of the Phaser effect.

Phase *0.00…1.00*

Sets the phase offset of the modulation oscillator between left and right audio channel. Higher values lead to a wider stereo range.

Feed *-1.00...+1.00*

Controls the feedback amount of the signal.

Color *0.00…1.007*

Controls the phase position of the Phaser signal. Lower settings produce a more resonant Phaser effect.

Dry / Wet *0…100%*

This parameter controls the volume ratio between the original signal and the effect output. If set to *0%*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *100%*, the pure effect signal will be heard.

For the typical Phaser effect sound, the **Dry / Wet** parameter should be set to 50%.

Flanger

The flanger effect is very similar to the chorus effect, but features feedback circuitry to feed the generated signal back into the comb filter. This generates a deeper detuning and colorizes the signal. With extreme settings you can hear a whistling sound which is very characteristic of a flanger effect.

Speed *0.01...10.00*

Sets the LFO speed of the flanger effect.

Depth *0.00…1.00*

Sets the modulation depth of the flanger effect.

Phase *0.00…1.00*

Sets the phase offset of the modulation oscillator between left and right audio channel. Higher values lead to a wider stereo range.

Feed *-1.00...+1.00*

Controls the feedback amount of the flanger signal.

Dry / Wet *0…100%*

This parameter controls the volume ratio between the original signal and the effect output. If set to *0%*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *100%*, the pure effect signal will be heard.

Chorus

A Chorus effect is generated by using comb filters that generate slightly detuned copies of the input signal and mix it into the output signal. The result sounds like an ensemble of several simultaneous sounds, like a choir as opposed to a single voice; hence the name Chorus. The detuning is generated by an internal LFO that can be controlled in speed and depth.

Speed *0.10...20.0*

Sets the LFO speed of the Chorus effect.

Depth *0.00…1.00*

Sets the modulation depth of the Chorus effect.

Dry / Wet *0…100%*

This parameter controls the volume ratio between the original signal and the effect output. If set to *0%*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *100%*, the pure effect signal will be heard.

Delay (FX1 Section)

A Delay is an effect that produces echoes of the input signal.

Delay L *0 ms…2.00 s*

Sets the length of the Delay tap for the left channel in milliseconds or rather seconds. If **Clck** is activated, the delay lenght can be entered in musical values.

Delay R *0 ms…2.00 s*

Sets the length of the Delay tap for the right channel in milliseconds or rather seconds. If **Clck** is activated, the delay lenght can be entered in musical values.

Delay Chained

If activated, the **Delay L** and **Delay R** parameter can be edited simultaneously.

Clocked (Clck) *Off / On*

Clocked synchronizes the delay to the internal tempo of Nave (adjustable within the Arpeggiator menu). If activated, you can set up **Delay L** and **Delay R** in musical values.

Feed *0.00…1.00*

Controls the amount of signal that is routed back into the Delay line. Lower values therefore produce fewer echoes than higher values.

X-Feed *0.00…1.00*

Controls the feedback send from the left channel to the right one and vice versa.

High Cut *0.00…1.00*

Dampens the high frequencies produced by the Delay effect. This filter is routed before the feedback circuitry meaning that adjacent taps of the Delay will be dampened further. This creates the typical "high frequency loss" that often happens in natural echoes. A minimal setting means that the signal isn't filtered, while higher settings filter the high frequencies of the feedback signal.

Decouple *0.00…1.00*

This parameter delays the synced delay for the right and the left channel dissimilar. This leads to a less static delay sound.

Dry / Wet *0…100%*

This parameter controls the volume ratio between the original signal and the effect output. If set to *0%*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *100%*, the pure effect signal will be heard.

Reverb (FX2 Section)

The Reverb effect is probably the most widely used effect in music production. Nave's reverb effect is an addition to the sound to make it more 3 dimensional and expressive.

Time *0.0...1.00*

Determines the reverb time. Lower settings simulate a normal room while higher settings simulate a big hall or church.

Color *-1.00...+1.00*

Determines the spectral colorization of the reverb sound. Negative values dampen the higher frequencies while positive settings dampen the deeper frequencies.

Predelay *0.00…1.00*

Determines the delay between the direct sound and the reverb effect output. Lower settings connect the reverb more to the original signal while higher settings separate the effect signal to produce a more spatious sound.

Dry / Wet *0…100%*

This parameter controls the volume ratio between the original signal and the effect output. If set to *0%*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *100%*, the pure effect signal will be heard.

Equalizer (EQ) (FX2 Section)

Nave offers a parametric equalizer to adjust the sound frequencies to your needs. The equalizer contains three bands with the following parameters:

- **Equalizer Active** – click on this button to activate or deactivate the EQ.
- **Gain** (for all three bands) raises or lowers the volume of the selected frequency.
- **Frequency** (for all three bands) sets the frequency in Hz (Hertz) respective kHz (Kilohertz) at which the tones will be affected.
- **Q (Filter Quality)** (only Mid band) widens or shortens the frequency range.

You can edit the EQ settings directly in the EQ graph. Click on the desired EQ band and change the **Frequency** with horizontally moving and the **Gain** with vertical moving.

Compressor (FX2 Section)

The compressor compensates differences in the level of a sound signal by automatically raising lower levels.

Threshold *0.00…1.00*

Determines, to which signal level the compressor will be working. If the signal falls below the threshold, the amplification takes place.

Ratio *0.0...20.0 dB*

Ratio defines the maximum amplification of the signal in dB.

The Wave Detail Section

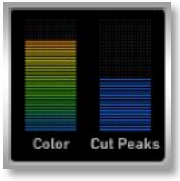
Click on the **Wave** button to switch the parameter window to the wave window with additional options for the wavetable representation and editing.

⚠ **Pay attention! You have now entered the most creative section of Nave!**

The following parameter affects the wavetable representation:

- Click on the **Wave** button to show the wavetable representation in fullwindow mode.

- Click on the **Spec** button to show the wavetable presentation as spectrum representation.
- Use the **Color** slider for colouring the peaks in the representation more intensively.
- Use the **Cut Peaks** slider for smoothening the peaks in the representation.



- The buttons **Peaks**, **Smooth Plane**, **Hard Plane**,

Strips, **Lines**, **Cross Lines** and **Flow** changes the displayed style of the wavetable representation.

Playback with the Ribbon Band

The Ribbon Band easily enables you to play and hear the current wavetable.

- Click and hold the left mouse button and move the mouse left to right on the center section of the Ribbon band to go forward through the wavetable. Moving the mouse from right to left plays the wavetable backwards.
- Click on any location of the center section of the Ribbon band to play the corresponding single wave.
- Click on the right section of the Ribbon band to start the Travel function. The more right you click, the more faster the wavtable will be go through forward.
- Click on the left section of the Ribbon band to start the Travel function. The more left you click, the more faster the wavetable will be go through backwards.

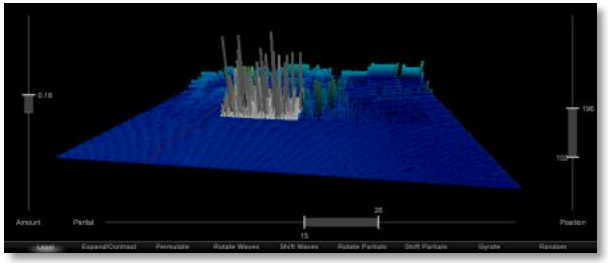
The last selected wavetable position on the Ribbon band as well as the Travel position will be automatically assigned to the **Wave** and the **Travel** parameter.

- By using the **Dry / Wet** switch you can hear the wavetable without any other oscillator, filter, drive and effects (*Dry*).
- The **Octave Down / Up** button sets the playback signal of the Ribbon band one octave up or down with any tap.

The Edit Button

Click on **Edit** to open the Edit section of the wavetable display.

Use the three sliders to edit the spectrum of the current wavetable in a 3D space. This gives you unlimited sound changing possibilities.



- Use the **Partial** slider to select a frequency area. Click on front or the back section of the slider to limit the frequency area. Click on the middle section of the slider to move the selected frequency area at once.
- Use the **Position** slider to select a wavetable area for editing. Click on front or the back section of the slider to limit the wavetable area. Click on the middle section of the slider to move the selected frequency area at once.
- The **Amount** slider allows you a direct access to the spectrum of the selected area of the wavetable. You can perform positive or negative changes.

The different options below the wavetable representation offers some remarkable edit options for the wavetable spectrum:

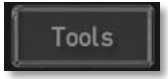
- *Level* changes the level of the selected area.
- *Expand/Contract* works nearly similar as contrast setting. A positive amount increases louder parts and increases lower part. With a negative amount all levels draw closer to the average level.
- *Permute* re-arranges the spectral components of the selected area up to progressive chaos.
- *Rotate Waves* moves the waves of the selected area in a cyclic way. The part that leaves the one end will be pushed back at the other end.
- *Shift Waves* moves the waves of the selected area to a new position. In opposite to *Rotate,* the level of the pushed back spectrum is 0.
- *Rotate Partials* moves the spectrum of the selected area to a new position of the frequency axis. The parts that leave the one end will be pushed back at the other end.

- *Shift Partials* moves the spectrum of the selected area to a new spectral position. In opposite to *Rotate,* the level of the pushed back spectrum is 0.
- *Gyrate* rotates the selected area.
- *Random* mixes random values in the selected area.

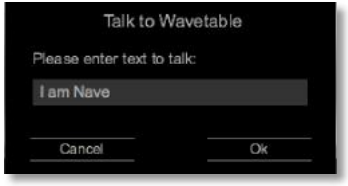
Sequentially changes of different areas and different edit options will be add up.

The Tools Button

Click on the **Tools** button to open a pop-up menu for creating and exporting your own wavetables. The following options are available:



- **Talk** allows you to enter one or more words with your computer keyboard. These words will be automatically synthesized as a new wavetable.



- **Analyze Audiofile** enables you to import a WAV file with any sample rate and bit rate from your computer hard disk. This audio file will be automatically synthesized as a new wavetable.
- **Export Wavetable** exports the current wavetable to your hard disk. This enables you to exchange your own created wavetables with other Nave users.

The Load Button

Click on **Load** to load a wavetable from your hard disk into Nave.

To close the wavetable editor click on any other detail section button.

The Matrix Detail Section

A modulation can be described as a signal-generating unit's influence upon a sound parameter. The terms used in this context are "Source" and "Destination". Nave offers 10 independent modulation assignments (slots) each with individual settings of source, destination and amount.

- Click on the corresponding **Active** button to switch a modulation slot on or off. An active slot button lits blue.
- Click on the **Source** slot to open a pop-up menu with all modulation sources. A complete list of all available sources can be found in the Appendix of this manual.
- The **Amount** slider determines the amount of modulation applied to the destination. Since the modulation is in fact a multiplication of the source signal and this parameter, the resulting amplitude depends on the type of modulation source you select. For the so-called unipolar modulation sources, the resulting amplitude lies within the range of 0…+1, if **Amount** is positive or 0…-1, if **Amount** is negative. These sources are for example envelopes, Modwheel and Velocity. For the so-called bipolar modulation sources, the resulting amplitude lies within the range of -1…0…+1. These sources are for example the LFOs and Keytrack.
- Click on the **Destination** slot to open a pop-up menu with all modulation destinations. A complete list of all available destinations can be found in the Appendix of this manual.

The Control Detail Section

The Wheels

Nave offers a virtual pitch bend as well as a modulation wheel. You can set up both wheels as follows:

- **Range** determines the intensity of the pitchbend via MIDI pitch bend messages in semitones from 1 to 24.
- **Mod Wheel Modulation** determines the behaviour of the Mod Wheel. Select a modulation destination for the Mod Wheel by clicking the **Mod Destination** list. **Amount** determines the amount of modulation that is applied.

X-Y Pad

Nave provides three X-Y pads, a two dimensional controller based on two selected sound parameters. One X-Y pad is always present in the Control detail section while the others can be show via the **Open Controls** function. Please read also page 51.

A double click will center the button exactly in the middle of the pad. A single click on any position within the pad will set the button to this position.

- *X* determines the behaviour of the horizontal X axis. Select a modulation destination by click on the **Mod Destination** list. **Amount** determines the amount of modulation that is applied.
- *Y* determines the behaviour of the vertical Y axis. Select a modulation destination by click on the **Mod Destination** list. **Amount** determines the amount of modulation that is applied.

Mode

diverse settings

The Mode buttons offer settings that have influence on the play behaviour of your keyboard.

- **Poly** means that each note triggers its own voice or voices, as on a piano.
- **Mono** means that only the last played note sounds. All other notes are stored in an internal list but aren't played. As soon as you release the note that is currently played, the highest note from the list is played. When you play legato, only the first note that was played triggers the envelopes (Single Trigger on). All later notes use these envelopes, but sound in the pitch you've played. This mode is for sustained sounds like typical 1970's solo sounds.
- **Chord** means that each note triggers and holds its own voice or voices.

Click on the **Hold** button to activate additional behaviour:

- **Poly Hold** means, that a short trigger of one or more keys will hold the played notes until they are played again.
- **Mono Hold** is identical to the *Mono* mode, except that a short trigger of a key will hold this note until another key is played.
- **Chord Hold** is automatically activated, if **Chord** is activated. It means, that a short trigger of two or more keys will hold the played notes until a new chord is triggered.

All Keyboard settings will be saved with the current patch. You can e.g. set up chords for the Blades.

Voices

Unisono OFF / 2...4

Controls how many voices are triggered when a note is played.

- *Unisono OFF* means that a note triggers one voice. This is the standard mode.
- *Unisono 2* means that a note triggers two voices.
- *Unisono 3 / 4* means that this number of voices is triggered when a note is played.

Spread *0.00...1.00*

Controls the detuning of the Unison voices and spreads all voices automatically within the stereo panorama. Higher values will alternate the voices between a left and right panorama position and offers a deeper detuning. If the **Voices** parameter is set to *Unisono OFF*, **Spread** has no functionality.

Keyboard Control Modes

Here you can change the representation of the virtual keyboard.

- The *Keyboard symbol* switches to the well-known piano with ebony and ivory keys.
- The *Blade symbol* switches to the Blade keys.
- The *Pad symbol* switches to two additional and free programmable X-Y pads (see after the next page).

The Controls Section

Click on the **Open Controls** button to expand Nave. With the **Keyboard Control Modes** you determine the representation of the expanded section. To close the Controls section, click on **Close Controls**.

The Blades

This virtual keyboard is different from the regular piano keyboard. It allows normal playing but you can click and hold a blade and move it vertically or horizontally to release additional modulations. This will be displayed by a yellow indicator bar. Besides this there are additional parameters in the left section.

Scales and Chord Settings

Here you can set up chord playing for incoming MIDI notes. Notes that not fit into the selected **Scale** are automatically moved to the next note within the actual Scale

- **Scale** opens a pop-up menu with numerous musical scales, e.g. *chromatic*, *major*, *minor* or *lydian dominant*.
- **Key** determines the tonic keynote for the chord which is selected in the **Chord** menu.
- **Chord** opens a pop-up menu with numerous chord connections, e.g. simple 1-3-5 connections up complex chords.

What does 1-3-5 mean? Basic chords with three voices contain notes always at a distance of two scale steps. A C-major chord is then C (1), E (3 - two semitones distance to C) and E (5 - again two semitones distance to E). Nave also provides chords with four voices (e.g. 1-3-5-7). Experiment with the different chord connections and listen to the results.

The X-Y Touch Modulations

Here you can set up modulation destinations for the X (horizontal) axis and the Y (vertical) axis of the Touch Keys and Blades.

Select a modulation destination for the X or the Y modulation by clicking on the **Mod Destination** list. The corresponding **Amount** determines the amount of modulation that is applied.

The two X-Y Pads

Nave provides two additional X-Y pads, a two dimensional controller based on two selected sound parameters. Please read also page 48. The parameter settings of both pads are identical.

- *X* determines the behaviour of the horizontal X axis. Select a modulation destination by tapping the **Mod Destination** list. **Amount** determines the amount of modulation that is applied.
- *Y* determines the behaviour of the vertical Y axis. Select a modulation destination by tapping the **Mod Destination** list. **Amount** determines the amount of modulation that is applied.

Transpose *-12...off...+12*

Allows a global pitch transposition for the tone generator. Incoming MIDI notes are shifted by the number of semitones.

Master Tune *414 Hz...466 Hz*

Controls the Nave's overall pitch in Hertz. The value specified here is the reference pitch for MIDI note A3. The default setting is 440 Hz, which is commonly used by most instruments.

Sound Synthesis Basics

Wavetable Synthesis in Nave

The sound generation of the wavetables in Nave is based on wavetable synthesis.

The following overview explains how the Wavetable Synthesis works:

A wavetable in Nave is a table consisting of single waveforms. Each waveform is classified by its own special sound character. The main difference of wavetable synthesis in comparison with other sound generation principles is the facility not only to play one waveform per oscillator, but also to walk through the wavetable via different modulations. Therefore you can create wavetable sweeps. The results can be dramatic - much more so than those any sample playback based system could ever produce.

This principle offers powerful capabilities. To give some examples:

- Each note on a keyboard can access a different wave of a wavetable.
- The Travel parameter allows a cyclic go through all waves of a wavetable.
- A LFO can modulate the position within the wavetable. You can create subtle to drastic sound changes.
- User-selected controllers e.g. the mod wheel, can change the position within the wavetable. When you turn the wheel while playing a chord, each note's wave will be modified intantly.

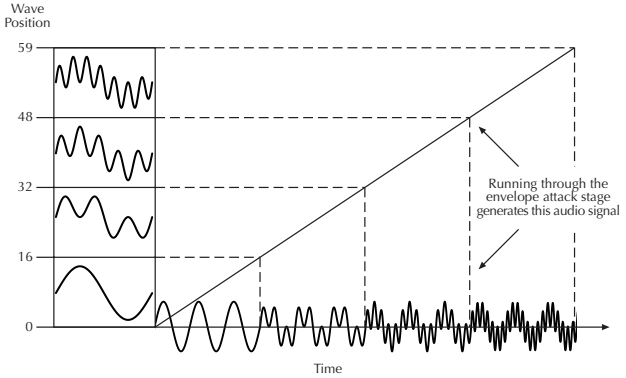
You should keep the following sentence in mind:

A wavetable is a list with two or more waves, among which you can move at will.

Modulating Waves over time

The graphic below shows a wavetable with 60 waves and some of its contained waves from position 0 to 59 on the vertical axis.

When you set **Wave** to *0*, **Mod Source** to **Free Env** -> **Wave Position** with maximum amount and **Free Env Attack** to some medium value, the horizontal axis represents the audio signal that is generated and the diagonal line in the graphic shows the attack stage over time.



As soon as you play a note the envelope moves through the wavetable positions generating different waveforms over time.

The decay stage would move through these waves in the opposite direction while ultimately holding a certain wave at its sustain stage. When you release the note, the envelope decays to zero.

Most Wavetables are created so that they start with a hollow wave at position 0 and go through increasingly brighter waves up to maximum position. This results in a behaviour similar to a low pass filter so that they can be controlled conveniently by an envelope.

If Attack is 0 and Decay set to a medium value you get a percussive sound, if you turn up attack, you get a soft sound start.

You can also use a LFO to modulate the wavetable position and, depending on the selected **LFO Shape**, you might get a wave scanning that goes back and forth (triangle), only into one direction followed by a hard reset to the origin (sawtooth) or between only two waves (square)

Exceeded Waves of a Wavetable

Of course you can combine envelope and keytrack modulations or add other modulation sources. All these modulations will be added so that maybe the end or the beginning of a wavetable could be exceeded. In this case, the waves will be repeated cyclic.

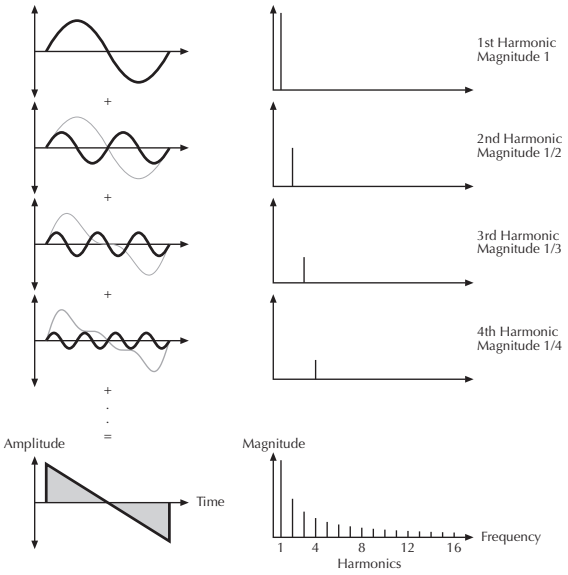
Oscillators Introduction

The oscillator is the first building block of a synthesizer. It delivers the signal that is transformed by all other components of the synthesizer. In the early days of electronic synthesis, engineers found that most real acoustic instrument waveforms can be reproduced by using abstracted electronic versions of these waveforms. They weren't the first who came to that conclusion, but they were the first in recreating them electronically and building them into a machine that could be used commercially. What they implemented into his synthesizer were the still well-known waveforms sawtooth and square. For sure, this is only a minimal selection of the endless variety of waveforms, but Nave gives you exactly these waveforms at hand.

Now, you probably know how these waveforms look and sound, but the following chapter gives you a short introduction into the deeper structure of these waveforms.

The Sawtooth Wave

The Sawtooth wave is the most popular synthesizer waveform. It consists of all harmonics in which the magnitude of each harmonic descends by the factor of its position. This means that the first harmonic (the fundamental) has full magnitude, the second harmonic has half magnitude, the third harmonic has a third magnitude and so on. The following picture shows how the individual harmonics build up the sawtooth wave:

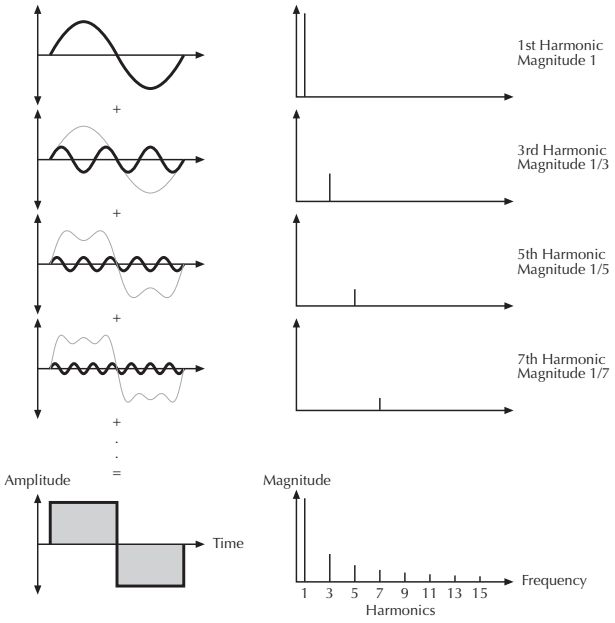


Additive components of the Sawtooth wave

The sawtooth wave was thought as an abstraction of the timbre of string and brass instruments. You can easily understand that when you think of a violin. Imagine a bow pulling the string slightly into one direction. At one point, the string abruptly comes off the bow and swings back to its original position. The bow is still moved and so it catches the string again and the procedure is repeated. The result is a waveform that looks like a sawtooth. The same is true for a brass instrument. The string in this case are the lips while the bow is the air. The lips are moved by the air to a certain extent and abruptly move back to their original position.

The Square Wave

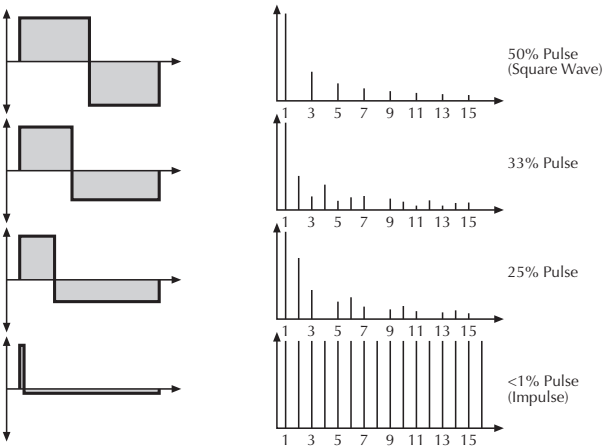
The Square Wave is a pulse waveform with 50% pulse width. This means that the positive part of the waveform has the same length as the negative part. The pulse waveform can have other pulse widths as you will read later. For now, we'll talk about the square wave as a unique waveform. The square wave consists of all odd harmonics in which the magnitude of each harmonic descends by the factor of its position. This means that the first harmonic has full magnitude, the third harmonic has a third magnitude, the fifth harmonic has a fifth magnitude and so on. The following picture shows how the individual harmonics build up the pulse wave:



Additive components of the square wave with 50% pulse width

The Pulse Wave

The Pulse wave is the most versatile wave in a classic synthesizer because its shape and therefore its harmonic content can be changed in real time. This is done by changing the width of the upper and lower portion of the waveform cycle. These portions are called pulses, hence the name pulse width. The width of the first pulse is used to distinguish between different pulse waves and it is measured in percent. The following picture shows several pulse waves with different pulse widths:



Additive components of Pulse wave with different pulse widths

The first fact you can probably observe is that the lower part of the wave has a narrower excursion. This is because the energy of the wider pulse is higher than the one of the narrower pulse. If this were not compensated, the overall signal would have an unwanted DC offset.

As you have read in the previous chapter, the harmonic content of a 50% pulse wave is a special case. It has a very symmetrical harmonic content, while all other pulse

widths create peaks or troughs at certain frequencies. Another special case is a pulse wave with a very narrow pulse width, in the above picture labelled as <1%. An infinitely thin pulse creates a spectrum that has all harmonics with equal magnitudes. In a digital synthesizer, "infinitely" necessarily means one sample.

The pulse wave is an artificial wave, which means that it doesn't occur in nature. It was built into synthesizers because it can create a lot of different timbres with a minimum of technical effort. However, certain pulse widths sound very close to the timbres of acoustic (or semi-acoustic) instruments, i.e. a guitar or bass guitar, an e-piano or even a flute.

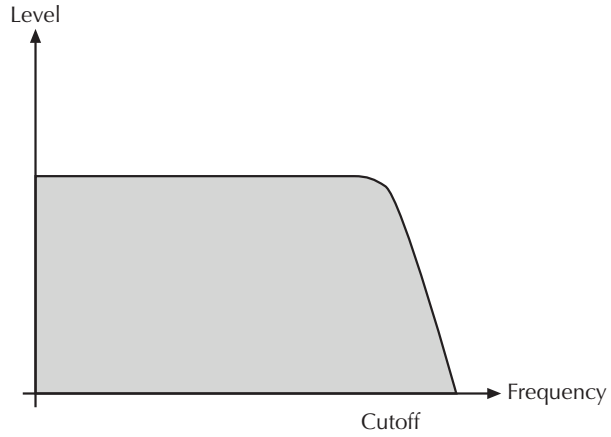
The most powerful feature of the pulse wave is the ability to change its width while sounding. This is called pulse width modulation. When the pulse width is changed, the waveform starts to sound thicker. This happens because the effect is very similar to what you hear when you have two oscillators running with slightly different frequencies. They interfere and create irregular troughs in the resulting waveforms.

Filter Introduction

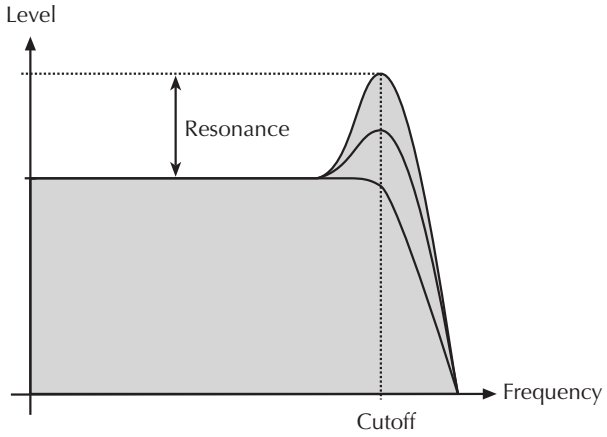
Once the audio signal leaves the oscillator, it is sent to the filter. The filter is a component that has significant influence on Nave's sound characteristics.

For now, we'll explain the basic function of a filter discussing the type used most commonly in synthesizers: the low pass filter

The low pass filter type dampens frequencies above a specified cutoff frequency. Frequencies below this threshold are hardly affected. The frequency below the cutoff point is called the pass band range, the frequencies above are called the stop band range. Nave's filter dampens frequencies in the stop band with a certain slope. The following picture shows the basic principle of a low pass filter:



Nave's filter also features a resonance parameter. Resonance in the context of a low, band or high pass filter means that a narrow frequency band around the cutoff point is emphasized. The following picture shows the effect of the resonance parameter on the filter's frequency curve:



If the resonance is raised to a great extent, then the filter will begin to self-oscillate, i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.

Appendix

Nave Modulation Sources

Mod Sources	Description:
None	No modulation
LFO1	LFO 1 signal
LFO2	LFO 2 signal
Filter Env	Filter Envelope signal
Amp Env	Amplifier Envelope signal
Free Env	Free Envelope signal
Key Track	MIDI note number
Velocity	MIDI Velocity
X-Touch	Horizontal wiping of the Blades
Aftertouch	Aftertouch data from MIDI keyboard
Random Trig	Random Trigger value
X-Pad	Horizontal axis of the main pad
Y-Pad	Vertical axis of the main pad
Wheel	MIDI modulation wheel (contr. #1)
X-Left Pad	Horizontal axis of the left pad
Y-Left Pad	Vertical axis of the left pad
X-Right Pad	Horizontal axis of the right pad
Y-Right Pad	Vertical axis of the right pad

Nave Modulation Destinations

Mod Destinations	Description:
None	No modulation
Volume	Main output volume
Pan	Panning
LFO1 Speed	Speed of LFO 1
LFO1 Gain	Intensity of LFO 1
LFO2 Speed	Speed of LFO 2
LFO2 Gain	Intensity of LFO 2
Pitch	Global pitch of all Oscillator modules
Wave 1 Pitch	Pitch of Wave Oscillator 1
Wave 2 Pitch	Pitch of Wave Oscillator 2
Osc Pitch	Pitch of the Oscillator module
Wave 1 Mix	Level of Wave Oscillator 1
Wave 2 Mix	Level of Wave Oscillator 2
W1*W2 Mix	Level of Ring modulation of Wave Oscillator 1 and 2
Osc Mix	Level of the Oscillator module
Osc * W1 Mix	Level of Ring modulation of Oscillator module and Wave oscillator 1
Amp Env Gain	Modulation depth Filter Envelope

Filter Env Gain	Modulation depth Amp Envelope
Free Env Gain	Modulation depth Free Envelope
Cutoff	Cutoff frequency
Resonance	Resonance
W1 Position	Wavetable position of Wave-Oscillator 1
W1 Travel	Wavetable Travel of Wave Oscillator 1
W1 Spectrum	Wavetable Spektrum of Wave Oscillator 1
W1 Noisy	Wavetable Noisy of Wave Oscillator 1
W2 Position	Wavetable Position of Wave Oscillator 2
W2 Travel	Wavetable Travel of Wave Oscillator 2
W2 Spectrum	Wavetable Spectrum of Wave Oscillator 2
W2 Noisy	Wavetable Noisy of Wave Oscillator 2
Pulsewidth	Pulsewidth of the Pulse Oscillator
Osc Spread	Detune and Spreading of the Oscillator module

Nave Wavetable List

No.	Wavetable	No.	Wavetable
000	Resonant	020	Robotic
001	Resonant2	021	StrongHrm
002	MalletSyn	022	Perc Organ
003	Square-Sweep	023	ClipSweep
004	Bellish	024	Reso Harms
005	Pulse-Sweep	025	2 Echoes
006	Saw-Sweep	026	Formant 2
007	MellowSaw	027	Formant Vocal
008	Feedback	028	Micro Sync
009	Add Harm	029	Micro PWM
010	Reso 3 HP	030	Glassy
011	Wind Syn	031	Square HP
012	High Harm	032	Micro PWM
013	Clipper	033	Glassy
014	Organ Syn	034	Square HP
015	SquareSaw	035	Saw Sync 1
016	Formant 1	036	Saw Sync 2
017	Polated	037	Saw Sync 3
018	Transient	038	Pulse Sync 1
019	ElectricP	039	Pulse Sync 2
040	Pulse Sync 3	062	Reso Sweep
041	Sine Sync 1	063	Xmas Bell
042	Sine Sync 2	064	FM Piano
043	Sine Sync 3	065	Fat Organ
044	PWM Pulse	066	Vibes
045	PWM Saw	067	Chorus 2
046	PWM Wave	068	True PWM
047	Fuzz Wave	069	Upper Waves
048	Distorted	070	Alt 1
049	Heavy Fuzz	071	Alt 2
050	Fuzz Sync	072	Spectrum #1
051	K+Strong 1	073	Spectrum #2
052	K+Strong 2	074	Spectrum #3
053	K+Strong 3	075	Spectrum #4
054	1-2-3-4-5	076	Drumloop
055	19/twenty	077	Buzz
056	Wavetrip 1	078	Guiro
057	Wavetrip 2	079	Crackle
058	Wavetrip 3	080	Wire
059	Wavetrip 4	081	Metal
060	Male Voice	082	Wood
061	Low Piano	083	Glass

084	Nave Chant	086	Almost anything
085	I Am Nave		

Glossary

Amount

Describes to which extent a modulation influences a given parameter.

Amplifier

An amplifier is a component that influences the volume level of a sound via a control signal. This control signal is often generated by an envelope or an LFO.

Arpeggiator

An arpeggiator is a device that splits an incoming chord into its single notes and repeats them rhythmically. Most arpeggiators feature different sequence modes to cover a wide range of applications. Typical controls for an arpeggiator are the octave range, the direction, the speed and the clock, which means the repetition interval. Some arpeggiators also feature preset or programmable rhythm patterns.

Band Pass Filter

A band pass filter allows only those frequencies around the cutoff frequency to pass. Frequencies both below and above the cutoff point are damped.

Clipping

Clipping is a sort of distortion that occurs when a signal exceeds its maximum value. The curve of a clipped signal is dependent of the system where the clipping takes place. In the analog domain, clipping effectively limits the signal to its maximum level. In the digital domain, clipping is similar to a numerical overflow and so the polarity of the signal's part above the maximum level is negated.

Control Change (Controllers)

MIDI messages enable you to manipulate the response of a sound generator to a significant degree.

This message essentially consists of two components:

- The Controller number, which defines the element to be influenced. It can be between 0 and 120.
- The Controller value, which sets the extent of the modification.

Controllers can be used for effects such as slowly swelling vibrato and influencing filter frequency.

Decay

"Decay" describes the descent rate of an envelope once the Attack phase has reached its zenith and the envelope drops to the level defined for the Sustain value.

Envelope

An envelope is used to modulate a sound-shaping component within a given time frame so that the sound is changed in some manner. For instance, an envelope that modulates the cutoff frequency of a filter opens and closes this filter so that some of the signal's frequencies are filtered out. An envelope is started via a trigger, usually a fixed trigger. Normally, the trigger is a MIDI Note. The classic envelope consists of four individually variable phases: Attack, Decay, Sustain and Release. This sequence is called an ADSR envelope. Attack, Decay and Release are time or slope values, and Sustain is a variable volume level. Once an incoming trigger is received, the envelope runs through the Attack and Decay phases until it reaches the programed Sustain level. This level remains constant until the trigger is terminated. The envelope then initiates the Release phase until it reaches the minimum value.

Filter

A filter is a component that allows some of a signal's frequencies to pass through it and dampens other frequencies. The most important aspect of a filter is the filter cutoff frequency. Filters generally come in four categories: low pass, high pass, band pass, and band stop. A low pass filter dampens all frequencies above the cutoff frequency. A high pass filter in turn dampens the frequencies below the cutoff. The band pass filter allows only those frequencies around the cutoff frequency to pass, all others are dampened. A band stop filter does just the opposite, i.e. it dampens only the frequencies around the cutoff frequency. The most common type is the low pass filter.

Filter Cutoff Frequency

The filter cutoff frequency is a significant factor for filters. A low pass filter dampens the portion of the signal that lies above this frequency. Frequencies below this value are allowed to pass through without being processed.

High Pass Filter

A high pass filter dampens all frequencies below its cutoff frequency. Frequencies above the cutoff point are not affected.

LFO

LFO is an acronym for low-frequency oscillator. The LFO generates a periodic oscillation at a low frequency and features variable waveshapes. Similar to an envelope, an LFO can be used to modulate a sound-shaping component.

Low Pass Filter

Synthesizers are often equipped with a low pass filter. A low pass filter dampens all frequencies above its cutoff frequency. Frequencies below the cutoff point are not affected.

MIDI

The acronym MIDI stands for "musical instrument digital interface." It was developed in the early 1980s so that diverse types of electronic musical instruments by different manufacturers could interact. At the time a communications standard for heterogeneous devices did not exist, so MIDI was a significant advance. It made it possible to link all devices with one another through simple, uniform connections.

Essentially, this is how MIDI works: One sender is connected to one or several receivers. For instance, if you want to use a MIDI keyboard to play Nave, then the keyboard is the sender and Nave acts as the receiver. With a few exceptions, the majority of MIDI hardware devices are equipped with two or three ports for this purpose: MIDI In, MIDI Out and in some cases MIDI Thru. The sender transfers data to the receiver via the MIDI Out jack. Data are sent via a cable to the receiver's MIDI In jack.

MIDI Kanal

This is a very important element of most messages. A receiver can only respond to incoming messages if its receive channel is set to the same channel as the one the sender is using to transmit data. Subsequently, the sender can address specific receivers individually. MIDI Channels 1 through 16 are available for this purpose.

MIDI Clock

The MIDI Clock message sets the tempo of a piece of music. It serves to synchronize processes based on time.

Modulation

A modulation influences or changes a sound-shaping component via a modulation source. Modulation sources include envelopes, LFOs or MIDI messages. The modulation destination is sound-shaping component such as a wave position or filter.

Note on / Note off

This is the most important MIDI message. It sets the pitch and velocity of every generated note. The time of arrival is simultaneously the start time of the note. Its pitch is derived from the note number, which lies between 0 and 127. The velocity lies between 1 and 127. A value of 0 for velocity is similar to "Note Off".

Panning

The process of changing the signal's position within the stereo panorama.

Pitch Bend

Pitch Bend is a MIDI message. Although pitchbend messages are similar in function to control change messages, they are a distinct type of message. The reason for this distinction is that the resolution of a pitchbend message is substantially higher than that of a conventional Controller message. The human ear is exceptionally sensitive to deviations in pitch, so the higher resolution is used because it relays pitchbend information more accurately.

Release

An envelope parameter. The term "Release" describes the descent rate of an envelope to its minimum value after a trigger is terminated. The Release phase begins immediately after the trigger is terminated, regardless of the envelope's current status. For instance, the Release phase may be initiated during the Attack phase.

Resonance

Resonance is an important filter parameter. It emphasizes a narrow bandwidth around the filter cutoff frequency by amplifing these frequencies. This is one of the most popular methods of manipulating sounds. If you substantially increase the resonance, i.e, to a level where the filter begins self-oscillation, then it will generate a relatively clean sine waveform.

Spectrum

A basic component of sounds are periodic oscillations. The perceived pitch corresponds to the fundamental frequency of this oscillation. The frequency spectrum of periodic oscillations is a line spectrum, with the lowest frequency corresponds to the fundamental frequency (fundamental) and the other frequencies-integer multiples of the fundamental frequency (harmonics). A spectrum display like that in the Nave is a graphical overview of all the frequencies of a wavetable with their amplitudes over time.

Sustain

An envelope parameter. The term "Sustain" describes the level of an envelope that remains constant after it has run through the Attack and Decay phases. Sustain lasts until the trigger is terminated.

Trigger

A trigger is a signal that activates events. Trigger signals are very diverse. For instance, a MIDI note or an audio signal can be used as a trigger. The events a trigger can

initiate are also very diverse. A common application for a trigger is its use to start an envelope.

USB

The Universal Serial Bus (USB) is a serial bus system to connect a computer with an external device. USB equipped devices can be plugged together while active. The recognition is made automatically.

Volume

The term describes a sound's output level.

Wave

Here: A Wave is a digitally memorized reproduction of one single period of a periodic waveform, such as a sawtooth wave. Insofar it is identical with a Sample that is looped after one single wave pass.

Wavetable

One Wave module shape in the Nave bases on waveform sets, called Wavetables. Wavetables are a collection of one or more Waves. The playback sequence of the Waves can be dynamically altered, which results in interesting sound transformations. If the Waves in the Wavetable are similar in shape, the result will sound smooth and pleasant. If, however, the shapes are completely different, the result will have wild spectral changes and may sound harsh.

Product Support

If you have any questions about your Waldorf product, feel free to contact us via one of the four options listed below:

① Send us an email message. This is the most efficient and fastest way to contact us. Your questions will be forwarded immediately to the resident expert and you will quickly receive an answer.

support@waldorfmusic.de

② Send us a letter. It will take a bit longer, but it is just as dependable as an email.

Waldorf Music GmbH

Lilienthal Str. 7

53424 Remagen, Germany