micro WAVE PLUG-IN

WAVETABLE SYNTHESIZER

user manual

waldorf

Content

Foreword

Thank you for purchasing the Waldorf Microwave 1 plug-in. You now own a virtual synthesizer that emulates the very first Waldorf hardware synthesizer featuring a wide range of unique sounds.

What to read?

The biggest problem with any manual is to find a way to cover both the needs of an absolute expert and a beginner alike. There are people who read a manual cover to cover while others don't even touch it. The latter is the worst choice, especially when the manual describes a Waldorf instrument.

Anyone reading the following manual is in for a lot of fun while learning about and working with the Waldorf Microwave 1 plug-in.

And now have fun with your Microwave 1 plug-in!

Your Waldorf Team

Hint

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Some History – A Legend Returns

35 years ago Waldorf Music released its first instrument, the Microwave, which took the hearts of the leading musicians and producers of the nineties by storm. Its vibrate and distinctive sound transported the early wavetable sounds of the eighties into the rising electronic dance music of the following decade. Massive base lines, enigmatic wavetable modulations, brutal attacks and pads smooth like silk have been inspired generations of musicians. Microwave's unique interpretation of wavetable synthesis combined with analogue filters defined what hybrid synthesis is at its best.

Now's the time to bring back this magical instrument in a software form to the digital workstations of producers and musicians world-wide. The Waldorf Microwave 1 Plug-In was painstakingly recreated from the original hardware with all its idiosyncrasies and wonderful singularities. A multi-year effort and a labor of love which analyzed and modeled the original instruments down to the finest sonic details of every aspect of the hardware.

Only the first generation of the Microwave and also the Waldorf Wave were based on a custom developed integrated circuit called the Waldorf ASIC. In combination with the legendary Curtis filter chips and a very unique 68k CPU based controller software the ASIC defined a very special flavor of wavetable sound unparalleled to none. No one else than the inventor of Wavetable Synthesis of the eighties, Wolfgang Palm, helped to design this unique chip. Waldorf took a huge effort to analyze and recreate this integrated circuit within the plug-in. As the original, the plug-in runs the internal synthesis with the ultra high sampling rate of 250 kHz regardless of the DAW sampling rate. The recreated digital waveforms have been bit-by-bit compared with the original to be 100% identical. The digital noise was rebuilt with all its wonderful artifacts.

Even the old-school digital-to-analogue converters of the original hardware were modeled with their non-linearities and tone shaping color which were leading into the two Curtis filter chips variants used for the revisions A and B of the original hardware. The plug-in allows further for artificially detuning and recalibrating of the analogue components.

Brutal attacks, snappy decays and a plethora of wonderful transients define the sound of the first generation Microwave. Its livelihood never sounding mechanical but always different was based on a very unique architecture to create the envelopes, LFOs and modulations which was painstakingly recreated by the plug-in down to the finest grains.

But the Microwave 1 Plug-In goes one step further: Its modern and inviting graphical user-interface reveals many aspects of the synthesis engine which were hidden before in the original hardware by its sparse hard to use interface. A fully scalable modern interface with readable high-contrast fonts supports an intuitive sound editing process with many graphical representations of the wavetables, envelopes and filter response curves using animations for modulations and playing positions. The Microwave 1 was never as close as this under your finger tips. A joy to edit sounds with.

But we stopped not here, for the first time the inner makings of the Microwave have been put to the surface. Based on the internal control tables the user can now easily edit existing wavetables and create new ones in a very unique and intuitive process. All the original wavetables are available with their control structures and the full original waveform catalogue. In addition to user wavetables, also user waveforms can be created within the plug-in. Additional randomization modes make wavetable editing fun and sonically surprising as experienced never before.

The multi-mode becomes now a weapon of its own for sound design. Originally hard to edit from the panel, the plug-in UI allows now for quickly layering of single sounds to create the most complex and exciting sonic structures. An easy to use mixer page lets you fine tune their sonic relationships. Even the more exotic feature like tuning and velocity tables have been implemented and can be edited in the UI.

All the original factory single and multi-mode sounds are contained in the plug-in in combination with new and modern sound presets. Original MIDI and Sys-Ex dump files can be imported such you can load your favorites from the past. Moreover, the plug-in can be used to control the original hardware are a graphical editor. If you a lucky owner of an Microwave first generation, the plug-in allows you to take your beloved hardware virtually with you where-ever you like and keeping its magical sound.

The Microwave 1 plug-in comes as VST, VST3, AU and AAX for macOS and Windows supporting the major digital audio workstations.

Why does the Microwave 1 Plug-In has 8 voices only?

This is due to authenticity. The 68K chip in the original hardware had the typical restriction of old microprocessors of the 1980s and 1990s: less calculation speed. The allocation of the voices, the attack of envelopes or the calculation of LFOs in conjunction with incoming MIDI

notes had to be cleverly calculated. This resulted is a unique sound interaction and behavior that cannot be found in modern plug-ins with dozens of voices. However, we wanted to reproduce this behavior 1:1 – and that was only possible by exactly reproducing the restrictions of the old hardware. That is the reason why our plug-in only offers 8 voices.

In the case that you need more voices, just open one or more instances of the Microwave 1 plug-ins.

Why there are no effects or additional features?

The restrictions of the original hardware in particular ensure the unique retro sound. We wanted to get exactly these nostalgic charm. We only have designed the user interface in a more modern style to make your edit experience more exciting. Believe us, you will not miss any effects or other features. And if you want to use a reverb or a chorus – we are sure that your DAW offers plenty of it.

Warning: This software is not suitable for controlling food preparation devices.

Microwave 1 plug-in Development Team

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Design:	Axel Hartmann
Original Hardware:	Andreas Busse, Wolfgang Palm
Manual:	Holger Steinbrink
Revision:	1.0, August 2024

Please visit our website for further support and downloads for your Microwave 1 plug-in: **waldorfmusic.com**

We would like to thank

Julia Bach, Evi Carroll, Claudio Chiriatti, Karsten Dubsch, Willie Eckl, Joachim Flor, Kevin Junk, Roger Keller, Jannik Lambert, Sascha Ludwig, Miroslav Pindus, Frank Schneider, Winfried Schuld, Michael von Garnier, Marcus Thoss, Kurt 'Lu' Wangard, Haibin Wu and anyone we have forgotten.

Overview

1) Head-up section

2) Wavetable Oscillators section

3) Wavetable section with display

4) Filter section

5) Modulators section

About this Manual

This manual was written to help you to become familiar with your Microwave 1 plug-in synthesizer. It will also aid experienced users with routine tasks.

To avoid confusion, the terminology in this manual is based on the Microwave 1 plug-in parameter names. You will find a glossary at the end of this manual; it explains the various terms used.

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.

Instruction – Follow these guidelines to execute a desired function.

Example – Real-world examples to try out.

Highlighted Control Features and Parameters

All of Microwave 1 plug-in's buttons, controls and parameters are highlighted in **bold** letters throughout the manual.

Examples:

- Click on the **Init** button.
- Turn the **Wavetable** knob.

Microwave 1 plug-in's different modes and parameter pages are illustrated in a depiction of the display.

The value range of a continuous parameter is indicated from low to high with both values shown in italic letters, separated by three dots.

Example:

Cutoff *0...127*

Installation & Activation

System Requirements for Windows

In order to be able to use Microwave 1 plug-in, you will need at least:

- A PC with a Intel or AMD processor.
- Windows 7 or newer.
- VST 2.4 or VST3 compatible host application. This must be correctly installed on your computer.
- AAX compatible host application. This must be correctly installed on your computer.

Please also observe the system requirements of your host application!

Microwave 1 plug-in runs only within 64 bit host applications.

Installation under Windows

1. Refer to the folder where the downloaded Microwave 1 plug-in zip archive is located.

2. Double click on the archive file to extract it.

3. Double click on the Microwave 1 plug-in Installer icon. This launches a special installation program.

4. Follow the on-screen instructions.

After installing Microwave 1 plug-in you will have to activate the program on your computer. Please refer to the chapter “Activation of Microwave 1 plug-in”.

System Requirements for macOS

In order to be able to use the Microwave 1 plug-in, you will need at least:

- Mac with Intel processor

  or

  Mac with Apple Silicon processor.
- macOS 10.14 or newer.
- VST 2.4 compatible host application or a VST3 compatible host application. This must be correctly installed on your computer.

  or
- An AudioUnit 2.0 compatible host application. This must be correctly installed on your computer.

  or

- An AAX compatible host application. This must be correctly installed on your computer.

Please also observe the system requirements of your host application!

Microwave 1 plug-in runs only within 64 bit host applications.

Installation under macOS

Proceed as follows to install Microwave 1 plug-in:

1. Refer to the folder where the downloaded Microwave 1 plug-in zip archive is located.

2. Double click on the archive file to extract it.

3. Double click on the Microwave 1 plug-in Installer DMG icon. This launches a special installation program.

4. Follow the on-screen instructions.

After installing Microwave 1 plug-in you will have to activate the program on your computer. Please refer to the next chapter „Activation of Microwave 1 plug-in“.

Activation of Microwave 1 plug-in

Microwave 1 plug-in uses a copy protection system based on the users email address as well as a personalized serial number.

Proceed as follows to activate Microwave 1 plug-in:

1. Start your host application.

2. Load the Microwave 1 plug-in plug-in as instrument in your DAW.

3. An input field occurs. In the upper field, please enter the email address that was used for purchasing Microwave 1 plug-in. In the lower field, please enter the 20 digit serial number which you have received with your purchase.

4. Click on the OK button to confirm your data. From now on, Microwave 1 plug-in is authorized for this computer.

If you want to use Microwave 1 plug-in on other computers, please proceed in the same way as described above.

Basic Operations

Worth Knowing about Single and Multi Programs

Microwave 1 plug-in offers a sound structure with either a single sound program or a multi program with up to 8 sound parts. All parts are always saved for each multi sound program. The 8 parts can be played simultaneously regardless of the incoming MIDI channel. More about loading/saving Single and Multi programs/working with Multi programs can be found later in this manual.

General Operation

Microwave 1 plug-in has been optimized for a screen resolution of at least 1024x768 pixels. You can click-drag one of the resize handles at the upper left and lower right corners of the plug-in window to scale the Microwave 1 plug-in window to your desired size.

Microwave 1 plug-in has various on-screen controls. The knobs can be moved with greater accuracy by holding down the CTRL/CMD key on your computer keyboard while moving your mouse. Double-clicking the corresponding fader or knob resets the parameter to the default value You can even right-click on a parameter and select „Set to default“ in the pop-up menu. Here, you also find the option „Set to the Last Loaded.“ This resets the parameter to the last loaded value from the current sound patch. Mouse scroll wheel is supported for all continuous controls. All graphic displays (filter curve, envelopes) can be edited with your mouse.

Double-click on any value field opens a text edit field for entering values with the computer keyboard.

Control Elements

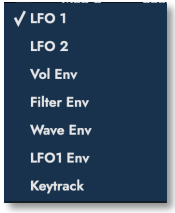
Using Microwave 1 plug-in's controls is simple. There are some different types of control elements:

Dials

To set a value, click on the dial, hold down the mouse button and move the mouse up and down. Pressing CTRL/CMD while holding the mouse button allows finer adjustments. If you hover over a dial using the mouse, the current parameter value appears below the dial.

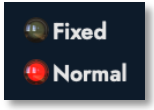
Pop-Down Menu

Click on the corresponding parameter/button to open a pop-down menu where you can choose the desired value/selection.



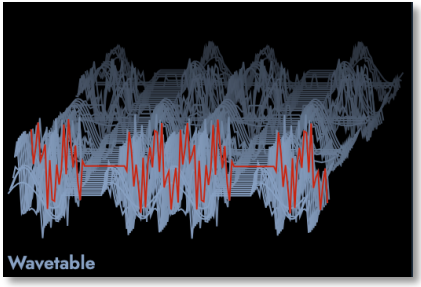
Switches

Switches are represented by "LEDs". If a function is active, its "LED" will be lit red and all others within the function block will be dark. To activate a function, click on its "LED".



Graphic Displays

Click into the graphic representation and drag the mouse to continuously and smoothly change the corresponding parameters. More on the graphic display types can be found in the corresponding manual sections.



Plug-In Parameters

Microwave 1 plug-in consists of numerous sound-shaping and utility components. The following pages describe all parameters in detail. Additional information can be found in the Appendix.

- Sound synthesis: Oscillators with wavetable generators, filter and amplifier. These modules represent the audio signal flow. Sound generation actually occurs within the oscillators. They can produce different wavetables. The filter shapes the sound by amplifying (boosting) or attenuating (dampening) certain frequencies. The amplifier is located at the end of the signal chain. It determine the overall volume of the signal.
- Modulators: LFOs, Envelopes. These modules are called Modulators. The Modulators are designed to manipulate or modulate the sound generating components to add dynamics to sounds. The Low-frequency Oscillators (LFOs) are designed for periodic or recurring modulations while Envelopes are normally used for modulations that only occur once on each note. These generators are assigned to parameters and influence these parameters to alter a sound.

The following pages describe all parameters in detail. Additional information can be found in the Appendix.

The Head-Up Section

The Head-up section provides the global overview and includes the following options:

1. With the **Bank** pop-up menu, you can select the desired *Single* or *Multi* Program banks. Besides different factory banks, there is a User bank for your own saved sounds and multis.

2. The **Singles / Multis** pop-up menu opens a list with all presets from the current selected single /multi bank.

3. The **Prev / Next** buttons steps through the single or multis sound programs of the current selected bank.

> Please note that some host applications as Steinberg Cubase use an additional sound data management. It offers you an alternative way to load and save sounds. Please refer to the corresponding manual chapter of your host application.

4. The **Init** button initializes the current single sound or multi and set all (multis) parameters to standard values.

5. The **Save** button opens a window to save the current Microwave 1 plug-in single or multi program. The User bank is automatically chosen.

6. The **Menu** button opens a pop-up menu including the following options:

- **Show Analyzer** opens a graphical spectrum audio analyzer in the lower zone, where the modulators are located.
- **Show Calibration Editor** opens the Filter cCalibration option in the lower zone, where the modulators are located.
- **Show User Wave Editor** opens the User Wave Editor in the lower zone, where the modulators are located.
- **Show Hardware Control** opens the Hardware Control option in the lower zone, where the modulators are located.

More information about these additional utility options can be found later in that manual.

- **Delete Preset (presetname) from „User“** (only available when a user preset is loaded) deletes the selected single or multi user preset from the user bank. To avoid mistakes, this process needs a confirmation.
- **Import from .syx file** opens a window to import a original Microwave 1 sound program or bank in SysEx data format.
- **Import from .mid file** opens a window to import a original Microwave 1 sound program or bank in MIDI file data format.
- **Show User Presets Folder** opens an Explorer window (Windows) or a Finder windows (macOS) to show the current location of your user sounds/banks.
- **Cancel all Voices** sends and executes an "All Notes Off" command. It is used to terminate stuck notes. Panic will immediately set all envelopes to their release phases.
- **Set Size to 50% / 75 % / 100 %** sets the plug-in window size to the corresponding fix size.
- **Website** opens your favorite web browser and loads our Waldorf website (if you computer is connected tot he internet).
- **Manual** opens your favorite web browser and directly navigates to the location of this PDF manual (if you computer is connected tot he internet).

- **About** opens a window with Microwave 1 plug-in version and further information.

7. The **Multis** button is only available, if the Multi option is active. Click on it to open a pop-up menu that offers the following options:

- **Init Instrument (No.)** initializes the current selected multi instrument and sets all (multis) parameters to standard values.
- **Copy Instrument (No.)** copies all settings of the current selected multi instrument into temporary buffer.
- **Paste Instrument (No.)** pastes all multi settings of the multi instrument in temporary buffer onto the current selected instrument.
- **Clone to all other Instruments** pastes the settings of the current selected multi instrument to all other multi instruments.

8. The **Instruments** pop-up menu opens a list with all 8 multi instruments for edit selection. Keep in mind that only current active multi instruments can be selected.

9. The **Master Volume** knob control's the overall volume of the plug-in.

More about Multi programs and settings can be found on page 43.

The Main Page

Click on the Main button in the leftmost section to open the main page in the upper plug-in area. This page gives you an overview over the most important parameters.

The parameters oft he Main page and the dedicated parameter pages are identical. You find all main page parameter explanations on the next pages in the corresponding sections.

There is one function, that can be found on the Main page only:

Glide

Glide (or portamento) describes the continuous gliding from one note to the next like strings or some brass instruments (e.g. trombone) can do. A glissando is a similar effect with one difference: The pitch does not change continuously but in note steps. On acoustic instruments a glissando can be performed e.g. on a piano when you play very fast over a wide key range.

Type

Selects the basic type of glide.

- *Off* disables Glide completely, regardless oft he other parameters.
- *Glissando* selects a glissando Glide effect. Rather than continuously moving from one pitch to the next, glissando uses semitone-steps to glide between two pitches.
- *Portamento* selects a portamento-effect, resulting in a continuous transition between the last and new pitch.
- *Midi Glissando* is the same as glissando, with the difference being that the glissando effect will only be applied, if a MIDI portamento-command (MIDI controller #65) is received.
- *Midi Portamento* is the same as portamento, with the difference being that the portamento effect will

only be applied, if a MIDI portamento-command (MIDI controller #65) is received.

- *Fingered Glissando* means that a continuous glissando is performed only when notes are played legato. Staccato played notes start on the exact pitch of their note.
- *Fingered Portamento* means that a continuous portamento is performed only when notes are played legato. Staccato played notes start on the exact pitch of their note.

Rate

Determines the glide time. Low values will give a short glide time in the range of milliseconds that gives a special character to the sound. High values will result in a long glide time up to several seconds which can be useful for solo and effect sounds.

Mode

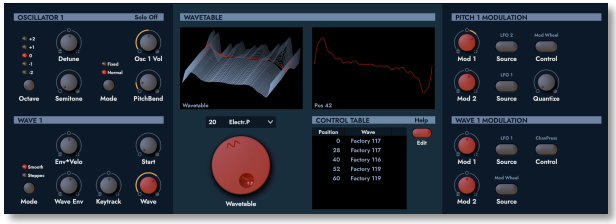
Selects between two different ways of applying Glide:

- *Equal Time* means that a glide always takes the same time to reach it's destination pitch regardless of the distance it must travel. In other words, if the interval the pitch must sweep is a minor third, the actual glide-speed will be slower than of a glide over three octaves. However, the time it takes to reach the destination pitch will be the same for both intervals. This is useful if you play chords in open position that must hit at the exact same time after a glide. The **Rate** parameter sets the time it takes to reach the destination pitch.
- *Equal Dist* means that a glide takes place always at the same speed for the same distance regardless of the time it may take to reach the destination pitch. Therefore, a glide over two octaves takes 8-times the time of a glide over a minor third. This is good, for instance, if you use Glissando and want the semitone-movement to stay in rhythm. The **Rate** parameter sets the actual speed of the glide.

The Wavetable Oscillator Pages

Microwave 1 plug-in offers two wavetable oscillators with independent wavetable generators.

Click on the corresponding **Osc1** or **Osc2** button in the leftmost section to select the desired wavetable oscillator.



The Central Wavetable Section

A wavetable 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 ability to not only to play one waveform per oscillator but also to step through the wavetable via different modulations, thereby creating wavetable sweeps. The results can be dramatic – much more so than anything any sample playback-based system could ever produce.

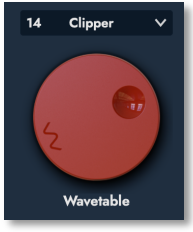
This principle offers powerful capabilities. To give some examples:

- The Wave Envelope can modulate the position within the wavetable.
- Each note on a keyboard can access a different wave of a wavetable.
- An LFO can modulate the position within the wavetable. You can create subtle to drastic sound changes.
- User-selected controllers, such as 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 instantly.

For more information about Wavetable synthesis please refer to the Appendix of this manual.

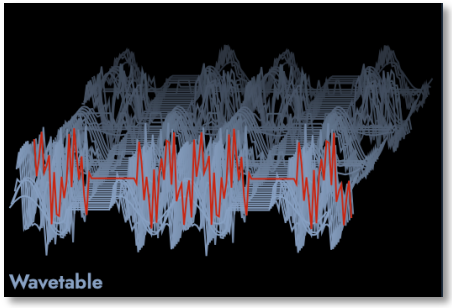
Wavetable Dial

Selects one of the 64 factory wavetables or custom wavetables (User 1-24) for the current selected oscillator. You can also use the Wavetable pop-up menu above the Wavetable dial. Depending on the chosen wavetable, both graphic representations and the Control Table list look different.

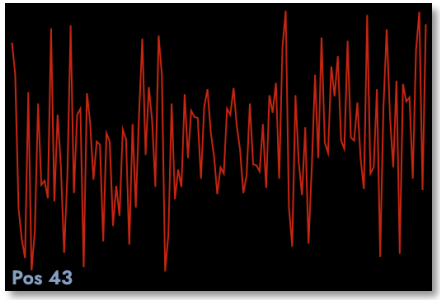


Wavetable Representation Displays

The left Wavetable display shows a 3D graphical representation of the current selected wavetable. The startwave position is shown as a thin red line. This position can be changed by click and hold in the graphic and vertical movement of your mouse.



The right Wavetable display shows a graphical representation of the current wave. In the lower left corner oft he display, the current position is displayed. This representation is useful when edit waves in the Control table. The wave position can be changed by click and hold in the graphic and vertical movement of your mouse.



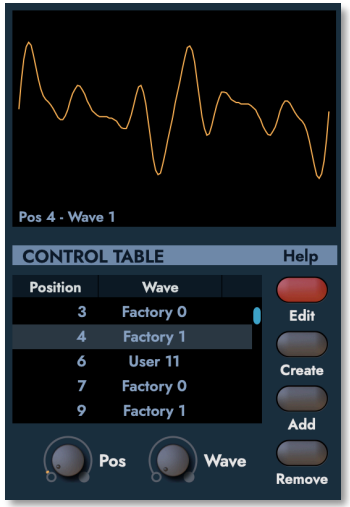
Control Table Section

The Control table is a list of all waves of the current selected wavetable. Within that list, you can select a wave. This wave is shown in yellow color within the Wavetable displays above. Keep in mind that a selection does not change the wave position.

In the right area of the Control Table header you find a **Help** button. Click on it to open a window with some basic information, how a wavetable can be edited.

Wavetables are stored in the Microwave plug-in using Control tables. Each wavetable has 64 positions for waves.

But not all positions are defined. Only a few positions are typically defined with waveforms. The other ones are interpolated. The first position 0 needs always tob e defined.



In the User wavetables you can add, remove and specify these position by desire. The waveforms itself are taken from a catalogue of 300 factory waves and 122 user definable waves.

A few factory wavetables are special are not using control tables. These wavetables are called „Algorithmic“ as they are computed by code.

User wavetables are stored in each sound program and can be sent to the Microwave hardware (if available).

The Edit Option

Behind this simple button you find a useful option to edit existing wavetables or to create new ones. Here is, how it works:

- To edit a factory wavetable, you first need to copy it into a User wavetable.
- This is done be clicking on the **Edit** button and confirm the pop-up message.
- After that, select a desired user wavetable, click on the **Edit** button and choose *Paste Table*. The right wave display shows the current selected wave in orange color.
- Now you are ready to edit the wavetable!

ⓘ Wavetables that based on Algorithmic calculation cannot be edited.

You can copy & paste wavetables within a sound program or also between different sound programs. The following options are available:

- Use the **Pos** knob to select the desired wavetable position for editing. You can also select the position within the wave list above or by click and drag in the right wave display.

- Use the **Wave** knob to select a desired wave for the current selected wave position. You can choose between nearly 300 factory waves and more than 120 User waves.

- User waves can be edited separately in the Wave Editor in the lower zone. More on that later.
- Use the **Wave** knob to select a desired wave for the current selected wave position. You can choose between nearly 300 factory waves and more than 120 User waves.
- Click on the **Add** button to add an additional wave behind the current selected wave position. Keep in mind that there is a maximum of 64 waves per wavetable.
- Click on the **Remove** button to remove the current selected wave from the User wavetable. Keep in mind, that a wavetable must contain at least one wave.
- Click on the **Edit** button to open a pop-up menu with the following options:
- **Select User Wave** selects the User Wave 1 for the current selected wave. This makes it easier to choose a User wave as with the **Pos** knob.
- **Copy / Paste Wave** copies the the current selected wave / pastes the wave from the clipboard onto the current selected wave. Keep in mind, that the current wave will be overwritten during this process.
- **Copy / Paste Table** copies the the current wavetable / pastes the wavetable from the clipboard into the current control table. Keep in mind, that the current User wavetable will be overwritten during this process.
- **Reverse Table** reverses the current wavetable. This means, that the wave on position 0 changes its position tot he last wave. Wave 1 goes to the next to last position and so on.
- **Shuffle Table** mixes the wave positions in the current wavetable. Use this option to randomize a wavetable.
- **Undo Last Edit** performs an undo command fort he last edit that was made. This is the ultimate help function if you accidentally overwrote a wave.

- The Create option offers some predefined waves for fast editing results. Click on the **Create** button to open a pop-up menu with the following options:
  - **Single Cycle** creates a sine wave with a single cycle.
  - The **Waves** options create 2 to 8 waves with simple waveforms.
  - The **Lucky** options create 2 to 8 waves with more complex waveforms.
  - The **User Waves** options create 2 to 8 waves based on the current user waveforms.

Oscillator 1 & 2 Section

Here you find basic oscillator settings related to pitch and volume.

Osc 1 and Osc 2 offer the same parameters.

Osc Solo Button

The right area of the OSCILLATOR header works as solo option to only hear the corresponding oscillator. Click on *Solo Off* to activate the Solo option. The header lights orange. Click on *Solo On* to switch back to regular oscillator playback.

Octave

Determines the octave setting of the corresponding oscillator. The reference pitch for the oscillator is generated at MIDI note A3 (note no. 69) when **Octave, Semitone** and **Detune** is set to 0. In this case the oscillator's frequency will be the same as set in the global **Master Tune** parameter (normally 440Hz). Set this parameter to 0 if you are creating a typical keyboard sound, set it to -1 for bass sounds. If you are programming strings or other high pitched sound, set Octave to +1 .

Detune

Fine-tunes the oscillator in increments of 64ths of a semitone. The audible result of detuning oscillators is a flanging. Use a positive setting for one oscillator and an equivalent negative setting for the other. A low value of ±1 results in a slow and soft flange effect. Mid-ranged settings of ±5 are optimal for pads and other fat sounding programs. High values of ±12 or above will give a strong detune that can be used for accordeons or effect sounds.

Semitone

Determines the pitch of the corresponding oscillator in semitone steps. The standard setting for this parameter is 0, but there are cases where different values are required: Most organ sounds include a quint, therefore one oscillator's semitone parameter must be set to +7. There are also many lead sounds with an interval, e.g. a quart (+5 semitones).

Osc Volume

Volume for the corresponding wave oscillator.

PitchBend

Determines the intensity of the pitch-bend (from 0 to 12 semitones) via MIDI Pitch-bend messages in semitones for the corresponding oscillator.

(Pitch) Mode Button

Determines, if incoming MIDI notes will change the pitch or not. If set to *Normal*, incoming notes change the oscillator´s pitch as defined by the corresponding MIDI note, as you would usually expect. If set to *Fixed*, a note on message will still trigger the oscillator, but the incoming pitch will be ignored. The result is the same pitch for every key, the default is MIDI note number 60 (C3).

Wave 1 & 2 Section

Both Wave sections offer the same parameters.

Wave

Determines the start point of the wavetable that is used when the sound starts. As an alternative to the waves of the currently selected wavetable, you can select the basic waveforms triangle, square with 50% duty cycle or sawtooth, when choosing the Wave values 61, 62, or 63.

The wave position can also be changed by clicking into the left wavetable graphic and move your mouse up or down.

Start

By means of this parameter you can define the Startwave and, as a result, the phase of the generated wave. Alternative to a fixed value, you can use *free* to set the phase to a different, random value each time a note is generated.

Wave Env (Wave Envelope Amount)

Determines the amount of influence the wave envelope has on the wavetable modulation for the corresponding oscillator.

Env*Velo (Envelope Velocity)

Determines the amount of influence the wave envelope has on the wavetable modulation, based on key velocity. In conjunction with **Wave Env** you can create nice effects when you set one of the two parameters to a negative setting while the other one is set to a positive setting.

Keytrack

Determines the amount of wavetable modulation depending on the received MIDI note number. Reference note for this parameter is C3, note number 60. For positive settings the modulation amount is increased for notes above to reference note, for negative settings the amount is decreased. A setting of +63 corresponds to a 1:1 scale. This means that each note above or below the reference note plays a different wave.

The Wavetables are the real power of your Microwave 1 plug-in. To make sure that you have access to all this power, you should make yourself familiar with the sound and the characteristic of each wavetable. The best way to do so is to set up a kind of test sound to listen to the wavetables: Start with an initialized sound (click on the **Init** button) and switch Osc 1 to solo. Use the **Wave** knob in the WAVE 1 section to move through the current selected wavetable. Use the **Wavetable** dial to select another wavetable. You will notice that they cover an extremely wide range of interesting spectral timbres, including analog, FM-like, bell-type or vocal.

Note that you can apply unipolar and bipolar modulation sources to the Wave parameter as with any other module. For example, set the Wave parameter to 29, which is almost the middle of the wavetable and apply a slow running LFO to the Wave module to sweep through the whole wavetable (except the three waveforms triangle, square or sawtooth). Try it with one of the PWM wavetables.

Pitch Modulation Section

Here you find routable modulation inputs, that are related to the pitch of the corresponding wave oscillator.

ⓘ Both sections offer nearly the same parameters for Osc 1 and Osc 2.

Mod 1 & 2 (Pitch)

Determines the amount of modulation applied to the corresponding oscillator pitch. This parameter can be set to both positive and negative values.

Source 1 & 2 (Pitch)

Selects the modulation source for the pitch modulation of the corresponding oscillator. Click on the corresponding **Source** button for Mod 1 or Mod 2 to open a list with 24 source options and select the desired one.

Control (Pitch, only for Mod 1)

Selects the sidechain controller that is used to scale the output of the modulation source. A typical example is a LFO as **Source** and the Mod Wheel as **Control**. This allows you to control the intensity of the LFO modulation using the mod wheel. If no Source is selected, no modulation takes place. If you want to use a classic source * destination behavior, set **Control** to *Maximum*.

Quantize (only for Pitch Mod 2)

Gradually transforms continuous modulations like a LFO sine-wave into discreet steps. If set to 0, no quantization is introduced to the modulation signal. Values from 1...7 introduces different levels of quantization, thus changing the modulation´s output from a continuous waveform to a quantized wave of discreet steps.

Use higher quantization values together with a LFO as source to achieve sample-and-hold effects.

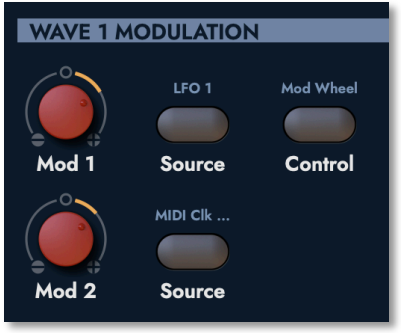
Link (only available for Pitch 2 Modulation)

Allows the use of the same pitch modulation settings for both wave oscillators. When enabled, Wave Osc 2 uses the pitch modulation parameters of Wave Osc 1 for both pitch modulation settings. That means, whenever a pitch modulation is applied to Wave Osc 1, it is also used for Wave Osc 2. When disabled, each wave uses its own individual modulation settings.

Wave Modulation Section

Here you find routable modulation inputs, that are related to the wave position of the corresponding wave oscillator.

Both sections offer nearly the same parameters for Osc 1 and Osc 2.



Mod 1 & 2 (Wave)

Determines the amount of modulation applied to the corresponding oscillator wave position. This parameter can be set to both positive and negative values.

Source 1 & 2 (Wave)

Selects the modulation source for the wave modulation of the corresponding oscillator. Click on the corresponding **Source** button for Mod 1 or Mod 2 to open a list with 24 source options and select the desired one.

Control (only for Wave Mod 1)

Selects the sidechain controller that is used to scale the output of the modulation source. A typical example is a LFO as **Source** and the Mod Wheel as **Control**. This allows you to control the intensity of the LFO modulation using the mod wheel. If no Source is selected, no modulation takes place. If you want to use a classic source * destination behavior, set **Control** to *Maximum*.

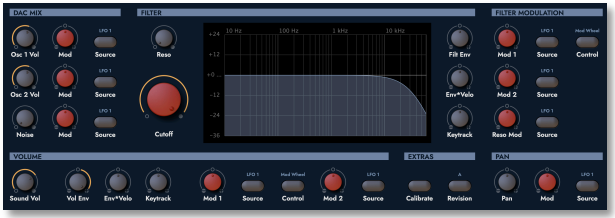
Link (only available for Wave 2 Modulation)

Allows the use of the same wave modulation settings for both wave oscillators. When enabled, Wave Osc 2 uses the modulation parameters of Wave Osc 1 for all modulation settings, **WaveEnv, Env*Velo** and **Keytrack.** That means, whenever a modulation is applied to Wave Osc 1, it is also used for Wave Osc 2. When disabled, each wave uses its own individual modulation settings.

The Filter & Amplifier Page

Within the Filter & Amplifier section, a DAC Mix section, the Filter modulations and a volume section is integrated.

Click on the **Filter** button in the Module selection area to open the Filter section.



DAC Mix Section

In this section you can control the volumes of both oscillators and the Noise generator. If an Osc volume dial is turned fully counterclockwise, no signal is passed. Here, you can also set up the volume modulations.

Osc 1 & 2 Vol

Volume of the corresponding wave oscillator. These knobs are the pendants to the Osc Volume knobs on the Osc 1 and Osc 2 sections.

It is possible to introduce a saturation of the Filter input. The circuit in the Waldorf Microwave 1 was designed to saturate about 70% of the oscillator's maximum mixer output (oscillator level setting 75 and above). This saturation acts as a mild overdrive effect and brings a little more warmth to the sound. The effect may vary depending on the waveform of the oscillators or their combination. In order to check this effect sonically, it is recommended to select the single oscillator of the sine wave and increase the level of this oscillator until the saturation can be heard.

Noise

Volume of the noise generator. The noise generator produces pink noise and features no other controls. Noise is a fundamental source for any kind of analog-type percussion. Also wind and other sound effects can be created by using the noise generator.

Mod

Determines the amount of modulation applied to the oscillators and noise levels. This parameter can be set to both positive and negative values.

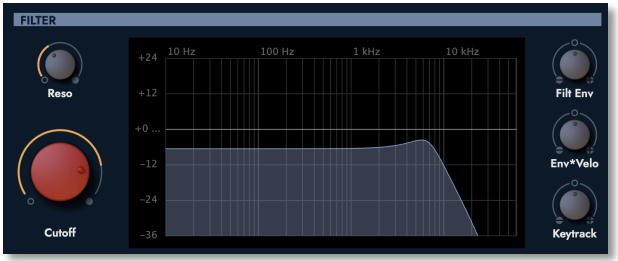
Source

Selects the modulation source for the Osc 1, Osc 2 or Noise level modulation.

Click on the corresponding **Source** button to open a list with 24 source options and select the desired one.

Filter Section

Microwave 1 plug-in offers an emulated analog lowpass filter with 24dB/oct and resonance. This filter type dampens frequencies which are higher than the specified cutoff frequency. Frequencies below this threshold are hardly affected. To give you an idea of the extent of damping, consider this: A reduction of 24dB reduces the original level by approx. 94%. The damping factor two octaves above the cutoff point reduces the original level by more than 99%, which in most cases means this portion of the signal is no longer audible. M's filter also features a resonance parameter. Resonance in this context means that a narrow frequency band around the cutoff point is emphasised. If the resonance is raised to a great extent, then the filter will begin self-oscillation, i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.



Cutoff

Determines the cutoff frequency for the low pass filter. All frequencies above the cutoff frequency are damped. You can bring more movement into the sound by modulating the cutoff frequency via the LFOs, the Filter Envelope or the **Keytrack** parameter. At a value of 50 and a **Reso** value of 80, the filter oscillates with 1046,5 Hz, which is equal to note C6. Tuning is scaled in semitone steps. When **Keytrack** is set to +63, the filter can be played in a tempered scale with a tolerance of +/- 2 cents within 5 octaves.

Reso (Resonance)

Determines the amplification of the frequencies around the cutoff point. Use lower values in the range 0...60 to give more brilliance to the sound. At higher values of 60...80 the sound gets the typical filter character with a strong boost around the cutoff frequency and a loss in the other range. When the setting is raised to values above 80, the filter starts to self-oscillate, generating a pure sine wave. This feature can be used to create solo sounds like the traditional "Moog lead" or analog-style effects and percussion like electronic toms, kicks, zaps etc.

Cutoff and **Resonance** can also edited in the filter display. Click into the graphic and move the mouse horizontally (Cutoff) and vertically (Resonance) to edit both parameters.

Filter Env

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. On the other side string sounds usually use a negative envelope amount that gives a slow and dark attack before the cutoff rises in the sustain phase.

Env*Velo

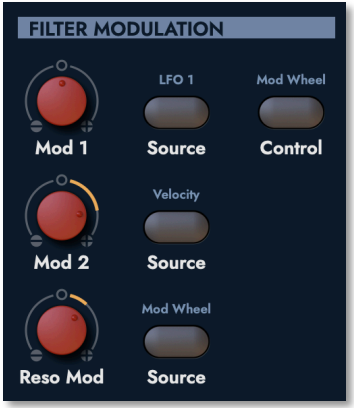
Determines the amount of influence the filter envelope has on the cutoff frequency, based on key velocity. This parameter works similarly to the **Filter Env** parameter with the difference that its strength is velocity based. Use this feature to give a more expressive character to the sound. When you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

Keytrack

Determines how much the cutoff frequency depends on the MIDI note number. The reference note for Keytrack is C3, note number 60. For positive settings, the cutoff frequency rises on notes above the reference note, for negative settings the cutoff frequency falls up to higher notes and vice versa. A setting of *+0* corresponds to a 1:1 scale, so e.g. when an octave is played on the keyboard the cutoff frequency changes for the same amount. If you want to play the filter in a tempered scale, e.g. for a solo sound with self-oscillation, set the value to +0%. On most bass sounds lower settings are optimal to keep the sound smooth at higher notes.

Filter Modulation Section

Here you find all parameters regarding the filter modulations.



Mod 1 & 2

Determines the amount of modulation applied to filter cutoff Mod 1 or Mod 2. These parameters can be set to both positive and negative values.

Reso Mod

Determines the amount of modulation applied to resonance. This parameter can be set to both positive and negative values.

Source

Selects the modulation sources for the both filter cutoff modulations and the resonance modulation. Click on the corresponding **Source** button to open a list with 24 source options and select the desired one.

Control (only for Filter Mod 1)

Selects the sidechain controller that is used to scale the output of the modulation source. A typical example is a LFO as **Source** and the Mod Wheel as **Control**. This allows you to control the intensity of the LFO modulation using the mod wheel. If no Source is selected, no modulation takes place. If you want to use a classic source * destination behavior, set **Control** to *Maximum*.

Volume Section

Here you find all parameters regarding the sound volume and the corresponding modulations.

Sound Vol

Determines the overall volume of the sound program.

Vol Env

Determines the amount of influence the volume envelope has on the volume. For positive settings, the volume is increased by the modulation of the envelope, for negative settings, the volume is decreased. Sounds with a hard attack usually have a positive envelope amount that makes the start phase louder and then closes the amplifier to get a smoother sustain phase.

Please note that negative values are also possible, so the volume envelope is used inverted. A setting of 0 switches the amplifier off. The reason for this is that the Microwave applies all modulations (EG * Vol Env) as CV source and not to the amplifier CV itself (as for example for the filter). So if there is 0 as Vol Env amount, no sound is hearable.

Env*Velo

Specifies how much volume will be affected by keyboard velocity. Use this feature to give more expression to the sound. With a setting of *0*, velocity will have no effect on the volume. Classic organs work in this way because they do not have dynamic response. For positive settings, the volume rises up to higher velocities. This is the most commonly used setting which gives a piano-like character. For negative settings, the volume falls up to higher velocities. This gives an untypical character suitable for effect sounds. As the Amplifier always works in conjunction with the VCA Envelope, this parameter actually determines the envelope velocity amount.

You need use the VCA envelope by setting its envelope amount or velocity parameters different to 0; otherwise there will be no output at all. Therefore you must define the volume envelope in a useful way even if you intend to use another envelope to shape the sounds loudness.

Keytrack

Determines how much the volume depends on the MIDI note number. The reference note for Keytrack is C3, note number 60. For positive settings, the volume increases on notes above the reference note, for negative settings the volume decreases up to higher notes and vice versa. This setting can be useful to adjust a sound's volume over the whole keyboard range. Especially when extensive filtering is used, the sound can be louder on the lower or the upper part of the keyboard. On the other side, you can apply this effect intentionally e.g. for effect sounds.

Mod 1 & Mod 2

Determines the amounts of modulation applied to volume. These parameters can be set to both positive and negative values.

Source

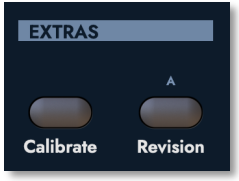
Selects the modulation sources for the volume modulations. Click on the corresponding **Source** button to open a list with 24 source options and select the desired one.

Control (only for Volume Mod 1)

Selects the sidechain controller that is used to scale the output of the modulation source. A typical example is a LFO as **Source** and the Mod Wheel as **Control**. This allows you to control the intensity of the LFO modulation using the mod wheel. If no Source is selected, no modulation takes place. If you want to use a classic source * destination behavior, set **Control** to *Maximum*.

Extras Section

In this section you find two very important options which are responsible for the typical Microwave sound character.



Calibrate

Each voice in the Microwave uses an analog low-pass filter. Due to various factors, these individual filter voices can sound slightly different. For this reason, there are often special calibration functions. Such a function can also be found in the Microwave plug-in. Click on the **Calibrate** button to call up the corresponding options in the lower zone. **Filter Calibration** can also be accessed via the **Menu** button in the head section.

For each voice there is a separate calibration control for **Cutoff** and **Resonance**. To make life a little easier, we have integrated **Calib** buttons on the right, which opens a menu with calibration presets. The recommendation here can only be: Just try it out!

The Calibration parameters are not stored within a Microwave sound program. This allows you to edit these parameters as desired and switch through the preset programs without affecting the overall sound. When using this plug-in within a DAW, these settings are stored in your DAW project file.

Revision A / B

The original Microwave was sold with two different filter chips. The first one was a CEM 3389 (Revision A), which was used in the first hardware version. It was later replaced by the CEM 3387 (Revision B). There were some differences in sound character that can be tested with this simple switch.

Pan Section

Pan

Determines the position in the stereo panorama. When the setting is *-64*, the sound is panned far left, when the setting is right *+63*, it is panned far right. If you want to set the sound into the middle of the stereo panorama, use the +0 setting. To give further movement to the sound, set this parameter to a basic value and apply some modulation to it e.g. via a LFO.

Pan Mod

Determines the amount of modulation applied to panning. This parameter can be set to both positive and negative values.

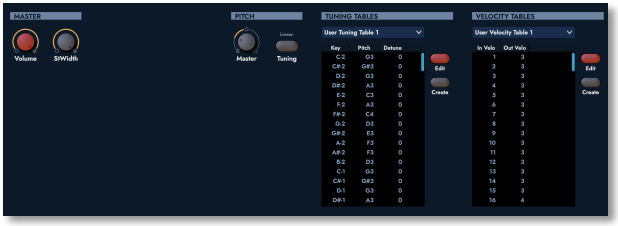
Source

Selects the modulation sources for the panning modulation. Click on the corresponding **Source** button to open a list with 24 source options and select the desired one.

The Global Page

Here you find global parameters regarding volume, pitch and Tuning/Velocity tables.

Click on the **Global** button in the left area to open the Global page.



Master Section

Keep in mind, that the Master parameters are not stored within a sound program. This allows you to edit these parameters as desired and switch through the preset programs without affecting the overall sound and stereo imaging.

Volume

Determines the overall volume of the plug-in. This knob is the pendant to the Master Volume knob in the head section.

StWidth

Determines the width oft he stereo filed. This parameter is useful if you programmed a stunning pan-sweep that should be a little more centered within the stereo image.

- *full* uses the entire width of the stereo field as determined in each Sound Program.
- *mono* combines both channels and send a monophonic signal of equal volume to both left and right outputs of the plug-in.
- Values between *1* and *126* will reduce the width of the stereo image.

Pitch

Master

Fine-tunes the current sound program in increments b< the 64th of a semitone.

Tuning Button

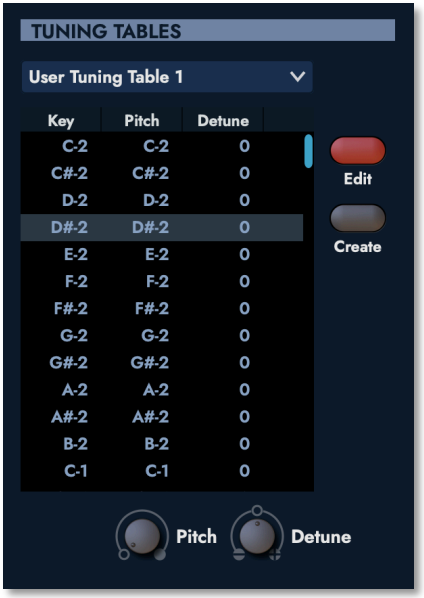
Selects the intonation that is used to play the sound program. This button can also be found on the Main page.

- *Linear+* is the regular equal-tempered intonation.
- *Linear-* is also an equal-tempered intonation. However, it is exactly inverted to the incoming MIDI note number. A note number of 1 will produce a pitch equal to note number 127, note number 30 is pitched to note number 97 etc.
- *Rand 1* will use the incoming MIDI notes as they are but will randomly detune them very slightly to achieve a more 'acoustic' effect.
- *Rand 2* does essentially the same as *Rand 1*, the only difference being in the greater amount of detuning it exerts on the notes. Use this on one single sound on a layered sound in Multimode to create a beautiful dynamically changing
- *User1-4* are the user-definable tuning-tables (see next page). You can map any incoming note to any note of your choice and, on top of that, detune it by up to a semitone in each direction.
- *Equal* is a method of dynamically tuning musical instruments. It creates clear frequencies for every fifth and third interval, for example. Retuning only affects individual notes and maintains the pitch relationship between keys and notes.

Tuning Tables

As the original hardware, the Microwave 1 plug-in offers 4 user-programmable Tuning Tables. They allow you to use a different intonation than the standard Western/European scale (twelve-tone equal temperment). Since you can program a separate pitch- and fine-tune value for each MIDI note-number, you can achieve very

complex intonations. Each of these tables is programmed in the same manner.



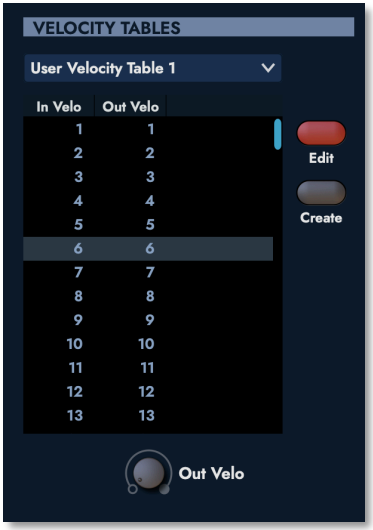
- First, select the desired User Tuning Table by clicking on the pop-up menu above the table.
- After that you can assign the desired pitch for each incoming key in the table. There are two options:
  - A separate **Pitch** value, adjustable in semitones
  - A separate **Detune** value that detunes the pitch +/- a semitone.
- Click on the desired key in the table to select it.
- Use the **Pitch** knob to adjust the pitch value in semitones.
- Use the **Detune** knob to detune the pitch by up to a semitone.
- Click on the **Edit** button to open a pop-up menu with the following options:
  - **Copy Tuning** copies the tuning values oft he selected key in the clipboard.
  - **Paste Tuning** pastes the tuning values in the clipboard onto the current selected key.
  - **Undo Last Edit** performs an undo command for the last tuning edit that was made.
- Click on the **Create** button to initialize the current selected User Tuning Table.

You should program a Tuning table completely. Otherwise you may experience strange detunings due to a forgotten or false assignment. The lowest key you can edit is C-2, the highest is G8 (the entire MIDI note range). A regular five octave keyboard employs the range from C1 to C6.

Velocity Tables

As the original hardware, the Microwave 1 plug-in offers 4 user-programmable Velocity Tables. They allow you to program a separate outgoing velocity value for each incoming one. Thus you can achieve very complex velocity curves, useful both for volume and all other parameters that may be modulated by velocity. All Velocity tables are programmed in the same manner.

- First, select the desired User Velocity Table by clicking on the pop-up menu above the table.
- After that you can assign the desired outgoing velocity value for each incoming velocity value in the table.
- Click on the desired Velocity row 1 to 127 in the table to select it.
- Use the **Out Velo** knob to select your desired outgoing velocity value.



- Click on the **Edit** button to open a pop-up menu with the following options:
  - **Copy Velocity Table** copies the current selected velocity table in the clipboard.

- **Paste Velocity Table** pastes the velocity table in the clipboard onto the current selected User Velocity table..
- **Undo Last Edit** performs an undo command for the last velocity edit that was made.

- Click on the **Create** button to initialize the current selected User Velocity Table.

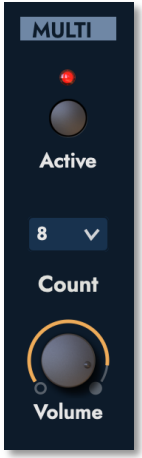
The Multi Page

Click on the **Multi** button to open the Multi page.

In this window section you can set up and edit your Multi instruments. Multis are used for split sound configurations or sound layers.

Keep in mind that the Microwave 1 plug-ins offers a polyphony of 8 voices at all. That means, that all instruments of a Multi share the same number of voices.

Multi Parameters Section



These parameters are valid for all Instruments of a Multi program.

Active

Click on this button to activate the Multi mode. When activated, all other Multi and Instruments parameters will be displayed. If deactivated, the plug-in works in Single sound mode.

Count

Defines how many Instruments are active in a certain Multi program. Rather than always having 8 instruments (of which six might not be used), here you can set how many instruments you need. You can always change this number, even after having programmed certain instruments. If you decrease the number of instruments the already defined instruments will not be lost, making it easy to check if certain Instruments are needed or not. If you only set as many Instruments as are truly needed, you will be able to cycle through these Instruments much faster, speeding up the process of programming Multi programs.

The displayed instruments depends on the instrument number determined with the **Count** parameter.

Volume

Sets the overall output level for this particular Multi program. If it is set to 0, there will be no sound. 127 will output full volume as programmed at the Sound Volume parameter.

Instruments Parameters Sections

These parameters define the settings for each individual instrument. The number of available instruments will be set by the **Count** parameter.

All 8 multi instruments offer the same parameters.

Instrument Button

Activates or deactivates an instrument. A deactivated Instrument can still be defined and will show up; however, it will not output sound and will ignore all MIDI messages sent to it. *On* activates an instrument. You can program it and it will play according to it's parameters. *Off* deactivates an Instrument. You may program it, but it won't output any sound and will ignore all MIDI messages. The 3rd option is Solo. This option gives you the ability to listen to only one or more instruments. This helps you to check instrument settings or to test instruments sound programs.

Bank Selection Menu

Here, you select the sound bank for the corresponding instrument. You may use any available Factory or User bank.

Sound Selection Menu

Here, you select the Sound program for the corresponding instrument. You may use any available Factory or User Sound program within the selected bank.

Transpose (Trans)

Permits you to transpose the corresponding instrument in semitones. -24..-1 will transpose the Instrument downwards. +1..+24 will transpose the Instrument upwards. 0 produces no transposition. A value of 12 equals one octave.

Detune

Allows you to detune the corresponding instrument, affecting both oscillators of the selected Sound program equally. -64 will detune the instrument one semitone downwards. +63 will detune the instrument one semitone upwards. 0 will not detune the instrument at all.

PanMod Button

Lets you decide if the modulation used in a Sound program shall be used or not. Often a single sound will employ some sort of dynamic panning to make it more interesting. In a multi-timbral arrangement, however, that panning modulation may destroy a delicately set stereo blend. With the PanMod parameter you can make the appropriate choice. *On* keeps the original panning modulation of the Sound program intact. *Off* cancels all panning modulation of the Sound program. The cancellation, however, is valid only for that Instrument in the Multi program. If the Sound is programmed without panning modulation, this parameter will have no effect. *Inverse* ist he same as *On*, but with inverse functionality. A sound that would normally be moved left will now be moved right.

Pan

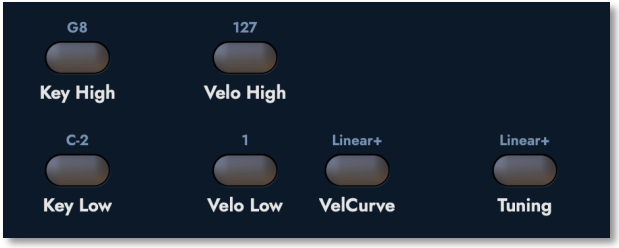
Sets the position in the stereo field where the Instrument will be placed. This parameter will over-ride the equivalent parameter in the selected Sound program. L64 positions the Instrument all the way to the left. M00 places the instrument in the center. R63 positions the instrument all the way to the right. Be aware that the "StereoWidth" parameter in the Master section might reduce the stereo field. As an extreme it might be set to "mono". Then, of course, any adjustment of the Pan parameter will yield the same result: the instrument will appear at center.

Volume

Lets you adjust the volume of the corresponding instrument to your needs. By changing the instrument's volume you will scale the Sound program's volume. Thus, the volume set at an instrument is not an absolute value but is relative to the volume of the sound program. 0 will completely suppress the Instrument's volume. Also, the Instrument won't play and nor use up voices. 127 will output the Instrument with the value programmed in the Sound program. If that is too low, you must raise it at the source to maintain a higher output level.

Settings

Click on this button to open the **Settings** section in the lower area of the plug-in window. You can click on the corresponding Settings button of the desired instrument to open the associated Instrument settings. An orange LED right to the **Settings** button shows the active Settings section.



- **Key High** (C-2..G8) sets the high note of the key-window recognized by the instrument. The instrument will only play notes within the key-window, ignoring all notes outside. Therefore, any note above the Key High will not be played by that instrument. This entry defines the highest note that will be played.
- **Key Low** (C-2..G8) sets the low note of the key-window recognized by the Instrument. The instrument will only play notes within the key-window, ignoring all notes outside. Therefore, any note below the Key Low will not be played by that Instrument. This entry defines the lowest note that will be played.
- **Velo High** (1..127) sets the loudest velocity of the velocity-window recognized by the instrument. The instrument will only play notes within the velocity-window, ignoring all notes outside. Therefore, any note with a velocity above the Velocity High will not be played by that Instrument. That entry defines the highest velocity that will be played.
- **Velo Low** (1..127) sets the lowest velocity of the velocity-window recognized by the instrument. The instrument will only play notes within the velocity-window, ignoring all notes outside. Therefore, any note with a velocity below the Velocity Low will not be played by that Instrument. That entry defines the lowest velocity that will be played by that instrument.
- **VelCurve** defines how incoming velocity information will be interpreted. There are six response-curves and four user-tables available that can be used to scale the incoming velocity to your needs.
  - *Linear+* (positive linear) is a response-curve that simply forwards the regular velocity as sent by your keyboard in a 1:1 relation, unchanged. That is,

an incoming velocity of 20 will be forwarded as a value of 20.

- *Linear-* (negative linear) is a response-curve that inverts the incoming velocities. Therefore, an incoming velocity of 1 will be forwarded as 127, 20 will become 107, etc. Whenever you want to do a velocity cross-fade, you should program one instrument with a positive, the other with a negative response-curve.
- *Expo+* (positive exponential) will change the incoming linear velocity to a more exponential curve, resulting in a response more suitable for crossfading two sounds or blending in a second layer at higher velocities.
- *Expo-* (negative exponential) is the reversed counterpart to the *Expo+* curve, becoming softer at increasing velocity values. Use it together with the *expo+* curve to create crossfade sounds whose combined loudness remains intact.
- *X-Fade+* (positive crossfade) will alter the incoming linear velocity to a very special curve that best works in conjunction with its *X-Fade-* counterpart on a second instrument to create a velocity crossfade of two sounds whose combined loudness will still be velocity sensitive, if at a smaller scale than its pure linear counterpart.
- *X-Fade-* (negative crossfade) is the reversed counterpart to the *X-Fade+* curve. It makes most sense when used in the above scenario. Try it while using a very high velocity sensitivity on the two sounds to be crossfaded, and you will like the results.
- *User 1...4* will output incoming velocities according to the corresponding user-definable Velocity Table. This table can map any incoming velocity value to any outgoing velocity value.

- **Tuning** selects the intonation that is used to play the corresponding instrument. The options are the same as for the **Tuning** parameter in the **Pitch** section.

In the Settings section you will also find parameters that allow certain MIDI sources to be switched on or off individually for each instrument. They all work in the same manner, but on different MIDI messages. Those MIDI filters will not be active (the LED lights red). The MIDI source (pitch wheel, modulation etc) affects the sound. If it is set to off (the LED does not light), the MIDI source will be filtered and have no effect on the sound whatsoever. Keep in mind that each instrument may individually switch on or off certain MIDI messages.

- **PitchBend** selects whether pitch wheel commands will be recognized by the Instrument.
- **Wheel** selects whether modulation data (MIDI continuous controller #1) will be recognized by the Instrument.
- **ChPress** selects whether aftertouch data will be recognized by the Instrument.
- **Poly AT** selects whether polyphonic pressure data will be recognized by the Instrument.
- **Vol Cntrl** selects whether volume controller data (MIDI continuous controller #7) will be recognized by the Instrument.
- **Pan Cntrl** (off/on) selects whether panning controller data (MIDI continuous controller #10) will be recognized by the Instrument.
- **Sus Ped** selects whether sustain- or hold-pedal data (MIDI continuous controller #64) will be recognized by the Instrument.
- **Prog Chg** (off/on) selects whether MIDI program change will be recognized by the instrument.

The Modulator Sections

The 5 programmable modulators (3 envelopes & 2 LFOs) allow you to manipulate sound parameters via rate or time based modulations.

Click on the corresponding button (**WaveEnv**, **FilterEnv**, **VolEnv**, or **LFOs**) in the Modulators selection area to open the desired section.

In this section, other options and functions can be displayed, e.g. the first 4 options in the **Menu** pop-up menu.

Wave Envelope

This loop-able envelope with 8 different times and levels (multi segment envelope) is designed to control the wave scanning for a wavetable, but can also be used for other modulations.

The wave envelope stages can also be edited in the graphic representation. First, click on the desired stage (it lights orange) and then move your mouse up or down to edit the level parameter or left or right to edit the time parameter.

Time 1-8

Determines the time for the individual segment to reach its end level.

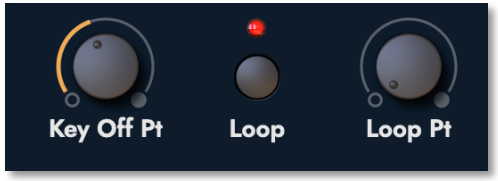
Level 1-8

End level that the corresponding segment finally reaches.

Multi segment envelopes are extremely flexible modulation sources. Their structure is made of grouped time/level parameters that allows one to generate an almost free modulation amount over several time segments. The envelope consists of several single segments, that can be divided into a sustain and a release phase. The crossover point between these two phases can be determined by selecting the corresponding segment number. The envelope is started by pressing a key. It ascends to the **Level 1** value at the rate determined by the **Time 1** parameter. In the next time segment **Time 2** the amplitude moves to the **Level 2** value. The same procedure is processed for the following segments until the end of the sustain phase is reached. The envelope then moves on to process the remaining segments until it finally ends with its last value **Level 8.** In fact you can reduce the number of processed segments to get things easier. Additionally you can repeat specific segments by installing loops in the sustain phase as well as in the release phase.

Key Off Pt (Key Off Point)

Defines the border between the key-on and the release portion of the wave envelope. This point is the last segment of the key-on portion. If there is no loop defined, the level of the Key off point is the sustain level at which the envelope will remain until the key is released (the MIDI note-off command is received) and the release portion of the Wave envelope begins. The Key Off point is also shown as a grey vertical line between the Time and Level parameters for better orientation.



Loop

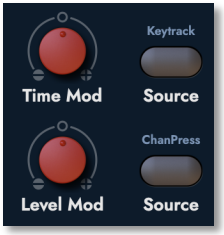
Selects whether a loop is performed in the Wave envelope's or not.

Depending on the selected Key Off Point and Loop Point, the number of the displayed Time/Level knobs can differ.

Loop Pt

Only visible, when Loop is active. Defines the segment at which the loop will start, if **Loop** is set to active. The loop will always run between the loop start point and the Key off point. Loop length is also shown as a red horizontal line below Time / Level parameters for a better orientation.

If Loop Start point is < than the Key Off point , the loop will be at sustain phase. If the Loop point is > than Keyoff, the loop will be at release phase. If Loop Start point = Key off point, there will be no loop.



Time Mod

Determines the amount of modulation applied to the time points. This parameter can be set to both positive and negative values.

Time Mod

Determines the amount of modulation applied to the time points. This parameter can be set to both positive and negative values.

Time Mod Source

Selects the modulation source for the time point modulation. Click on the **Source** button to open a list with 24 source options and select the desired one.

Level Mod

Determines the amount of modulation applied to the level points. This parameter can be set to both positive and negative values.

Level Mod Source

Selects the modulation source for the level-point modulation. Click on the **Source** button to open a list with 24 source options and select the desired one.

Filter Envelope

This ADSR envelopes is designed to control the filter cutoff, but can also be used for other modulations.

The filter envelope stages can also be edited by clicking into the envelope representation and move your mouse up or down.

An ADSR envelope is started by pressing a key. It ascends to its maximum value at the rate determined by the **Attack** parameter. It then descends at the rate determined by the **Decay** value until it reaches the predetermined **Sustain** value. It remains at this value until the key is released. The envelope then descends to zero at the rate determined by the **Release** parameter.

Delay

Delays the start of the filter envelope after a note trigger happens.

Below the Delay knob, you find **Mod** / **Source** parameters to modulate the delay time.

Attack

Determines the attack rate or amount of time it takes for a signal to go from zero to maximum level.

Below the Attack knob, you find **Mod** / **Source** parameters to modulate the Attack time.

Decay

Determines the decay rate or amount of time it takes for a signal to reach the **Sustain** level.

Below the Decay knob, you find **Mod** / **Source** parameters to modulate the Decay time.

Sustain

Determines the sustain level that is held until a note ends.

Below the Sustain knob, you find **Mod** / **Source** parameters to modulate the sustain level.

Release

Once the note has ended, the release phase begins. During this phase, the envelope fades to zero at the rate determined by the release value.

Below the Release knob, you find **Mod** / **Source** parameters to modulate the release time.

Mod (for Delay, Attack, Decay, Sustain, Release)

Determines the amount of modulation applied to the corresponding parameter. This parameter can be set to both positive and negative values.

Mod Source (for Delay, Attack, Decay, Sustain, Release)

Selects the modulation source for the corresponding parameter modulation. Click on the **Source** button to open a list with 24 source options and select the desired one.

Volume Envelope

This envelope is designed to control the sound volume, but can also be used for other modulations.

The volume envelope stages can also be edited by clicking into the envelope representation and move your mouse up or down.

Attack

Determines the attack rate or amount of time it takes for a signal to go from zero to maximum level.

Below the Attack knob, you find **Mod** / **Source** parameters to modulate the Attack time.

Decay

Determines the decay rate or amount of time it takes for a signal to reach the **Sustain** level.

Below the Decay knob, you find **Mod** / **Source** parameters to modulate the Decay time.

Sustain

Determines the sustain level that is held until a note ends.

Below the Sustain knob, you find **Mod** / **Source** parameters to modulate the sustain level.

Release

Once the note has ended, the release phase begins. During this phase, the envelope fades to zero at the rate determined by the release value.

Below the Release knob, you find **Mod** / **Source** parameters to modulate the release time.

Mod (for Attack, Decay, Sustain, Release)

Determines the amount of modulation applied to the corresponding parameter. This parameter can be set to both positive and negative values.

Mod Source (for Attack, Decay, Sustain, Release)

Selects the modulation source for the corresponding parameter modulation. Click on the **Source** button to open a list with 24 source options and select the desired one.

LFOs

In addition to the main oscillators, the Microwave 1 plug-in is equipped with two low frequency oscillators (LFOs) that can be used for modulation purposes. Each LFO generates a periodic waveform with adjustable frequency rate and shape.

Rate (LFO 1 & 2)

Determines the frequency of the generated signal of the corresponding LFO. The current rate is also displayed in Hertz in the upper right corner of the LFO waveform representation in the display.

Humanize (LFO 1 & 2)

Adds a random variation to the corresponding LFO speed at each cycle. When disabled, the LFO remains at its initial speed, preset by the **Rate** parameter. Low settings add a human touch to the sound, high settings are useful when creating effect sounds with an irregular character e.g a

wind sound where the filter frequency is modulated by an LFO.

Shape (LFO 1 & 2)

Determines the type of waveshape to be generated by the corresponding LFO (Sine, Triangle, Pulse, Random, S&H = Sample & Hold). S&H is a sampled value of the "opposite" LFO. E.g., the S&H shape of LFO1 samples LFO2 and vice versa. More variations can be achieved by means of the **Symmetry** parameter. Please read the corresponding paragraph later on in this chapter.

Symmetry (LFO 1 & 2)

Adjusts the relationship between the rising and the falling edge of the corresponding LFO signal. When set to *0* the generated waveshape is symmetrical. When set to positive values, the positive cycle becomes longer and the negative cycle becomes shorter and vice versa. Use this parameter to change the pulsewidth of the LFO square shape. When using it on a triangle waveshape, you can get a sawtooth wave with a soft rising or falling slope.

Global (only for LFO 1)

When active (lights red), the global LFO acts as a kind of "shadow copy" of LFO2. This global LFO is following the settings of LFO2 - Rate, Shape, Symmetry, and Humanize. However, it does NOT means that LFO2 is not a voice LFO anymore. LFO2 is staying back in its place (as a voice LFO). This global LFO is actually a third "synth level" LFO, which in addition is synchronized tot he tempo of your host application.

Delay (only for LFO 1)

Determines the start of the LFO EG (see next parameters).

Attack (only for LFO 1)

Determines the attack of the simple useful AD envelope to control the LFO 1 level. A setting of *0* gives instantaneous attack after the **Delay** time has passed. *127* ist the longest Attack time, requiring several minutes to fade in the LFO completely.

Decay (only for LFO 1)

Adjusts the decay time of the LFO envelope. 0 does not introduce any decay at all. Rather, the LFO will fade in according to the Attack parameter and stay constant throughout the keypress. To guarantee a smooth LFO modulation, upon release of the key the LFO will follow the VCA envelope curve in its release phase. In this configuration, the LFO is turned into an AR (attack/release) envelo-

pe. Values of *1...127* adjust the decay time of the LFO envelope, which now acts as an AD (attack/decay) envelope.

Rate Mod (only for LFO 1)

Determines the amount of modulation applied to the LFO 1 rate.

Rate Mod Source (only for LFO 1)

Selects the modulation source for the LFO 1 rate modulation.

Level Mod (only for LFO 1)

Determines the source to alter the LFO 1 level. Since the actual level of LFO intensity is set at the destination, there is no further amount value needed here. Instead, full positive modulation is always applied whenever a source is selected. If you do not want to use any dynamic modulation at all, select *Max* as a source.

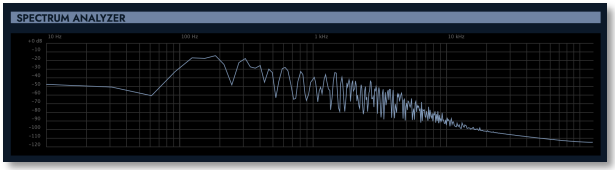
PhaseShift (only for LFO 2)

If disabled (*off*), LFO 2 operates independently from LFO 1. If enabled, the rate and phase of the generated LFO2 signal is defined by LFO 1. The Phase Shift parameter defines the angle in degrees (from 2 to 180) from which LFO 2's signal is phase shifted to LFO 1. The use of this function only makes sense when using a regular waveshape like sine, triangle or square.

Additional Options

These can be accessed via the **Menu** button and are displayed in the lower zone.

Spectrum Analyzer



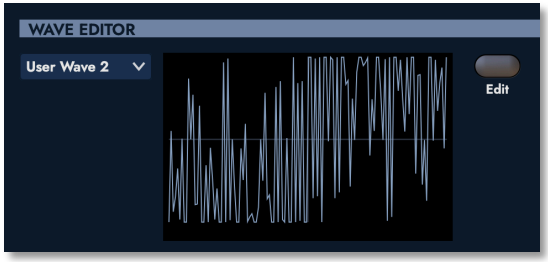
Offers a realtime analyzer to display the logarithmic frequency content of the current audio signal. The analzyer does not offer any editable parameter.

Calibration Editor

See Extras section in the Filter & Amplifier Page chapter.

Wave Editor

Here, you can edit single user wave for usage in the Control Table editor.

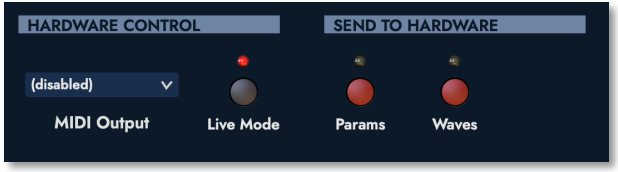


More information about using single waves within a wavetable can be found in the chapter „Control Table Section“

- Click on the **User Wave** pop-up menu to select one of the 122 user wave for editing.
- Click on the **Edit** button to open a pop-up menu with the following options:
  - **Sine**, **Triangle**, **Square**, **Saw**, and **Lucky** selects predefined waves.
  - **Load from Osc 1 / 2** imports the current selected wave from wavetable oscillator 1 or 2.
  - **Undo** performs an undo command for the edit that was made.
  - **Copy / Paste** copies the current selected user wave / pastes it to the current selected User Wave.

Hardware Control

With this option, you can use the Microwave 1 plug-in to control your Waldorf Microwave 1 hardware synthesizer.



MIDI Output

Selects the MIDI output of your computer MIDI interface, where your Microwave 1 hardware is connected with. Click on the pop-up list and select the desired MIDI interface.

Live Mode

Click on this button to activate the Live mode. If active, every parameter that is edited in the plug-in will sends ist parameter settings immediately to a connected Microwave hardware and changes the corresponding parameter. In some situations you might deactivate the direct live connection. If so, we add some helpful options in the **Send to HW** section.

Send to HW (Hardware)

Here, you can control, which data is sent to your Microwave 1 hardware. This is a useful option especially when **Live Mode** is deactivated.

Click on the corresponding button to sent the current state to a connected Microwave hardware.

- *Params* sends all parameter data for single programs.
- *Waves* sends your user waves to your Microwave hardware. Keep in mind, that this process might take some time.

Appendix

Wavetable Synthesis

A part of the sound generation in Microwave 1 plug-in is based on wavetable synthesis.

A wavetable is a table consisting of single waveforms, each with its own special sound character. The main difference between wavetable synthesis and other sound-generation principles is the ability to not only play one waveform per oscillator but also to step through other waves in the wavetable employing different modulations, thereby creating so-called wavetable sweeps. The results can be dramatic – much more so than anything sample-based systems could ever produce.

This principle offers powerful capabilities, such as:

- Each note on a keyboard can access a different wave of a wavetable.
- Different waves can be played depending on key velocity.
- An LFO can modulate the position within the wavetable. You can create subtle to drastic sound changes.
- User-selected controllers, such as 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 instantly.

You should keep the following sentence in mind:

> ⓘ A wavetable is a list of two or more (up to 64) waves, between which you can move at will.

As soon as you play a note, the envelope advances the position through the wavetable, generating different waveforms over time.

The decay stage would move through these waves in the opposite direction prior to holding a certain wave during its sustain stage. When you release the note, the envelope continues the move back through the waves to the starting point.

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 conveniently controlled by wave envelope.

If Time is 0 and Level set to a medium value you get a percussive sound; if you turn up the attack, you get a soft-sounding start.

You can also use an LFO to modulate the wavetable position and, depending on the selected **LFO Shape**, you might

get a wave scan that goes back and forth (triangle), in only one direction followed by a hard reset to the origin (sawtooth) or between only two waves (square).

If you like the sound and possibilities of wavetable synthesis, you should try out the our virtual instruments Waldorf PPG Wave 2.V / Wave 3.V.

Microwave 1 Plug-In Wavetables

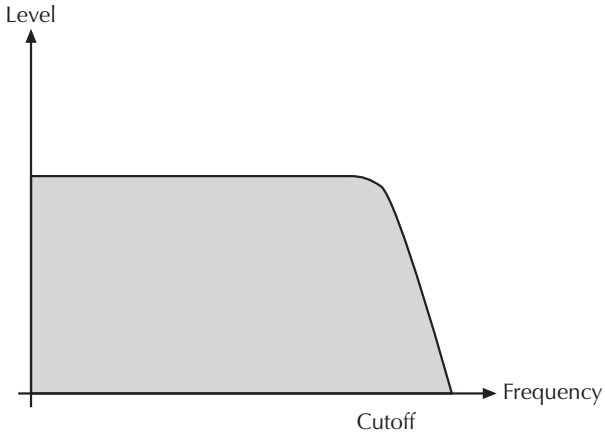
No.	Wavetable	No.	Wavetable
01	Resonant	57	SawSync1
02	Resonant2	58	SawSync2
03	Mallet	59	SawSync3
04	SqrSweep	60	PulSync1
05	Bellish	61	PulSync2
06	PulSweep	62	PulSync3
07	SawSweep	63	SinSync1
08	MelloSaw	64	SinSync2
09	Feedback	65	SinSync3
10	Add Harm	66	PWM Pulse
11	Reso 3 HP	67	PWM Saw
12	Wind Syn	68	Fuzz Wave
13	HighHarm	69	Distortd
14	Clipper	70	HeavyFuz
15	OrganSyn	71	Fuzz Sync
16	SquareSaw	72	K+St.#1
17	Formant1	73	K+St.#2
18	Polated	74	K+St.#3
19	Transient	75	from1to5
20	Electr.P	76	19/20
21	Robotic	77	WTrip1
22	Strong H	78	WTrip 2
23	PercOrgan	79	WTrip 3
24	ClipSwep	80	WTrip 4
25	ResoHrms	81	MaleVoice
26	2 Echoes	82	Low Piano
27	Formant2	83	ResoSweep
28	FmntVocl	84	Xmas Bell
29	MW Sync	85	FM Piano
30	MicroPWM	86	Fat Organ
31	Glassy	87	Vibes
32	SquareHP	88	Chorus 2
33-56	User 1 -24		

Filter Introduction

Once the oscillator signal leaves the mixer it is sent to the filters. Microwave 1 plug-in offers two filter units, each with its own individual settings. The signal flow in the filters can be controlled via the Routing function. The filters are components that have significant influence on Microwave 1 plug-in's sound characteristics.

Now, we'll explain the basic function of a filter discussing the type used most commonly in synthesizers: the lowpass filter.

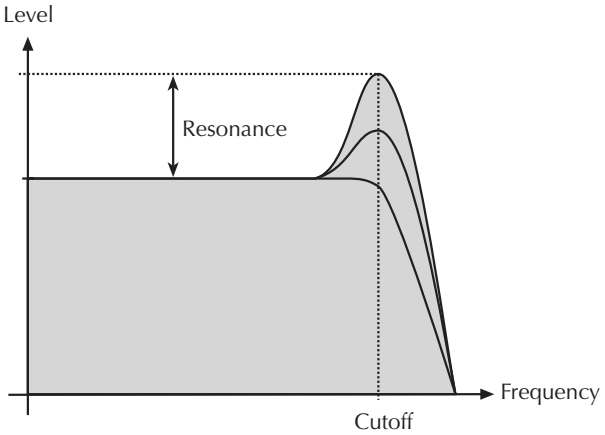
The lowpass filter type dampens frequencies that lie above a specified cutoff frequency. Frequencies below this threshold are hardly affected. The frequency below the cutoff point is called the pass band range; the frequencies above are called the stop band range. Microwave 1 plug-in's filter dampens frequencies in the stop band with a certain slope. The slope is 24dB per octave. This means that the level of a frequency that lies an octave above the cutoff point will be 24dB less than those frequencies of the signal that fall into the pass band. The following image illustrates the basic principle of a low pass filter:



To give you an idea of the extent of damping, consider this example of a lowpass filter: a reduction of 24dB reduces the original level one octave above the cutoff point by approx. 94%. The damping factor two octaves above the cutoff point reduces the original level by more than 99%, which in most cases means this portion of the signal is no longer audible.

Microwave 1 plug-in'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 image illustrates

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 self-oscillation – i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.

Glossary

Aftertouch

The majority of contemporary keyboards are capable of generating aftertouch messages. On this type of keyboard, when you press harder on a key you are already holding down, a MIDI Aftertouch message is generated. This feature makes sounds even more expressive (e.g. through vibrato).

Aliasing

Aliasing is an audible side effect arising in digital systems as soon as a signal contains harmonics higher than half the sampling frequency.

Amount

The extent to which 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.

Attack

An envelope parameter. 'Attack' is a term that describes the ascent rate of an envelope from its starting point to the point where it reaches its highest value. The Attack phase is initiated immediately after a trigger signal is received – i.e. after you play a note on the keyboard.

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.

Coffee Filter

A coffee filter is a coffee-brewing utensil, usually made of disposable paper. It is part of an essential toolkit for survival when working with Microwave 1 plug-in.

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 determines the extent of the modification.

Controllers can be used for effects such as slowly swelling vibrato, changing the stereo panorama position 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 programmed 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. The most common type is the lowpass filter. A lowpass filter dampens all frequencies above the cutoff frequency.

Filter Cutoff Frequency

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

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 lowpass filter. A lowpass 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 ’80s so that diverse types of electronic musical instruments by different manufacturers could interact. At the time a communications standard for different devices did not exist, so MIDI was a significant advance. It made it possible to link any MIDI-equipped device with 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 computer to play Microwave 1 plug-in, then the computer is the sender and Microwave 1 plug-in acts as the receiver. With a few exceptions, the majority of MIDI 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 is sent via a cable to the receiver's MIDI In jack.

MIDI Thru has a special function. It allows the sender to transmit to several receivers. It routes the incoming signal to the next device without modifying it. Another device is simply connected to this jack, thus creating a chain through which the sender can address a number of receivers. Of course it is desirable for the sender to be able to address each device individually. Consequently, there is a rule that is applied to ensure each device responds accordingly.

MIDI Channel

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. Consequently, the sender can address specific receivers individually. MIDI Channels 1 through 16 are available for this purpose.

Modulation

Modulation influences or changes a sound-shaping component via a modulation source. Modulation sources include envelopes, LFOs, or MIDI messages. The modulation

destination is a sound-shaping component such as a filter or an amplifier.

Note On / Note Off

This is the most important MIDI message. It determines 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 pitch-bend 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 pitch-bend 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 pitch-bend information more accurately.

Program Change

These are MIDI messages that switch sound programs. Program numbers 1 through 128 can be changed via program change messages.

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 amplifying these frequencies. This is one of the most popular methods of manipulating sounds. If you substantially increase the resonance, 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, the lowest frequency corresponds to the fundamental frequency (fundamental) and other frequencies-integer multiples of the fundamental frequency (harmonics).

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 to start an envelope.

Volume

The term describes a sound's output level.

Wave

In this context, a Wave is a digitally-memorized reproduction of one single wave pass insofar as it is identical to a sample that is looped after one single wave pass. In contrast to the samples in a sampler, all waves in Waldorf Wavetable synthesizers have the same lengths and are played back in the same pitch.

Wavetable

One oscillator shape in Microwave 1 plug-in is based on waveform sets called wavetables. You should think of these as a sequence of up to up to 64 single waves. This can be played back in a static way or played through dynamically, which results in their typically interesting sound transformations. If the waves do not differ much, then the wavetable will probably sound smooth and pleasant. If they have a completely different structure then this will result in wild spectral changes.

Product Support

Any Questions?

If you have any questions about your Waldorf product, feel free to contact us. We're here to help.

① Use the support form at our website. 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.com

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

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