QUANTUM

SYNTHESIZER

User Manual

Quantum OS 1.3

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Foreword

Thank you for purchasing the Waldorf Quantum. You now own a high-class hybrid synthesizer featuring a wide range of unique sounds with approved Waldorf quality – made in Germany!

What to read?

The biggest problem with any manual is to find a way to address the needs of absolute beginners and experts alike. Some people read a manual cover to cover while others don't even touch it. Opting for the latter is a poor 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 Quantum.

Your Waldorf Team

Hint

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(!) Please visit our website for further support and downloads for your Quantum: **www.waldorfmusic.com/quantum**

We would like to thank

Thomas Brenner, Karsten Dubsch, Willie Eckl, Joachim Flor, Roger Keller, Jonathan Miller, Pierre Nozet, Miroslav Pindus, Winfried Schuld, Lukas Schütte, Michael von Garnier, Kurt 'Lu' Wangard, Haibin Wu and anyone we have forgotten.

Overview

Front Panel
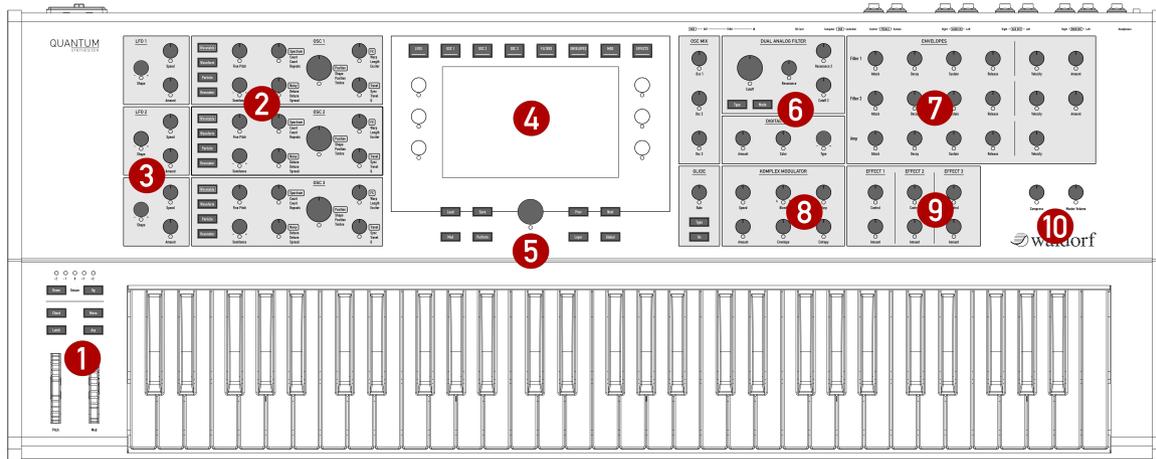
1) Wheel Section

2) Oscillator Section

3) LFO Section

4) Touchscreen Display

5) Selection Dial & Mode Pages Buttons

6) Dual Analog Filter & Digital Filter Sections

7) Envelopes Section

8) Komplex Modulator

9) Effects Section

10) Output Section

Rear Panel & Connections
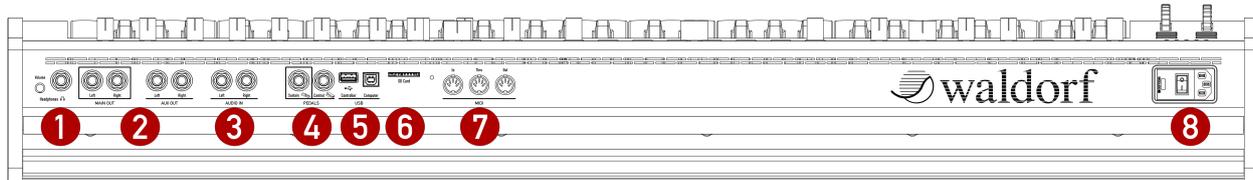
1) Headphones Output   5) USB Connections

2) Main & Out Outputs   6) SD Card Slot

3) Audio Inputs   7) MIDI In / Out /Thru Jacks

4) Pedal Inputs   8) Power Jack & Switch

Introduction

About this Manual

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

To avoid confusion, the terminology in this manual is based on the Quantum 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 the Quantum's buttons, controls and parameters are highlighted in bold letters throughout the manual.

Examples:

- Press the **Load** button.

- Turn the **Cutoff** knob.

The Quantum'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*

General Safety Guidelines

⚠️ Please read the following safety tips carefully! They include several precautions you should always observe when dealing with electronic equipment. Read all of the instructions before operating your device.

Suitable Operating Conditions

• Use the device in enclosed rooms only.

• Never use the device in damp conditions such as bathrooms, washrooms, or around indoor swimming pools.

• Do not use the device in extremely dusty or dirty environments.

• Make sure that adequate ventilation is available on all sides of the device.

• Do not place the device near heat sources such as radiators.

• Do not expose the device to direct sunlight.

• Do not expose the device to extreme vibrations.

Power Supply

• Only use the power cable that came with Quantum.

• Unplug the device when you are not using it for longer periods.

• Never touch the plug with wet hands.

• Always pull the plug when unplugging the device - never the cable.

Operation

• Never place objects containing liquids on or near the device.

• Place the device on a stable base only. Use a suitable platform.

• Make sure no foreign objects find their way into the chassis. If for some reason this occurs, switch the power off, unplug the device, and consult a qualified repair center.

• This device can generate volume levels that may do irreparable damage to your hearing when used on its own or with amplifiers, speakers, or headphones. For this reason you should keep the volume at tolerable levels.

Maintenance

- Do not open the device or remove the cover. Refer all service and repair tasks to qualified personnel. The interior of the chassis contains no components that require user maintenance.

- Use only a dry, soft cloth or brush to clean the device. Never use alcohol, cleaning solutions or similar chemicals. They will damage the surface of the chassis.

Proper Use

This device is designed exclusively to produce low-frequency audio signals for the purpose of generating sound. Any other use is prohibited and voids the warranty extended by Waldorf Music. Waldorf Music is not liable for damages due to incorrect use.

⚠ Do not place your Quantum anywhere near children, mothers-in-law or pets. This could lead to critical interactions.

Setup and Connections

The Waldorf Quantum comes complete with:

• The Waldorf Quantum Synthesizer itself

• A power cable

• A printed Quick Start manual

Please ensure all the above items were included. If something is missing, contact your local dealer.

We recommend that you save the original packing material for future transport.

Setup

Place the Quantum on a clean, even surface.

Connections

In order to get started with your Quantum you will need an AC power outlet, a mixing console, an amp, and/or an audio monitor such as a speaker cabinet or a headphone.

You can also use a computer or sequencer to make use of Quantum's MIDI features.

⊘ To connect the devices:

1. Turn all units off.

2. Connect the Quantum's **Main Out** audio outputs to your mixing console or your computer audio interface. Optionally connect the stereo **Headphones** outputs to a headphone.

3. If you want to use a computer, connect the Quantum's **Computer USB** port with a USB cable to your computer (Windows or macOS). Thereafter, Quantum becomes automatically available as a MIDI device.

4. Optionally you can connect the Quantum's MIDI ports to a computer MIDI interface or other MIDI devices.

5. If desired, connect the **Controller USB** input to any suitable class-compliant USB hardware controller to send MIDI data to control functions of the Quantum.

6. Connect the power cable that came with the Quantum to a suitable AC power outlet.

7. Press the power switch on the rear panel of your Quantum.

8. Then switch on your computer (if connected), the mixing console and finally the amplifier or active monitor speakers.

⊕ The startup procedure is about 10-15 seconds. After this, the Quantum is ready to play.

⊕ The overall volume of the Quantum can be controlled with the **Master Volume** dial. This also affects the **Headphones** output but not the **AUX** output.

⊕ If you do not choose to connect a mixing console, you can patch the Quantum's output signals directly to an amplifier or an audio interface. Use an input usually called Line, Aux or Tape input.

⊕ The Quantum's audio outputs deliver unbalanced line levels. When connecting to an amplifier, a mixing console or an audio interface with automatic balanced/unbalanced sensing inputs, please make sure to use TS mono jack cables and not TRS stereo jack cables.

⚠ Before connecting and disconnecting the Quantum to a power supply source, turn your amp's volume control all the way down to avoid damage due to on/off switching noise. Quantum produces a high level output signal. Please take care that the connected playback device is suitable for the high level of an electronic instrument. Never use the microphone or phono input of the connected amp!

The Rear Panel Connections

The Quantum provides two analog stereo audio outputs and a headphones output. The Main and Headphone outputs are affected by the setting of the Master Volume control and the Comp(ressor) dial. Use 2 TS mono jack cables to connect the Main output to a mixer. The Quantum is a stereo instrument. There is no inherent mono output. Use your mixing console to appropriately distribute the stereo channels in case.

Headphones Output and Headphone Volume

Here you can connect any headphone with a 1/4-inch stereo plug. The headphone output uses the same signal as the main output. The **Headphones Volume** controls the Quantum's headphone volume in addition to the **Main Volume** knob. Use this knob to amplify or attenuate headphones level to adjust for individual headphone loudness and impedance.
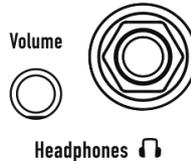
Main Output

Connect the left and right jack with 1/4-inch mono plugs.
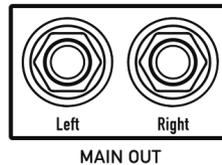
Aux Output

Connect the left and right jack with 1/4-inch mono plugs. The Aux Output contains no signal unless specified in the **Layer** page for example when using split or layered sounds. The Aux Outputs are neither affected by the **Master Volume** nor are using the master compressor. For more information on how to set up the Aux output please read 'The Layer Page' chapter.
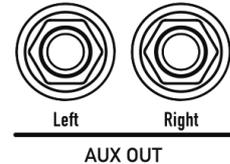
Audio Input

Quantum offers a stereo audio input (2x mono jacks) that can be used to feed an external audio signal into the Quantum. Therefore, the signal can either be routed through Quantum's signal path for realtime live processing or directly recorded by using the Audio Recorder on the Global page. For more information, please refer to the 'The Audio Tab' chapter within the Global Page description and also 'The Layer Page' chapter.
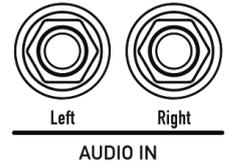
Pedal Inputs

A sustain pedal switch connected to the **Sustain** input enables you to hold played notes as long as you press the pedal. As some pedals open contacts when pressed and others close, it is necessary that the connected pedal is not pressed when switching on the Quantum. This enables Quantum to match the pedal.
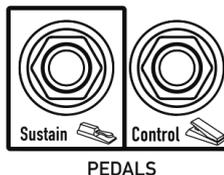
The **Control** Pedal input allows you to connect any suitable pedal. In the simplest case, you can plug in an expression pedal. For using its full-range signal as a modulation source the pedal needs to be calibrated using the "Control Pedal" button in Global->System->Calibrate.

Connect a suitable passive pedal or any active CV source (control voltage with 0-5V range) from modular systems, say, as a modulation source in Quantum.

The USB Connections

Quantum offers two USB ports. The **Controller USB** input lets you connect any suitable class-compliant USB hardware controller to send MIDI data to control functions of Quantum.
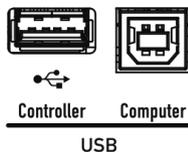
You can also use the MIDI Learn function for most of Quantum's parameters that can be controlled by an external MIDI hardware controller. Further any sound module with an appropriate USB input could be connected and played from the Quantum keyboard.

⚠ Make sure that you use a USB 2 port on your computer and a USB 2 compatible cable to avoid problems with data transmission.

The **Computer USB** port connects the Quantum to your computer or iOS device with the following system requirements:

• Windows PC: Windows 7 or newer, a USB 2 port

• Apple: Intel Mac with macOS 10.9 or newer, a USB 2 port

• Apple iPad with iOS 9 or newer by using an optional Apple 'Lightning to USB Camera Adapter' cable

The Computer USB connection of the Quantum allows transmitting and receiving of MIDI data

⚠ Read more about the configuration of USB MIDI in 'The Global Page' chapter

SD Card Slot

⚠ It is important to use a FAT or FAT32 file system formatted SD card. Other file formats won´t work.

⚠ Please insert the SD Card **upside down**, i.e. with the contacts showing to the upper side. This is due to the mechanical construction of Quantum. Please insert the card with normal force to avoid any damage.

A connected SD card allows:

- Updating the Quantum's operating system. Read more in 'The Global Page' chapter.

- Importing and saving audio files.

- Importing and saving Quantum-specific data – e.g. sound patches, oscillator presets, wavetables, MIDI Maps, etc.

MIDI In/Thru/Out Jacks

Although we can hardly believe it, the Quantum might not be enough for some people, so we added an elegant way to control external sound modu-les with the Quantum keyboard: just connect the DIN MIDI out (or USB Controller port) to your external gear and play. For use with a computer we recommend the **Computer USB** port.
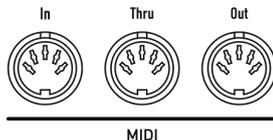
⚠ Read more about the configuration of the MIDI ports in 'The Global Menu' chapter.

The Wheel Section

Octave Down/Up Buttons

Although the MIDI standard requires 128 keys, Quantum offers only 61, so we added these buttons to enable you to reach more keys than are physically accessible. Press **Octave Down** to go one octave lower, and **Octave Up** to go one octave higher. Transposition is maximum two octaves up and two octaves down.
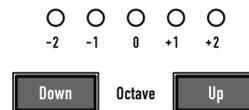
⚠ Press both Octave buttons simultaneously to send an *All Notes Off* message. This will terminate any stuck notes.

Mono Button

Switches polyphonic to mono-phonic mode and vice versa. If the **Mono** button lights up (or blinks depending on the button backlight mode, see Global -> Colors page for more information), the monophonic mode is active. Mono means that only the last played note sounds. All other notes are stored in an internal list but aren't played. As soon as you release the note that is currently played, the second last note is played and so on. When you play legato, only the first note that was played triggers those envelopes which have the **SingleTrig** parameter activated. Those envelopes with **SingleTrig** deactivated will re-trigger at each note even when played legato. You can freely mix and match **SingleTrig** settings between all envelopes. The **SingleTrig** mode is for sustained sounds like typical 1970s solo sounds.
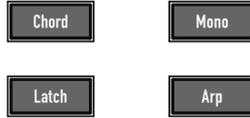
Latch Button

If active, all played notes are held. This also affects the arpeggiator. The **Latch** button acts similar to a pressed sustain pedal, but in addition you could release individual latched notes by pressing them again. Press **Latch** again to disable it.

Chord Button

Chord is a variant of the **Latch** mode. Instead of latching based on a single key basis, an active Chord mode will latch all notes played within a short period of time like when you play a chord. If you then play another chord, the new chord will replace the previous chord. Press the **Chord** button again to end the Chords mode. In order to visualise that the **Chord** mode is a variant of the **Latch** mode, each time the **Chord** mode button is activated, the **Latch** mode button is activated too.

Arpeggiator (Arp) Button

Push this button to activate or deactivate the Arpeggiator or the Step Sequencer. When you hit a note or a chord on the keyboard or via MIDI, it is split up and repeated rhythmically. Read more about the Arpeggiator and the Sequencer in 'The Perform Mode' chapter.

⚠ We recommend to push the **Chord** button instead of **Latch**, when using the arpeggiator. In **Latch** mode, all played notes are held until their key is pushed again.

Pitch Bend Wheel

Use this wheel to alter the pitch of
the played notes. It will jump to the
center position when you release it.
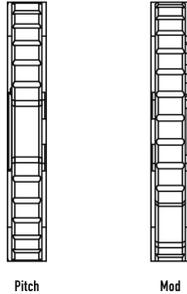
Modulation Wheel

Use this wheel to alter the sound of
the played notes. In contrast to the
pitch bend wheel it does not go back
to its default position on release.
Don't worry if sometimes the sound does not change. In
this case it is likely that the sound designer simply forgot
to assign it.

⚠ Pitch Bend wheel and Modulation wheel can be
calibrated by using the corresponding function on
the Global page. For more information, please refer
to the Global chapter.

Basic Operation

Switching On / Off

Quantum is equipped with a power switch.
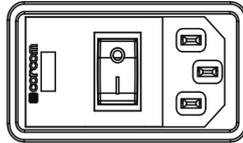
⊘ To switch Quantum on:

- Press the Power switch to switch on Quantum. The boot procedure may take a few seconds. After this, the display is lit and Quantum is ready to play.

⊘ To switch Quantum off:

- Press the Power switch to switch off Quantum.

Master Volume

Use the **Master Volume** to control Quantum's overall volume. The volume setting is global and affects the level of the Main audio outputs including the Headphones output. The level of the Aux audio output is not affected.

Master Volume
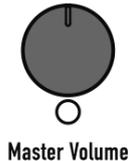
The Quantum Mode Pages

The Quantum offers mode pages in addition to the panel parameters or for global settings. To enter a desired mode page, just press the corresponding mode button above or below the touchscreen display. The following mode pages are available:

- **LFOs** (6x Low Frequency Oscillators) mode page
- **OSC 1**, **2** and **3** (Oscillators) mode page
- **FILTERS** (Dual Analog Filter, Digital Former and Routing) mode page
- **ENVELOPES** (Amp-, Filter 1 & 2-, Free 1, 2, 3 envelopes) mode page
- **MOD** (Modulation Matrix & Komplex Modulator) mode page
- **EFFECTS** (Effects 1 to 5) mode page
- **Load** mode page
- **Save** mode page
- **Mod** (Modulation Assignment)
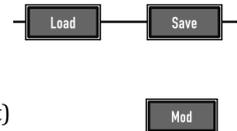
- **Perform** mode page (Favorites, Arpeggiator, Sequencer and ModulationPad)

- **Layer** mode page (Levels & Routing and Voices assignment)

- **Global** mode page (Scope, Pitch, Audio, MIDI, Settings, System)

(!) Press a mode button several times to switch through the corresponding function tabs.

(!) All modes will be described in detail in the corresponding chapters of this manual.

The Touchscreen Display

The Touchscreen display gives you an overview of the actual Mode page, parameter changes, and delivers additional information. To select a desired function, open a pop-up menu, or to edit a graphic (e.g. envelopes) just tap on it and move your finger up and down or from left to right (and vice versa). The six silver endless dials on the left and the right side of the display control the corresponding parameter that is shown in the display next to the dials. The display presentation depends on the selected mode, but the lower part always shows the same overview:
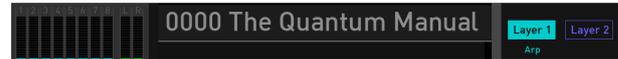
1) The **Monitor** section in the lower left corner displays a VU meter unit to show the sound level of the left/right channels of the main output signal and the eight played voices. Here you can also see the polyphonic workload as well as the used voices for each Layer with its own color code. Tap on the monitor section to open a pop-up menu. Here you can choose other representations of this section. *Scope* delivers a realtime waveform display of the current stereo signal. The scope can be further configured in the Global Scope screen. *Analyzer (lin)* offers a realtime analyzer to display the linear frequency content of the signal,

while *Analyzer (log)* delivers a logarithmic representation like most audio analyzers. Finally, a *MIDI Monitor* displays all MIDI messages that Quantum creates (Internal) as well as incoming MIDI messages (from MIDI In and the USB ports).

2) The **Sound Name** section shows the current loaded sound program. Active sound filters (can be set in the **Load** browser) are also displayed. Read more about the Layer modes in 'The Layer Mode'. Tap on the sound name to enter the **Load** mode. Read more about the **Load** mode page in the 'Loading Programs' chapter. Left to the sound name the program number is shown. Tap on the program number to select a program by entering its number.

3) The **Layer** buttons show which Layer is active. Tap on the corresponding button **Layer 1** or **Layer 2** to switch between the layers. Under each layer button it is noted, if its program uses specific modes like Arp, Sequencer, Unisono, Mono and such. In case of an active split-mode, an appropriate icon of the split is displayed above the layer buttons. For a layered sound playebd by both layers simultaneously, an icon is displayed above the layer buttons. Read more about the layers in 'The Layer Page' chapter.

Loading Programs

The Quantum offers different ways of loading sound programs:

- When in Load mode (**Load** button lights), use the **Selection** dial to select the desired sound program in the sound list. Turning the dial clockwise increases the Program number, turning the dial counterclockwise decreases it. To load the desired sound program, press the **Selection** dial once. You can also tap on the **1234** button to enter a desired sound number. After that, tap on **Return** to load this sound program. Tapping a sound in the list will select the sound and the details section on the right is shown more information about the sound. Selection is depicted by showing a turquoise frame. Tapping the sound a second time, i.e. tapping an already selected sound will load it. The loaded sound in the list is depicted by a white background.

ⓘ You can also enter the **Load** mode page by tapping on the sound program name.

ⓘ You can also enter the sound number by tapping on the sound program number.

You can filter sounds by attributes, banks, and authors. Use the three silver endless knobs to the left of the display. When set to *All* you have access to all existing sounds.

- Press the **Next** or **Prev** buttons to load the next or previous sound program immediately. This function is available in nearly every mode and on every display page.

If the current sound is a **Split** or **Layered** sound, then an option will be shown to load the patch only into the current layer and keep the other layer as it is. This option will be only shown when using the **Load** button so as not to slow down performance-oriented patch loading – like from **Favorites** page or via **Next / Prev** buttons.

The right section of the Load Patch page gives you more information about the selected sound. Beside the sound name, here you find the **Bank**, the **Author** and also the **Attributes**. These settings can be made while saving a sound program (see chapter 'Saving Sounds').

By tapping on the **Init** button, you can initialize the current loaded sound. No sound program is overwritten during this action. If in Layered mode, a popup window will open where you can choose, if the current selected layer (**Current**) or the complete sound program (**Reset**) will be initialized. If **Reset** is chosen, the initialized sound program will be a single layer program. By tapping on the **Delete** button, you can delete the current selected sound. This procedure must confirmed before, because it is irreversible.

Tap on the **Favorites** button to open a new page for managing your favorite sounds. You can select any sound from the left list and add it to the Favorites list on the right side. You can add sounds to empty slots, replace or remove sound programs or change their positions (Up & Down). Tap on **Back** to leave the Favorites page. Read more about the Favorites Tab within the chapter 'The Perform Mode Page'.

Tab on the **Actions** pop-up menu to perform the following actions:

- **Import** lets you import sound programs from a connected SD card.

- **Export** lets you export the current sound program to a connected SD card.

- **Rebuild Cache** lets you rebuild the internal data cache in case of any problems.
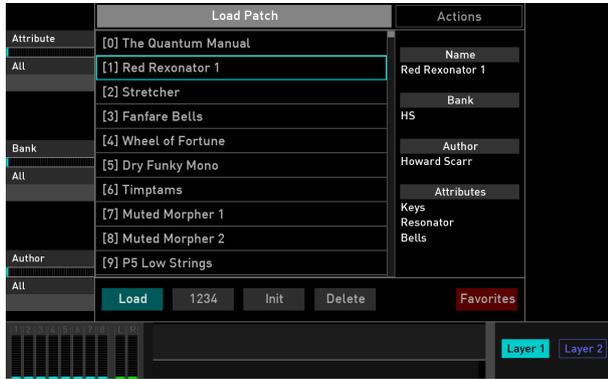
The Load mode display page

Editing Parameters

In order to change or edit a sound program, you must access the appropriate parameters. Depending on the type of parameters, there are different ways to achieve this:

• The controls on the Quantum's front panel offer direct access to the most important sound parameters. The panel is divided into several sections, each containing knobs and dials associated with that section. By adjusting the controls on the panel you have instant access to the sound. These parameters are called **Panel Parameters**. When editing a Panel parameter, this is displayed in the lower part of the touchscreen display (parameter name and corresponding value).

ⓘ All Panel parameter dials and pots are capable of sending MIDI Controller data via USB and MIDI Out. Read more in 'The Global Menu' chapter.

• Most sections offer additional sound parameters that are available through the touchscreen display. To edit an additional parameter, press the corresponding mode button above or below the touchscreen (e.g. **LFOs**) and use the six display knobs to the left and the right of the touchscreen display. The touchscreen display page includes additional parameters that are not accessible directly via the control elements on the panel. These

parameters are called **Display Menu Parameters**. For each parameter the original value from a loaded patch is indicated by a vertical bar in the main bottom area and in the encoder displays.

- Some functions can be edited via the touchscreen display directly. Use your finger to tap on the corresponding parameter/option/button on the touchscreen to open pop-up menus or sliders which can be moved to change values or to edit graphics (e.g. envelopes).

- On most display pages the **Selection** dial can be used to control the most important parameter – for example **Cutoff 1** on the Dual Analog Filter page.

(!) Some parameters can be found on the panel and also as touchscreen display parameters – for example the Envelope phases.

All rotary controls consist of endless dials or potentiometers. Turning a dial clockwise increases the corresponding value; turning it counterclockwise decreases it. Bipolar parameters (parameters with positive and negative values) use special gradation when changing their values. As soon as the value *0* is reached, the sweep is stopped for a short period to make it easier to edit Quantum.

(!) For each parameter the original value from the loaded patch is indicated by a vertical bar in the main bottom area and in the encoder displays.

(!) A useful hint: Press a button above the display several times to switch through the corresponding function tabs.

(!) Read more about basic settings for the knobs in 'The Global Page' chapter.

⑆ Want to start with a clean initialized sound? By tapping on the **Init** button, you can initialize the current loaded sound. No sound program is overwritten during this action. If in Layered mode, a popup window will open where you can choose, if the current selected layer (**Current**) or the complete sound program (**Reset**) will be initialized. If **Reset** is chosen, the initialized sound program will be a single layer program.

Saving Programs

After you have finished editing a sound program you must save it if you intend to use it again. All of Quantum's memory locations are available for this purpose.
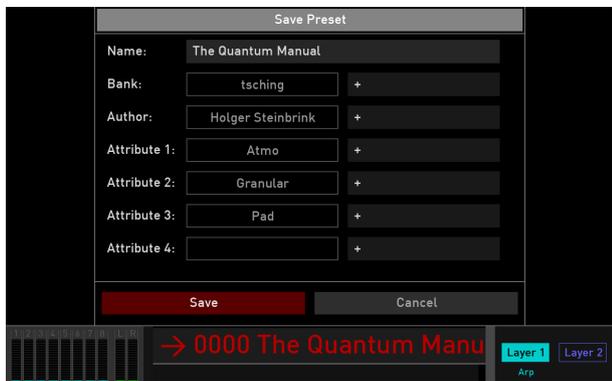
> To save a sound program:

1. Press the **Save** button to activate the Save Preset page. The **Save** button is red lit.

2. Edit the **Name** (if desired). Tap on the sound name on the touchscreen to open a virtual keyboard. The program name can use up to 40 characters. Tap on **Return** to confirm. Tap on **Cancel** to cancel the naming procedure.

3. Tap on the **Bank** name to open a pop-up menu for selecting a desired sound bank. You can also add a new bank by tapping on *+* next to the bank name.

4. Tap on the **Author** name to select a desired author in the pop-up menu. You can also add a new author name by tapping on *+* next to the author name.

5. You can also choose up to four attributes for your sound. Tap on the corresponding **Attribute 1** to **4** on the touchscreen to open a pop-up menu selection list. Select the desired attribute. You can also add a new attribute by tapping on *+* next to the corresponding attribute name. It is strongly recommended to select an appropriate attribute for your sound. This helps you to locate your sound later.

6. Use the **Prev**/**Next** button or the **Selection** dial to select the desired sound program number, where the sound is saved to. Alternatively, tap on the number field at the bottom of the screen to enter the sound program number manually.

7. Finally, tap on **Save** on the touchscreen to store the sound program at the selected location.

8. By tapping on **Cancel** in the touchscreen or pressing any button on the front panel, you can discard the storing process at any time.

⚠ Whenever you save a program, the selected memory location is overwritten. Therefore, any previously stored program at this location will be erased and there is no way to get it back. So, you should do backups of your sounds regularly by using **Export** in the Load screen´s **Action** pop-up menu.

① Use the **Save** function for copying sound programs. There is no need to edit a program before storing it.

Sound Parameter

Overview of Functions

Waldorf Quantum consists of numerous sound-shaping components. The following pages describe all parameters in detail.

Note that Quantum consists of two different types of components for sound generation and sound shaping:

- Sound synthesis: Oscillator models, Filters, Digital Former, Amplifier, Effects. These modules represent the audio signal flow. Sound generation actually occurs within the oscillators. They can produce different shapes based on the selected model – e.g. classic waveforms such as square, sawtooth, triangle, and sine, or wavetables and samples. The analog filter shapes the sound by amplifying (boosting) or attenuating (dampening) certain frequencies. Digital Former delivers digital filters and effects for sound processing. The Amplifier and the Effects are located at the end of the signal chain. They determine the overall volume of the signal and add up to five effects like chorus, flanger, delay, and reverb, etc.
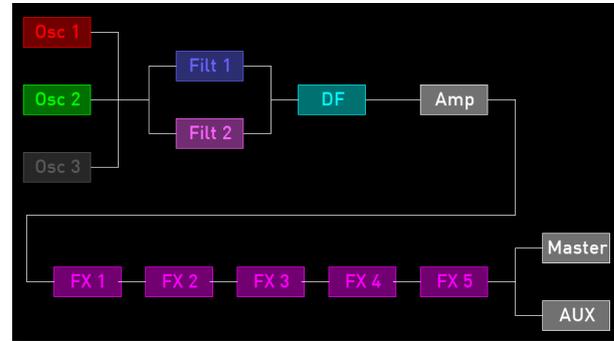
Potential signal routing for an audio signal

- Modulators: LFOs, Envelopes, Komplex Modulator, Modulation Matrix. 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 through the Modulation Matrix and influence these parameters to alter a sound.

Oscillator Section
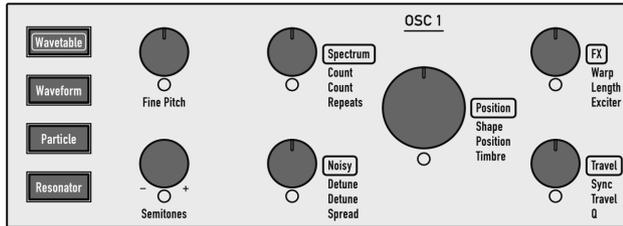
The Oscillator Section for Oscillator 1

The Quantum offers three oscillators with different capacities: **Wavetable Oscillator**, **Waveform Oscillator**, **Particle Generator**, and **Resonator**.

The most important oscillator controls can be found in the Oscillator section on the Quantum's user panel.

Choose the desired oscillator model by pressing the corresponding button. The button of the chosen model lights up. Every model uses its own color – as is the case for the oscillator parameter knobs. For example, if the **Particle Generator** for Oscillator 1 is selected, the whole section lights up in blue.

(!) If you press an active oscillator model button, the current oscillator is switched off completely. This gives you a better overview when editing sounds because you can use it as a mute function.

Based on the selected model the oscillator parameter knobs have different functions. This will be explained in detail in the next chapters.

The Wavetable Oscillator

⊗ Press the **Wavetable** button to activate the Wavetable oscillator for the corresponding oscillator 1, 2 or 3. The whole oscillator section lights up in turquois.

⚠ An explanation of Wavetable synthesis can be found in the 'Sound Synthesis Basics' chapter.

⚠ Further parameters can be found on the corresponding Oscillator display page. Read more on the next page.

Wavetable Oscillator Panel Parameters

Semitones

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

Fine Pitch

Fine-tunes the oscillator within the range of a semitone up or down. The audible result of detuned oscillators is a chorus-like effect. Use a positive setting for one oscillator and an equivalent negative setting for another.

Spectrum

The spectral envelope of a sound can be controlled independently from the pitch. Furthermore, the Wavetable oscillator can perfectly produce a periodic sound up to noisy components. The Spectrum parameter transposes the spectrum of a sound – specifically the spectral envelope. Negative values move the spectrum down; higher values move it up. The default setting is *0*, where no transposition happens. This is the behaviour of classic wavetable synthesis.

Noisy

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

Position

This parameter defines the start-point of the selected wavetable. A setting of *0* selects the first wave; the maximum setting selects the last wave of the wavetable.

FX

Determines the amount of saturation/gain that is added to the wavetable signal. If set to *0*, no saturation/gain will be

added – the signal will remain clean, in other words. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will add more and more distortion/gain. The result depends on the selected **FX Type** (*Off*, *Drive*, *Gain*) which can be found on the Timbre tab page. Please refer to the corresponding section below.

Travel

Allows cyclic moving through a wavetable. Positive values allow a forward movement; negative values a backward movement. Lower values slow down the movement speed; higher values speed it up. Cyclic means, that a wavetable starts automatically again from the beginning when the end is reached. If you don't want a cyclic modulation, use the **Position** parameter modulated with an envelope, an LFO, or any other modulation source. You can also set up different **Travel Modes**. Please refer to the corresponding section below.

> ⏸ Use **Travel** with a value setting of 3 seconds to get an impression of the sound diversity of the factory wavetables.

Wavetable Oscillator Display Page

To access the Wavetable Oscillator display page, press the corresponding OSC 1, 2 or 3 button.

Here you can switch between two modes: **Control** and **Timbre**. Tap on the corresponding tab to select it. The display switches to this mode. A third tab displays the current oscillator model. Tap on it to select another model or to switch it off.

Control Mode Tab

Here you find parameters for tuning and basic settings.

Semitones

Same functionality as for the corresponding panel parameter.

Tap on **Semitones** to open a pop-up menu for further settings:

• **Set Default**: sets Semitones to its default value *0*.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter. In contrast to the stepped nature of the semitone control, the pitch modulation is changing the pitch continuously according to the modulation source shape.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Fine Pitch

Same functionality as for the corresponding panel parameter.

Tap on **Fine Pitch** to open a pop-up menu for further settings:

• **Normal**: Fine Pitch parameter change is about 2 cents.

• **Fine**: Fine Pitch parameter change is about 0.2 cents.

• **Super Fine**: Fine Pitch parameter change is about 0.02 cents.

• **Set Default**: sets Fine Pitch to its default value *0*.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Pitch Keytrack

Determines how much the pitch of the selected oscillator depends on the MIDI note number. The reference note for Keytrack is C3, note number 60. For positive settings, the oscillator pitch rises on notes above the reference note; for negative settings the oscillator pitch falls by the same amount, and vice versa. A setting of *+100%* corresponds to a 1:1 scale – e.g. when an octave is played on the keyboard the pitch changes for the same amount. Settings other than

+100% make sense, especially when using ring modulation.

Tap on **Keytrack** to open a pop-up menu for further settings:

- **Normal**: Keytrack change is about 4%.

- **Fine**: Keytrack change is about 0.4%.

- **Super Fine**: Keytrack change is about 0.04 %.

- **Set Default**: sets Keytrack to its default value *100%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Osc 1/2/3 Vol

Same functionality as for the corresponding panel parameter.

Tap on **Osc 1/2/3 Vol** to open a pop-up menu for further settings:

- **Normal**: changes Oscillator volume on a normal scale.

- **Fine**: changes Oscillator volume more fine grained.

- **Super Fine**: Offers the most precise oscillator volume change.

- **Set Default**: sets Osc 1 volume to its default value *0 dB*, and Osc 2 & 3 to their defaults *-inf*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Osc 1/2/3 Pan

Determines the stereo panning position of the corresponding oscillator.

Tap on **Osc 1/2/3 Pan** to open a pop-up menu for further settings:

- **Normal**: Oscillator panning change is about 2 %.

- **Fine**: Oscillator panning change is about 0.2 %.

- **Super Fine**: Oscillator panning change is about 0.02 %.

- **Set Default**: Sets Osc 1/2/3 panning to its default setting *Center.*

- **Set Last Loaded**: Resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: Activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Osc 1/2/3 Dest

Here you can determine the routing of the corresponding wavetable oscillator signal. The following routing options are available:

- **Main**: routes the signal to the full signal path (Dual Analog Filter, Digital Former, VCA) as determined with the **Routing** parameter on the Filter page.

- **VCA**: routes the signal directly to the VCA without passing through the filter section.

- **DF – Fil** settings: offers a different setting for the signal relationship between the Digital Former section (**DF**) and the Dual Analog Filter section (**Fil**). If you want to send the signal, for example, through the Digital Former section by 30% and through the analog filter by 70%, select *DF 30 Fil 70* here. The routing also depends on the **Routing** parameter setting on the Filter page.

Tap on **Osc 1/2/3 Dest** to open a pop-up menu for further settings:

- **Set Default**: sets Osc 1/2/3 Dest to its default setting *Main.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

RingMod (only available for Osc 2 and 3)

Controls the volume of the ring modulation between Osc 1 and 2 (for Osc 2) or 1 and 3 (for Osc 3).

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

Tap on **RingMod** to open a pop-up menu for further settings:

- **Normal**: ring modulation volume change is about 0.4 dB.

- **Fine**: ring modulation volume change is about 0.04 dB.

- **Super Fine**: Ring modulation volume change is about 0.004 dB.

- **Set Default**: sets RingMod volume to its default value *0 dB.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

PB Range Osc 1, 2 or 3

Determines the intensity of the pitch wheel in semitones for the selected oscillator from *-24* to *+24*. Negative values inverse the direction of the pitch bend.

Tap on **PB Range** to open a pop-up menu for further settings:

- **Set Default**: sets PB Range to its default value *+12.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

PitchVar

To simulate the pitch variations that analog circuits have due to component tolerances, missing calibration and temperature effects, the Quantum assigns each oscillator of each voice a random out-of-tune coefficient at startup. The amount by which these out-of-tune coefficients affects

each oscillators pitch is controlled by the **PitchVar** para-meter. The higher the value, the stronger the variation. Setting this parameter to *0* will disable this variation. While each oscillator of each voice has an individual out-of-tune coefficient, the **PitchVar** parameter is global to all oscillators of all voices.

Tap on **PitchVar** to open a pop-up menu for further settings:

- **Set Default**: sets Pitchvar to its default value *0.17.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Timbre Mode Tab

Here you find specific parameters for the wavetable generators.

⚠ The wavetable position can be dragged vertically in the graphical wavetable representation.

⚠ Below the graphical wavetable representation, **Travel** and **Wavetable info** is shown.
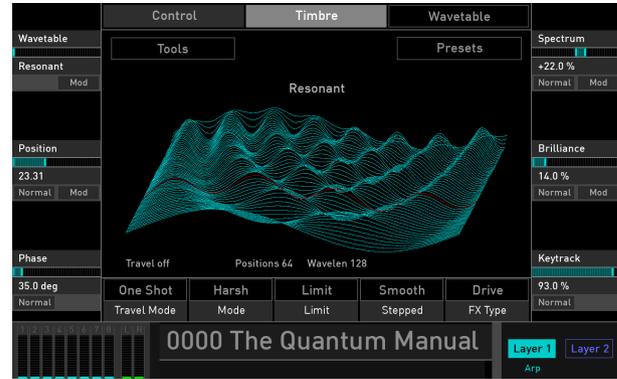
Wavetable

Here you can select all available factory wavetables and your own custom wavetables.

Tap on **Wavetable** to open a pop-up menu for further settings:

- **Set Default**: sets the wavetable to its default *Resonant.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

> 🎛 Switching between wavetables while notes are hold are super smooth without interruptions. This opens the door to use the table selection itself as a modulation target. This opens up an extra new dimension of wavetable synthesis: You modulate not only the position within a table to change a timbre, but you can simultaneously modulate between all preset tables. This modulation can be polyphonic, which means if your modulation source is like *Rand Trig* or *Voice Index*, each voice will use a different wavetable. Of course this is also true for LFO or Envelope based modulation.

Position

Same functionality as for the corresponding panel parameter.

Tap on **Position** to open a pop-up menu for further settings:

- **Normal**: Wavetable position change is about 0.64.

- **Fine**: Wavetable position change is about 0.06.

- **Super Fine**: Wavetable position change is about 0.06.

- **Set Default**: sets Wavetable position to its default value *0.00.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Phase

Sets the initial phase of the wavetable in degree. By this you could e.g. generate clicks at note onsets if these are wanted. Turning **Phase** to maximum value will result in a "Free Running" phase much you would expect from an hardware oscillator.

Tap on **Phase** to open a pop-up menu for further settings:

- **Normal**: Phase change is about 5 degree.

- **Fine**: Phase change is about 0.5 degree.

- **Super Fine**: Phase change is about 0.1 degree.

- **Set Default**: sets Phase l to its default value *0.0 degree.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Spectrum

Same functionality as for the corresponding panel parameter.

Tap on **Spectrum** to open a pop-up menu for further settings:

- **Normal**: Spectrum change is about 2 %.

- **Fine**: Spectrum change is about 0.2 %.

- **Super Fine**: Spectrum change is about 0.02 %.

- **Set Default**: sets Spectrum to its default value *+ 0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Brilliance

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

Tap on **Brilliance** to open a pop-up menu for further settings:

- **Normal**: Brilliance change is about 1 %.

- **Fine**: Brilliance change is about 0.1 %.

- **Super Fine**: Brilliance change is about 0.01 %.

- **Set Default**: sets Brilliance to its default value *0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Keytrack

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

Tap on **Keytrack** to open a pop-up menu for further settings:

- **Normal**: Keytrack change is about 1 %.

- **Fine**: Keytrack change is about 0.1 %.

- **Super Fine**: Keytrack change is about 0.01 %.

- **Set Default**: sets Keytrack to its default value *100.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Travel Mode

There are several modes available for the wavetable cycling.

Tap on **Travel Mode** to open a pop-up menu with the following options:

- **Cycle**: a wavetable starts automatically again from beginning when the end is reached. Every played note starts its own travel cycle.

- **Global Cyc**.: a wavetable starts automatically again from beginning when the end is reached. Every played note uses the same travel cycle.

- **Sync**: the Travel speed is controlled by the internal tempo of Quantum (adjustable with the Arpeggiator or Sequencer **Bpm** parameter) or an incoming synchronisation signal via MIDI. If **Sync** is selected, you can set up **Travel** in musical values. The highest amount is *1024*, where one turn needs 1024 beats.

- **One Shot**: a wavetable stops when the last wave is reached. The last wavetable position is played and held. Every played note starts its own travel cycle.

- **Ping Pong**: a wavetable automatically starts a reverse playback when the end is reached and vice versa. Every played note starts its on travel ping pong cycle.

- **Global P. P.**: a wavetable automatically starts a reverse playback when the end is reached and vice versa. Every played note uses the same travel cycle.

Tap on **Travel Mode** to open a pop-up menu for further settings:

- **Set Default**: sets the Travel Mode to its default *Ping Pong.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mode

Selects the synthesis quality. The first setting *Normal* keeps the current algorithm which synthesises in highest quality avoiding digital artefacts like aliasing and such. However, as we learned to love the digital artefacts of legacy wavetable synthesis implementation, other modes are available: *Harsh* produces additional non-harmonic components in the lower pitch ranges which result in more

rich to aggressive timbres. *Dirty* adds digital aliasing in higher pitch ranges you will remember from time where processing power was restricted and cheaper implementations were used.

Tap on **Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Mode to its default *Normal.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Limit

Determines the wavetable interpolation quality when using the **Travel** parameter.

- **Wrap**: uses a smooth interpolation when **Travel** reaches the end of the wavetable and blends back to the start wave position. This setting is useful when the **Travel Mode** is set to *Cycle.*

- **Limit**: uses no interpolation as in older Waldorf wavetable synthesizers (e.g. Microwave) when **Travel** reaches the end of the wavetable and blends back to the start wave position.

Tap on **Limit** to open a pop-up menu for further settings:

- **Set Default**: sets the Limit to its default setting *Limit.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stepped

Determines the wave interpolation for traveling and modulation.

- **Smooth**: a very smooth interpolation is used to create a clean wavetable sound.

- **Stepped**: no interpolation is used to create a more pristine sound

- **2/4/8 Steps**: only every second, fourth, or eighth wave is interpolated. This creates a harsher sound for some wavetables.

Tap on **Stepped** to open a pop-up menu for further settings:

- **Set Default**: sets Stepped to its default setting *Smooth.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

FX Type

Determines the saturation/gain type that is added to the wavetable signal. The amount can be set with the **FX** parameter in the oscillator section.

- **Drive**: selects a drive type for signal saturation.

- **Gain:** selects an additional gain stage after the wavetable oscillator for adjusting the oscillator level.

- **Off:** no FX type is used. The FX parameter dial has no function.

Tap on **FX Type** to open a pop-up menu for further settings:

- **Set Default**: sets FX Type to its default setting *Drive.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Tools Button

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

- **Talk**: allows you to enter one or more words with a virtual keyboard that automatically opens. These words will be synthesized as a new wavetable when tapping on *Return*.

- **Analyze Audio**: enables you to select an audio file from the Audio File browser of Quantum's Flash memory. This audio file will be automatically synthesized as a new wavetable. Select the desired file and tap on **Analyze**.

- **Load Single Cycle**: Load a single-cycle waveform from the internal Flash memory (Internal) or a connected SD Card into the Quantum's Flash memory. A single-cycle waveform is in fact a very short wav/aif file which samples are interpreted as a single cycle of a wave. Good sizes are from 200 to 1024 samples. The size can be odd. You could use longer files but waveform will be averaged to a maximum of 1024 samples in case. An 8

position wavetable will be created morphing the single-cycle wave into a sine.

> ⓘ Free single-cycle waveforms can be found here **https://www.adventurekid.se/akrt/waveforms/** but there are many more available as free and commercial waveforms.

- **Import from .wav**: Creates a wavetable from .wav/.aiff files which use a constant sample period. The period can be configured in import dialogue window from 64 to 4096, many popular synths use 2048.
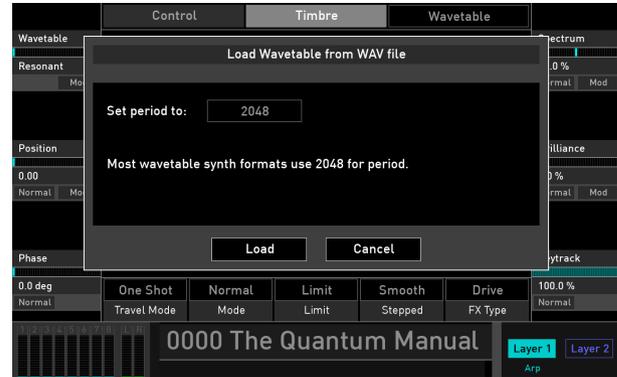
Wavetable import dialogue window

- **Load Wavetable**: imports a wavetable from the internal Flash memory (Internal) or a connected SD Card into the Quantum's Flash memory. This enables you to exchange user wavetables with other Quantum users.

- **Save Wavetable**: exports the current wavetable to the internal Flash memory (Internal) or a connected SD Card. This enables you to exchange your own created wavetables with other Quantum users.

(!) After a user wavetable loaded/analyzed from external file, the display shows **Prev/Next** buttons to quickly browse through all files in same folder.

Presets Button

Tap on the **Presets** button to open a pop-up window for loading, saving, and managing Wavetable oscillator settings. Here, the following options are available:

- On the left side you find a list of all Wavetable oscillator presets. Tap on the desired name to select it and load it immediately. Current Wavetable oscillator settings will be overwritten.

- With the **Save** option you can save the current Wavetable oscillator settings. You can also enter a desired name for the preset.

- **Import**: imports a Wavetable oscillator presets from a connected SD card into the Quantum's Flash memory. The imported preset is shown within the Wavetable oscillator preset list.

- **Export**: exports the current selected Wavetable oscillator presets to a connected SD card.

- **Delete**: deletes the current selected Wavetable oscillator preset after a security confirmation.

- **Init**: initializes the current selected Wavetable oscillator to its default settings.

- **Close**: closes the pop-up window. No further action is taking place.

The Waveform Oscillator

Quantum offers a standard oscillator model to create typical analog synthesizer waveforms (sawtooth, triangle etc.) plus other classic waveforms like square (which is the father of the pulse waveform) and the sine wave (also part of every other waveform). Also, different noise signals can be choosen.

The Waveform oscillator also can generate up to eight oscillator signals (called Kernel) simultaneously. Here, you can produce super-saw like waves, for example.

⊗ Press the **Waveform** button to activate the Waveform oscillator for the corresponding oscillator 1, 2, or 3. The whole oscillator section lights up in green.

Waveform

⚠ An explanation of waveform synthesis can be found in the 'Sound Synthesis Basics' chapter.

⚠ Further parameters can be found on the corresponding OSC page. Read more on page 43.

Waveform Oscillator Panel Parameters

Semitones

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

Fine Pitch

Fine-tunes the oscillator in steps of 1/128th of a semitone. The audible result of detuned oscillators is a Chorus effect. Use a positive setting for one oscillator and an equivalent negative setting for another.

Count

The waveform oscillator can generate up to eight oscillator signals simultaneously. This is determined by the **Count** knob. Up to eight kernels (equivalent to oscillators) are possible. Values in between two integer values mean that an additional oscillator is mixed in at a reduced level.

⚠ Use **Count** to generate super-saw like waves, for example.

Detune

Detunes the multi oscillator when **Count** is set to any kernel value greater than 1.0.

Shape

Use this knob to select the desired waveform. The following waveforms are available:

- *Sawtooth* selects the sawtooth waveform. A sawtooth wave has all the harmonics of the fundamental frequency in descending magnitude.

- *Sine* consists of the fundamental frequency only. It has no harmonics at all.

- *Triangle* selects the triangle waveform. The triangle wave mainly consists of the odd harmonics with very low magnitudes.

- *Square* selects the pulse waveform. A pulse waveform with a pulse width of 50% has only the odd harmonics of the fundamental frequency present. This waveform produces a hollow/metallic sound.

- *Pink Noise* – this special kind of noise produces higher levels in the deeper frequency range. It is a better match with the human hearing than the unfiltered white noise.

- *White Noise* is a fundamental source for any kind of analog-type percussion. It offers the same level over the complete frequency range. Wind and other sound effects can also be created by using noise.

Warp

Depending on the selected **Shape**, the **Warp** function alters the basic shape of a waveform.

- If *Sawtooth* is selected, the Warp parameter blends from a double saw wave (lowest setting) into a regular saw wave (middle setting) to a square wave (highest setting).

- If *Sine* is selected, the Warp parameter blends from a soft rising saw wave (lowest setting) into a regular sine wave (middle setting) to a soft falling saw wave (highest setting).

- If *Triangle* is selected, the Warp parameter blends from a rising saw wave (lowest setting) into a regular triangle wave (middle setting) to a falling saw wave (highest setting).

- If *Square* is selected, the Warp parameter changes the pulse width of the square wave

- If *Pink Noise* or *White Noise* is selected, the Warp parameter blends from a filtered noise (lowest setting)

into the corresponding selected noise (middle setting) to a pitched noise (highest setting).

Sync

Adds a typical oscillator synchronisation to the selected oscillator shape (except Noise types). As a result, interesting sound effects may be generated – especially when higher **Sync** settings are used.

Waveform Oscillator Display Page

To access the Waveform Oscillator display mode, press the corresponding OSC 1, 2 or 3 button above the touchscreen display.

Here you can switch between two modes: **Control** and **Timbre**. Tap on the corresponding tab to select it. The display switches to this mode. A third tab displays the current oscillator model. Tap on it to select another model or to switch it off.

Control Mode Tab

Here you find parameters relating to tuning and some basic settings. The functions and options are the same as for the Wavetable oscillator. Please refer to the corresponding chapter.

Timbre Mode Tab

Here you find specific parameters for the Waveform oscillators.
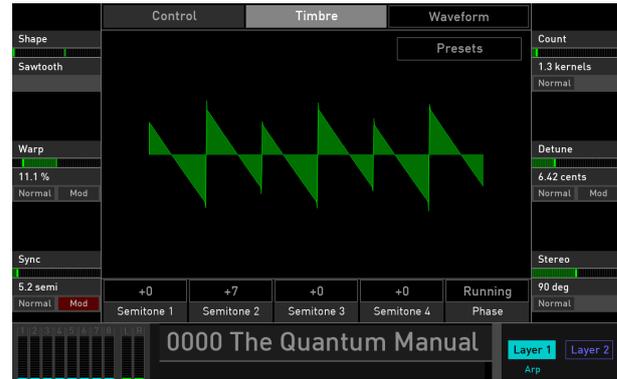
Shape

Same functionality as for the corresponding panel parameter.

Tap on **Shape** to open a pop-up menu for further settings:

• **Set Default**: sets Shape to its default *Sawtooth.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Warp

Same functionality as for the corresponding panel parameter.

Tap on **Warp** to open a pop-up menu for further settings:

- **Normal**: Warp position change is about 1 %.

- **Fine**: Warp position change is about 0.1 %.

- **Super Fine**: Warp position change is about 0.01 %.

- **Set Default**: Warp position is set to its default value of *50.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Sync

Same functionality as for the corresponding panel parameter.

Tap on **Sync** to open a pop-up menu for further settings:

- **Normal**: Sync change is about 0.3 semi.

- **Fine**: Sync change is about 0.03 semi

- **Super Fine**: Sync change is about 0.003 semi.

- **Set Default**: sets Sync to its default value *0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Count

Same functionality as for the corresponding panel parameter.

Tap on **Count** to open a pop-up menu for further settings:

*   **Normal**: Count change is about 0.3 semi.

*   **Fine**: Count change is about 0.03 semi

*   **Super Fine**: Count change is about 0.003 semi.

*   **Set Default**: sets Count to its default value *1.0 kernels.*

*   **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

*   **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Detune

Same functionality as for the corresponding panel parameter.

Tap on **Detune** to open a pop-up menu for further settings:

*   **Normal**: Detune change is about 0.3 cents.

*   **Fine**: Detune change is about 0.03 cents

*   **Super Fine**: Detune change is about 0.003 cents.

*   **Set Default**: sets Detune to its default value *0.0 % cents.*

*   **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

*   **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

*   **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stereo

When Count is set to any kernel value higher than 1.0, this parameter determines the stereo panning for every played oscillator kernel signal. In *Center* setting, all oscillators are played on both stereo channels. Higher settings move the signals within the stereo field.

Tap on **Stereo** to open a pop-up menu for further settings:

*   **Normal**: Stereo change is about 2 degree.

*   **Fine**: Stereo change is about 1 degree.

*   **Super Fine**: Stereo change is about 0.1 degree.

- **Set Default**: sets Stereo to its default value of *0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Semitone 1 - 4

Here you can individually transpose the first four oscillator kernels in semitones. If more than four kernels are selected then kernels 5 to 8 use the same pitch settings as kernels 1 to 4. Tap on the corresponding Semitone button to open a pop-up menu with semitone settings from -12 up to +12.

Tap on **Semitone 1 - 4** to open a pop-up menu for further settings:

- **Set Default**: sets Semitone to its default value of *+0.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Phase

Determines the start phase of the selected oscillator shape.

- **Running** results in free-running oscillators as in analog synthesizers. A played note „jumps in" the current phase cycle.

- **Reset** forces the oscillator waveform to start with phase 0 for every played new note. Use this setting if you want to create drum-like sounds where every played note sounds similar during its attack phase.

Tap on **Phase** to open a pop-up menu for further settings:

- **Set Default**: sets Phase to its default setting *Running.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Presets

Tap on the **Presets** button to open a pop-up window for loading, saving and managing Waveform oscillator settings. For more information on the available options please refer to the Presets chapter in the Wavetable section.

The Particle Generator

⊗ Press the **Particle** button to activate the Particle Generator for the corresponding oscillator 1, 2, or 3. The whole oscillator section lights up in blue.

This generator creates its sound by playing back audio samples. There are two different ways of sample playback: normal playback and granular playback. Read more about the sample playback in the following chapters.

The Particle Generator needs to be fed with one or more samples. The Particle Generator can use one single sample as well as multi samples that are mapped over the keyboard.

⚠ For more information about loading and editing samples, please refer to the 'Loading & Editing Samples' chapter.

This is where the samples can come from:

- From Quantum's internal Flash memory. Here are located lot of factory samples, that can be loaded into the Particle generator.

- From SD card: you can import own samples from a connected SD card into Quantum's internal Flash memory and load it from there into the Particle generator.

- From audio recordings done with Quantum. The **Global** page features an audio recorder. All recorded files are stored into the internal Flash memory and can be loaded into the Particle generator.

- From the audio input of Quantum by using the Live Granular mode. Read more on this in the corresponding section.

⚠ The Quantum can playback WAV or AIFF/AIFC files (stereo or mono) with any sample rate and bit rate. We recommend to use samples with a rate of 44.1 kHz to keep the original pitch.

⚠ An explanation of granular synthesis can be found in the 'Sound Synthesis Basics' chapter.

⚠ Further parameters can be found on the corresponding display page. Read more on page 50.

Particle Generator Panel Parameters

Semitones

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

Fine Pitch

Fine-tunes the particle generator in steps of 1/128th of a semitone. The audible result of detuned oscillators is a Chorus effect. Use a positive setting for one oscillator and an equivalent negative setting for another

Count/Grain Poly (only in Granular Mode)

The Particle generator can generate up to eight grain streams for simultaneous playback. This is determined by the **Count/Grain Poly** knob. Up to eight kernels (equivalent to grain oscillators) are possible. Values in between two integer values mean that an additional grain oscillator is mixed in at a reduced level.

Detune/Pitch Spread (only in Granular Mode)

Determines the amount the grains that are displaced from center pitch, when **Count/Grain Poly** is set to any kernel value higher than 1.0.

Position (only in Granular Mode)

Determines the sample start position for grain playback. The higher the value, the later the sample starts.

Length (only in Granular Mode)

Determines the length of the grains that are used for playback. The higher the value (up to 250 ms), the more precise the playback.

Travel (only in Granular Mode)

Determines the speed by which the position is wandering in the sample. This allows for cyclic moving through a granular sample. Positive values allow a forward movement, negative values a backward movement. Lower values slow down the movement speed, higher values speed it up. Cyclic means that a sample starts automatically again from beginning when the end is reached. If you don't want a cyclic modulation, use the **Position** parameter modulated with an envelope, an LFO, or any other modulation source. You can also set up different **Travel Modes**. Please refer to the corresponding section below.

Particle Generator Display Page

To access the Particle Generator display page, press the corresponding **OSC 1**, **2** or **3** button above the touchscreen display.

Here you can switch between two modes: **Control** and **Timbre**. Tap on the corresponding tab to select it. The display switches to this mode. A third tab displays the current oscillator model. Tap on it to select another model or to switch it off.

Control Mode Tab

Here you find parameters for tuning and some basic settings. The functions are the same as for the Wavetable oscillator. Please refer to the corresponding chapter.

Timbre Mode Tab

Here you find specific parameters for the Particle Generator as well as the option to load samples into this generator.

Here, the display visualizes the envelopes and grain distribution.

Particle / Sample Buttons

Tap on the corresponding button to switch between Particle and Sample mode. Depending on the selected mode, the display parameter differs.
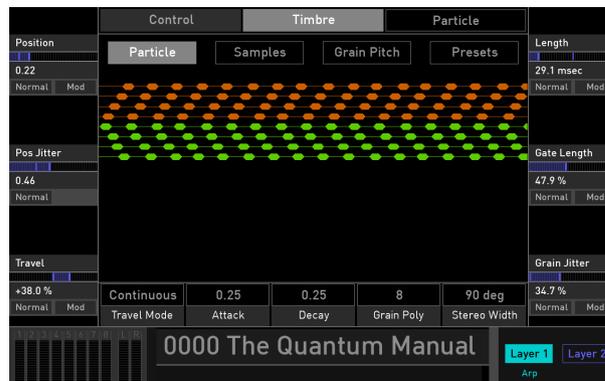
ⓘ The Particle parameter page can only be reached, if the Mode is set to 'Granular'. This can be done by tapping on the **Particles** button (and confirming the granular mode switch) or selecting *Granular* with the **Mode** parameter.

> (!) For more information about loading and editing samples, please refer to the 'Loading & Editing Samples' chapter.

Position (only in Granular Mode)

Same functionality as for the corresponding panel parameter.

Tap on **Position** to open a pop-up menu for further settings:

- **Normal**: Sample position change is about 0.01.

- **Fine**: Sample position change is about 0.001.

- **Super Fine**: Sample position change is about 0.0001.

- **Set Default**: sets Sample position to its default value *0.00.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Position Jitter (Pos Jitter, only in Granular Mode)

Determines the amount of how much the grain position will be randomized. The higher this value, the more random the sample start based on the initial **Position** setting.

Tap on **Pos Jitter** to open a pop-up menu for further settings:

- **Normal**: Sample position variation change is about 0.01.

- **Fine**: Sample position variation change is about 0.001.

- **Super Fine**: Sample position variation change is about 0.0001.

- **Set Default**: sets Sample position variation to its default value of *0.30.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Travel (only in Granular Mode)

Same functionality as for the corresponding panel parameter.

Tap on **Travel** to open a pop-up menu for further settings:

- **Normal**: Travel change is about 2%.

- **Fine**: Travel change is about 0.2%.

- **Super Fine**: Travel change is about 0.02%.

- **Set Default**: sets Travel to its default value of *+0.0%*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Length (only in Granular Mode)

Same functionality as for the corresponding panel parameter.

Tap on **Length** to open a pop-up menu for further settings:

- **Normal**: Length change is about 2.5 msec.

- **Fine**: Length change is about 0.25 msec.

- **Super Fine**: Length change is about 0.025 msec

- **Set Default**: sets Length to its default value of *0.00.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Gate Length (only in Granular Mode)

Determines the amount of the length that is used for its envelope – much like a Gate parameter. Smaller values

produce gaps between the grains. **Gate Length** could also be called density.

Tap on **Gate Length** to open a pop-up menu for further settings:

- **Normal**: Gate Length change is about 0.9%.

- **Fine**: Gate Length change is about 0.09 %.

- **Super Fine**: Gate Length change is about 0.009 %.

- **Set Default**: sets Gate Length to its default value of *100.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Grain Jitter (only in Granular Mode)

Determines the amount by which the grain length and gate is randomized.

Tap on **Grain Jitter** to open a pop-up menu for further settings:

- **Normal**: Grain Jitter change is about 1 %.

- **Fine**: Grain Jitter change is about 0.1 %.

- **Super Fine**: Grain Jitter change is about 0.01 %.

- **Set Default**: sets Grain Jitter to its default value *0.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Travel Mode (only in Granular Mode)

There are several modes available for the granular cycling process.

- **Continuous**: a granular sample automatically starts again from beginning when the end is reached. Every note played starts its own travel cycle.

- **One Shot**: a granular sample stops when the end is reached. Every note played starts its own travel cycle.

- **Ping Pong**: a granular sample automatically starts a reverse playback when the end is reached and vice versa. Every note played starts its own travel cycle.

- **Global**: a granular sample automatically starts again from beginning when the end is reached. Every note played uses the same travel cycle.

Tap on **Travel Mode** to open a pop-up menu for editing.

- **Set Default**: sets Travel Mode to its default setting *Continuous.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Attack (only in Granular Mode)

Determines the attack phase of a grain. The higher the value, the smoother the grain playback. **Attack** can strongly influences the spectrum of the sound.

Tap on **Attack** to open a pop-up menu for editing.

- **Set Default**: sets Attack to its default value of *0.25.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Decay (only in Granular Mode)

Determines the decay phase of a grain. The higher the value, the smoother the grain playback. **Decay** can strongly influences the spectrum of the sound.

Tap on **Decay** to open a pop-up menu for editing.

- **Set Default**: sets Count to its default value of *0.25.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Grain Poly (only in Granular Mode)

Same functionality as for the corresponding panel parameter.

Tap on **Grain Poly** to open a pop-up menu for editing.

- **Set Default**: sets Count to its default value *8.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stereo Width

The grain streams are panned to left/right based on the setting of this parameter. It determines the position of the granular streams in the stereo field. The lower the value, the less the stereo width (0% is mono).

Tap on **Stereo Width** to open a pop-up menu for further settings:

- **Normal**: Stereo Width change is about 1.0 %.

- **Fine**: Stereo Width change is about 0.1%.

- **Super Fine**: Stereo Width change is about 0.01%.

- **Set Default**: sets Stereo Width to its default value of *50.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

⚠ If a granular stereo sample is routed through the Dual Analog Filter section, it automatically becomes mono because of the mono signal path within this circuitry.

Grain Pitch Button

On this display page, you can make settings relating to the tuning of the granular pitch response.

Pitch Spread

Determines the amount that grains are displaced from center pitch.

Tap on **Pitch Spread** to open a pop-up menu for further settings:

- **Normal**: Pitch Spread change is about 0.1

- **Fine**: Pitch Spread change is about 0.01.

- **Super Fine**: Pitch Spread change is about 0.001.

- **Set Default**: sets Pitch Spread to its default value of *0.10.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Pitch Mode

Determines by which method pitches will be altered. Here you can select between five options:

- **Random**: randomizes the pitch for each grain at grain-start.

- **Cluster**: constantly displaces each lane equidistant from its neighbouring lane.

- **Spread**: works similar to "Cluster" but with much more spread while keeping the overall pitch amplitude (from highest to lowest lane) constant, regardless of grain poly.

waldorf

- **Mapped**: will constantly displace the grains based on a semitone map of up to six intervals specified at the bottom of the display page.

- **Mapped Random**: works like "Mapped" but the grain pitch is chosen randomly from the semitone map at each grain start.

For the "Mapped" modes the **Pitch Spread** parameter will determine how many parts of the semitone map will be used. For example, at lower values, only the first one or two semitones will be used; turned up to maximum, all semitone items will be used. The **Pitch Spread** can be modulated, so you can animate the chord or scales to be used. The semitone entries do not need to be in any order, such as rising or falling, and could be anything.

Tap on **Pitch Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Pitch Mode to its default setting *Cluster.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Pitch Jitter

Adds an extra random pitch regardless of the current pitch.

Tap on **Pitch Jitter** to open a pop-up menu for editing.

- **Normal**: Pitch Jitter change is about 2 cents.

- **Fine**: Pitch Jitter change is about 0.2 cents

- **Super Fine**: Pitch Jitter change is about 0.02 cents.

- **Set Default**: sets Pitch Jitter to its default value of *+/- 0.0 cents.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Semitone 1 - 6

Here you can set up a map with up to six intervals – see also **Pitch Mode**. Tap on the corresponding **Semitone** button to open a pop-up menu with semitone settings from -0 up to 24.

Tap on **Semitone 1 - 6** to open a pop-up menu for further settings:

• **Set Default**: sets Semitone to its default value of *0.*

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Presets

Tap on the **Presets** button to open a pop-up window for loading, saving and managing Particle Generator settings. For more information on the available options please refer to the **Presets** chapter in the Wavetable section.

The Resonator

⊘ Press the Resonator button to activate the Resonator for the corresponding oscillator 1, 2 or 3. The whole oscillator section lights up in red.

Resonator

ⓘ Further parameters can be found on the corresponding display page. Read more on page 60.

The basic concept of the Resonator is sound creation by using an initial exciter signal (mostly a short noise impulse) which goes through a bandpass filter bank, where its resonating filters finally produce a ringing sine-like sound.

Based on different Timbre modes, the partials of this signal can be adjusted in many ways.

The Resonator can also feed with one or more samples (instead of using a noise impulse). You can load one single sample as well as multi samples that were mapped over the keyboard range.

🎚 For a better understanding on how the Resonator works, we recommend initializing a sound program (on the **Load** page) and starting with a default Resonator. Try out all parameters to become familiar with the functionality of this powerful sound creation tool.

ⓘ For more information about loading and editing samples, please refer to 'The Loading & Editing Samples' chapter.

Resonator Panel Parameters

Semitones

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

Fine Pitch

Fine-tunes the Resonator in steps of 1/128th of a semitone. The audible result of detuned oscillators is a Chorus effect. Use a positive setting for one oscillator and an equivalent negative setting for another.

Repeats

Determines how often the exciter signal is repeated. The higher the value (up to 16), the more repeats include the sound. The speed of the repeats depends on the **Decay** settings at the Resonator display page.

Spread

Extends or compresses the partials of the resonator, which leads to massive timbre changes. There are two **Spread** modes that can be set at the Resonator display page.

Timbre

Based on the **Timbre Mode** at the Resonator display page, this parameter changes the structure of the partials. In some cases this works similar to a filter, which cuts off partials. In other cases the partials are emphasized.

Exciter

Determines the sound of the exciter signal. Fully counterclockwise, a short impulse is generated while higher settings fade this impulse into a short noise. Use higher settings when you want to simulate the blowing sound of a wind instrument. If a loaded sample is used as exciter, this parameter influences how the sample sounds.

(!) For more information about loading and editing samples, please refer to 'The Loading & Editing Samples' chapter.

Q

Determines the resonance of the created partials. The higher the setting, the longer the duration of the created sounds.

Resonator Display Page

To access the Resonator display page, press the corresponding OSC 1, 2, or 3 button above the touchscreen display.

Here you can change between two modes: **Control** and **Timbre**. Tap on the corresponding tab to select it. The display changes to this mode. A third tab displays the current oscillator model. Tap on it to select another model or switch it off.

Control Mode Tab

Here you find parameters relating to the tuning and some basic settings. The functions are the same as for the Wavetable generator. Please refer to the corresponding chapter.

Timbre Mode Tab

Here you find specific parameters for the Resonator.
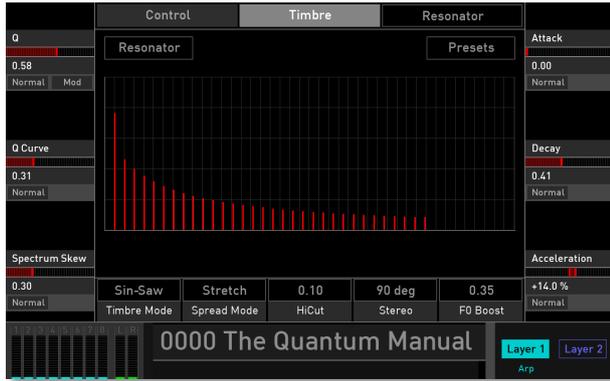
Q

Same functionality as for the corresponding panel parameter.

Tap on **Q** to open a pop-up menu for further settings:

- **Normal**: Q change is about 0.01.

- **Fine**: Q change is about 0.001.

- **Super Fine**: Q change is about 0.0001.

- **Set Default**: sets Q to its default value of *0.68.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Q Curve

Determines the resonance performance of the partials. The higher the setting, the more partials are emphasized.

Tap on **Q Curve** to open a pop-up menu for further settings:

- **Normal**: Q Curve change is about 0.01.

- **Fine**: Q Curve change is about 0.001.

- **Super Fine**: Q Curve change is about 0.0001.

- **Set Default**: sets Q Curve to its default value of *0.32.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Spectrum Skew

Determines the level of the partials in relation to themselves. The higher the setting, the smoother the sound. Very low values result in partials with a similar level.

Tap on **Spectrum Skew** to open a pop-up menu for further settings:

- **Normal**: Spectrum Skew change is about 0.01.

- **Fine**: Spectrum Skew change is about 0.001.

- **Super Fine**: Spectrum Skew change is about 0.0001.

- **Set Default**: sets Spectrum Skew to its default value of *0.25.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Attack

Works similar to the attack parameter of an envelope. It controls the attack phase of the exciter. The more partials the exciter has (e.g. **Exciter** parameter set to maximum), the more the **Attack** parameter has an influence.

Tap on **Attack** to open a pop-up menu for further settings:

- **Normal**: Attack change is about 0.01.

- **Fine**: Attack change is about 0.001.

- **Super Fine**: Attack change is about 0.0001.

- **Set Default**: sets Attack to its default value of *0.00.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Decay

Determines the decay phase of the exciter signal. When **Repeat** is set to 1, this parameter has no effect. For higher **Repeat** settings, **Decay** also controls the speed of the repeats.

Tap on **Decay** to open a pop-up menu for further settings:

- **Normal**: Decay change is about 0.01.

- **Fine**: Decay change is about 0.001.

- **Super Fine**: Decay change is about 0.0001.

- **Set Default**: sets Decay to its default value of *0.10.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Acceleration

Controls the repeat speed behaviour. Positive settings accelerate the speed of the repeats by time while negative settings will slow it down accordingly.

Tap on **Acceleration** to open a pop-up menu for further settings:

- **Normal**: Acceleration change is about 0.01.

- **Fine**: Acceleration change is about 0.001.

- **Super Fine**: Acceleration change is about 0.0001.

- **Set Default**: sets Acceleration to its default value of *+0.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Timbre Mode

Here you can select different modes that affect the partial editing when using the **Timbre** parameter.

- **Peak Mode**: in the lowest **Timbre** setting the partials fade out exponentially. This sounds as a sawtooth wave. Higher settings create a partial shift with random peaks. The maximum setting emphasizes every 2nd partial so that the result sounds like a square wave.

- **Sin Mod**: this mode exhibits almost the same behaviour as the **Peak** mode, except that the maximum setting results in a triangle wave sound.

- **Saw-Square**: this mode starts from a regular partial fade out and removes most of the 2nd partials as **Timbre** is turned up. The result sounds like a square wave.

- **Sin-Saw**: this mode starts with a sine-like sound (only the fundamental note is heard). It adds more and more partials as **Timbre** is turned up. The result sounds like a sawtooth wave.

- **Modulo**: in the lowest **Timbre** setting the partials fade out exponentially. This sounds like a sawtooth wave. The more **Timbre** is turned up, the more partials will suddenly disappear. This leads to a less complex sound.

Tap on **Timbre Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Timbre Mode to its default *Peak Mod* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Spread Mode

Here you can determine the distance of the partials when using the **Stretch** parameter.

- **Stretch**: uses a wide range of stretching. The **Stretch** parameter can produce drastic changes to the timbre of a sound.

- **Stiffness**: uses a smaller range of stretching. The results of the **Stretch** parameter are less drastic.

Tap on **Spread Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Timbre Mode to its default *Stretch* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

HiCut

Determines the hi-cut frequency for cutting high frequencies. This filter is located between the exciter and the filter bank. Use it if the exciter signal is producing too many overtones.

Tap on **HiCut** to open a pop-up menu for further settings:

- **Set Default**: sets HiCut to its default value of *0.10.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stereo

Spreads the signal in the stereo field. Keep in mind that if a signal is routed through the Dual Analog Filter section, it automatically becomes mono because of the mono signal path within this circuitry. If you want to hear the full stereo effect, you should route the signal directly to the VCA or to the Digital Former only (DF 100 Fil 0). This can be done with the **Osc Dest** parameter on the **Control** page.

Tap on **Stereo** to open a pop-up menu for further settings:

- **Set Default**: sets Stereo to its default value of *0.50*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

F0 Boost

F0 is the denomination for the fundamental note. This parameter boosts F0 independently from the partials.

Tap on **F0 Boost** to open a pop-up menu for further settings:

- **Set Default**: sets F0 Boost to its default value of *0.15.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Presets

Tap on the **Presets** button to open a pop-up window for loading, saving, and managing Resonator settings. For more information on the available options please refer to the **Presets** chapter in the Wavetable section.

Oscillator Mixer (OSC MIX) Section

In the Oscillator Mixer section you control the volumes of the three oscillators. If an oscillator volume dial is turned fully counterclockwise, no signal is passed. The LED below the dial doesn't light up.

Level Osc 1 / Osc 2 / Osc 3

Determines the volume of the corresponding oscillator.
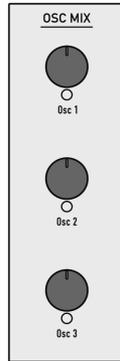
Glide Section

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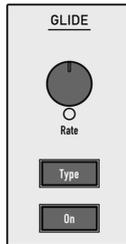
Rate

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

Type

Press this button to switch between two Glide modes:

- **Onset** means that a continuous glide is performed on all new notes.

- **Legato** means that a continuous glide is performed only when notes are played legato. Staccato played notes start on the exact pitch of their note.

Dual Analog Filter Section

Quantum offers two analog lowpass filters with additional settings (12 dB/24 dB Lopass with resonance - clean, saturated or dirty). With the **Mode** parameter different filter routings can be realized (e.g. Boost, Twin Peaks, Escaping, Opposition and many more).
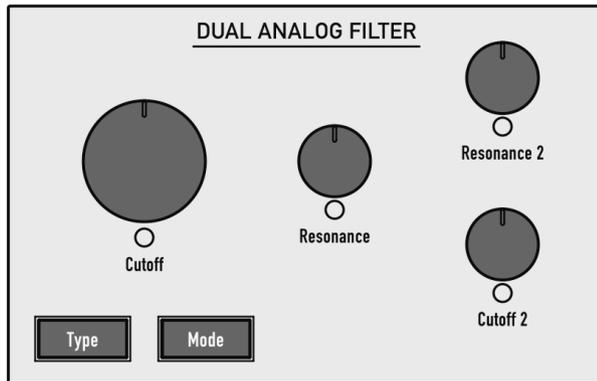
The Dual Analog Filter Section

> ⚠ Due to the fact that the Quantum offers eight analog filter voices the maximum polyphony is about eight voices.

> ⚠ The Dual Analog Filter section can be bypassed by using the **Osc Dest** parameter on the corresponding Oscillator display pages.

> ⚠ Further filter parameters can be found on the Filter display page.

Filter Panel Parameters

Cutoff 1 & 2

Controls the cutoff frequency for the lowpass filters, which dampens all frequencies above the cutoff frequency. You can bring more movement into the sound by modulating the cutoff frequency via the LFOs, the filter envelope or the Keytrack parameter of the filter. The functionality on these knobs depends on the **Mode** setting.

Resonance 1 & 2

Controls the emphasis of the frequencies around the cutoff point. Use lower values to give more brilliance to the sound. At higher values the sound exhibits typical filter characteristics with a strong boost around the cutoff frequency. When the setting is raised to maximum, the filter starts to self-oscillate, generating a pure sine wave. This feature can be used to create analog-style effects and per-

cussion-like electronic toms, kicks, zaps, etc. The functionality of these knobs depends on the **Mode** setting.

Type

Selects the filter slope for the lowpass filter (LP):

- **12dB LP** removes frequencies above the cutoff point with a 12dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a soft limiter. This leads to a neutral audio signal.

- **12dB sat. LP** removes frequencies above the cutoff point with a 12dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a saturation stage. This leads to a light driven audio signal.

- **12dB dirty LP** removes frequencies above the cutoff point with a 12dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a saturation stage. This leads to a harsh driven audio signal.

- **24dB LP** removes frequencies above the cutoff point with a 24dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a soft limiter. This leads to a neutral audio signal.

- **24dB sat. LP** removes frequencies above the cutoff point with a 24dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a saturation stage. This leads to a light driven audio signal.

- **24dB dirty LP** removes frequencies above the cutoff point with a 24dB slope. The oscillator signal need to be sent to a DA converter before passing the analog filter circuitry. The necessary signal adaption is done by a saturation stage. This leads to a harsh driven audio signal.

Mode

Switches between the available filter modes. Depending on the selected mode the effect of the Cutoff and Resonance parameters as well as the behaviour of Filter 1 and 2 differs. The following modes are available:

- **Single**: only **Cutoff 1** and **Resonance 1** (Filter 1) have an affect on the sound signal. **Cutoff 2** and **Resonance 2** have no influence here.

- **Boost**: only **Cutoff 1** and **Resonance 1** (Filter 1) have an affect on the sound signal. **Cutoff 2** is set to an automatic cutoff value depending on the settings of **Cutoff 1**. This leads to a boosted signal. **Resonance 2** has no influence here.

- **Twin Peaks**: both filter cutoff values are set to a constant frequency distance where Cutoff 1 is higher than Cutoff 2. **Cutoff 2** and **Resonance 2** have no influence here.

- **Escaping**: both filter cutoff values are set to a constant frequency distance where Cutoff 2 is higher than Cutoff 1. **Cutoff 2** and **Resonance 2** have no influence here.

- **Opposition**: Cutoff 1 controls the frequency of Filter 1 and 2. Higher values increase Cutoff 1 and decrease Cutoff 2. Lower values increase Cutoff 2 and decrease Cutoff 1. **Cutoff 2** and **Resonance 2** have no influence here.

- **Endless**: similar to **Opposition**, but cutoff frequency from Filter 2 has a different behaviour relationship. **Cutoff 2** and **Resonance 2** have no influence here.

- **Independent**: both filters allow independent settings for **Cutoff 1** and **2** and **Resonance 1** and **2**.

- **Linked**: both filters allow independent settings for **Cutoff 1** and **2** and **Resonance 1** and **2**, but **Cutoff 1** controls the overall frequency cutoff.

Filter Display Page

To access the Filter display page for further Filter parameters press the FILTERS button. With the tabs in the upper part of the display you can call up the **Analog Filter 1** and **Analog Filter 2** parameters and also **Digital Former** and **Routing**. Tap on the desired tab to select the corresponding page.
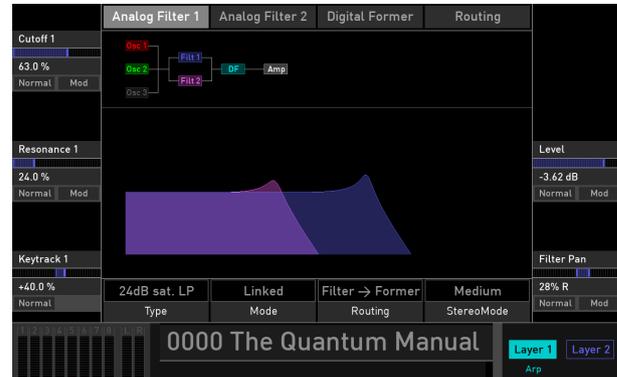
> ⚠ Digital Former and Routing will be explained in the corresponding chapters.

Cutoff (for Analog Filter 1 & 2)

See corresponding description in the 'Filter Panel Parameters' chapter.

Tap on **Cutoff 1** or **Cutoff 2** to open a pop-up menu for further settings:

- **Normal**: Cutoff change is about 1 %.

- **Fine**: Cutoff change is about 0.1 %.

- **Super Fine**: Cutoff change is about 0.01 %.

- **Set Default**: sets Cutoff to its default value of *100.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Resonance (for Analog Filter 1 & 2)

See corresponding description in the 'Filter Panel Parameters' chapter.

Tap on **Resonance 1** or **Resonance 2** to open a pop-up menu for further settings:

- **Normal**: Resonance change is about 1 %.

- **Fine**: Resonance change is about 0.1 %.

- **Super Fine**: Resonance change is about 0.01 %.

- **Set Default**: sets Resonance to its default value of *0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Keytrack (for Analog Filter 1 & 2)

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

🎚️ On most bass sounds lower settings in the range of around +30% are optimal to keep the sound smooth at higher notes.

Tap on **Keytrack 1** or **Keytrack 2** to open a pop-up menu for further settings:

- **Normal**: Keytrack change is about 2 %.

- **Fine**: Keytrack change is about 0.2 %.

- **Super Fine**: Keytrack change is about 0.02 %.

- **Set Default**: sets Keytrack to its default value of *+0.0 %.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Level (for both Analog Filter 1 & 2)

Sets the output level of the corresponding filter.

Tap on **Level** to open a pop-up menu for further settings:

- **Normal**: Level change is about 0.6 dB.

- **Fine**: Level change is about 0.1 dB.

- **Super Fine**: Level change is about 0.01 dB.

- **Set Default**: sets Level to its default value of *0 dB.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Filter Pan (for both Analog Filter 1 & 2)

Sets the panning for the audio signal that comes from the analog filter section.

Tap on **Filter Pan** to open a pop-up menu for further settings:

- **Normal**: Filter Pan change is about 2% L/R.

- **Fine**: Filter Pan change is about 1% L/R.

- **Super Fine**: Filter Pan change is about 0.1% L/R.

- **Set Default**: sets Filter Pan to its default *Center.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Type Analog Filter 1& 2

See corresponding description in the 'Filter Panel Parameters' chapter.

Tap on **Type** to open a pop-up menu for selection.

- **Set Default**: sets Type to its default setting *12 dB LP.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mode

See corresponding description in the 'Filter Panel Parameters' chapter.

Tap on **Mode** to open a pop-up menu for selection.

- **Set Default**: sets Mode to its default *Single* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Routing

Determines the routing of the audio signal that comes from the oscillators.

- **Former -> Filter**: the audio signal first leads into the Digital Former section and from there into the Dual Analog Filter section.

- **Filter -> Former**: the audio signal first leads into the Dual Analog Filter section and from there into the Digital Former section.

- **Parallel**: the audio signal is routed in equal parts to the Digital Former section as well as into the Dual Analog Filter section. This enables simultaneous parallel processing.

Tap on **Routing** to open a pop-up menu for selection:

- **Set Default**: sets Routing to its default setting *Filter -> Former.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stereo Mode

Due to the fact that the Dual Analog Filter section produces a mono output signal, this parameter reconstructs the signal and produces a similar type of stereo signal.

- **Neutral**: the signal that leaves the Dual Analog Filter section is unaffected by the Stereo Mode effect.

- **Medium**: this produces a light stereo effect of the output signal.

- **Strong**: this produces a strong stereo effect of the output signal.

Tap on **Stereo Mode** to open a pop-up menu for selection.

- **Set Default**: sets Stereo Mode to its default setting *Medium.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Digital Former Section

This section offers additional digital filters and signal enhancer effects, such as Drive and Bit Crusher.
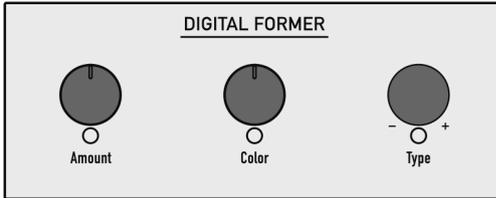
The Digital Former Section

> (!) Keep in mind that the **Routing** parameter determines if the audio signal is routed into the Dual Analog Filter section before or after passing the Digital Former section. Therefore, the **Routing** parameter is available on the Digital Former as well on the Dual Analog Filter display page.

Digital Former Panel Parameters

Type

The following Digital Former types are available. Depending on the selected type, **Amount** and **Color** control different settings. This will be explained in the following list:

• **Bypass**: no effect is used. **Amount** and **Color** have no effect on the signal.

• **Drive**: adds a drive effect. **Amount** determines the amount of saturation that is added to the signal. If set to *0.00*, no saturation will be added – in other words, the signal will remain clean. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will bring in more and more distortion, suitable for harder lead sounds and effects. **Model** determines the character of the drive. You can also deactivate the drive curves completely. The following drive curves are available:

  • **PNP** generates a distortion based on a bipolar transistor.

  • **Tube** simulates the asymmetric distortion of a tube circuit.

- **PickUp** simulates an electrostatic pickup. This drive type sounds very interesting, when the audio signal level is modulated.

- **Diode** generates a typical diode distortion.

- **Crunch** is a sinusoidal waveshaper. It generates FM-like sounds that can be extremely distorted.

- **Gain**: offers an adjustable gain level. **Gain** increases the level of the audio signal. With **Gain Phase** you can switch the phase of the signal between *Normal* and *Reverse*.

- **Comb + / Comb -** : a comb filter is basically a very short delay that can be controlled in length and feed-back. The delay time is so short that you can't hear its individual taps but rather a colorization of the original signal created by peaks or holes in the frequency spectrum. The frequency of the colorization is set by the delay length, which is controlled through **Freq**, while the amount of colorization is set by the Comb filter feedback, which is controlled through **Feedback**. Quantum offers two comb filter types (+ and -) which differ in the shape of the peaks.

- **Bit Crusher**: produces lo-fi sound effects by decimating and truncating the audio signal. **Bits** determines the bit resolution of the audio signal. **Rate** determines the amount by which the audio samples are decimated. At the lowest setting no processing takes place. Higher settings eliminate more and more of the information describing the original audio signal, turning it into un-recognizable noise.

- **Nave LP 12 / LP 24**: offers a lowpass filter with resonance as in the Waldorf *Nave* synthesizer. This filter type was implemented due to compatibility reasons because Quantum can load sound programs from *Nave*. **LP12/24 Freq** controls the cutoff frequency while **LP12/24 Reso** controls the emphasis.

- **PPG LP 12 / LP 24**: offers a lowpass filter with resonance as in the Waldorf *PPG Wave 3.V* synthesizer. **LP12/24 Freq** controls the cutoff frequency while **LP12/24 Reso** controls the emphasis.

- **Largo LP 12 / LP 24**: offers a lowpass filter with resonance as in the Waldorf *Largo* synthesizer. **LP12/24 Freq** controls the cutoff frequency while **LP12/24 Reso** controls the emphasis.

- **Nave HP 12 / HP 24**: offers a highpass filter with resonance as in the Waldorf *Nave* synthesizer. This filter type was implemented due to compatibility reasons because Quantum can load sound programs from *Nave*. **HP12/24 Freq** controls the cutoff frequency while **HP12/24 Reso** controls the emphasis.

- **Largo HP 12 / HP 24**: offers a highpass filter with resonance as in the Waldorf *Largo* synthesizer. **HP12/24 Freq** controls the cutoff frequency while **HP12/24 Reso** controls the emphasis.

- **Nave BP 12 / BP 24**: offers a bandpass filter with resonance as in the Waldorf *Nave* synthesizer. This filter type was implemented due to compatibility reasons because Quantum can load sound programs from *Nave*. **BP12/24 Freq** controls the cutoff frequency while **BP12/24 Reso** controls the emphasis.

- **Largo BP 12 / BP 24**: offers a bandpass filter with resonance as in the Waldorf *Largo* synthesizer. **BP12/24 Freq** controls the cutoff frequency while **BP12/24 Reso** controls the emphasis.

- **Nave Notch 12 / Notch 24**: offers a notch filter with resonance as in the Waldorf *Nave* synthesizer. This filter type was implemented due to compatibility reasons because Quantum can load sound programs from *Nave*. **Notch12/24 Freq** controls the cutoff frequency while **Notch12/24 Reso** controls the emphasis.

- **Largo Notch 12 / Notch 24**: offers a notch filter with resonance as in the Waldorf *Largo* synthesizer. **Notch12/24 Freq** controls the cutoff frequency while **Notch12/24 Reso** controls the emphasis.

Amount

Depending on the selected **Type**, this parameter controls filter frequency or gain amount. Please refer to the corresponding Types.

(!) The Main Encoder also controls the amount parameter, depending on the selected **Type**.

Color

Depending on the selected **Type**, this parameter controls the filter resonance or selects the Drive type. Please refer to the corresponding **Types**.

(!) Further Digital Former parameters can be found in the Filter display page.

Digital Former Display Page

To access the Digital Former display page for further parameters, press the FILTERS button. Tap on the **Digital Former** tab on the touchscreen to select the corresponding display page.
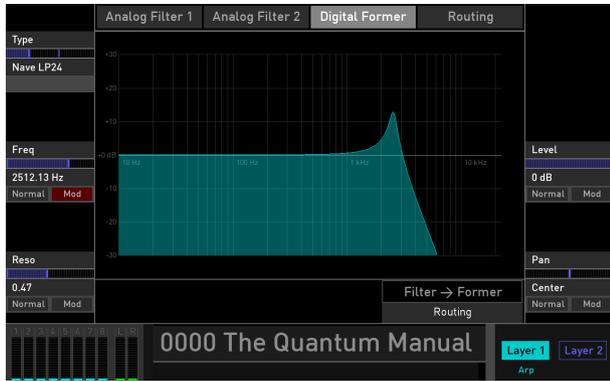
Digital Former display page with Nave LP24 Type

⚠ Based on the selected **Type**, the display may look different.

Type

See corresponding description in the 'Digital Former Panel Parameters' chapter.

Tap on **Type** to open a pop-up menu for further settings:

• **Set Default**: sets Type to its default *Bypass* setting.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Amount

See corresponding description in the 'Digital Former Panel Parameters' chapter. Depending on the selected **Type**, this parameter can be named different. Please refer to the corresponding Types.

Tap on **Amount** to open a pop-up menu for further settings:

• **Normal**: Amount change will be normal.

• **Fine**: Amount change will be fine.

• **Super Fine**: Amount change will be very fine.

- **Set Default**: sets Amount to its default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Color

See corresponding description in the 'Digital Former Panel Parameters' chapter. Depending on the selected **Type**, this parameter can be named different. Please refer to the corresponding Types.

Tap on **Color** to open a pop-up menu for further settings:

- **Normal**: Color change will be normal.

- **Fine**: Color change will be fine.

- **Super Fine**: Color change will be very fine.

- **Set Default**: sets Color to its default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Routing

Determines the routing of the audio signal that comes from the oscillators.

- **Former -> Filter**: the audio signal first leads into the Digital Former section and from there into the Dual Analog Filter section.

- **Filter -> Former**: the audio signal first leads into the Dual Analog Filter section and from there into the Digital Former section.

- **Parallel**: the audio signal is routed in equal parts to the Digital Former section as well as into the Dual Analog Filter section. This enables simultaneous parallel processing.

Tap on **Routing** to open a pop-up menu for further settings:

- **Set Default**: sets Routing to its default *Filter -> Former* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Routing Display Page

To access the Routing display page press the FILTERS button. Tap **Routing** on the touchscreen to select the Routing display page.
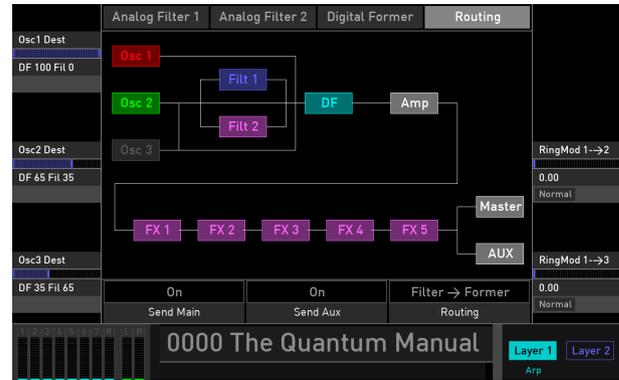
Here you will get a graphic overview of the Quantum's signal routing. You can also control the routing of the three oscillators, the ring modulators, and set up the audio outputs for the current sound.

The Graphic Routing Overview

The central area of the display shows the current audio signal path from the sound generation (Osc 1, 2, 3) through the Dual Analog Filters (Filt 1 and 2), the Digital Former section (DF), and the Amplifier (AMP), followed by the Effects section (FX 1 to 5). The audio signal finally leaves the Quantum via the Master output and/or AUX output.

The signal path changes when one of the following parameters are edited:

- **Osc 1, 2, 3**: the Osc block lights up in the color of the selected oscillator model when the corresponding **Osc Mix** parameter is turned up. An Osc block is moved to another signal position when the **Osc Dest** parameter is set to *VCA*. An Osc block shows another routing when the **Osc Dest** parameter is set to one of the *DF Filter* settings.

- Based on the setting of the **Routing** parameter, the Filter and DF blocks change their position within the graphic. If Digital Former **Type** is set to *Bypass*, the DF block is greyed out.

- Depending on the defined audio outputs, the FX5 output leads to **Master**, **AUX**, both outputs, or no outputs (you don't really want to use that setting, believe us).

Osc 1/2/3 Dest

Here you can determine the routing of the corresponding oscillator signal. The following routing options are available:

- **Main**: routes the signal to the full signal path (Dual Analog Filter, Digital Former, VCA) as determined with the **Routing** parameter on the Filter page.

- **VCA**: routes the signal directly to the VCA without passing both filter sections.

- **DF – Fil** settings: offers different signal relationship settings between the Digital Former section (**DF**) and the Dual Analog Filter section (**Fil**). If you want to send the signal, for example, through the Digital Former section by 30% and by 70% through the analog filter, select *DF 30 Fil 70* here. The routing also depends on the **Routing** parameter setting on the Filter page.

Tap on **Osc 1/2/3 Dest** to open a pop-up menu for further settings:

- **Set Default**: sets Osc 1/2/3 Dest to its default *Main* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: Activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

RingMod 1-->2, 1-->3

Controls the volume of the ring modulation between Osc 1 and 2 and Osc 1 and 3.

Tap on the corresponding **RingMod** to open a pop-up menu for further settings:

- **Normal**: RingMod volume change is about 0.4 dB.

- **Fine**: RingMod volume change is about 0.04 dB.

- **Super Fine**: RingMod volume change is about 0.004 dB.

- **Set Default**: sets RingMod volume to its default value of *0 dB.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Send Main

Determines, if the audio signal is sent to the Main Out jacks (*On*) or not (*Off*).

(!) The audio signal can be sent to both Outputs simultaneously, if desired.

Tap on **Send Main** to open a pop-up menu for further settings:

- **Set Default**: sets Send Main to its default *On* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Send Aux

Determines, if the audio signal is sent to the Aux Out jacks (*On*) or not (*Off*).

(!) The audio signal can be sent to both Outputs simultaneously, if desired.

Tap on **Send Aux** to open a pop-up menu for further settings:

- **Set Default**: sets Send Aux to its default *On* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Routing

Determines the routing of the audio signal that comes from the oscillators.

- **Former -> Filter**: the audio signal first leads into the Digital Former section and from there into the Dual Analog Filter section.

- **Filter -> Former**: the audio signal first leads into the Dual Analog Filter section and from there into the Digital Former section.

- **Parallel**: the audio signal is routed in equal parts to the Digital Former section as well as into the Dual Analog Filter section. This enables simultaneous parallel processing.

Tap on **Routing** to open a pop-up menu for further settings:

- **Set Default**: sets Routing to its default *Filter -> Former* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Envelopes Section
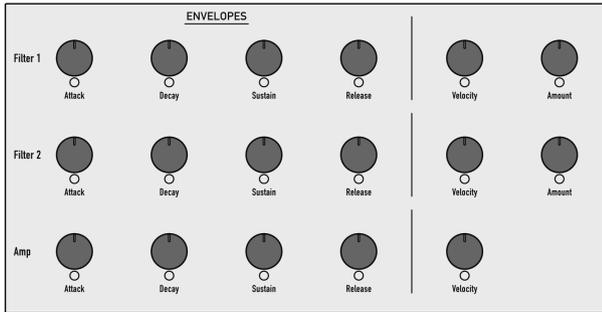
The Envelope Section with Filter 1+2 and Amp envelopes

Quantum's envelopes allow you to manipulate sound parameters via rate or timed modulations. Quantum offers six independent programmable envelopes for every sound program:

- Two Filter Envelopes. These envelopes are designed to control the Dual Analog Filter 1 and 2 but can also be used for other modulations.

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

- Three additional Free Envelopes. These envelopes can be used freely to perform additional modulations on any module.

> (!) Only the Filter 1 + 2 and Amplifier envelopes can be edited via the front panel parameter controls. All envelopes are completely accessible via the Envelopes display page.

Most traditional synthesizers feature ADSR envelopes. These envelopes are made up of four parameters that determine their response: Attack, Decay, Sustain, and Release.

The 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.

Envelope Panel Parameters

ⓘ The Panel parameter controls of the Filters envelopes and the amplifier envelope are almost identical.

Attack

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

Decay

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

Sustain

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

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.

Velocity

Determines the amount of influence the corresponding envelope has on the routed parameter – for example, cutoff frequency for the filter envelope, based on key velocity. This parameter works similarly to the **Amount** parameter with the difference that its intensity is velocity based. Use this feature to give a more expressive character to the sound. When you hit the keys smoothly only minimal modulation is applied. Hit them harder, the modulation amount increases likewise.

Amount (not for Amp Envelope)

Determines the amount of influence the corresponding envelope has on the modulated parameter – for example, cutoff frequency. For positive settings, the modulation is increased by of the envelope; for negative settings, it is decreased.

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

Envelopes Display Page

To access the Envelope display page, press the ENV button. Tap on the corresponding tab (**Amp**, **Filter 1**, **Filter 2**, **Free 1** to **3**) to select the desired envelope you want to edit.
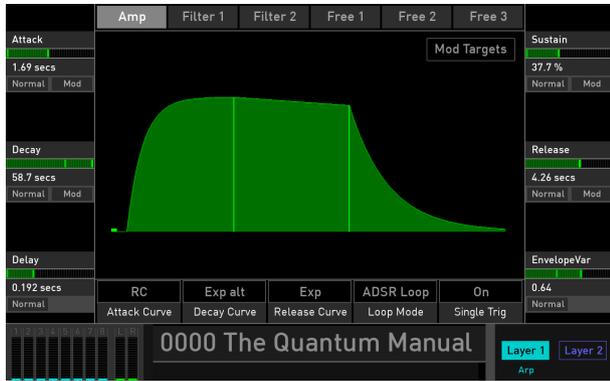
⚠ The display page parameters for every one of the six envelopes are similar.

Attack, Decay, Sustain, Release

See corresponding parameter in the 'Envelope Panel Parameters' chapter.

Tap on the corresponding parameter to open a pop-up menu for further settings:

• **Normal**: amount change will be normal.

• **Fine**: amount change will be fine.

• **Super Fine**: amount change will be very fine.

• **Set Default**: sets amount to its default setting.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Delay

Delays the start of the envelope by the selected time after a note trigger happens.

Tap on **Delay** to open a pop-up menu for further settings:

- **Normal**: Delay change will be normal.

- **Fine**: Delay change will be fine.

- **Super Fine**: Delay change will be very fine.

- **Set Default**: sets Delay to its default setting of *0 secs*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

EnvelopeVar

Creates an analog-like behaviour when a note is triggered. The higher the setting, the more the attack and decay envelope phases differ from their original values.

Tap on **EnvelopeVar** to open a pop-up menu for further settings:

- **Normal**: EnvelopeVar change is about 0.01.

- **Fine**: EnvelopeVar change is about 0.001.

- **Super Fine**: EnvelopeVar change is about 0.0001.

- **Set Default**: sets EnvelopeVar to its *0.35* default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Attack Curve

Sets the characteristic of the attack phase.

- **Exponential (Exp)** switches the attack phase to exponential.

- **RC** simulates an analogue circuit and delivers a convex attack envelope phase.

- **Linear (Lin)** switches the attack phase to linear.

Tap on **Attack Curve** to open a pop-up menu for further settings:

- **Set Default**: sets Attack Curve to its default *RC* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Decay Curve

Sets the characteristic of the decay phase.

- **Exponential (Exp)** switches the decay phase to exponential.

- **Alternate Exponential (Exp alt)** switches the decay phase to an alternative exponential curve.

- **Linear (Lin)** switches the decay phase to linear.

Tap on **Decay Curve** to open a pop-up menu for further settings:

- **Set Default**: sets Decay Curve to its *Exp* default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Release Curve

Sets the characteristic of the release phase.

- **Exponential (Exp)** switches the release phase to exponential.

- **Alternate Exponential (Exp alt)** switches the release phase to an alternative exponential curve.

- **Linear (Lin)** switches the release phase to linear.

Tap on **Release Curve** to open a pop-up menu for further settings:

- **Set Default**: sets Release Curve to its *Exp* default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Loop Mode

Sets one of the two available loop functions for the corresponding envelope:

- **AD Loop** repeats the **Attack** and **Sustain** phases while a note is held until it gets released and normal fade out starts. After releasing the note, **Release** phase of the envelope starts.

- **ADSR Loop** is identical to **AD**. As soon as the **Release** phase starts, the loop will go on.

Tap on **Loop Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Loop Mode to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Single Trigger

All envelopes offer a single trigger function. It works in Mono mode only, which can be activated with the **Mono** button:

- When set to **Off**, every note starts the envelope of its own voice; also works when playing legato.

- When set to **On**, the envelopes of all voices of a selected patch behave like a single envelope. This is the perfect setting for playing legato. The common envelope starts as soon as the first note is played. The sustain level remains until the last note is released. Afterwards the release phase is active.

Tap on **Single Trig** to open a pop-up menu for further settings:

- **Set Default**: sets Single Trigger to its *Off* default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mod Targets Button

Read more in the 'Modulation' chapter.

LFO Section

In addition to the main oscillators, Quantum is equipped with six low frequency oscillators (LFOs) that can be used for modulation purposes. Each LFO generates a periodic waveform with adjustable frequency and shape.
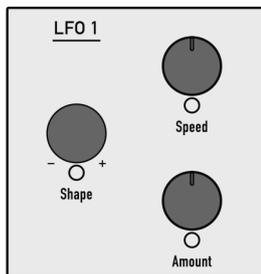
The LFO Section for LFO 1

⚠ The basic parameters of LFO1, LFO2, and LFO3 can be edited via the Panel parameter controls. LFO 4 through to 6 are completely accessible via the LFO display page.

⚠ Tap on the corresponding LFO waveform on the touchscreen display to modify the **Speed** and **Warp** parameters.

LFO 1 – 3 Panel Parameters

Shape

Sets the type of waveform generated by the corresponding LFO.

• The **Sine** shape is best suited for oscillator FM or pan modulations.

• The **Triangle** shape is perfect for smooth pitch, filter or volume modulations.

• The **Square** shape can be interesting for hard pan modulations or special effects.

• The **Saw (down)** shape can generate interesting filter or volume changes. It creates a falling sawtooth wave.

• The **Saw (up)** shape can generate interesting filter or volume changes. It creates a rising sawtooth wave.

• **S&H** (Sample & Hold) samples a random value and holds it until the next value is generated. If **Speed** is set to *0*, a random value is generated on each new note.

Speed

Determines the frequency of the corresponding LFO. At low values it might take four minutes for the LFO to per-

form a complete cycle while higher values are in the audible range.

When the LFO **Sync** parameter is set to *On*, you can adjust **Speed** in musical values. The lowest possible value is *1024* bars, meaning that a complete LFO cycle would need 1024 bars.

Amount

Determines the amount of the corresponding LFO modulation applied to all destinations. Since the modulation is in fact, a multiplication of the source signal and this parameter, the resulting amplitude depends on the type of modulation source you select.

LFO Display Page

To access the LFO display page, press the LFO button. Tap on the corresponding tab (**LFO1** to **6**) to select the desired LFO you want to edit.
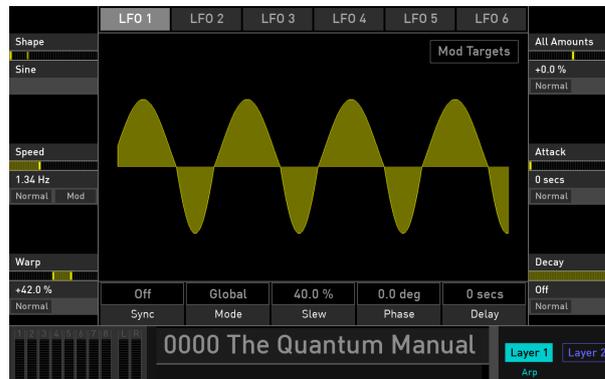
⚠ The display page parameters for every one of the six LFOs are similar.

Shape

See corresponding description in the 'LFO Panel Parameters' chapter.

Tap on **Shape** to open a pop-up menu for further settings:

- **Set Default**: sets Shape to its default *Sine* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Speed / Speed Ratio

See corresponding description in the 'LFO Panel Parameters' chapter.

Tap on **Speed** to open a pop-up menu for further settings:

- **Normal**: Speed change is about 2.8 Hz.

- **Fine**: Speed change is about 0.28 Hz.

- **Super Fine**: Speed change is about 0.028 Hz.

- **Set Default**: sets Speed to its default value of *6.25 Hz*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Warp

Depending on the selected LFO **Shape**, the **Warp** parameter folds the corresponding waveform. Here are the results for the different LFO waveforms:

- If **Sine** is selected, positive or negative values compress the upper or lower phase of the waveform.

- If **Triangle** is selected, higher values turn the wave into a rising sawtooth wave while lower values create a falling sawtooth wave.

- If **Square** is selected, Warp changes the pulsewidth of the waveform.

- If **Saw (down or up)** is selected, the waveform is folded. Settings below *0.00%* also reduce the LFO phase from bipolar to unipolar.

- If **S&H** (Sample & Hold) is selected, Warp shapes the edges of the held waveform and smooths it.

Tap on **Warp** to open a pop-up menu for further settings:

- **Normal**: Warp change is about 2.0 %.

- **Fine**: Warp change is about 0.2 %.

- **Super Fine**: Warp change is about 0.02 %.

- **Set Default**: sets Warp to its default value of *+0.0%*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

All Amounts

See corresponding description in the 'LFO Panel Parameters' chapter.

Tap on **All Amounts** to open a pop-up menu for further settings:

- **Normal**: All Amounts change is about 2.0 %.

- **Fine**: All Amounts change is about 0.2 %.

- **Super Fine**: All Amounts change is about 0.02 %.

Attack

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

Tap on **Attack** to open a pop-up menu for further settings:

- **Normal**: Attack change is normal.

- **Fine**: Attack change is fine.

- **Super Fine**: Attack change is super fine.

- **Set Default**: sets Attack to its default value of *0 secs.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Decay

Controls the speed with which the LFO is faded out. With this parameter you can create slowly falling modulations that might create interest when routed to pitch or volume.

Tap on **Decay** to open a pop-up menu for further settings:

- **Normal**: Decay change is normal.

- **Fine**: Decay change is fine.

- **Super Fine**: Decay change is super fine.

- **Set Default**: sets Decay to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Sync

When **Sync** is activated, the corresponding LFO is synced to the global Tempo of the Quantum (can be set with the **Bpm** parameter). The **Speed** setting (called **Speed Ratio** here) can be changed to offer musically meaningful values.

Tap on **Sync** to open a pop-up menu for further settings:

- **Set Default**: sets Sync to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mode

When set to *Global*, the LFO phases of all voices are synced so that they sound as one LFO. This can be interesting when the LFO is applied to modulate **Cutoff**. If set to *Poly*, every note triggers its own LFO.

Tap on **Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Mode to its default *Poly* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Slew

Determines the slew rate of the selected LFO waveform. The higher the setting, the smoother the slew rate. Higher settings also change the phase from a bipolar LFO wave-form to nearly unipolar.

Tap on **Slew** to open a pop-up menu for further settings:

- **Set Default**: sets Slew to its default value of *40.0%*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Phase

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

Tap on **Phase** to open a pop-up menu for further settings:

- **Set Default**: sets Phase to its default setting of *0.0 deg.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Delay

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

Tap on **Delay** to open a pop-up menu for further settings:

- **Set Default**: sets Delay to its default value of *0 secs..*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mod Targets Button

Read more in the 'Modulation' chapter.

Komplex Modulator Section

The Komplex Modulator could be described as a complex LFO with two different curves that can be mixed together, if desired. The output signal of this section can be used as modulation source to create morphing atmospheres, drones, and blurring sounds.
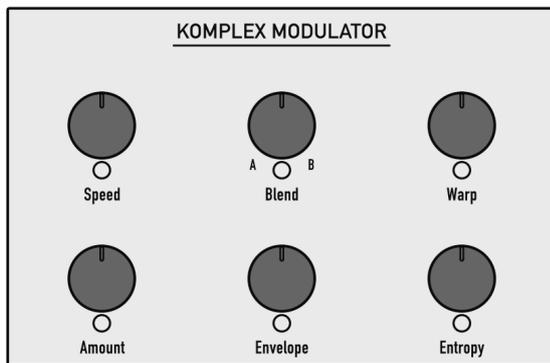
The Komplex Modulator Section

> (!) To hear result of the Komplex Modulator you should define it as a modulation source for a desired parameter like pitch, filter cutoff frequency, or any other parameter you like.

Komplex Modulator Panel Parameters

Speed

Determines the frequency of the Komplex Modulator waveform. At low values it might take four minutes to perform a complete cycle while higher values go up to the audible range.

When the Komplex Modulator **Sync** parameter is set to *On*, you can adjust the Speed in musical values. The lowest possible value is *1024* bars, meaning that a complete cycle would need 1024 bars.

Blend

Mixes the result of **Curve A** and **Curve B**. The leftmost setting (*A 100%*) only uses the signal from **Curve A** as modulation source while the rightmost setting (*B 100%*) only uses **Curve B**. Other settings morph **Curve A** into **Curve B**, and vice versa.

Warp

Depending on the created Komplex Modulator shape the **Warp** parameter folds the waveform. The result may look different, based on the initial waveform.

Amount

Determines the amount of the Komplex Modulator modulation applied to all destinations. Since the modulation is in fact, a multiplication of the source signal and this parameter, the resulting amplitude depends on the type of modulation source you select.

Envelope

Controls the speed with which the Komplex Modulator is faded in and out. With this parameter you can create slowly rising and falling modulations that might create interest when routed to pitch or volume.

Entropy

Determines how intensive a random noise signal has influence on the time axis. The higher the Entropy value, the more randomly the complete waveform seems to be in all cycles. The graphic display of the waveform may give an idea of what exactly is happening. Otherwise the result is far from accurate.

> (!) Further Komplex Modulator parameters can be found on the Mod display page.

Komplex Modulator Display Page

To access the Komplex Modulator display page for further parameters, press the MOD button. Tap on the **Komplex Modulator** tab to select the corresponding display page.

The Komplex Tab

Here you find parameters that are used for the overall Komplex Modulator signal.
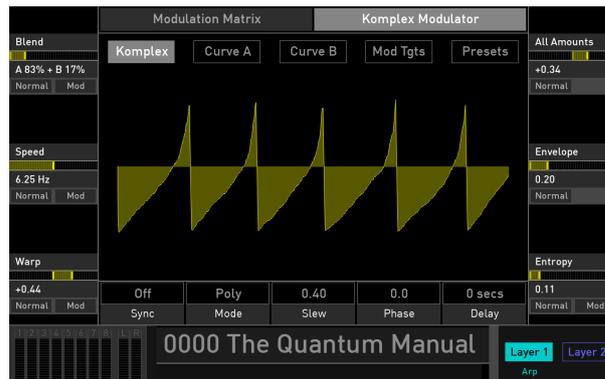
Blend

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **Blend** to open a pop-up menu for further settings:

- **Normal**: Blend change is about 1%.

- **Fine**: Blend change is about 0.1%.

- **Super Fine**: Blend change is about 0.01%.

- **Set Default**: sets Blend to its default value of *A 100%*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Speed

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **Speed** to open a pop-up menu for further settings:

- **Normal**: Speed change is about 0.01.

- **Fine**: Speed change is about 0.001.

- **Super Fine**: Speed change is about 0.0001.

- **Set Default**: sets Speed to its default *0.50* value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Warp

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **Warp** to open a pop-up menu for further settings:

- **Normal**: Warp change is about 0.02.

- **Fine**: Warp change is about 0.002.

- **Super Fine**: Warp change is about 0.0002.

- **Set Default**: sets Warp to its default value of *+0.0%*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

All Amounts

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **All Amounts** to open a pop-up menu for further settings:

- **Normal**: All Amounts change is about 2.0 %.

- **Fine**: All Amounts change is about 0.2 %.

- **Super Fine**: All Amounts change is about 0.02 %.

Envelope

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **Envelope** to open a pop-up menu for further settings:

- **Normal**: Envelope change is about 0.01.

- **Fine**: Envelope change is about 0.001.

- **Super Fine**: Envelope change is about 0.0001.

- **Set Default**: sets Envelope to its default value of *0.00*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Entropy

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **Entropy** to open a pop-up menu for further settings:

- **Normal**: Entropy change is about 0.1.

- **Fine**: Entropy change is about 0.01.

- **Super Fine**: Entropy change is about 0.001.

- **Set Default**: sets Entropy to its default value of *0.00*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Sync

When Sync is activated, the Komplex Modulator is synced to the global Tempo of the Quantum, which can be determined via the **Arpeggiator** or **Sequencer** pages. The **Speed** setting (called **Speed Ratio** here) changes to offer musically meaningful values.

Tap on **Sync** to open a pop-up menu for further settings:

- **Set Default**: sets Sync to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Mode

When set to *Global*, the Komplex Modulator phases of all voices are synced so that they sound as one Komplex Modulator. This can be interesting when the Komplex Modulator is applied to modulate **Cutoff**. If set to *Poly*, every note triggers its own Komplex Modulator. If set to *Envelope*, the Komplex Modulator acts as a free-form envelope. In this mode the graphic representation changes to a single envelope based on the settings made for **Curve A** and **B**.

Tap on **Mode** to open a pop-up menu for further settings:

- **Set Default**: sets Mode to its default *Poly* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Slew

Determines the slew rate of the created Komplex Modulator waveform. The higher the setting, the smoother the slew rate. Higher settings also change the phase from the bipolar Komplex Modulator waveform to nearly unipolar.

Tap on **Slew** to open a pop-up menu for further settings:

- **Set Default**: sets Slew to its default *0.40* value*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Phase

Controls the initial phase of the Komplex Modulator shape when a new note is started. *Free* means that the Komplex Modulator isn't restarted on a new note but runs freely while other values set the Komplex Modulator phase to the respective offset in degrees.

Tap on **Phase** to open a pop-up menu for further settings:

- **Set Default**: sets Phase to its default value of *0.0.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Delay

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

Tap on **Delay** to open a pop-up menu for further settings:

- **Set Default**: sets Delay to its default value of *0 secs.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

### The Mod Tgts (Modulation Targets) Button

Read more in the 'Modulation' chapter.

The Presets Button

Tap on the **Presets** button to open a pop-up window for loading, saving, and managing Komplex Modulator settings. For more information on the available options please refer to the **Presets** chapter in the Wavetable section.

The Curve A & B Tabs

Here you can edit the two curves A and B. Tap on the button **Curve A** or **Curve B** to open the corresponding edit page.
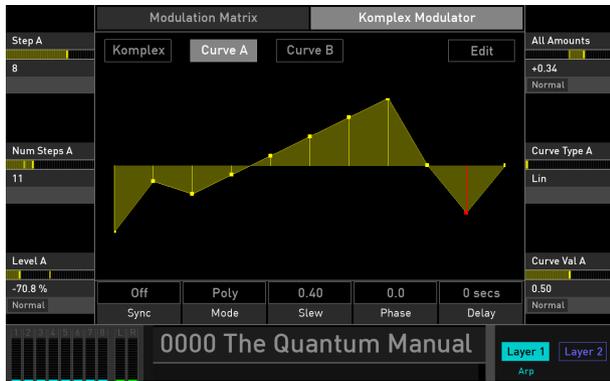
(!) Curve A and B use the same parameters for editing.

Editing Curves within the Curve Graphic

To edit a curve in the graphic display you can do the following:

- Tap on the corresponding step and move your finger up or down to change its level. The selected step is lit in red.

- You can also tap and hold a step and move your finger to the left or to the right to draw the level of the steps in one go.

- If you double tap above or below a step, the level jumps immediately to this position.

(!) For more precise editing of steps we recommend using the corresponding display page parameters.

Step A/B

Selects a desired step for further editing. The current selected step is lit in red.

Num Steps A/B

Determines the number of available steps. Here you can set up step numbers from a minimum of two through to a maximum of 32.

Tap on **Num Steps A** or **B** to open a pop-up menu for further settings:

- **Set Default**: sets Num Steps to its default value of *8*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Level A/B

Determines the level of the selected step.

Tap on **Level** to open a pop-up menu for further settings:

- **Normal**: Level change is about 2%.

- **Fine**: Level change is about 0.2%.

- **Super Fine**: Level change is about 0.02%.

- **Set Default**: sets Level to its default setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

All Amounts

See corresponding description in the 'Komplex Modulator Panel Parameters' chapter.

Tap on **All Amounts** to open a pop-up menu for further settings:

- **Normal**: All Amounts change is about 2.0 %.

- **Fine**: All Amounts change is about 0.2 %.

- **Super Fine**: All Amounts change is about 0.02 %.

Curve Type A/B

Selects the curve type that is used for the selected step. The following curve types are available:

- **Lin**: uses a linear curve.

- **Step**: uses a step that switches directly to the level of the next step.

- **Cos**: uses a cosine curve.

- **Saw**: uses a sawtooth-like curve that rises or falls to the next step. This depends on the step level.

- **Curve**: uses a curve characteristic that can be defined with the **Curve Type** parameter.

Tap on **Curve Type** to open a pop-up menu for further settings:

- **Set Default**: sets Curve Type to its default *Lin* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Curve Val A/B

If the **Curve Type** is set to *Curve*, you can shade the curve from exponential to linear to inverse exponential.

Tap on **Curve Val** to open a pop-up menu for further settings:

- **Normal**: Curve Val change is about 0.01.

- **Fine**: Curve Val change is about 0.001.

- **Super Fine**: Curve Val change is about 0.0001.

- **Set Default**: sets Curve Val to its default setting of *0.50*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

The Edit Button

Tap on the **Edit** button to open a pop-up window with additional tools for editing Curve A or B. This parameter does not affect the number of the steps.

- **Clear**: clears all steps and sets their levels to *0*.

- **All Steps**: sets all steps to the Step curve type.

- **All Lin**: sets all steps to the linear curve type.

- **All Saw**: sets all steps to the sawtooth curve type.

- **All Cos**: sets all steps to the cosine curve type.

- **All Curve**: sets all steps to the Curve type.

The Effects Section

Quantum offers five effect units with a bunch of different effect types. Two basic parameters of the first three effect units can be controlled via panel parameters while deeper editing is done on the Effect display page.
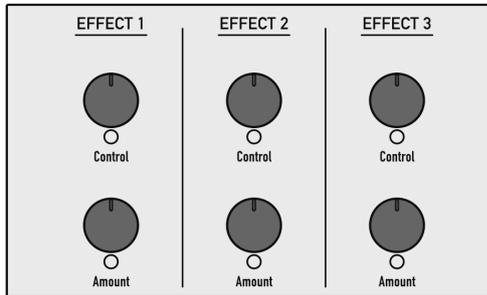
The Effects Section for effect 1, 2 and 3

⚠ Keep in mind that the five effect units provide insert effects with a serial routing. That means that the signal will first go through Effect 1, then through Effect 2 after that, and so on.

Effects Panel Parameters (for Effect 1 to 3)

Depending on the selected effect type, both dials offer different parameters.

Amount for Effect 1, 2, and 3

In most cases, this parameter controls the Dry/Wet mix for the selected effect type:

- For **Phaser**, **Chorus**, **Flanger**, **Delay**, **EQ** and **Drive**, **Amount** controls the **Dry/Wet** level of the signal.

- For the **Reverb** effect, **Amount** controls the reverb **Gain**.

- For the **Compressor**, **Amount** controls the **Threshold**.

Control for Effect 1, 2, and 3

Controls a basic parameter of the selected effect:

- When **Phaser** is selected, **Control** determines the **Speed** of the Phaser effect.

- When **Chorus** or **Flanger** is selected, **Control** sets the **Depth** of the corresponding effect.

- When **Delay** is selected, **Control** determines the **Feedback** of the delays.

- When **Reverb** is selected, **Control** determines the reverb **Time**.

- When the **EQ** is selected, **Control** sets the **Frequency Shifting** of the EQ frequencies.

- When **Drive** is selected, **Control** determines the **Amount** of the chosen drive type.

- When **Compressor** is selected, **Control** determines the **Ratio** of the compression.

Effects Display Page

To access the Effects display page for further effect parameter press the EFFECTS button. Tap on the corresponding **Effect** tab to select the desired effect unit you want to edit.

(!) The overall editing of the five effect units is similar. Depending on the selected effect type, different effect parameters are provided.

(!) Hint: most of the effect parameters can be modulated by any modulation source the Quantum offers.

How to select an effect?

1) Tap on the desired Effect tab (Effect 1 to 5) you wish to use.

2) Tap on the Effect pop-up menu below the Effect tab button. Hint: You can skip step 1, because opening an Effect pop-up menu jumps automatically to the corresponding Effect unit.

3) Select the desired effect from the effect list.

4) All effect types can only be used once. This means, for example, that if you have set up the Delay for Effect 2 and you also select the Delay for Effect 4, Effect 2 is set to *Off*. All parameter edits made will be adopted. This enables you to perform an insert swapping of effects.

5) After an effect is loaded it can be edited by using the display page parameters.

Common Effect Parameters

Every effect type offers an **Active** and a **Presets** button. Tap on it to activate its function:

- By tapping on **Active** the corresponding effect unit is set to bypass. No effect signal is generated. Tap on **Bypass** to unmute the effect again.

- Tap on **Presets** to open a pop-up window. Here you can load, save, and manage effect presets for the corresponding effect type. Here the following options are available:

  - On the left side you find a list of all presets for the current effect type. Tap on the desired name to select it and load it immediately. Already made effect settings will be overwritten.

  - With the **Save** option you can save the selected effect settings. You can also enter a desired name.

  - **Import** imports an effect preset from a connected SD card into the Quantum's Flash memory. The imported preset is shown within the effect preset list.

  - **Export** exports the current selected effect preset to a connected SD card.

  - **Delete** deletes the current selected effect preset after a security confirmation.

  - **Init** initializes the current selected effect preset to its default settings.

  - **Close** closes the pop-up window. No further action takes place.

The Effect Types of Quantum

Phaser

Phase shifting is a sweeping effect that was first popularized in the 1960s. It adds motion and a swirling character to the sound. It works by splitting the incoming signal, changing the phase of one side, and recombining it with the unaffected signal. This creates a notch-comb filter that can be swept through the frequency spectrum, causing the signature 'whooshing' sound of the phase shifter. The sweep is caused when the phase of the affected half is modulated by a LFO, with the frequency determined by the Speed control. Depth sets the amplitude for the action of the filtering, while Feedback amplifies certain harmonics.
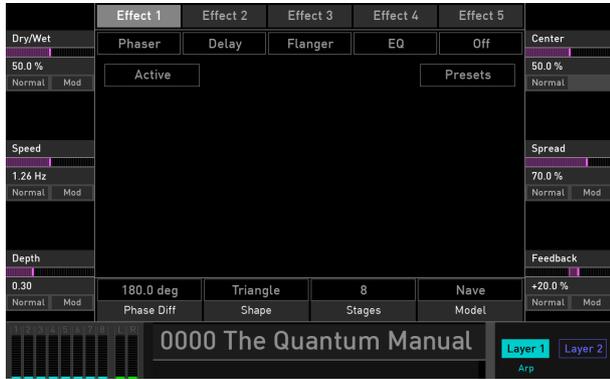
ⓘ For the typical Phaser effect sound the **Dry/Wet** parameter should be set to 50%.

Dry/Wet

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

Speed

Sets the LFO speed of the Phaser effect.

Depth

Sets the modulation depth of the Phaser effect.

Center

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

Spread

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

Feedback

Controls the feedback amount of the signal.

Phase Diff

Determines the start phase of the modulation waveform in degrees.

Shape

Determines the shape of the LFO waveform, which is used for the phaser modulation. You can select between a sine and a triangle waveform.

Stages

Determines the numbers of stages that are used for the Phaser effect. The Phaser offers five phaser types with either two, four, eight, 12, or 16 independent delay lines, where half of them are routed to the left input and output and the others to the right input and output.

Model

Determines the Phaser model that is used. You can select between the Phaser from Waldorf's *Nave* and *PPG Wave 3.V*.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Chorus

A Chorus effect is generated by using comb filters that generate slightly detuned copies of the input signal and mix it into the output signal. The result sounds like an ensemble of several simultaneous sounds, like a choir as opposed to a single voice – hence being called Chorus. The detuning is generated by an internal LFO that can be controlled in speed and depth.
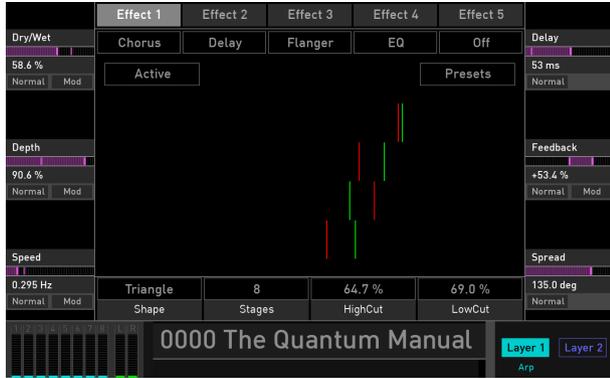
ⓘ For the typical Chorus effect sound the **Dry/Wet** parameter should be set to 50%.

Dry/Wet

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

Depth

Sets the modulation depth of the Chorus effect.

Speed

Sets the LFO speed of the Chorus effect.

Delay

Determines a delay for the chorus signal in milliseconds.

Feedback

Controls the feedback amount of the signal.

Spread

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

Shape

Determines the shape of the LFO waveform, which is used for the chorus modulation. You can select between a sine and a triangle waveform.

Stages

Determines the numbers of stages that are used for the Chorus effect. The Chorus offers four chorus types with either two, four, six, or eight independent delay lines, where half of them are routed to the left input and output and the others to the right input and output.

HighCut

Reduces the high frequencies of the chorus signal.

LowCut

Reduces the low frequencies of the chorus signal.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Flanger

The flanger effect is very similar to the chorus effect, but features feedback circuitry to feed the generated signal back into the comb filter. This generates a deeper detuning and colorizes the signal. With extreme settings you can hear a whistling sound which is very characteristic of a flanger effect.
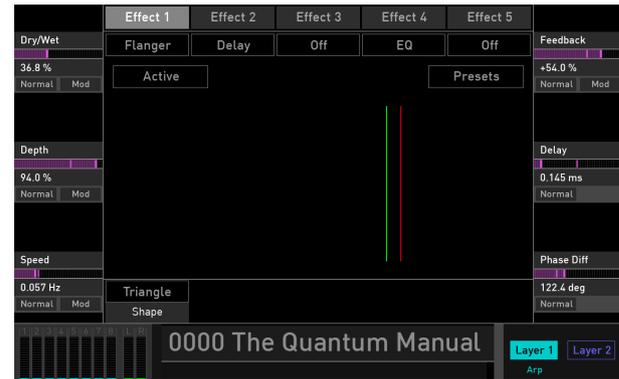
⚠ For the typical Flanger effect sound the **Dry/Wet** parameter should be set to 50%.

Dry/Wet

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

Depth

Sets the modulation depth of the Flanger effect.

Speed

Sets the LFO speed of the Flanger effect.

Feedback

Controls the feedback amount of the flanger-signal.

Delay

Determines a delay for the flanger signal in milliseconds.

Phase Diff

Determines the start phase of the modulation waveform in degrees.

Shape

Determines the shape of the LFO waveform, which is used for the flanger modulation. You can select between a sine and a triangle waveform.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Delay

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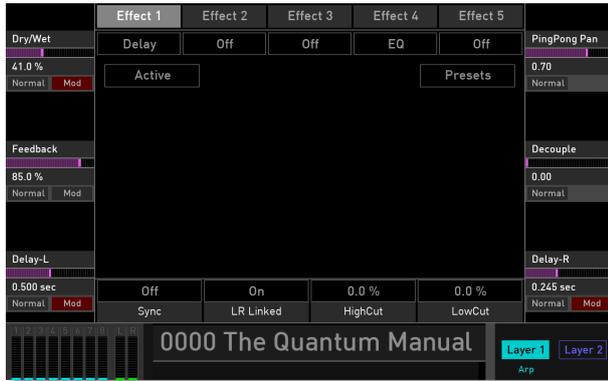
Dry/Wet

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

Feedback

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

Delay-L

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

PingPongPan

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

Decouple

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

Delay-R

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

Sync

Synchronizes the delay to the internal tempo of the Quantum. If activated, you can set up **Delay-L** and **Delay-R** in musical values.

LR Linked

If this parameter is set to on, both delay signals (Delay-L and Delay-R) work as one signal. **Delay-L** is used to set the delay length; **Delay-R** has no function.

HighCut

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

LowCut

Dampens the low frequencies produced by the Delay effect.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Reverb

The Reverb effect is probably the most widely used effect in music production. Quantum's reverb effect is an addition to the sound to make it more expressive with a three-dimensional feel.
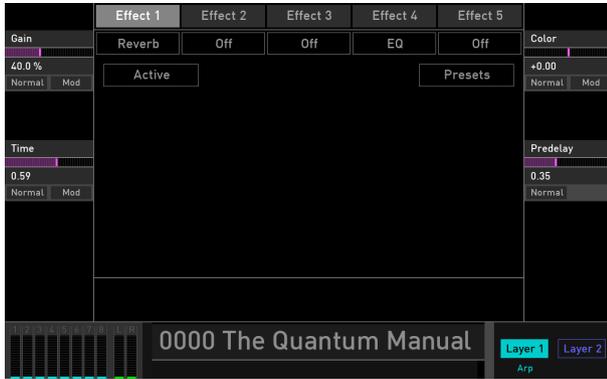
Gain

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

Time

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

Color

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

Predelay

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

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

• **Normal**: parameter change is about 1%.

• **Fine**: parameter change is about 0.1%.

• **Super Fine**: parameter change is about 0.01%.

• **Set Default**: sets the parameter to its default value.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

EQ (Equalizer)

Quantum offers a parametric equalizer to adjust the sound frequencies to your needs.
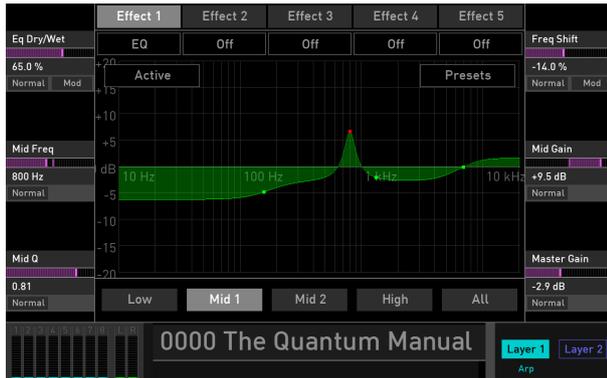
⚠ Tap on the corresponding EQ curve in the touch-screen display to edit the **Frequency** and **Gain** parameters.

The equalizer features four bands with the following parameters:

EQ Dry/Wet

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

Low Freq

Controls the cutoff frequency of the low band. This shelf filter type looks like a normal or an inverted 'S' and it sounds and works similar to a low filter with adjustable stop band attenuation or boost.

Low Gain

Controls the gain boost or cut of the low band.

Freq Shift

Frequency shifting moves each frequency in a signal by the set amount. This is different to pitch shifting. For example, set an EQ Mid band to 2000 Hz with a Gain of 10 dB; every frequency within the signal is shifted by the same amount so that the harmonic relationships within the signal are broken, resulting in a very different sound.

High Freq

Controls the cutoff frequency of the high band. This shelf filter type looks like a normal or an inverted 'S' and it works and sounds similar to a hi-pass filter with adjustable stop band attenuation or boost.

High Gain

Controls the gain boost or cut of the high band.

Mid Freq / Mid 2 Freq

Controls the center frequency of the corresponding band. This bell filter looks like a normal or inverted bell and works and sounds similar to a band pass or notch filter – again with variable boost or attenuation and also with variable width.

Mid Gain /Mid 2 Gain

Controls the gain boost or cut of the corresponding band.

Mid Q / Mid2 Q

Controls the quality or width of the corresponding band. Higher values result in a narrower band, lower values widen it.

Master Gain

Working with an equalizer mostly affects the level of the output signal. Use **Master Gain** to adjust the overall gain to suit your needs.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Drive

Adds gain to a signal causing it to clip and distort. It introduces new harmonics that add a harsh edge to sounds.
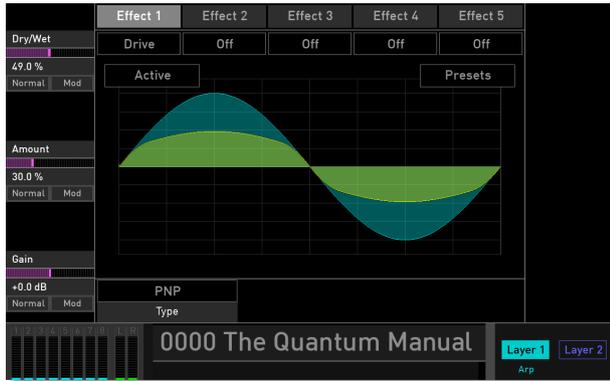
⚠ Tap on the drive curve in the touchscreen display to edit the **Amount** parameter.

Dry/Wet

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

Amount

Determines the amount of saturation that is added to the signal. If set to *0.00%*, no saturation will be added or, in other words, the signal will remain clean. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will bring in more and more distortion, suitable for harder lead sounds and effects.

Gain

Working with the drive effect mostly affects the level of the output signal. Use **Gain** to adjust the overall gain to your needs.

Type

Determines the character of the drive. The following drive curves are available:

- **PNP** generates a distortion based on a bipolar transistor.

- **Tube** simulates the asymmetric distortion of a tube circuit.

- **PickUp** simulates an electrostatic pickup. This drive type sounds very interesting, when the audio signal level is modulated.

- **Diode** generates a typical diode distortion.

- **Crunch** is a sinusoidal waveshaper. It generates FM-like sounds that can be extremely distorted.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Compressor

An Compressor reduces signals which exceed a certain **Threshold** level in volume by an adjustable **Ratio**. The speed of this level reduction is controlled by **Attack**, when the signal starts to exceed the threshold, and **Release**, when it drops below the threshold again.
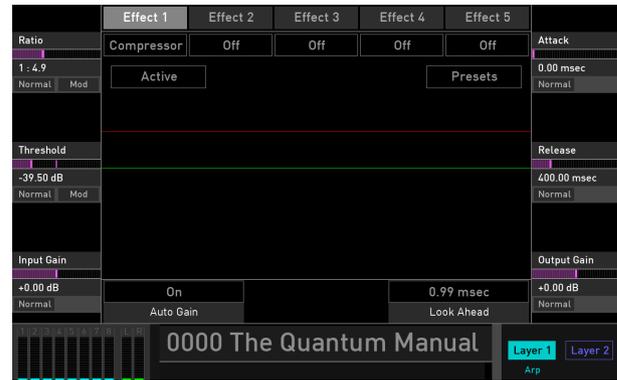
Ratio

Sets the amount of gain reduction (compression) applied to signals above the set threshold. A ratio of 4:1 means that for every 4 dB the input level increases, the output level increases by 1 dB.

Threshold

Determines to which signal level the compressor will be working. Only signal levels above threshold are processed.

Input Gain

Determines the input gain of the incoming audio signal.

Attack

Determines how fast the compressor responds to audio signals above the set **Threshold**. If the attack time is high, more of the transient parts of the signal passes through unprocessed.

Release

Sets the time after which the gain returns to its original level when the signal drops below the threshold.

Output Gain

Compensates for output gain loss caused by compression.

Auto Gain

Switch on the **Auto Gain** function for an automatic control of **Output Gain** when adjusting the **Threshold**.

Look Ahead

Higher **Look Ahead** values produce more accurate processing, but adds a certain amount of latency.

(!) Keep in mind, that the Compressor effect settings are stored with the current sound program. This is not valid for the **Compressor** knob in the **Output** section.

Tap on the corresponding effect parameter to open a pop-up menu for further settings (not all settings are available for all effect parameters):

- **Normal**: parameter change is about 1%.

- **Fine**: parameter change is about 0.1%.

- **Super Fine**: parameter change is about 0.01%.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Output Section

Compress

A 'one knob – one function' tool. Reduces the dynamic range of the audio signal. The signal seems to be louder and more assertive. The compressor effect is positioned after the effect units and before the **Master Volume**.

> ⓘ Keep in mind that the setting of the **Compress** knob is not saved within a sound preset.

Master Volume

Controls the overall output of the audio signal. **Master Volume** controls the **Main Outs**, the **Aux Outs** as well as the **Headphones Out**. Keep in mind that the headphones output contains an extra volume dial that works in addition to Main Volume.
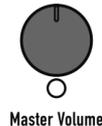
The Modulations of Quantum

Modulation can be described as a signal-generating unit's influence upon a sound parameter. The terms used in this context are 'Source' and 'Destination'. Quantum offers 40 independent modulation assignments (slots) each with individual settings of source, destination, and amount. The Modulation Matrix (Mod Matrix) is key to the power of every Waldorf synthesizer, so start experimenting with it *right now*.

> ⓘ A complete table of all available sources and destinations can be found in the Appendix.

Direct Panel Modulations

Quantum offers an easy way to determine modulation by using the dials on the panel. This modulation assignment can be called up in different ways:

- Press the **Mod** button

    or

- Tap on one of the display parameter names (the three parameters on the left and right side) to open a pop-up menu. Select the **Modulation** option. Keep in mind that not all parameters include this option.

The display shows the **Modulation Assignment** window. The basic concept is to select a modulation destination first (a parameter or function to be modulated), then select a modulation source (a function, such as an LFO or a wheel, that will modulate the destination) and finally determine the amount of modulation. This is also called modulation depth or intensity.

(!) If you have opened the Modulation Assignment window by clicking on a display parameter, the modulation destination is already defined by this parameter.

This is how the Modulation Assignment works:

1) If you have pressed the **Mod** button, first select a modulation destination by turning one of the parameter dials that are lit in blue. This step is not necessary if the **Modulation** option is selected in the pop-up menu of a display parameter.

2) Select the corresponding modulation source by either turning one of the available panel dial sources (the LED below any dials/sources is lit in yellow). By turning the dial you can directly set the desired modulation amount. This will be also shown in the display.

3) You can also select one of the six modulation sources in the display. Turn the corresponding dial (e.g. wheel) to select the desired modulation amount.

4) You can add other modulation assignments by repeating step 2. Any assignment will be shown in the display by its **Source**, its **Amount** and the **Destination**.

5) Amounts can be changed at any time by turning the corresponding modulation source dial.

(!) Keep in mind that you can set up positive or negative modulation amounts. Positive amounts will be shown as as green bar while negatives will be shown as a red bar. The same goes for the LEDs below the corresponding modulation source.

The Modulation Assignment window includes some more options:

• **Clear Selected** button: tap on the desired modulation entry to select it. Tap on the **Clear Selected** button to delete the selected modulation assignment.

• **Clear All** button: tap on this button to delete all modulation assignments that are shown in this list.

- **Go to Matrix** button: tap on this button to open the Modulation Matrix. Read more on this in the next chapter.

- **Close** button: closes the Modulation Assignment window. Already made modulation assignments will not be deleted.

Modulation Matrix Display Page

To access the Modulation Matrix display page press the MOD button. Tap on the **Modulation Matrix** tab on the touchscreen to select the display page.
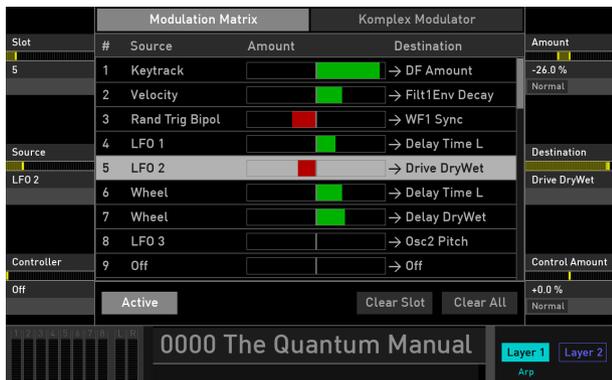
This page shows all modulation assignments in a list. You can set up to 40 assignments.

How to setup a modulation:

1) Select the desired slot by using the **Slot** dial or tap on the slot in the list. You can scroll the list up and down by tapping and holding on it, then moving your finger up or down.

2) Select the desired modulation source by using the **Source** dial. Within the Source list there are 43 sources.

3) Select the desired modulation destination by using the **Destination** dial. Within the Destination list there are 158 destinations.

4) Set the desired modulation amount by turning the **Amount** dial. You can set a positive or negative amount.

5) You can also add a **Controller** with a **Control Amount** to a modulation assignment. More on this below.

Slot

Selects the respective Modulation Slots 1 to 40.

Source

Defines the modulation source.

Tap on **Source** to open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Controller

All modulation sources can also be used as controllers for the selected **Source**. A controller is used to scale the output of the modulation source. A typical example is the Modulation wheel as source and a LFO as the controller. This allows you to control the intensity of the LFO modulation using the wheel.

Tap on **Controller** to open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Amount

Determines the amount of modulation applied to the destination. Since the modulation is, in fact, a multiplication of the source signal and this parameter, the resulting amplitude depends on the type of modulation source you select:

- For the so-called unipolar modulation sources the resulting amplitude lies within the range of $0...+1$ – if **Amount** is positive or $0...-1$ – if **Amount** is negative. These sources are: all envelopes; all MIDI controllers including Mod Wheel, Pedal, etc; Velocity; Release Velocity; Aftertouch (Pressure; and Polyphonic Pressure).

- For the so-called bipolar modulation sources the resulting amplitude lies within the range of $-1...0...+1$. These sources are: all LFOs, Keytrack, and Pitchbend.

Tap on **Amount** to open a pop-up menu for further settings:

- **Normal**: parameter change is about 2%.

- **Fine**: parameter change is about 0.2%.

- **Super Fine**: parameter change is about 0.02%.

- **Set Default**: sets the parameter to its default value of *+0.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Destination

Defines the modulation destination.

Tap on **Destination** to open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default *Off* setting.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Control Amount

Determines an additional amount for the selected **Controller**. **Amount** and **Control Amount** is summed up to the total amount.

Tap on **Control Amount** to open a pop-up menu for further settings:

- **Normal**: parameter change is about 2%.

- **Fine**: parameter change is about 0.2%.

- **Super Fine**: parameter change is about 0.02%.

- **Set Default**: sets the parameter to its default value of *+0.0%.*

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Active Button

Select a desired modulation entry. Tap on the **Active** button to disable the corresponding modulation assignment. The button is labeled 'Disabled' and the modulation slot is

greyed out. Use this to temporarily bypass a modulation. Tap on Disabled to activate the modulation again.

Clear Slot Button

Select a desired modulation entry. Tap on the **Clear Slot** button to delete this modulation assignment.

Clear All Button

Tap on this button to delete all modulation assignments that are shown in the modulation matrix. A confirmation to finish this process is necessary.

Modulation Matrix List

The matrix list shows all currently made modulations. If a **Controller** is selected, it will also be shown in the **Source** column. If a **Control Amount** is set, it will also be shown as a separate bar in the **Amount** column.

Additional Modes

Perform Mode Page

To access the Perform display page press the **Perform** button below the touchscreen display. To select the desired option tap on the corresponding tab in the upper display area.
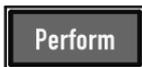
Favorites Tab

This is a special perform mode for live musicians. Here you can set up 20 sound programs per **Set** for faster selection. You can define up to six Sets, which means that you have fast access to 120 sound programs with just two taps.

⚠ You can also access the **Favorites** tab by pressing the selection dial. This is valid from every location except when in the Load display page.

Here is how it works.

1) Select the desired sound program by using the **Prev/Next** buttons or tapping on the sound name in the lower display section.
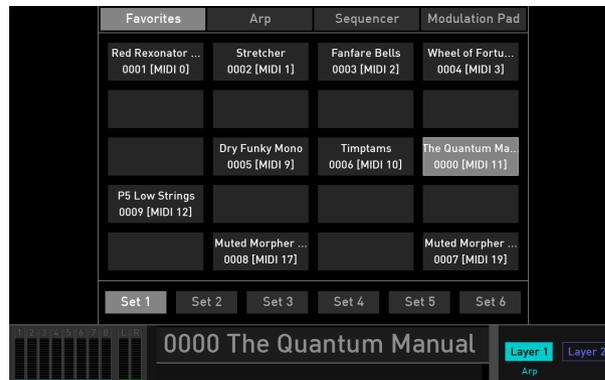
2) Tap and hold on one of the 20 blocks. After a little while a pop-up window will be shown. Here you can **Assign** the current sound program to the selected block. You can also **Clear** the selected block or **Cancel** any action.

3) Repeat steps 1 and 2 until you have filled the matrix with your favorite sound programs. You can tap on Set 1 to 6 to select a new favorite matrix.

4) To call up a favorite sound program just tap on the desired matrix block or use the **Selection** dial to scroll through the sound programs of the cur-

waldorf

rent Set. If you want to load a sound program, press the **Selection** dial.

5) One Set can contain only one sound program at any given time. This means that if you want to add the same sound program as previously added, the older one disappears when saving the new one to a desired location.

Arpeggiator (Arp) Tab

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

Click on the **Arp** button in the Wheel section to activate or deactivate the arpeggiator.

⚠ We recommend to press the **Chord** button instead of Latch. In **Latch** mode, all played notes are held until their key is pushed again.

⚠ The arpeggiator outputs MIDI notes in case the MIDI Out function on the **Global** menu page is enabled.

Bpm
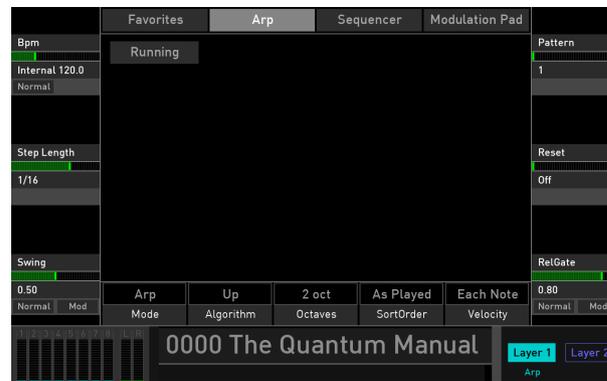
Sets the overall tempo for the Arpeggiator and the Sequencer in Bpm (beats per minute). This tempo also affects the functions that can be affected by tempo (e.g. LFOs, Komplex Modulator, Delay effect).

Step Length

Determines the rate at which notes are triggered – that is to say, the speed at which the arpeggio is running. In addition to the **Bpm** parameter this gives you further control over the playback speed. You can specify a value in frac-

tions of beats. For example, if **Step Length** is set to 1/8, the arpeggio plays eight notes per measure.

Swing

Determines how much the timing affects an arpeggio step. If **Swing** is set to *0.50,* the arpeggio is played back without any shuffled timing. Settings from *0.51* to *0.95* increase the shuffling of the notes and creates a typical swing. You can also use settings below *0.50* to influence the timing.

Pattern

With the pop-up menu **Pattern** you can select one of the 31 internal rhythm and accent patterns.

Reset

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

RelGate (Release Gate)

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

Mode

Quantum also offers a programmable Step Sequencer. This can be used as a luxury arpeggiator. Therefore, most of the parameters are shared by the Arpeggiator and the Sequencer. Here you can switch between the Arpeggiator mode, which uses the standard arp parameters, and Sequencer mode, where own patterns can be programmed. **Mode** is available on the Arpeggiator page and the Sequencer page.

Algorithm

Sets the direction that is used to play back the arpeggio. This parameter works in conjunction with **Octaves** and **Sort Order**:

• If *Up* is selected, the note list is played forward and the octaves are transposed upward. The arpeggio starts in the original octave and goes up to the highest octave (determined with **Octaves**). Then the arpeggio is repeated.

• If *Down* is selected, the note list is played backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octaves**) and goes down to the original octave. Then the arpeggio is repeated.

- If *Up ⌃ Down* is selected, the note list is first played forward and the octaves are transposed upward. After reaching the last note of the note list in the highest octave to play, the note list is played backward and the octaves are transposed downward down to the first note of the note list in the original octave. Then the arpeggio is repeated.

- If *Up − Down* is selected, the note list is first played forward and the octaves are transposed upward. After reaching the last note of the note list in the highest octave to play, this note is repeated and the note list is played backward and the octaves are transposed downward down to the first note of the note list in the original octave. Then the arpeggio is repeated.

- If *Down v Up* is selected, the note list is first played backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octaves**). After reaching the first note of the note list in the original octave, the note list is played forward and the octaves are transposed upward up to the last note of the note list in the highest octave to play. Then the arpeggio is repeated.

- If *Down − Up* is selected, the note list is first played backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octaves**). After reaching the first note of the note list in the original octave, this note is repeated and the note list is played forward and the octaves are transposed upward up to the last note of the note list in the highest octave to play. Then the arpeggio is repeated.

- If *Random* is selected, the note list will be played randomly.

Octaves

Determines the range of the single notes in octaves. When it is set to *1 oct*, the note list will be played back in the same octave as originally entered. Higher octave values mean that the note list is repeated in higher or lower octaves. The octave in which the arpeggio starts is determined by the **Algorithm** parameter. If you play notes that span more than one octave, they are still kept in the note list and played back before the note list is transposed.

SortOrder

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

- If *As Played* is selected, the notes are sorted in the exact order you played them.

- If *Reversed* is selected, the notes are sorted in reverse order to which you played them. If, for example, you press E1, G1 and C1, the note list is sorted to C1, G1, and E1.

- If *Key Lo->Hi* is selected, the notes are sorted from the lowest note to the highest note. If, for example, you press E1, G1 and C1, the note list is sorted to C1, E1, and G1.

- *Key Hi->Lo* is the opposite of *Key Lo->Hi*. The example would be sorted as G1, E1, and C1.

- If *Vel Lo->Hi* is selected, the notes are sorted from the softest to the loudest velocity.

- *Vel Hi->Lo* is the opposite of *Vel Lo->Hi*.

- If *Chord* is selected, the arpeggiator plays a chord based on all notes from the note list.

Velocity

With the settings in the pop-up menu **Velocity** you can determine how velocity is interpreted in the arpeggio:

- If *Each Note* is selected, each note of the arpeggio is played back with the velocity that you originally played.

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

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

Tap on the corresponding arpeggiator parameter to open a pop-up menu for further settings (not all settings are available for all arpeggiator parameters):

- **Normal**: parameter change is about normal.

- **Fine**: parameter change is about fine.

- **Super Fine**: parameter change is about super fine.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Sequencer Tab

This display page contains a programmable step sequencer, where you can use up to 32 steps per measure. For each step the note length, velocity, and pitch can be defined. You can also create four additional controller sequences that can be used as modulation sources.

⚠ The sequencer outputs MIDI notes in case the MIDI Out function on the **Global** menu page is enabled.
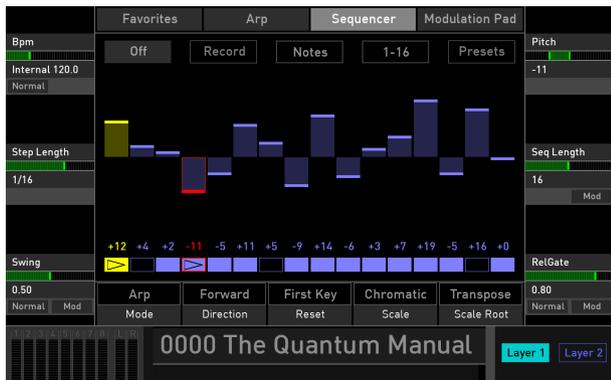
⊙ To start the sequencer playback, tap on the **Off** button (it switches to **Running**) and play one or more notes on the keyboard. You can also press the **Arp** button in the Wheel section to start the sequencer.

The Sequencer Graphic

The display gives you an overview of all steps of a sequence. You can edit this graphic directly by using the following tools:

- Each block in the center of the graphic represents a step. The number of blocks depends on the settings of the **Step Length** parameter. Up to 32 blocks/steps are possible. Tap on a step to select it (it lights up in red). Move your finger up and down to change the pitch of the selected step. Move your finger from left to right or vice versa to 'draw' a sequence.

- Below the graphic you find the same number of blocks. Each block represents a step. Tap on a desired block to mute the corresponding step. the same applies for un-muting. A selected block lights up in red and displays the current pitch (e.g. +3).

- For a more accurate editing of a selected step you can use the **Pitch** parameter.

- To get a better overview you can divide the graphic in steps overview from 1-16 and 17-32, if desired. Tap on the corresponding button above the graphic.

- Based on the selected step overview the blocks display pitch, velocity, gate (note length), or one of the four modulation parameters.

Bpm

Sets the overall tempo for the Sequencer and the Arpeggiator in Bpm (beats per minute). This tempo also affects the functions that can be affected by tempo (e.g. LFOs, Komplex Modulator, Delay effect).

Step Length

Determines the rate at which notes are triggered – that is to say, the speed at which the sequence is running. In addition to the **Bpm** parameter this gives you further control over the playback speed. You can specify a value in fractions of beats. For example, if **Step Length** is set to 1/8, the sequence plays eight notes per measure.

Swing

Determines how much the timing affects a sequence step. If **Swing** is set to *0.50,* the sequence is played back without any shuffled timing. Settings from *0.51* to *0.95* increase the shuffling of the notes and create a typical swing. You can also use settings below *0.50* to influence the timing.

Pitch/Velocity/Gate/Param 1 - 4

This parameter depends on the setting of the Notes button above the graphic. If **Notes** is selected, **Pitch** is shown and you can set the pitch for the selected step. If **Velo** is selected, you can edit the velocity for the selected step and so on.
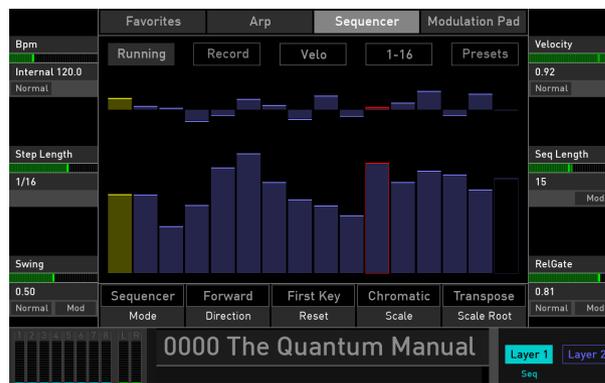
The Sequencer in Velocity mode

Seq Length

Determines the length of the step sequence. A sequence must contain a minimum of one step. You can set up to 32 steps.

RelGate (Release Gate)

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

Mode

Here you can switch between the Sequencer and the Arpeggiator mode. **Mode** is available on the Arpeggiator page and the Sequencer page.

Direction

Sets the direction that is used to play back the sequence:

• If *Forward* is selected, the notes are running from the first step to the last. Then the sequence is repeated.

• If *Backwards* is selected, the notes are running from the last step to the first. Then the sequence is repeated.

• If *Ping-Pong* is selected, the notes are running from the first step to the last, then back to the first note and so on.

• If *Forw-Back* is selected, the notes are running from the first step to the last. The last step is repeated and the sequence is running back to the first note, which also is repeated and so on.

• If *One-Shot* is selected, the notes are running from the first step to the last. Then the sequence stops.

Reset

Determines the behaviour of the Step sequencer when a new note is triggered:

• If *First Key* is selected, the sequence always starts from the beginning when a new note is triggered.

• If *No Reset* is selected, the sequence always runs, regardless of any new notes, that are triggered.

• If *Random* is selected, the sequence always starts from a random position, when a new note is triggered.

Scale

Opens a pop-up menu with numerous musical scales, e.g. *Chromatic*, *Major*, *Minor* or *Lydian dominant*.

Scale Root

Determines the tonic keynote for used scale.

Tap on the corresponding sequencer parameter to open a pop-up menu for further settings (not all settings are available for all sequencer parameters):

- **Normal**: parameter change is about normal.

- **Fine**: parameter change is about fine.

- **Super Fine**: parameter change is about super fine.

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the Mod menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

The Sequencer Buttons

Above the graphic you find four buttons for further settings.

Running/Off

Here you start or stop the sequencer playback. You can also use the Arp button in the Wheel section.

Record/Stop Record

Here you can start and stop the realtime recording function. It records a played note (pitch) for each step, one at a time.

1-32/1-16/17-32

Tap on this button to open a pop-up menu where you can switch between the graphic overview of the steps. You can display all steps (1-32), only steps 1-16, or only steps 17-32.

Presets

Tap on the **Presets** button to open a pop-up window for loading, saving, and managing Step sequences. For more information on the available options please refer to the **Presets** chapter in the Wavetable section.

Modulation Pad Tab

This page provides a X-Y pad, a two-dimensional controller based on two selected modulation parameters.
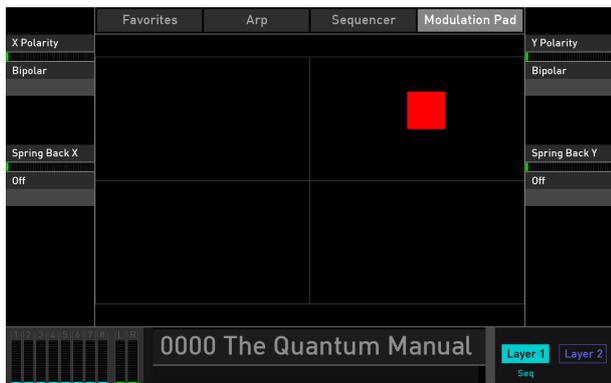
First you need to define the X and Y controller within the **Modulation Matrix**. You can, for example, easily set up a modulation for Cutoff (Pad X) and Resonance (Pad Y).

X/Y Polarity

Both controllers can be switched from *Bipolar* to *Unipolar*. For the so-called unipolar modulation sources the resul-ting amplitude lies within the range of 0...+1. For the so-called bipolar modulation sources the resulting amplitude lies within the range of -1...0...+1.

Spring Back X/Y

If set to *On*, the button jumps back in the middle of the pad, when you release your finger. If set to *Off*, the button stays in its last position.

Tap on the corresponding Modulation Pad parameter to open a pop-up menu for further settings:

• **Set Default**: Sets the parameter to its default value.

• **Set Last Loaded**: Resets the parameter to the last loaded value from the current sound patch.

• **MIDI Learn CC**: Activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

⚠ Keep in mind that the **Modulation Pad** tab opens automatically when the **Perform** button is pressed.

Layer Mode Page

To access the Layer mode page press the Layer button below the touchscreen display.

Here you can make settings regarding the two sound layers as well as the audio output routing. You will also find the display controls for the Unisono voices mode.

To select the desired mode tap on the corresponding tab (**Levels & Routing** or **Voices**).

Levels & Routing Tab

Quantum offers a dual sound mode which means that two different sounds can be played simultaneously either as layered or as split sounds.

To switch between Layer 1 and Layer 2 just tap on the corresponding **Layer** button in the lower right corner of the touchscreen display. The current selected **Layer** button lights up. Below the Layer buttons the current layer mode is displayed as well as the running state of the arpeggiator or the sequencer.

(!) Keep in mind that both sound layers will share the maximum polyphony of eight voices.

(!) Basic layer settings can also be made on the Voices tab display page.

Vol (Volume)

Here you determine the volume of the selected layer.

Tap on **Vol** to open a pop-up menu for further settings:

• **Normal**: Volume change with normal values.

• **Fine**: Volume change with fine values.

• **Super Fine**: Volume change with super fine values.

- **Set Default**: sets Volume to its default value of *0 dB*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Pan (Panning)

Here you determine the panning of the selected layer.

Tap on **Pan** to open a pop-up menu for further settings:

- **Normal**: panning change is about 2%.

- **Fine**: panning change is about 0.2%.

- **Super Fine**: panning change is about 0.02%.

- **Set Default**: sets panning to its default *Center* value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **Modulations**: opens the **Mod** menu to sets up a modulation for this parameter. How to set up a modulation can be read in 'The Modulation Mode' chapter.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Input Volume

Here you determine the input volume of an external audio signal for the selected layer. Use this parameter if you want to feed an external audio signal through the Quantum's signal path in **Live Granular** mode. Be careful with this setting because higher values could disturb the sound.

Tap on **Input Volume** to open a pop-up menu for further settings:

- **Normal**: Input Volume change with normal values.

- **Fine**: Input Volume change with fine values.

- **Super Fine**: Input Volume change with super fine values.

- **Set Default**: sets Input Volume to its default value of *–inf dB*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Amp Velo Amt. (Amplifier Velocity Amount)

Specifies how much volume will be affected by keyboard velocity. Use this feature to give more expression to the sound. With a setting of *0.0%* 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 with higher velocities. This is the most commonly used setting, which gives a piano-like character. With negative settings, the volume decreases at higher velocities. This gives an atypical character is suited for effect sounds. As this parameter always works in conjunction with the Amplifier Envelope it actually determines the envelope velocity amount.

Tap on **Amp Velo Amt.** to open a pop-up menu for further settings:

- **Normal**: Amp velocity amount changes with normal values.

- **Fine**: Amp velocity amount changes with fine values.

- **Super Fine**: Amp velocity amount changes with super fine values.

- **Set Default**: sets Amp velocity amount to its default value of *+0.0 %*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Gain

Here you determine the gain for an external signal. Make sure to adapt the overall level of an external audio signal by using **Input Volume** in conjunction with **Gain**.

Tap on **Gain** to open a pop-up menu for further settings:

- **Normal**: Gain changes with normal values.

- **Fine**: Gain changes with fine values.

- **Super Fine**: Gain changes with super fine values.

- **Set Default**: sets Gain to its default value of *+0.0 dB*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Input Routing

Here you can determine the signal flow for an incoming audio signal. Tap on **Input Routing** to open a pop-up menu with the following options:

- **Off**: an incoming signal is ignored.

- **Main Output**: an incoming audio signal is directly routed to the Quantum's Main Output.

- **Aux Output**: an incoming audio signal is directly routed to the Quantum's Aux Output.

- **FX Layer 1**: an incoming audio signal is directly routed into the Effect section of Layer 1.

- **Filter L1**: an incoming audio signal is directly routed into the Dual Analog Filter section of Layer 1.

- **Former L1**: an incoming audio signal is directly routed into the Digital Former section of Layer 1.

- **FX Layer 2**: an incoming audio signal is directly routed into the Effect section of Layer 2.

- **Filter L2**: an incoming audio signal is directly routed into the Dual Analog Filter section of Layer 2.

- **Former L2**: an incoming audio signal is directly routed into the Digital Former section of Layer 2.

(Global) Send Main

Determines if the currently selected Layer sound is sent to the Quantum's Main outputs (*On*) or not (*Off*). If the Output Routing on the Global -> Settings -> Audio display page is set to *Global*, this parameter globally assigns each layer to certain outputs independend of patch settings and keep this constant.

Send Aux

Determines if the currently selected Layer sound is sent to the Quantum's Aux outputs (*On*) or not (*Off*).

⚠ Keep in mind that you can route both layers to all outputs, if desired. You can also set up different audio outputs for each layer.

Voices Tab

Here you determine the layer mode and how many voices are triggered when a note is played.

Voices tab display page with active Unisono section

Timbre Mode

Quantum offers three different modes for the Sound layers:

- **Single**: both Sound layers have individual settings and cannot be played together. You can switch between two layers by tapping on the **Layer 1** or **Layer 2** button in the touch screen display.

- **Split**: Layer 1 and Layer 2 use a dedicated keyboard range for playing. A typical situation is that a bass sound is played in the lower range of the keyboard while a lead sound is played in the upper range. Use the **Voices** and **Min Key/Max Key** parameters of both Layers to set the desired keyboard ranges for the split sounds.

- **Layered**: both Sound layers are played simultaneously over the whole keyboard range. Use this option to combine two sounds, such as a pad sound and a poly lead.

Unisono Count

Here you determine the number off voices that are stacked when playing a note. This means that the selected number of voices are triggered when a note is played. Only the first voice has high priority, meaning that it can cut off other played notes. The other voices can only sound if any voices are free or if there are other unison voices with lower priority that could be cut off. This ensures that older notes play at least one voice as long as the voice allocation isn't forced to even steal this voice for a new note. You can select a maximum of eight voices.

Tap on **Count** to open a pop-up menu for further settings:

- **Set Default**: sets Count to its default value of *Off*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

⚠ Please note that the chosen number of Unisono voices will respectively lower the number of available voices.

⚠ The following parameters (Unisono Detune, Pan and Delay) are only available if **Unisono Count** is set to a voice value higher than 1.

Unisono Detune

Controls the detuning of the Unisono voices. Each voice is detuned differently; with **Detune** you control the overall amount.

Tap on **Detune** to open a pop-up menu for further settings:

- **Normal**: Detune changes with normal values.

- **Fine**: Detune changes with fine values.

- **Super Fine**: Detune changes with super fine values.

- **Set Default**: sets Detune to its default value of *0.20*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Unisono Pan

Controls the panning of the Unisono voices. Each voice is panned differently; with **Pan** you control the overall degree amount.

Tap on **Pan** to open a pop-up menu for further settings:

- **Normal**: Pan changes with normal values.

- **Fine**: Pan changes with fine values.

- **Super Fine**: Pan changes with super fine values.

- **Set Default**: sets Pan to its default value of *90 deg*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Unisono Delay

Controls the delay of the Unisono voices relating to the first played note. Each voice is delayed differently; with **Delay** you control the overall delay amount.

Tap on **Delay** to open a pop-up menu for further settings:

- **Normal**: Delay changes with normal values.

- **Fine**: Delay changes with fine values.

- **Super Fine**: Delay changes with super fine values.

- **Set Default**: sets Delay to its default value of *0.25*.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

> ⚠ The following parameters are only available if **Timbre Mode** is set to *Split*.

Voices (only for Split Mode)

Here you determine, how many voices the corresponding sound layer is able to play. Keep in mind that the Quantum offers an overall polyphony of eight voices. If you set Layer 1 to five voices, Layer 2 automatically switches to three voices, and vice versa.

Voices tab display page in Split Layer mode with activated Unisono voices

Min Key / Max Key (only for Split Mode)

Here you determine the keyboard range for the selected layer when in **Split** mode. The lowest setting is 0 (note C-2); the highest is 60 (note C8).

Tap on **Min Key** or **Max Key** to open a pop-up menu for further settings:

- **Set Default**: sets Min Key/Max Key to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

- **Set From Keys**: play a key on your keyboard to set the corresponding note.

Controller Mode (only for Split and Layered Mode)

Determines which layer will be affected by local Mod wheel, Pitch bend, Aftertouch and Modulation pad.

- **Both**: wheels and play controls affect both layers.

- **Layer 1 / Layer 2:** wheels and play controls affect Layer 1 or Layer 2.

- **Selected**: wheels and play controls affect the current selected layer.

Global Mode

To access the Global Mode page press the Global button below the touchscreen display. To select the desired function tap on the corresponding tab in the upper display area. On the next pages, we describe every Tab mode in detail.

Scope Tab

Here you can select a graphic representation of the current sound that is played. Tap on **Source**, **Type**, or **Mode** to open a pop-up menu with further settings.
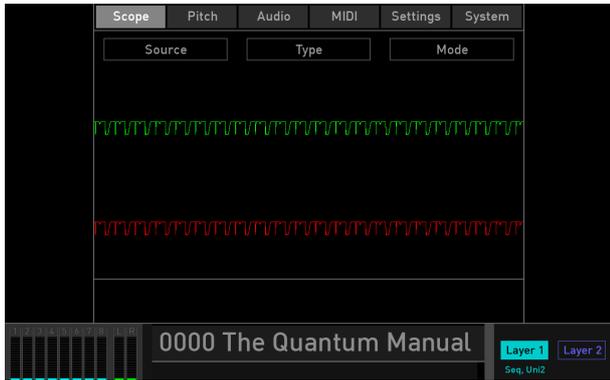
- **Source**: here you can determine the signal that is shown in the graphic representation. You can select single signals (as for Osc 1, 2 or 3) or the signal that passes a component of Quantum's signal flow (Filter, DigiFormer, VCA), a layer signal or the Input signal of the external audio input.

- **Type**: you can choose three types of graphic representation: *Scope* shows a realtime stereo wavemeter (see also **Mode**), *Analyzer (lin),* and *Analyzer (log)* shows a graphic analyzer of the frequency spectrum of the signal, either with a linear (lin) or a logarithmic (log) representation.

- **Mode/FFT Size**: depends on the selected **Type**. If *Scope* is selected, you can choose between *One Shot* (a momentary shot of the corresponding sound), *Pitch* (a continuous representation) and *Continuous* (a realtime wavemeter). If any other **Type** is chosen, it determines the block size of the FFT (Fast Fourier transformation) spectrum analyzer. Higher block sizes provide more resolution in the lower frequency range, but decrease time coherence (time precision) in the higher frequency range – the higher frequency information becomes over-averaged.

Pitch Tab

Here you can make settings relating to the overall tuning of the Quantum.
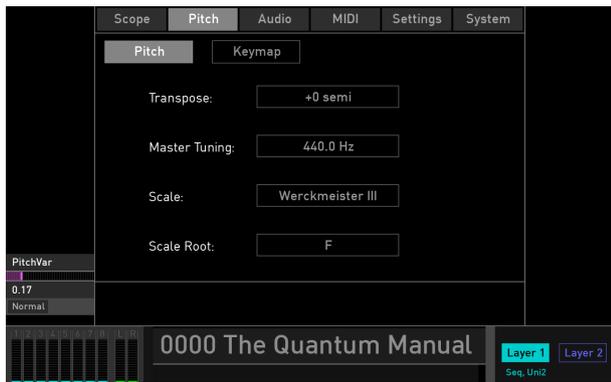
The **PitchVar** parameter (on the left display section) is global to all oscillators of all voices. It represents the **PitchVar** parameter that also can be found on the bottom of the Oscillator Control display page.

Pitch Button

- **Transpose**: Allows a global pitch transposition for the tone generator. Played notes are shifted by the number of semitones.

- **Master Tuning**: Determines the Quantum's overall pitch in Hertz. The value specified here is the reference pitch for MIDI note A3. The default setting is 440 Hz, which is commonly used by most instruments.

- **Scale**: Opens a pop-up menu for a wide-ranging selection of musical scales – *chromatic*, *major*, *minor*, or *lydian dominant*, for example. You can also choose User 1 - 8 for selecting a user definable tuning. In this case, an additional **Edit Tuning** button is available.

- **Scale Root**: Determines the tonic keynote for the selected scale. This parameter is not available for the User scales.

Edit Tuning Button

If a User scale is selected with the Scale option, you can create an equal tuning from scratch by giving number of steps and repeating interval (like 1200 cents for an octave or anything else).

The following options are available in the User Tuning window:

- **New** adds a new tuning table with definable **Steps** and **Repeat Intervals**.

- **Insert** adds a new tuning step after the current one.

- **Delete** removes the current tuning step.

- Use the **Step** dial to select the desired Step for editing.

- Use the **Step Type** dial to edit individual steps by specifying **Interva**l in cents **From Root**, from previous Step or by numeric **Ratio** like 5/4 (with Numerator/Denominator). **Skip** certain keys to distribute scale notes over keyboard to be more playable.

- Tune individual steps by holding a note and then turn interval encoder.

- The **Import/Export** option allows to load/save a User Tuning table from and to Quantum´s SD card.

- Tab on **Pitch** to return to the regular Pitch page.

- If a User table is selected, it can be renamed, copied and pasted by using the corresponding buttons.

(!) You can also import Tuning tables that are made with the free software application Scala by Huygens-Fokker Foundation (http://www.huygens-fokker.org/scala). Tap on **Import Tuning** to import a Scala (*.scl) file from a connected SD card.

Tap on **Keymap** to display the current tuning settings for each note by MIDI pitch and its interval. Use the **MIDI Note** dial to scroll through the Tuning list. By tapping **Pitch** you can close this window.

Audio Tab

Here you find a simple and easy-to-use Audio Recorder to record any audio signal from the Audio Input or the Outputs into the Quantum's Flash memory.
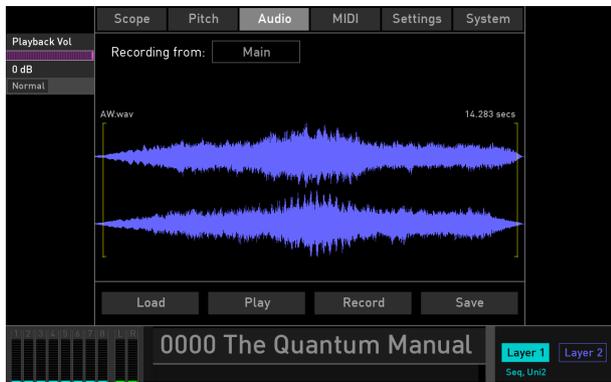
Here is how to proceed:

1) Tap on the button right beside the **Recording from** label to select the desired input signal. You can either record an external audio signal (**Input**) or the output signal of Quantums **Main** or **Aux** outs. In the latter case, no further signal

connection is necessary since the signal is recorded internally without any loss.

2) Tap on **Record** to start the recording process.

3) Tap on **Stop** to end the recording process.

4) Tap on **Play** to playback your recording. Use the **Playback Vol** parameter to control the playback volume.

5) If you want to save your recording in the Quantum's Flash memory, tap in **Save** to open the Save Audio file window.

6) You can also search the internal Flash memory by tapping on **Load**. Here you can import an audio file from the Flash memory or a connected SD card.

MIDI Tab

Here you can make further settings relating to the MIDI inputs and outputs as well as for the synchronisation. You can also manage the MIDI Controller Learn settings. Tap on the desired button to open the corresponding setting window.
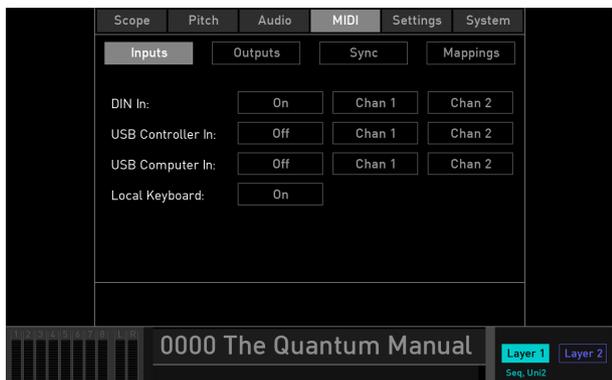
Inputs

Here you can make settings regarding the MIDI inputs (DIN In, USB Controller In, USB Computer In):

- **State**: Tap on the first state button to switch the corresponding MIDI In port on or off.

- **Layer 1/2 Input Channel**: Tap on the corresponding button to open a pop-up menu. Here you can select the desired MIDI channel on which Layer 1 and Layer 2 reacts.

- **Local Keyboard**: Determines whether incoming MIDI messages are received (*On*) or ignored (*Off*) by the keyboard.

Outputs

Here you can make settings relating to the MIDI outputs (DIN Out, USB Controller Out, USB Computer Out).

- **State**: Tap on this button to switch the corresponding MIDI Out on or off. keep in mind that Arp & Step Sequencer will send MIDI notes for enabled MIDI outputs

- **Send CC Mappings**: Here you can activate all mapped MIDI Control Change (MIDI CC) data being sent out for the panel pots, buttons, and encoder.

⚠ If you have MIDI Controller routed in both directions, you could use your DAW automation function to easily control Quantum.

Sync

Determines how the Quantum reacts to incoming MIDI Clock messages.

Tap on **Sync Source**, to determine the sync behaviour:

- *Internal* means that the Quantum doesn't react to incoming MIDI Clock, nor does it send MIDI Clock. The Quantum only syncs to its own tempo base that is set by **Bpm**. This parameter can be also found on the Arpeggiator/Sequencer page.

- *External* means that the Quantum automatically syncs to incoming MIDI Clock if it is sent by an external device like a sequencer or drum machine.

Tap on **Snap to Downbeat**, to activate (*On*) or deactivate (*Off*) the external synchronisation to the downbeat.

> Pressing the **Global** and **Layer** buttons together toggles between Internal and External sync mode.

Mappings

Opens a page with all mapped MIDI Control Change data. This page gives you an overview of all used MIDI mappings. You can also change or set up settings.

Use the MIDI CC parameter dial or your finger to scroll through the list and select a desired MIDI CC.

Below the list there are a few more buttons regarding the MIDI CC editing:

- **Set:** Tap on set to open a page for set up a desired MIDI CC connection to any panel parameter dial, potentiometer, or button. Follow the instructions on the touchscreen display.

- **Clear:** Deletes the current selected MIDI Controller mapping.

- **Clear All:** Deletes all MIDI Controller mappings after a confirmation.

- **Used/All:** Switches between used MIDI Controller mappings and the complete list representation.

- **Load:** Loads a MIDI Controller mapping from the Flash memory. Current MIDI Controller mappings will be overwritten.

- **Save:** Saves the current MIDI Controller mapping to the Quantum's Flash memory.

Settings Tab

Here you can make general settings relating to the dials, the display, and further options.

Settings display with selected Colors page

General Page

- **Load at Startup**: determines, which sound program the Quantum should load after starting up the machine: you can choose between the *Last Loaded* preset, an *Init Sound* program, and *Patch 0* (sound program number 0000).

- **Display Brightness**: controls the brightness of the touchscreen display from 0 to 100%.

- **LED Brightness**: controls the brightness of all LEDs from 0 to 100%.

Edit Page

- **Pot Mode**: Tap on this button to select the behaviour of the potentiometers (not the endless dials). *Immediate* means that a parameter value will jump immediately to the corresponding dial position. *Pick-Up* means that you have to turn the dial until it reaches the current parameter value. If reached, the value is changed. *Catch* works almost the same as Pick-Up, but the current value moves while turning – if the dial position matches the value.

- **Touch Mode**: Controls the behaviour of value changes with the touch display, especially when editing sliders and faders. *Direct* means that the value jumps directly to the value that is tapped on, while *Relative* means that a value must be picked up before changing.

- **Switch Screens**: here you can determine whether the touchscreen display should automatically open the corresponding parameter page when editing any sound parameter in any panel section (*At Edit*) or not (*Off*).

- **Edit Popup Time**: here you can determine how long a popup window/menu will be shown in the touchscreen display. The default setting is *2.0 sec*.

Audio Page

Output Routing allows a *Global* override of the Main/Aux output settings for patches. In Layer view, it will be noted by **Global Send Main** if global override is active. By this you can globally assign each layer to certain outputs independend of patch settings and keep this constant. The default setting is *Patch*.

Colors Page

Here you can switch on/off the backlight LEDs for all buttons and determine a personal color scheme.

- **Button Backlight**: here you can switch on/off the backlight LEDs for all buttons. We recommend switching it on when the ambient light is dark.

- **Custom Section Color List**: here you can define a custom LED color for every parameter section, for example, the LFOs or the Resonator. Select the corresponding section with the **Item** parameter or by tapping on the touchscreen and choose the desired LED color with the **Color** parameter. You can **Save** and **Load** co-

lor setups or **Reset** the complete list to its default setting.

System Tab

This page gives you information on the current operating system and your serial number (UID) as well as the unit´s running time. Here you can also update the operating system software and calibrate the Quantum keyboard, analog filters and wheels.
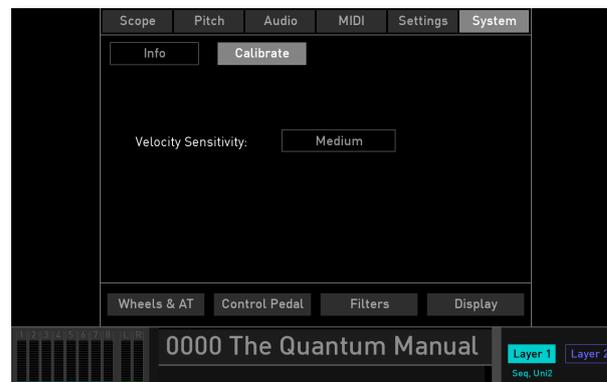
- **Info Tab**: tap on this button to open the Info display page. Here you are able to update the operating system

software (**Update**). Read more in the next section. You can also use the **Flash Panel** button to update the panel. Tap on **Support Log** to save a log file onto a connected SD card in case you need support or service for your Quantum.

- **Calibrate Tab**: tap on this button to open the Calibration display page. Here you can calibrate the keyboard, the wheels (**Wheels & AT**), connected pedals (**Control Pedal**) and the analog filters (**Filters**). Please follow the onscreen instructions. You can also determine the **Velocity Sensitivity** for the Quantum keyboard from *Soft* to *Hard*. The basic setting is *Medium*. Tap on **Display** to adjust the display horizontally and vertically.

How to update the Quantum operating system

Quantum has a service-friendly feature that makes it possible to update the system software without changing any parts.

All software updates come in the form of a .bin file that can be copied on every FAT file formatted SD card. The fastest way to get this file is by downloading it from our web site at:

http://www.waldorfmusic.com/quantum

Please make sure to download the following files:

- quantum.update.bin

If downloaded onto your computer hard disk, please proceed as follows:

1) Connect a suitable SD card (formatted with FAT or FAT32 file system) to your computer.

2) Copy the quantum.update.bin file to the SD card and move it into the top folder (if necessary).

3) Insert the SD card into the Quantum's SD card slot.

4) Tap on the **Update** button on the **System** tab page (**Info** tab).

5) Follow the onscreen instruction.

6) Wait until the operation is completed. If updating was successful, Quantum will perform a system reset and start up.

⚠ Do not under any circumstances turn off the Quantum while the update step is in progress. A complete loss of data may occur and it will be impossible for you to make your machine work again!

Loading & Editing Samples

As you may know, Quantum can play back samples via the Particle generator or as an exciter for the Resonator.

Out of the box Quantum is delivered with a bunch of audio samples, but you can also use your own samples to create interesting sounds.

(!) Quantum is capable of loading WAV and AIFF/AIFC samples with bit rates from 8 to 32 (including floating point format) and all sample rates. We recommend using 44.1 kHz as the sample rate, otherwise you have to use the Pitch parameter to set the sample pitch accordingly. Sample loops are also recognized by Quantum.

(!) Stereo samples are supported, but you can also use mono samples and multichannel files. In the latter case, only channels 1 and 2 are used.

There are three ways to load/import samples for further usage:

- **Factory samples**: you can load and edit all of the factory samples. This is the easiest way to start exploring the sample capabilities of your Quantum.

- **Import own audio samples**: you can import your own samples from a connected SD card and load them in the Quantum's Flash memory. Here the samples are stored permanently and can be used for loading and further editing.

- **Record own audio samples**: you can use the Audio Recorder on the Global page to record samples via the external audio input or they can be resampled via the Main/Aux outputs. Recordings are stored in Quantum's Flash memory. Here they can be used for loading and further editing.

You can use samples within Quantum with the following oscillator modes:

- **Particle Generator**: one or more samples can be used for normal or for granular playback. Read more about the Particle Generator on page 43. To use a sample, simply tap on the **Particles** button within the Particle Generator display page. The **Sample** display page opens.

- **Resonator:** one ore more samples can be used as an exciter for the Resonator. Read more about the Resonator on page 54. To use a sample, simply tap on the **Resonator** button within the Resonator display page. The **Sample** display page opens.

The Sample Display Page

Here you can load, manage, and edit your sample(s). To close the Sample display page, simply tap on the **Samples** button.
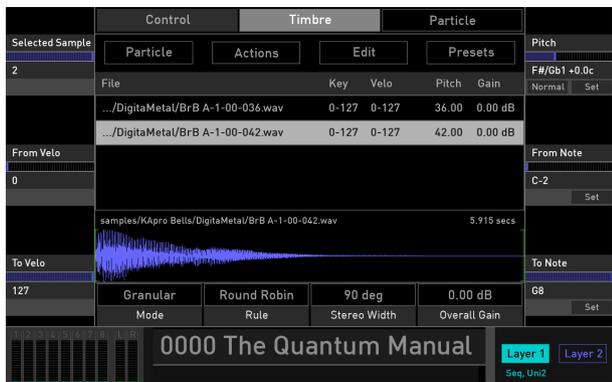
> ⓘ To edit the following parameters we recommend loading a sample. For more information please refer to 'The Actions Tab' chapter.

The Display Representation

If one sample is loaded, the central display shows a graphic waveform representation of this sample. If more than one sample is loaded, the display also shows a sample file list. The currently selected sample is highlighted.

Selected Sample

If more than one sample is loaded, you can use this parameter to select the desired sample for further editing. You can also tap on the desired sample file in the display list to select it.

> ⓘ Read more about adding samples later in this chapter.

From Velo / To Velo

Here you determine the velocity range of the currently selected sample. You can set up a minimum velocity for triggering (**From Velo**) and a maximum velocity value (**To Velo**) so the incoming velocity determines which sample is played. Use this function to create stacked samples that react on different velocities.

Pitch

Determines the pitch of the currently selected sample. Use this parameter to tune samples that don't match up with your desired tone pitch.

Tap on **Pitch** to open a pop-up menu for further settings:

• **Normal**: Pitch change is about 10.0 cents.

• **Fine**: Cutoff change is about 1.0 cents

• **Super Fine**: Cutoff change is about 0.1 cents.

• **Set From Keys**: play a key on your keyboard to set the corresponding pitch.

From Note / To Note

Here you determine the keyboard range of the currently selected sample. You can set up a minimum key (**From Note**) and a maximum key (**To Note**). Use this function to create multi-samples where every sample has its own playback range.

Tap on **From Note** or **To Note** to open a pop-up menu for further settings:

• **Set From Keys**: play a key on your keyboard to set the corresponding note.

Mode (only available for Particle Generator)

Determines the playback mode of all loaded samples.

• **Normal**: plays back the loaded sample(s) in a regular way. If only one sample is loaded, it will mapped automatically over the complete keyboard. This also affects the original pitch and length. When this mode is selected, some parameters of the Particle Generator are not available.

• **Granular**: uses the Quantum Particle engine for granular playback.

• **Live Granular**: uses Quantum's Audio Input for a live granular transformation. Make sure to set up the audio input on the **Layer** page (Input Volume, Input Routing).

Tap on **Mode** open a pop-up menu for further settings:

• **Set Default**: sets the parameter to its default value.

• **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

• **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Rule (only available for Particle Generator)

Determines the playback rule if more than one sample is loaded.

- **Round Robin**: the samples are played repeatedly one after the other from the top of the sample list to the end, and so on.

- **Reverse Robin**: the samples are played repeatedly one after the other from the end of the sample list to the top and so on.

- **Ping Pong**: the samples are played repeatedly one after the other from the top of the sample list to the end and backwards.

- **Random Robin**: the samples are played repeatedly one after the other in a random way. No sample is played twice.

- **Random**: the samples are played repeatedly one after the other, in a random way. Samples can be played twice or more.

Tap on **Rule** open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Stereo Width (only available for Particle Generator)

The Quantum is able to playback mono and stereo sample files. Sometimes stereo samples have a stereo width that doesn't fit with your needs. Use **Stereo Width** to adapt the stereo width of all samples as desired.

Tap on **Stereo Width** open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Overall Gain (only available for Particle Generator)

Determines the overall gain of all loaded samples. If you want to change the gain of a single sample, please use the **Sample Gain** option on the **Edit** page.

Tap on **Overall Gain** open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

The Action Button

Here you load and manage your samples. Tap on this button to open a pop-up menu with further options:

- **Add**: opens the Add Samples window. Here you have full access to all the samples in Quantum's Flash memory. Here you can select a sample by tapping through the directories. By tapping the corresponding button below the window you can perform further options:

- **New Dir**: creates a new directory folder. The directory path depends on the selected row. You need to name the new folder.

- **Delete**: deletes the selected folder/sample after a confirmation.

- **Rename**: renames the selected folder/sample.

- **Move**: moves the selected sample/folder. If performed, the folder/sample is copied into a clipboard. Use Insert to move it to the desired location.

- **Play**: plays back the selected sample.

- **Cancel**: closes the Add Sample windows. No further action is taken.

- **Add**: finally adds the selected sample to the Particle Generator or the Resonator.
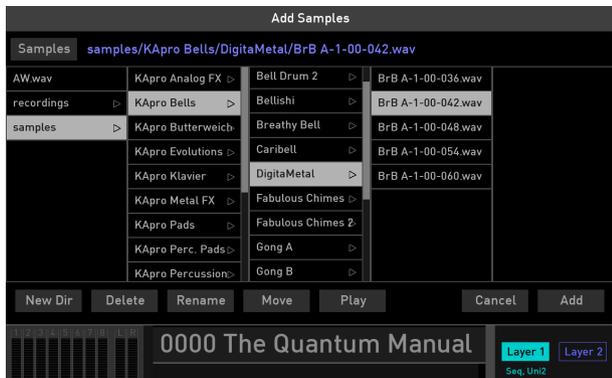
The Add Samples window

- **Remove**: removes the selected sample from the list.

- **Auto-Map**: if more than one sample is loaded, **Auto-Map** maps the samples over the keyboard. This means that the keyboard range (**From Note** and **To Note**) is set automatically.

- **Load Map**: loads a Map from the Flash memory.

- **Save Map**: samples and their settings can be saved as a Map. Tap on **Save Map** to perform the storing process.

- **Clear Map**: deletes all samples and their settings.

- **Import**: imports a sample from a connected SD card into the Quantum's Flash memory. If imported, the sample can be loaded by using the **Add** function.

- **Reload**: if one or more samples don't work properly, the **Reload** function can be helpful to load it again.

The Edit Button

Tap on the Edit button to enter the Sample Edit mode. The display representation changes in some partitions. In Sample Edit mode you can perform further editing at the sample start and end, as well as loop settings.
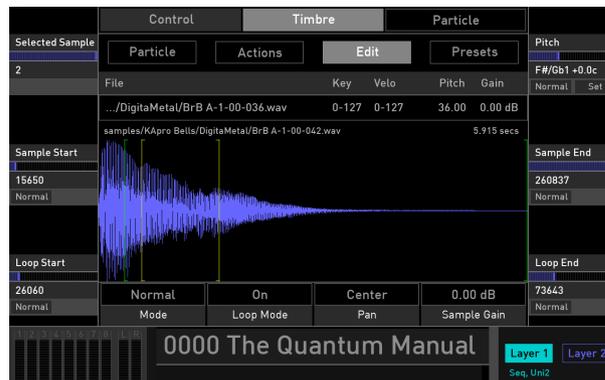
The Display Representation

The central display shows a graphic waveform representation of the currently selected sample with some rulers. If more than one sample is loaded, the display also shows a sample file list. The currently selected sample is highlighted.

Selected Sample

If more than one sample is loaded, you can use this parameter to select the desired sample for editing. You can also tap on the desired sample file in the display list to select it.

Sample Start / Sample End

Here you determine the start position (**Sample Start**) and end position (**Sample End**) of the currently selected sample. Use this function to adapt the sample length to your needs. Within the waveform representation two green rulers shows the loop start and end.

Tap on **Sample Start** or **Sample End** to open a pop-up menu for further settings:

• **Normal**: parameter change is normal.

• **Fine**: parameter change is fine.

• **Super Fine**: parameter change is super fine.

Pitch

Determines the pitch of the currently selected sample. Use this parameter to tune samples that don't match with your desired tone pitch.

Tap on **Pitch** to open a pop-up menu for further settings:

• **Normal**: Pitch change is about 10.0 cents.

• **Fine**: Pitch change is about 1.0 cents

• **Super Fine**: Pitch change is about 0.1 cents.

• **Set From Keys**: play a key on your keyboard to set the corresponding pitch.

Loop Start/ Loop End

If **Loop Mode** is set to *On*, you can define a **Loop Start** and **Loop End**. Within the waveform representation two yellow rulers shows the loop start and end.

Tap on **Loop Start** or **Loop End** to open a pop-up menu for further settings:

• **Normal**: parameter change is normal.

• **Fine**: parameter change is fine.

• **Super Fine**: parameter change is super fine.

Mode (only available for Particle Generator)

Determines the playback mode of all loaded samples.

- **Normal**: plays back the loaded sample(s) in a regular way. If only one sample is loaded, it will mapped automatically over the complete keyboard. This also affects the original pitch and length. When this mode is selected, some parameters of the Particle Generator are not available.

- **Granular**: uses the Quantum Particle engine for granular playback.

- **Live Granular**: uses Quantum's Audio Input for a live granular transformation. Make sure to set up the audio input on the **Layer** page (Input Volume, Input Routing).

Tap on **Mode** open a pop-up menu for further settings:

- **Set Default**: sets the parameter to its default value.

- **Set Last Loaded**: resets the parameter to the last loaded value from the current sound patch.

- **MIDI Learn CC**: activates the MIDI Learn function, which maps an incoming MIDI control change to this parameter.

Loop Mode

Determines if the sample loop is active (*On*) or not (*Off*).

Pan (only available for Particle Generator)

Determines the panning for the currently selected sample.

Sample Gain

Determines the gain for the currently selected sample.

Presets

Tap on the **Presets** button to open a pop-up window for loading, saving, and managing sample settings. For more information on the available options please refer to the **Presets** chapter in the Wavetable section.

Appendix

Wavetable Synthesis

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

The following overview explains how the Wavetable Synthesis works:

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:

- Each note on a keyboard can access a different wave of a wavetable.

- The Travel parameter allows a cyclic run through all waves 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.

You should keep the following sentence in mind:

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

Modulating Waves over time

The graphic below shows a wavetable with 60 waves and some of its included waves from position 0 to 59 on the vertical axis. The horizontal axis represents the audio signal that is generated and the diagonal line in the graphic shows the attack stage over time.

Wave
Position

Running through the
envelope attack stage
generates this audio signal
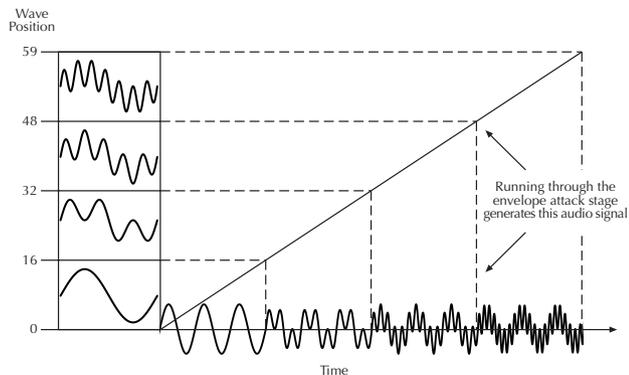
Time

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

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

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

If Attack is 0 and Decay 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 scanning that goes back and forth (triangle) only into one direction followed by a hard reset to the origin (sawtooth) or between only two waves (square)

Exceeded Waves of a Wavetable

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

Waveform Oscillators Introduction

The oscillator is the first building block of a synthesizer. It delivers the signal that is transformed by all other components of the synthesizer. In the early days of electronic synthesis, Robert A. Moog found out that most real acoustic instrument waveforms could be reproduced by using abstracted electronic versions of these waveforms. He wasn't the first who came to that conclusion, but he was the first to recreate them electronically and build them into a machine that could be used commercially. What he implemented into his synthesizer were the still well-known waveforms sawtooth, square and triangle. For sure, this is only a minimal selection of the endless variety of waveforms, but the Waldorf Quantum provides all those waveforms, plus other classic waveforms like square (which is the father of the pulse waveform) and the sine wave (also part of every other waveform).

You probably know how these waveforms look and sound, but the following chapter gives you a small introduction into the deeper structure of these waveforms. Let's start with the most basic one.

The Sine Wave

The Sine Wave is the purest tone that can be generated. It consists of only one harmonic, the fundamental, and has no overtones. The following picture shows the sine wave and its frequency representation:
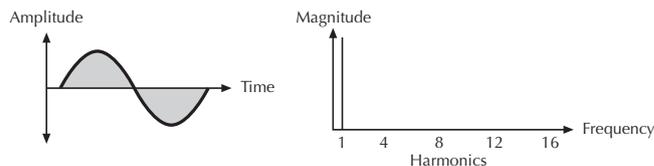
The Sine Wave

There is no acoustic musical instrument that generates a pure sine wave; the only instrument that comes close to it is the pitch fork. Therefore, the sine wave sounds a little artificial to the ear. However, the sine wave can be an interesting oscillator waveform to emphasize a certain harmonic while other oscillators are playing more complex waveforms, or as an FM source for frequency modulation.

The sine wave is the most basic building block of each waveform. Any waveform can be broken down into several (or many) sine waves that are arranged with different frequencies and magnitudes. These sine waves are called *partials*. In most waveforms the partial with the lowest frequency is dominant, meaning that this partial is used by the ear to determine the pitch of the tone. This partial is called the *fundamental*. All other partials are called *overtones*. So the second partial is the first overtone.

Cyclic waveforms such as the waveforms in the Quantum only feature sine waves in integer frequency ratios to the fundamental like double frequency, triple frequency and so on. Those partials are called *harmonics* because their frequency is a harmonic multiple of the fundamental.

Confusing? Let's generalize it to cyclic waveforms: a cyclic waveform – like sawtooth, square, etc. – only consists of harmonic partials. The harmonic with the lowest frequency is dominant and therefore called the fundamental. All other harmonics are called overtones.

The Sawtooth Wave

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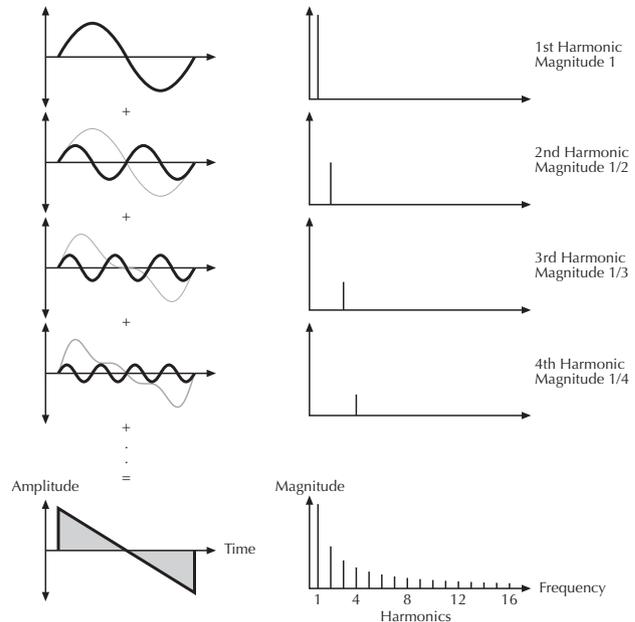
Additive components of the Sawtooth wave

The sawtooth wave was thought as an abstraction of the timbre of string and brass instruments. You can easily understand that when you think of a violin. Imagine a bow

pulling the string slightly into one direction. At one point, the string abruptly comes off the bow and swings back to its original position. The bow is still moved and so it catches the string again and the procedure is repeated. The result is a waveform that looks like a sawtooth. The same is true for a brass instrument. In this case the 'string' are the lips while the bow is the air. The lips are moved by the air to a certain extent and abruptly move back to their original position.

The Square Wave

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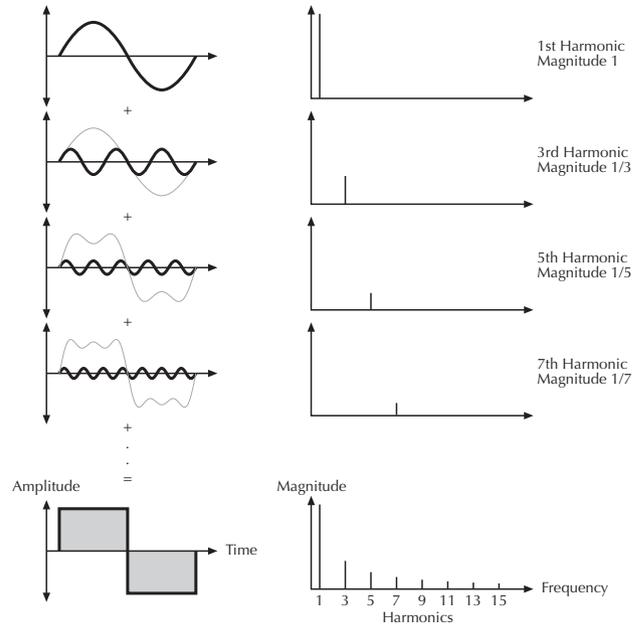
Additive components of a square wave with 50% pulse width

The square wave was thought as an abstraction of wind instruments like a pan flute or a recorder. They consist of a tube that can contain a certain amount of air. The player

blows air through the tube in such a way that the air starts to vibrate. This vibration is almost completely symmetrical, resulting in a hollow timbre.

The Square Wave

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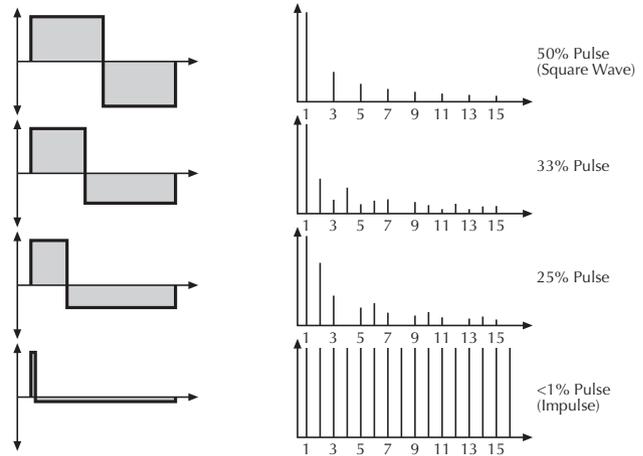
Additive components of Pulse wave with different pulse widths

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

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

symmetrical harmonic content while all other pulse widths create peaks or troughs at certain frequencies. Another special case is a pulse wave with a very narrow pulse width – labelled as < 1% in the previous image. An infinitely thin pulse creates a spectrum that has all harmonics with equal magnitudes. In a digital synthesizer, 'infinitely' necessarily means one sample.

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

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

The Triangle Wave

The Triangle Wave is very similar to the square wave. It is composed of the same harmonics as the square wave but with different magnitude ratios. The magnitude of each harmonic is divided by the power of its number. This means that the third harmonic's magnitude is a ninth, the fifth harmonic is a twenty-fifth and so on. The following image illustrates the harmonic content:

1st Harmonic
Magnitude 1

3rd Harmonic
Magnitude 1/9

5th Harmonic
Magnitude 1/25

7th Harmonic
Magnitude 1/49

Amplitude

Time

Magnitude

Frequency

1   3   5   7   9   11 13 15
Harmonics

Additive components of the Triangle wave

The reason why the triangle wave is so popular in classic synthesizers is that it can act as a sub-oscillator wave, to emphasize certain frequencies or to frequency modulate other oscillators.

The triangle wave sounds like a woodwind instrument – i.e. a clarinet. It can also be used for mallet instruments like vibraphone and xylophone, etc.

A Short Introduction to Granular Synthesis

Granular synthesis is based on a simple idea: instead of playing back an entire sample, only short portions of the sample – the so-called grains – are played. These grains can be played back in any order. Each time a grain ends, a new one starts. To avoid discontinuities in the playback, and to minimize artefacts, envelopes are applied to the grains. Granular synthesis can be used to extract interesting spectra from all kinds of samples creating sound effects by completely scrambling a sample, or for low-fidelity time stretching, for example.

Very short grains produce sounds with an individual pitch. For that reason you can also use samples without a distinct pitch – such as drum loops and sound effects – to extract pitched spectra from them. Sounds with longer grains usually play back with the pitch of the original sample.

If you play back the same portion of a sample over and over again, the sound may become too static. You can use the Particle Generator parameters to compensate for this and bring more liveliness into the sound. By adding more grain streams (kernels) the grain and sound density can be increased to produce a richer sound.

Filter Introduction

Once the oscillator signal leaves the mixer it is sent to the filters (Dual Analog Filters and Digital Former). The Quantum offers two filter units, each with its own individual settings. The signal flow in the filters can be controlled via the Routing function on the Filter page. The filters are components that have significant influence on the Quantum'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. The Quantum's filter dampens frequencies in the stop band with a certain slope. The slope can be 12dB or 24dB per octave. This means that the level of a frequency that lies an octave above the cutoff point will be 12dB or 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:

Level

Frequency
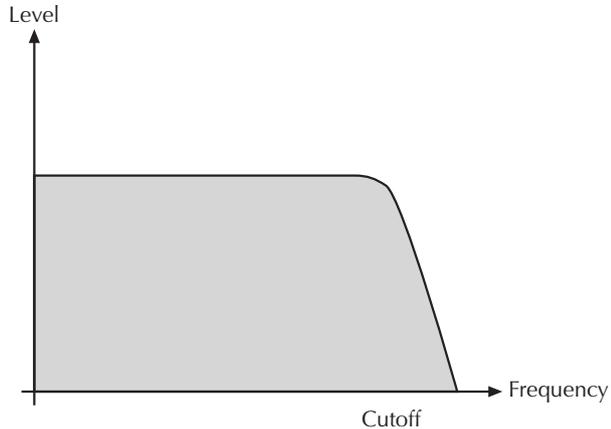
Cutoff

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.

The Quantum'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:

Level

Resonance

Cutoff

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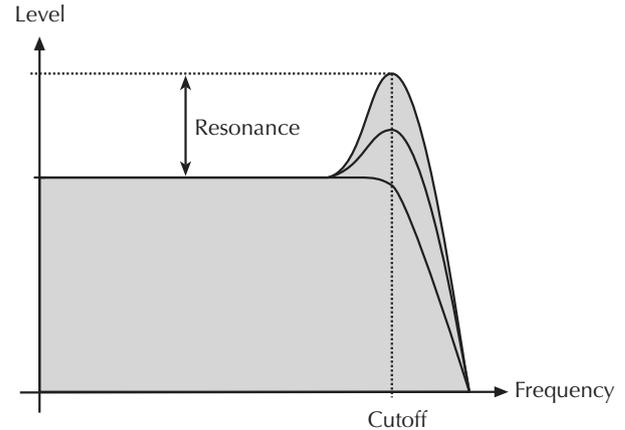
If the resonance is raised to a great extent then the filter will begin self-oscillation – i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.

Updating the System Software

Quantum has a service-friendly feature that makes it possible to update the system software without changing any parts.

All software updates come in the form of a .bin file that can be copied on a FAT/FAT32 file formatted SD card. The fastest way to get this file is by downloading it from our web site at:

http://www.waldorfmusic.com/quantum

Please make sure to download the following file:

quantum.update.bin

⊘ To update Quantum's system software:

- Copy the .bin file onto the top-level of a suitable SD card.

- Insert the SD card into Quantum's SD card slot.

- Press the **Global** button to enter the Global page.

- Tap on the **System** tab to open the System sub page. Tab on the Info tab.

- Tap on the Update button and follow the onscreen instructions.

- After the file is installed correctly, Quantum burns the update into its FLASH memory.

- Wait until the operation is completed. If updating was successful, Quantum will perform a system reset and start up.

⚠ Do not under any circumstances turn off Quantum while the update step is in progress. A complete loss of data may occur and it will be impossible for you to make your machine work again!

FAQ – Frequently Asked Questions

How do I make a backup of my patches?

Please go to Load > Actions > Export. There, you can select and export your patches. Please note that the samples attached to the patches will not be saved automatically.

My SD card is not recognized by the Quantum

Please make sure the SD card is turned upside down and inserted properly. Also, it should be FAT or FAT32-formatted. There are no known incompatibilities with any SD card.

Quantum doesn't recognize the update file, although it definetly is located in the top directory of the SD card.

Please allow a bit of time, sometimes Quantum needs up to a minute after inserting the SD before it recognizes the card and the update file. In rare cases, you may try two or three times. Opening the zip file isn't enough, the quantum.update.bin file has actually be unpacked. Maybe your file got corrupted during download, please try downloading it again.

What is the difference between Latch and Chord Mode?

In Latch Mode, a key is engaged when pressed and sustained until you hit the same key again, then the note will be released. In Chord Mode, only the last note or chord will be held until you press the next key(s), then the previous notes will be released and the new note or chord will be sustained.

My device isn't recognized via USB.

- Make sure that your device is connected to your computer directly and not through a hub.

- Use the rear USB, not front USB connection.

- Disconnect all other USB devices from your computer which aren't needed at the moment.

- Change the USB cable or try from a different computer.

- On macOS: Click on **About this Mac** in the Apple menu. Select **System Report**. Go to the **Hardware** dropdown menu on the left and unfold it. Select **USB**. Check if your device is listed there.

- On Windows: Press the Win key + R. Enter **devmgmt.msc** and press OK. Check if your device is listed there. If it shows up as an "Unknown Device" and if there's a black and yellow warning sign, deinstall the

driver. Then unplug the instrument, reboot your machine and plug it back in.

I think of a certain feature about sound design, is this possible to do in Quantum?

In many cases, specific wishes for sound design can be realized using the modulation matrix. Remember that you can use a Control Amount that will be added to the modulation. E.g., an unipolar LFO can be achieved with Constant in the Control amount of the same modulation slot.

Quantum has crashed!

First, please update Quantum's OS. We often release a new firmware with new features and we definetly recomment going for it. The procedure takes less than a minute. Quantum's OS is really stable so crashes rarely occur. If Quantum crashes anyway, please generate a system logfile by pressing Global -> System -> Support Log. Include your name and crash date in the file name when saving. Send us your file and we will take a look into this.

Which footswitch and expression pedals can I use with my device?

Any sustain pedal with a 6.3 mm jack that closes the contact when being pressed should work. Our recommendation is a Fatar/Studiologic VFP1/10. Only use a single pedal, dual pedals won't work.

For the swell / continuous pedal, we recommend using a Fatar/Studiologic VP-27. Otherwise, other 10k maximum resistance expression/swell pedals should work, too.

For both sustain and continuous, pedals compatible with Fatar, Roland, Moog, Kurzweil, M-Audio should be working as well. The Korg/Yamaha models may **not** work though.

Are the outputs from my device balanced or unbalanced?

This device has unbalanced outputs. We recommend using it with unbalanced cables.

Does my device send audio via its USB connection?

No. This device only sends and receives MIDI via USB. Transferring audio or files isn't possible.

Can I lift up Quantum by the aluminum rod on the back?

Yes, you can lift up Quantum and move it around using that rod as a handle.

Modulation Sources and Destinations

Modulation Sources

Source	Description
Off	No modulation source
Amp Env	Amplifier Envelope signal
Filter1 Env	Filter 1 Envelope signal
Filter2 Env	Filter 2 Envelope signal
Free Env1	Free Envelope 1 signal
Free Env2	Free Envelope 2 signal
Free Env3	Free Envelope 3 signal
LFO 1	LFO 1 signal
LFO 2	LFO 2 signal
LFO 3	LFO 3 signal
LFO 4	LFO 4 signal
LFO 5	LFO 5 signal
LFO 6	LFO 6 signal
Komplex	Komplex Modulator signal
Wheel	Modulation wheel (CC #1)
Pitchbend	MIDI Pitchbend signal
After Touch	Keyboard Pressure Data
Pedal	MIDI Sustain pedal (CC #64)

Expression	MIDI Expression pedal (CC #11)
Breath Control	MIDI Breath Controller (CC #2)
CC 22 - CC 31	MIDI CC #22 - #31
Keytrack	MIDI Note number
Velocity	MIDI Velocity
Voice Number	Number of played voice
Unisono Idx	Number of Unisono voices
Poly Idx	Number of active voices
Rand Trig	Random Trigger signal unipolar
Rand Trig Bipol	Random Trigger signal bipolar
Constant	Constant modulation value
Mod Pad X	Modulation Pad position X
Mod Pad Y	Modulation Pad position Y
SeqParam 1 - 4	Step Sequencer parameter values

Modulation Destinations

Destination	Description
Off	No modulation destination
Pitch	Global pitch of all three Oscillators at once
Osc1/Osc2/Osc3 Pitch	Pitch of Oscillator 1…3
Osc1/Osc2/Osc3 Mix	Level of Oscillator 1…3

Osc1/Osc2/Osc3 Pan	Panning of Oscillator 1...3	PT1/PT2/PT3 Attack	Particle Attack of Oscillator 1...3
WT1/WT2/WT3 Position	Wavetable Position of Oscillator 1...3	PT1/PT2/PT3 Decay	Particle Decay of Oscillator 1...3
WT1/WT2/WT3 Travel	Wavetable Travel of Oscillator 1...3	PT1/PT2/PT3 Pos	Particle Position of Oscillator 1...3
WT1/WT2/WT3 Noisy	Wavetable Noisy of Oscillator 1...3	PT1/PT2/PT3 Travel	Particle Travel of Oscillator 1...3
WT1/WT2/WT3 Brilliance	Wavetable Brilliance of Oscillator 1...3	PT1/PT2/PT3 PSpread	Particle Pitch Spread of Oscillator 1...3
WT1/WT2/WT3 FX	Wavetable FX of Oscillator 1...3	RS1/RS2/RS3 Timbre	Resonator Timbre of Oscillator 1...3
WT1/WT2/WT3 Table	Wavetable selection of Oscillator 1...3	RS1/RS2/RS3 Exciter	Resonator Exciter of Oscillator 1...3
WF1/WF2/WF3 Warp	Waveform Warp of Oscillator 1...3	RS1/RS2/RS3 Spread	Resonator Spread of Oscillator 1...3
WF1/WF2/WF3 Sync	Waveform Sync of Oscillator 1...3	RS1/RS2/RS3 Q	Resonator Q of Oscillator 1...3
WF1/WF2/WF3 Detune	Waveform Detune of Oscillator 1...3	DF Amount	Digital Filter Amount (based on the selected Type)
PT1/PT2/PT3 Length	Particle Length of Oscillator 1...3	DF Color	Digital Filter Color (based on the selected Type)
PT1/PT2/PT3 Gate	Particle Gate of Oscillator 1...3	DF Pan	Digital Filter Panning
PT1/PT2/PT3 Jitter	Particle Jitter of Oscillator 1...3	DF Level	Digiatal Filter Level
		F1 Cutoff/F2 Cutoff	Cutof of Filter 1/2

F1 Reso/F2 Reso	Resonance of Filter 1/2
Filter Pan	Analog Filter Panning
Filter Level	Analog Filter Level
VCA	VCA
AmpEnv Attack	Attack rate of Amp Envelope
AmpEnv Decay	Decay rate of Amp Envelope
AmpEnv Sustain	Sustain level of Amp Envelope
AmpEnv Release	Release rate of Amp Envelope
Filt1/2 Env Attack	Attack rate of Filter Envelope 1/2
Filt1/2 Env Decay	Decay rate of Filter Envelope 1/2
Filt1/2 Env Sustain	Sustain level of Filter Envelope 1/2
Filt1/2 Env Release	Release rate of Filter Envelope 1/2
Free1/2/3 Env Attack	Attack rate of Free Envelope 1/2/3
Free1/2/3 Env Decay	Decay rate of Free Envelope 1/2/3
Free1/2/3 Env Sustain	Sustain level of Free Envelope 1/2/3
Free1/2/3 Env Relealse	Release rate of Free Envelope 1/2/3

FX1/2/3/4/5 DryWet	FX Dry Wet for Effect 1...5
FX1/2/3/4/5 Control	FX Control for Effect 1...5 (based on the selected FX Type)
Volume	Amplifier output volume
Pan	Output Panning
LFO1/2/3/4/5/6 Speed	Speed of LFO 1...6
LFO1/2/3/4/5/6 Gain	Gain of LFO 1...6
Komplex Speed	<- see destination name
Komplex Blend	<- see destination name
Komplex Entropy	<- see destination name
Komplex Warp	<- see destination name
Komplex Gain	<- see destination name
Glide Rate	<- see destination name
Chorus DryWet	<- see destination name
Chorus Depth	<- see destination name
Chorus Speed	<- see destination name
Chorus Feedback	<- see destination name
Phaser DryWet	<- see destination name
Phaser Depth	<- see destination name
Phaser Speed	<- see destination name
Phaser Feedback	<- see destination name
Phaser Spread	<- see destination name

Flanger DryWet	<- see destination name
Flanger Depth	<- see destination name
Flanger Speed	<- see destination name
Flanger Feedback	<- see destination name
Reverb Gain	<- see destination name
Reverb Time	<- see destination name
Reverb Color	<- see destination name
Delay DryWet	<- see destination name
Delay Feedback	<- see destination name
Delay Time L	<- see destination name
Delay Time R	<- see destination name
EQ DryWet	<- see destination name
EQ FreqShift	<- see destination name
Drive DryWet	<- see destination name
Drive Amount	<- see destination name
Drive Gain	<- see destination name
Compress Ratio	<- see destination name
Compress Thresh	<- see destination name
Arp/Seq RelGate	<- see destination name
Arp/Seq Swing	<- see destination name
Seq Length	<- see destination name

Technical Data

Power Supply

Supply Voltage	100 – 240 V AC / 47-63 Hz
Maximum current consumption:	1.3 A
Maximum power consumption:	50 W

Dimensions and Weight

Width:	1006 mm
Depth:	401 mm
Height (including knobs):	131 mm
Total weight:	17,8 kg

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.

Arpeggiator

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

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.

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 the Quantum, then the computer is the sender and the Quantum 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.

MIDI Clock

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

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.

Pitchbend

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

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). A spectrum display like that which is in the Quantum is a graphical overview of all the frequencies of a wavetable with their amplitudes over time.

Sustain

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

System Exclusive Data

System exclusive data allow access to the heart of a MIDI device, enabling access to data and functions that no other MIDI messages are able to address. 'Exclusive' in this context means that this data pertains to only one device type or model. Every device has unique system exclusive data. The most common applications for SysEx data include transfer of entire memories and complete control of a device via a computer.

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 use to start an envelope.

Volume

The term describes a sound's output level

USB

The Universal Serial Bus (USB) is a serial bus system to connect a computer with an external device. USB equipped

devices can be plugged together while active. The recognition is made automatically.

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 the Quantum is based on waveform sets called wavetables. You should think of these as a sequence of up to up to 128 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

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

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

support@waldorfmusic.de

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

Waldorf Music GmbH
Lilienthalstr. 7
53424 Remagen, Germany

③ Visit our support forum at www.waldorfmusic.com

www.waldorfmusic.com

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