nord wave
S Y N T H E S I Z E R

User Manual
Nord Wave

OS Version 2.x

IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

C E

Nord Wave User Manual

1 Introduction

Thank you!

First we would like to thank you for purchasing the Nord Wave. The Nord Wave is built on Clavia's legacy of making virtual analog synthesizers for more than 15 years and we hope you will have as much fun owning the instrument, as we had developing it.

Development story

To us, details are everything - and an intuitive user interface is just as important as the actual sound. We are musicians ourselves, and know by experience how frustrating it can be to have to wade through menus and page-plus buttons to change a setting.

That is why we have a physical button or knob for every sound related parameter on the Nord Wave front panel. We also know the importance of building our instruments as light as possible - some times it is a long walk to that gig.

Our vision in designing and combining our own hardware and software is to have professional sound quality and playability in every single component; from the moment you strike a key to the audio output.

Our patented pitch stick is a perfect example on how dedicated hardware and software extends playability. Once you get familiar with it you are likely to dismiss all other pitch controllers as a toys.

Since we are working in a digital domain, we can do a lot of interesting stuff with our virtual analog synthesizer that would not be possible if it was analog-for-real. We have provided the Nord Wave with a very impressive and useful set of both analog and digital features.

Morphing is a Nord speciality; if there is one chapter in this manual you **must** read - it's the one about morphing. This is very intuitive yet extremely powerful, and will change not only how you play but also your entire approach to sound design.

With the ability to use any kind of sampled waveform, the Nord Wave is a sample player **and** an analog synthesizer in one - and anything in-between.

Features

The Nord Wave is a virtual analog synthesizer with an extensive set of functions that allows you to shape the sound in a variety of ways. The Wave is bi-timbral, it's two slots are independent of each other, making it possible to e.g. layer two sounds on top of each other.

The Nord Wave is also a true stereo synthesizer, the signal paths for the left and the right outputs are separated at the very core in the sound engine.

Synthesizer

In an classical analog style synthesizer environment, each of the Nord Wave's two slots consist of 2 oscillators, 2 LFOs, 1 modulation envelope, 1 amplifier envelope and a multi-type filter section with an envelope as well.

- Oscillator 1 can produce wavetable, FM, analog and noise waveforms. The traditional analog waveforms (Pulse, Triangle, Saw and Sine) can also operate in a oscillator sync-mode.
- Oscillator 2 can produce sampled waves, FM, analog waveforms and multi-sample Sample Instruments, and function as a modulation source for Oscillator 1. The sampled waves are acoustic samples turned into wavetables with the attack part of the sample intact.
- Sample Instruments allows you to use any standard .wav file as an oscillator source in a virtual analog environment.
- The LFOs have a wide array of modulation destinations several waveforms and the ability to run in Poly and Single mode.
- The Modulation Envelope also has a wide array of modulation destinations and can function either as a attack/decay or as a attack/release envelope.
- The filter section has envelope and velocity control. You have the option of resonant high pass, band pass and low pass modes as well as comb, multi and vocal modes.

Morph

The Morph function lets you continuously control defined ranges of several parameters in a Program, using only a single control source. This allows you to produce radical changes in a sound in a very fast and easy way.

Slots

Each of the two slots also feature a 2-band EQ, chorus, controls for the output level, mono/legato, glide and vibrato functions.

Programs

There are 1024 program locations, organized in 8 banks in the Nord Wave where you can store your own programs. Both the individual **Slots A & B** settings are stored within a program.

Effects

Each program can be processed with a tube style overdrive, a stereo delay and/or a reverb.

Sample Instruments

User recorded samples can be downloaded as Sample Instruments to the Nord Wave via USB. The capacity of the Flash memory is 99 available memory locations, with a maximum total size of 180 MB. Samples are compressed before they are downloaded using a lossless algorithm that Clavia has developed. This allows the sample data sizes to be reduced to up to a third of its original size.

The memory is of the Flash type which means that the Sample Instruments remains in the memory when the synth is turned off. You do not have to use hard drives or other types of storage media; once loaded into the memory the data will be there until you decide to remove it!

Nord Sample Editor

The Nord Sample Editor is the application that allows you to edit, create and load collections of samples - called Sample Instruments - to and from the sample memory area of the Nord Wave synthesizer. This area is what we call the Flash memory. Another application, the Nord Sound Manager will also act as a librarian utility for the samples and the Program memory area.

The Nord Sample Editor will assist you in your editing efforts; it contains powerful tools for various actions that can be applied to a sample. These tools will for instance help you in setting a start point of a sample, creating a loop and other tasks that are essential in making the samples ready for use in the Nord Wave. The Editor also has functions for automatic mapping of samples across the keyboard and much more.

Both applications are delivered free of charge with every Nord Wave, and is compatible with computers running Windows XP or Vista. They can also run on a Macintosh with Mac OSX 10.4 or later.

Controls & connections

The Nord Wave has a 49-key keyboard which responds to velocity and aftertouch. It is also equipped with a modulation wheel and wooden pitch stick, 2 line level outputs, 1 headphone output, MIDI IN & OUT, a USB port and inputs for a sustain pedal and a control pedal.

More samples

More high quality Sample Instruments can be downloaded free of charge from the Nord web site: www.nordkeyboards.com

2 Panel Overview
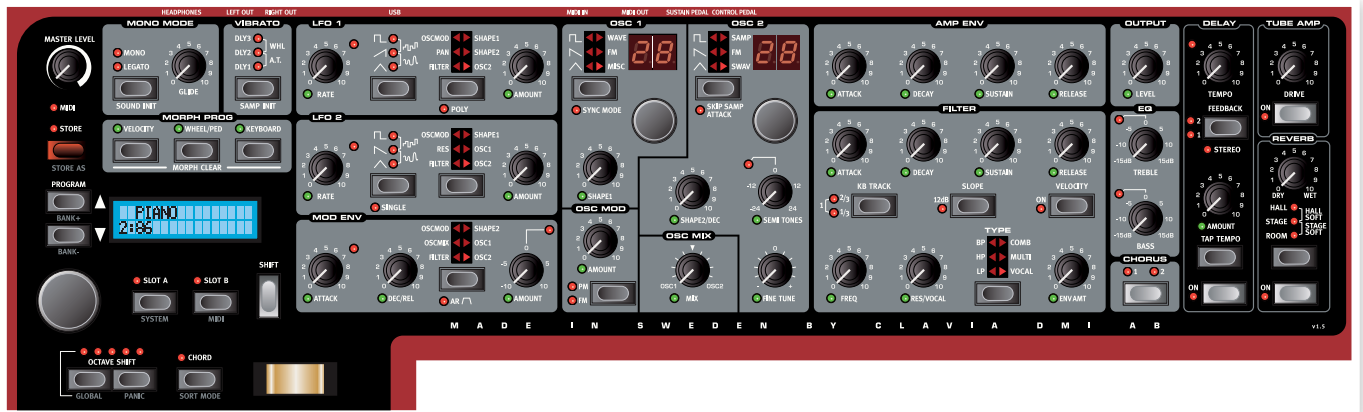
The Front Panel

The front panel on the Nord Wave has three main areas, which are identified by their background color. We'll familiarize ourselves briefly with the panel here and describe the functions in detail in the following chapters.

The parameters and functions in this area are used to select programs, to set global and MIDI functions and to add expression to your performance with the **Pitch Stick** and the **Mod Wheel**. This is also where you find the two Slot buttons, which you use to activate one or both of the Nord Wave synth engines.

We'll describe the functions in this area in greater detail, starting at page 15.

Synth area

The synth area is where all the action happens. Every vital, sound generating function in the Nord Wave has a dedicated knob or button, and they are all there for you to go ahead and get crazy, to design the sound as you wish.

Each program in the Nord Wave contains two individual synth engines. Both are controlled through the same panel, one at a time. You choose which section to control by pressing the **Slot A** or **Slot B** button.

We'll describe the functions in this area in greater detail, starting at page 18.

Effect area

The Effect area contains the parameters used for editing the program specific effect parameters. The functions here are common for both slots. Please refer to page 31 for more information.

Program & Performance area

The Program and Performance area starts at the **Master Volume** in the top left panel corner, and then sweeps down right towards the keyboard.

LCD

The **LCD** is normally used for displaying the current program bank, number, name and category.
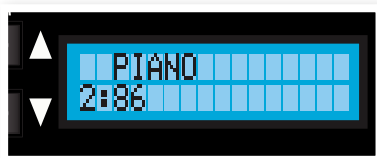
When operating a knob or button, the associated parameter name and setting will be displayed in the **LCD**.

Knobs & dials

Knobs

The knobs controls the continuously variable parameters in the Nord Wave synth engine.

- A parameter value can be totally different from the knob's physical position when you load a Program. As soon as you start turning the knob, the value will 'snap' to the knob's physical position.

Most of the knobs have a green LED indicator below them. This LED is used for indicating when a parameter is connected to a **Morph** source. Please refer to page 13 for more information on morphing.

The Rotary dial

The **Rotary** dial is used for changing the current setting displayed in the **LCD**. Usually this means loading a new program, but in the System or MIDI menus, the **Rotary** is used to change parameter settings.

LED-dials

These dials in the oscillator section have an associated **LED display** which shows their parameter setting. They are used to select wavetables or Sample Instruments.

Master Level knob

The **Master Level** knob controls the overall amplitude for the audio outputs, the line level outputs and headphone output. The **Master Level** knob's actual position indicates the output level.

Buttons

Selector buttons

Selector buttons are used to activate one setting in an array of two or more. Selector buttons have a set of round or triangular LEDs to indicate the current setting. Press the button several times to cycle through the possible options.
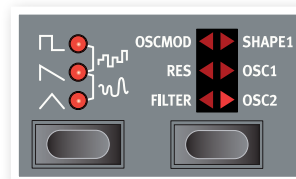
On/Off buttons

On/Off buttons are used for activating a parameter or a group of parameters such as effects.

Shift button

Some buttons have a secondary function, which will be available if you hold down **Shift** while pressing the button. The name of the secondary function is printed below the button.
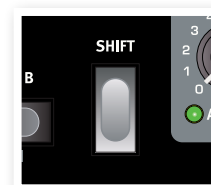
3 Connections

Audio Connections

Left out and right out

The left and right line level outputs from the Nord Wave are unbalanced. Use 1/4" connectors to connect the Nord Wave to an amplifier or recording equipment.

The Nord Wave is a true stereo instrument, with separate signal paths for the left and right audio channels. To properly experience the Nord Wave, always use both outputs in a stereo operation.

Headphones

This is where you connect a 1/4" stereo connector from a pair of headphones.

General guide on audio connections

• Make all the connections before you turn on the power to your amplifier.

• Turn **on** the power to your amplifier **last**.

• Turn **off** the power to your amplifier **first**.

⚠ *Playing at a high volume level can result in hearing impairments such as permanent hearing loss.*

MIDI Connections

MIDI OUT

MIDI connection used for sending MIDI data from the Nord Wave to other equipment such as sound modules or computers.

MIDI IN

MIDI connection used to receive MIDI data to the Nord Wave from other equipment such as keyboards, sound modules and computers.

USB Connection

The USB connection is used for the Nord Wave to communicate with a personal computer. The computer can e.g. run the Nord Sound Manager application, the Sample Editor application, or be used if the operating system in the synthesizer needs to be updated.

⚠ *Computers running Microsoft Windows operating systems need a driver for the USB connection to function. The driver can be found on the enclosed Nord Wave DVD, or at the Nord web site.*

Pedal Connections

The Nord Wave has two pedal inputs; one for a sustain pedal and one for a control pedal (an expression type pedal, which can be used to control various parameters).

Sustain pedal

1/4" connector for a switch type pedal. When a connected pedal is operated, the notes you play will be sustained.

Two types of pedal polarities can be used, you select the one that applies to your sustain pedal, in the System menu which is described on page 59.

Control pedal

1/4" stereo connector for pedals of potentiometer type (also know as expression pedals). This can be used as a source for the Morph function or to control the overall volume. Please refer to page 13 for more information on Morphing.

When connecting an expression pedal to the Control Pedal input, you should use a stereo cable (Tip-Ring-Sleeve). Please note that the pedal must have a stereo output jack. The resistance range of the Control Pedal should be 10 or 50 kOhm.

To simplify setup, the most common pedal models (Roland, Yamaha, Ernie Ball and Fatar) are pre-configured in the Nord Wave, and you simply select the type of pedal which you want to use in the System menu. The System Menu is described on page 59.

4 Getting Started

About Programs

Complete sound settings are stored in the Program memory of the Nord Wave. This memory area consists of 8 Banks with 128 Programs each which makes a grand total of 1024 Programs. Every Program can be edited and replaced as you wish. A complete set of the factory Programs are available on the Nord Wave DVD and on our website.

Select a Program

1. Use the **ROTARY DIAL** to select a Program.

2. To switch between Banks, press and hold **Shift** and then the **Up/Down** buttons that is located to the left of the **LCD**.

   The Bank is indicated by the single digit to the left and the program number by the digits to the right in the LCD. Each Program has a name and they are also categorized in 17 different categories.

3. If you reach the last or the first Program in a Bank, you can switch to the next bank by pressing the **Up** or the **Down** button.

- It's also possible to browse or select Programs by Category or in an alphabetical order. This is described in detail in the Sort Mode section on page 18.
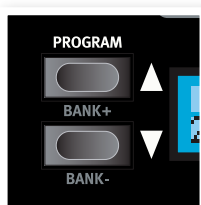
Edit a Program

Editing a Program is just as easy as grabbing a knob and change a setting, or press a button to select a different setting. The knobs physical position isn't always as the setting in the Program that is active, but as soon as you start turning a knob, the parameter will snap to the knob's position.

1. Turn e.g. the **Filter Freq** knob.

   The parameter value will be shown briefly in the LCD.

When you have edited a Program, an asterisk (*) will appear in the **LCD** next to the Program number to alert you to the fact that the program has been edited but not yet saved.

If you select a new program without saving, any edits you have made will be lost and the Program will have its original settings the next time you select it.

Saving a Program

If you are happy with an edit that you have made, you should probably save the Program.

1. Press the **Store** button.

   The Store button LED starts flashing and the original Program location is shown in the LCD.
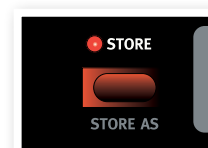
- There is a Memory Protect function that is set to On when the Wave leaves the Nord Factory. This needs to be turned Off in the System Menu before you can save a Program.

2. Press **Shift** + **System** and scroll to the Memory Protect setting with the **Up/Down** buttons and set this to Off using the **Rotary**.

3) Select a new location where you want to store the Program.

Use the **Up/Down** buttons and/or the **Rotary** dial to choose a new Program location if you do not want to overwrite the original Program.

To select another bank, press **Shift** and select another bank with the **Up/Down** buttons.

4) Press the **Store** button a second time to confirm your choice.

Your edited Program has now replaced the previous one in the location you specified.

• To cancel the procedure, press any buttons on the panel before you press **Store** the second time.

• With Memory Protect set to Off, a double tap on the **Store** button will store a Program in its original location.

Saving a Program with a new name and/or category

1) Press the **Store as** button (**Shift** + **Store**).

The Store button LED starts flashing and the Program name and category is shown in the LCD.

2) Use the **Rotary Dial** to select a category.

Give your program a name using the **Up/Down** buttons to change position, and the **Rotary** to scroll between the available characters.

3) Press the **Store** button a second time to confirm the new name and category selection.

4) Use the **Up/Down** buttons or the **Rotary** dial to choose the location where you want to store the Program.

5) Press the **Store** button a third time to confirm your choice.

Your edited Program has now replaced the previous one in the location you chose.

Slots

The Nord Wave has two Slots labelled A and B. Each slot represents a complete synthesizer setup, a complete sound if you wish. The Slots can be used for layering sounds or quickly switch between sound settings. The Slots are also used when the Nord Wave is controlled via MIDI.

Every Program contains the settings for each individual slot. Program 1:11 can have a piano sound setting for Slot A and a string setting for slot B. You can very quickly switch between the two slots in a live situation by pressing a button. You can also layer the two slots, playing both sounds from the keyboard at the same time.

Switch between two sounds

1) Select a Program.

2) Press repeatedly on the Slot A and the Slot B buttons to activate the two different sounds in that particular Program.
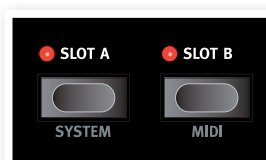
Layering

To play with both the slots in a selected Program is called to layer two sounds.

1) Press both of the Slot buttons at the same time.

One slot LED will be steadily lit, the other will flash. This indicates which of the two slots has the Panel focus, more on this in a little while.

Deactivating Slots

1) To deactivate a Slot in a layer, press both **Slot** buttons, and then release one of them.

The slot with the button you released will be the one that is removed from the layer.

Copying a setting from one Slot to another

In order to be able to organize the sounds to suit your needs, you can copy settings from one slot to another.

1) Press and hold a **Slot** button.

Turn the Rotary dial or press the **Up/Down** buttons to scroll through the memory area.

2) When you have found the desired Slot and Program that you wish to copy, release the **Slot** button.

The settings from the selected Slot and Program are now copied to the Program/Slot in use.

• If you want to keep these new settings, make sure that you save the Program before you select a new one.

Focus

To be able to fully take advantage of the flexibility of the two slots and the knobs and buttons on the panel, the Nord Wave uses a concept that we call Focus which means "active for".

When you select a Program in the Wave and play on the keyboard with e.g. Slot A active (its LED being lit), that Slot has the keyboard focus. This means that you use the keyboard, pitch stick, morph functions and other performance controls on the Wave to control it.

This slot also has the panel focus; a solitary slot always has both panel and keyboard focus. If you grab a knob on the panel and turn it, the sound will change.

If you select both slots to create a layer as described earlier, the slot with the flashing LED will be the one with panel focus. Both slots will have keyboard focus.

1) To switch the panel focus from one slot to the other in a layer, just press the **Slot** button of the slot you wish to put in panel focus.

This makes it possible to play two sounds with the keyboard, and edit one of them at a time with the panel controls.

• The configuration of the two slots in a Program will be kept when a Program is saved. This includes the selection of the Panel Focus.

Adding an effect

The Nord Wave has two different sets of effects. The two band EQ and the chorus are Slot effects which mean they can be used with individual settings for each one of the two slots in a Program.

The delay, the tube amp simulator and the reverb are the Program effects, and they will process both the slots at the same time, if both slots are active.

1 Dial up the Wurlitzer program, bank 1, number 30.

Play a few notes and notice the subtle reverb and the panning. The panning effect is actually made with the LFO; turn down the LFO1 AMOUNT knob if you want to turn this off.

2 Press the **Chorus** button once.

This adds a subtle chorus effect.

3 Press the **Chorus** button again to select the second chorus depth, and a third time to select the third chorus depth.
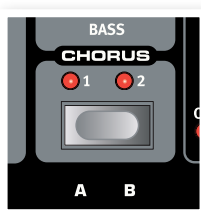
If you find a sound to be to offensive in the overall mix, try turning down the Bass EQ control a bit. The EQ is activated as soon as you turn an EQ knob from its 12 o'clock position.

4 Press the **Delay ON** button to add a delay to the Wurly.

You set the level of the delay signal with the **Amount** knob and the feedback by pressing repeatedly on the **Feedback** button.

5 Press **Shift** + **Stereo** in the delay section to get a stereo delay with a panning effect.

A quick MIDI Setup

The default MIDI Channel on the Wave is channel 1 for the transmission of the keyboard and performance functions, and also for the reception of note-on messages for both the two slots.

Every knob and button on the panel can send MIDI Control Change messages. This makes it possible to record e.g. a filter sweep to a sequencer.

Since the two slots combined have more knobs and buttons than the MIDI specification has available CC addresses, the two slots can be set to two separate MIDI transmission channels.

1 Press **Shift** + **MIDI** to enter the MIDI Menu.

Use the **Up/Down** buttons to select the MIDI Channel function.

This sets the MIDI Channel that is being transmitted from the keyboard and also being used as the receiving channel for both slots simultaneously.

2 Exit the MIDI Menu by pressing any button except the **Up/Down** buttons.

Controlling Slot A and B on separate MIDI Channels

The two slots may receive MIDI note messages on individual MIDI channels, in the bi-timbral mode.

1 Press **Shift** and **MIDI** to enter the MIDI Menu.

2 Use the **Up/Down** buttons to navigate to the MIDI parameter.

Set this function to Bi-Timb.

- This will not disconnect the Wave keyboard and performance controls from the Slots. If you want that kind of functionality, you also have to set the Local function to Off.

3 Use the **Up/Down** buttons to select the MIDI Ctrl A parameter and set this to the MIDI channel that you want Slot A to respond to.

4 Use the **Up/Down** buttons to select the MIDI Ctrl B parameter and set this to the MIDI channel that you want Slot B to respond to.

5 Exit the MIDI Menu by pressing any button except the **Up/Down** buttons.

In the following sections you will find a chapter about the powerful Morph function, a function reference, a chapter that is totally devoted to the Nord Sound Manager, another that explains the Nord Sample Editor application and also a chapter that describes a bit what this "synthesis" thing is all about.

5 The Morph Function
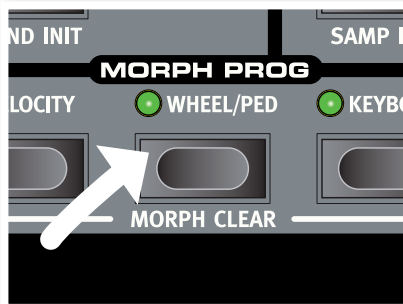
1. Press

2. Turn
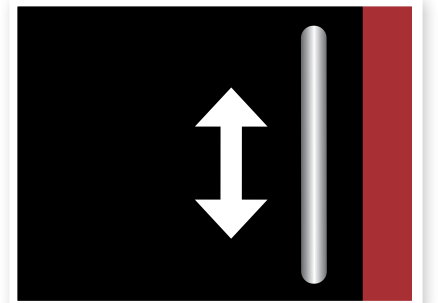
3. Play and use the Mod Wheel

About Morphing

Morphing allows you to be very dynamic and creative in your sound design, and is all about being able to control virtually any important sound related parameter from the Morph sources. These three sources are: the Modulation Wheel & Control Pedal, the Keyboard and the Velocity.

There are 26 available Morph destinations to choose from. This gives you plenty of real-time control possibilities to augment your playing style. A Morph is very simple to set up and use, and all Morph assignments are stored with the Program.

Many of the factory Programs have morph assigned parameters. If a Program uses Morph, one or more of the green **Morph Prog** indicators on the panel will be lit to indicate this.

- If e.g. the **Wheel** indicator in the Morph Prog section is lit for a Program, you can move the wheel and experience how the morph will influence the sound.

A Morph Source controls the range from the parameter's original position in the Program to a position you define when you set up the morph.

This means that you can control a very small range on one parameter at the same time as you control a very large range on a another parameter. One parameter can be controlled clockwise, and another can be controlled counter clockwise.

Morph Sources

There are three **Morph Sources** available:

Note Velocity (Velocity)

This Morph source uses the Note Velocity from the Nord Wave keyboard and from any incoming MIDI messages.

- A key velocity of 0 represents the parameters original value.

- A key velocity of 127 represents the parameters morphed value.

Modulation Wheel and/or Control Pedal (Wheel/Ped)

Uses the **modulation wheel** and/or a pedal connected to the **Control Pedal** input as the Morph Source.

☼ *Incoming MIDI Control Change messages on CC 01 and CC 11will also act as a Wheel/Ped Morph source.*

- The bottom position of the **Modulation Wheel** or **Control Pedal** represents the parameters original value.

- The top position of the **Modulation Wheel** or **Control Pedal** represents the parameters morphed value.

☼ *If the Control Pedal is set to control the overall volume of the Nord Wave, in the System Menu, the wheel will be a solitary Morph source when Wheel/Ped is selected.*

Keyboard Note (Keyboard)

This sets the Keyboard Note Numbers as a Morph Source.

- The bottom key of the **keyboard** (C2) represents the parameters original value.

- The top key (C6) of the **keyboard** represents the parameters morphed value.

⚠ *When using an external keyboard controller connected to the Nord Wave MIDI IN, or when the Wave keyboard has been transposed, any incoming notes outside of the keyboard range, will morph the parameter until the parameters end position is reached.*

Assign a Morph source to a destination

① Hold down a **Morph Source** button.

If this source has any previously assigned Morph destinations, these destinations LEDs will light up.

② Operate a Morph Destination parameter.

The selected Morph Destination's green LED will indicate that a Morph is active.

③ The LCD will indicate the parameters original value and the Morphed value.

In this example the filter cutoff will be Morphed from its original setting of 62Hz to 1.9kHz during the full travel or range of the Morph source.
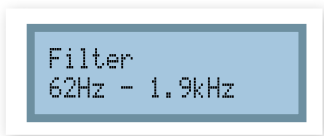
```
Filter
62Hz - 1.9kHz
```

④ Release the **Morph Source** button.

When the Morph source is operated, the parameter's value will change accordingly and the sound will change.

To edit a morph range from a Morph Source:

• Press the corresponding Morph Source button and turn the destination's knob to a new position.

To clear all morphs from a single Morph Source:

• Press **Shift** + the corresponding Morph Source button.

To clear a single Morph destination:

• Hold down the corresponding Morph Source button and operate the parameter knob to its original position, where the Morph LED will be turned off.

Morph Mode

Morph Mode provides you with a great overview that can simplify setting up and adjusting multiple Morph Destinations at once.

① Double-tap on one of the Morph Source buttons.

The Morph Source button flashes continuously, and the LEDs will show any of the associated Morph Destinations.

② Operate a Morph Destination parameter.

The selected Morph Destination's green LED will indicate that a Morph is active.

③ The LCD will indicate the parameters original value and the Morphed value.

☼ *Press any of the Morph Source buttons to exit Morph Mode.*

When the Morph Mode is active you can:

• Operate any **Morph Destination** to set-up or adjust a morph.

• Hold down the **Shift** button and operate a **Morph Destination** to clear it.

Morph Destinations

A Morph Source can control virtually any important sound related knob, Each one of these Morph Destinations has a green LED next to it, which will be lit when a Morph is active for this parameter.

Parameter name		
LFO 1 Rate	OSC MOD Amount	FILTER Decay
LFO 1 Amount	OSC MIX	FILTER Sustain
LFO 2 Rate	OSC SEMI TONES	FILTER Release
LFO 2 Amount	UNISON	FILTER Freq
MOD ENV Attack	AMP ENV Attack	FILTER Res
MOD ENV Dec/Rel	AMP ENV Decay	FILTER Env Amt
MOD ENV Amount	AMP ENV Sustain	OUTPUT Level
OSC Shape 1	AMP ENV Release	DELAY Amount
OSC Shape 2	FILTER Attack	

Morph Examples

New to morphing? No worries, let's setup a Morph for one of the Factory Programs.

① Select the Grand Piano, Program 1:2.

② Press the Slot B button and hold it down, and then turn the Rotary counter clock wise until you see FullStrings 1:1 A.

This will copy the string sound to Slot B for this little exercise. Don't activate Slot A just yet.

③ Press and hold Shift and then press Morph Velocity and also the Morph Wheel buttons.

This will remove the Morph assignments in this string sound and we can start with a clean slate.

④ Operate the Output Level knob all the way to the minimum value.

This will make the string sound silent, enabling us to be able to use the Morph to bring it back up in amplitude again.

⑤ Double tap on the Morph Wheel button and turn up the Output level to about 3.0.

The LCD will display the original setting of 0, and the Morphed setting of 3.0. The Morph will be instantly available, play a few notes and operate the Mod Wheel to hear the result.

⑥ Press both the Slot A and Slot B buttons to activate these two sounds in a layer.

When you operate the Mod Wheel, the string sound will be gradually introduced in the layered sound.

You want more? Here is another example:

① Dial up the Persian Santur Program, 1:41.

Play a few notes in the high, the middle and the low part of the keyboard. Notice how the release is quite long in every area of the keyboard.

② Double tap on the Morph Keyboard button.

③ Turn the Amplifier Release knob counter clock wise and set the Morphed release to be about 250 ms.

You'll notice that the release is long in the lower octave and gets shorter the higher up on the keyboard you play.

Press the Morph Keyboard button again to exit the Morph Mode.

The LFO2 doesn't do anything in this Program so let's give it some work.

④ Select OSC2 for the LFO2 Destination.

Make sure that the triangle waveform is selected to the LFO2.

⑤ Set the LFO rate to about 3-4 Hz and the amount to 0.

This will not produce any noticeable modulation on the sound but wait, we are not done yet.

⑥ Press Shift and LFO2 Single to set the LFO to single mode.

The LFO will now run through one single cycle, acting like an envelope.

⑦ Double tap on the Morph Velocity button.

⑧ Turn up the LFO2 amount to about 4.

When you play with a bit of force, the velocity will Morph the LFO2 Amount, and the pitch of the sound will change according to the one cycle the LFO will produce.

6 Nord Wave Reference

Master Level knob

The **Master Level** knob controls the overall amplitude for the audio outputs - the line level outputs and the headphone output. The **Master Level** knob's actual position indicates the output level. This is one of the very few functions in the Nord Wave that is not stored in a Program.

MIDI LED indicator

The **MIDI LED** will indicate incoming MIDI note messages by briefly lighting up.

- If the incoming messages are on a MIDI channel that the Nord Wave is not responding to, these indications will be short. If the incoming MIDI channels matches the channel(s) you select in the System menu, the indications will be longer.

Store Button

The **Store** button is used when you wish to store a Program in the Program memory on the Nord Wave. During the process, you will get the opportunity to select a location where you want to store the Program.
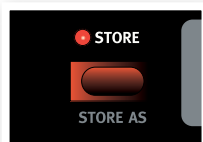
This button's secondary function Store As can be used if you wish to change the name of a Program or the category.

1. Press the **Store** button.

   The Store button LED starts flashing and the original Program location is shown in the LCD.

- There is a Memory Protect function that may need to be turned Off in the System Menu before you can save a Program. Press **Shift + System** and scroll to the Memory Protect setting with the **Up/Down Navigator** buttons and set this to Off using the **Rotary Dial**.

2. Select a new location.

   Use the Program buttons and/or the **Rotary Dial** to choose a new Program location if you do not want to overwrite the original Program. To select another bank, press **Shift** and the **Up/Down Navigator** buttons.

3. Press the **Store** button a second time to confirm your choice.

   The Store LED stops flashing and your Program has now replaced the previous one in the location you selected.

- To cancel the procedure, press any button on the panel before you press **Store** the second time.

Saving a Program with a new name and/or category

1. Press the **Store As** button (**Shift + Store**)

   The Store button LED starts flashing and the Program name and category is shown in the LCD.

2. Use the **Rotary Dial** to select a category.

   There are 17 categories to chose from. Look at page 18 for a complete list.

3. Give your program a name using the **Up/Down** buttons to change position, and the **Rotary** to scroll between the available characters.

4. Press the **Store** button a second time to confirm the new name and category selection.

5. Use the **Program** buttons or the **Rotary** dial to choose the location where you want to store the Program.

6. Press the **Store** button a third time to confirm your choice.

   The Store LED stops flashing and your edited Program has now replaced the previous one in the location you chose.

- To cancel the procedure, press any button on the panel before you press **Store** the third time.

Program Up/Down buttons

The **Up/Down** buttons allows you to select Programs. Depending on the selected Sort Mode, you may step through consecutive numbers in the Banks, step through the Programs in a selected category or step through the Programs in an alphabetical order.
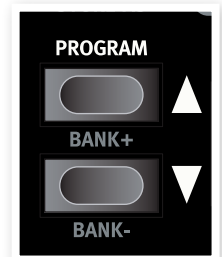
- If you press and hold any of these buttons, Programs will be selected in a rapid and consecutive order.

If you press and hold Shift, these buttons allows you to change Banks, change Category or initial character, depending on the Sort Mode. Read more about the Sort Mode on page 18.

- When you have reached the last Program in a Bank, Category or alphabetical list, pressing Up will select the next available Program in the next Bank, Category or alphabetical list.

☼ *If a Bank contains empty memory locations, these will not be displayed when you scroll through the Banks. They will however be displayed when you browse for a location to save a Program.*

Rotary Dial

The **Rotary** dial is used for changing the current setting displayed in the LCD. Usually this means loading a new program, but in the System or MIDI menus, the **Rotary** is used to change parameter settings.

The dial is endless, though the array of parameter settings are not. Once you reach the first or last possible setting, turning the dial further will have no effect.

The **Rotary** has an accelerator feature; when operated swiftly you scroll through the values in larger intervals.

Octave Shift buttons

The **Octave Shift** buttons transposes the sound of the Slot that has the Panel Focus.
Range: -24. -12, 0, +12, +24
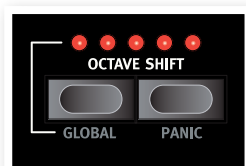
The center LED indicates when no octave shift is applied.

• LEDs to the right of the center LED will indicate a higher octave shift as you press the right **Octave Shift** button.

• LEDs to the left of the center LED will indicate a lower octave shift as you press the left **Octave Shift** button.

☼ *Messages from the Nord Wave's MIDI Out will not be affected.*

Global Octave

By pressing the **Global** button (**Shift** + **Octave Shift** down) you can transpose the keyboard in even octaves. The LEDs will be in a inverted state to indicate that you are in the Global Octave Shift mode.

• In this mode, both Slots as well as the note messages from the MIDI output will be effected.

⚠ *A combination of extreme **Octave Shift** and **OSC 2**'s **Semi Tone** setting can produce sounds that are outside the hearing range.*

Panic

By pressing the **Panic** button (**Shift** + **Octave shift up** buttons) any voices that are producing a sound on the Nord Wave will be silenced.

☼ *Equipment connected via **MIDI Out** will not be affected.*
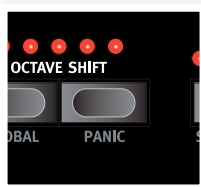
Mono Mode

The Nord Wave is a polyphonic instrument with 18 stereo voices. If the Mono Mode is activated, it will behave as a monophonic synthesizer. Only one key will produce a sound at any time.

Mono Mode button

There are two available mono modes. These differ in how the envelopes are triggered if you press a key without releasing the previous one.

• The **Mono** setting will re-trigger the envelopes; the sound will "restart" for each note you play.

• The **Legato** setting will not re-trigger the envelopes; the sound will "continue" with only a change in pitch.

Sound Init

By pressing the **Sound Init** button (**Shift** + **Mono Mode** buttons), the settings of the Slot in focus will be initialized. This provides you with a neutral starting point if you want to program a sound from scratch.

• The settings of the oscillator waveforms, oscillator mix and the program effects will be excluded from the initialization. The effects will be turned off for the Slot but the actual settings will not be changed.

Glide knob

If you press a key without releasing the previous one, the Glide parameter can be used to set the time interval for the pitch to glide from the previous note, to the new note. With a setting of zero the pitch will change instantly.

Range: 0 - 10.0

Morph Buttons

These are the buttons that you use to select the Morph sources when you set up a Morph - Velocity, Wheel/Ped and Keyboard.

Note Velocity (Velocity)

This Morph source use the Note Velocity from the Nord Wave keyboard and from any incoming MIDI messages.

• A key velocity of 0 represents the parameters original value.

• A key velocity of 127 represents the parameters morphed value.

Modulation Wheel and/or Control Pedal (Wheel/Ped)

Uses the **modulation wheel** and/or a pedal connected to the **Control Pedal** input as the Morph Source.

☼ *Incoming MIDI Control Change messages on CC 01 and CC11 will also act as a Wheel/Ped Morph source.*

• The bottom position of the **Modulation Wheel** or **Control Pedal** represents the parameters original value.

• The top position of the **Modulation Wheel** or **Control Pedal** represents the parameters morphed value.

Keyboard Note (Keyboard)

This sets the Keyboard Note Numbers as a Morph Source.

• The bottom key of the **keyboard** represents the parameters original value.

• The top key of the **keyboard** represents the parameters morphed value.

☀ *The top and bottom keys of the Nord Wave keyboard are always used as the reference, regardless of the* **octave shift** *and* **global octave shift** *settings.*

⚠ *When using an external keyboard controller connected to the Nord Wave MIDI IN, any received notes outside of the keyboard range, will morph the parameter, until the parameters end position is reached.*

For a detailed description on how to set up a Morph scenario, please go to page 13.

Assign a Morph source to a destination

1. Hold down a **Morph Source** button.

   If this source has any previously assigned Morph destinations, these destinations LEDs will light up.

2. Operate a Morph Destination parameter.

   The selected Morph Destination's LED will indicate that a Morph is active.

3. The LCD will indicate the parameters original value and the Morphed value.

• The physical position of a knob may prevent you from adjusting this in a desired manner, e.g. if the knob is at the 0 position and you want a negative Morph. In these cases, adjust the knob to a more suitable position, reload the Program and set up the Morph again.

4. Release the **Morph Source** button.

   When the Morph source is operated, the parameter's value will change accordingly.

To edit a morph range from a Morph Source:
• Press the corresponding Morph Source button and turn the destination's knob to a new position.

To clear all morphs from a single Morph Source:
• Press **Shift** + the corresponding Morph Source button.

To clear a single Morph destination:
• Hold down the corresponding Morph Source button and operate the **Morph Destination** knob to its original position, where the Morph LED will be turned off.

Morph Mode

Morph Mode provides you with a great overview that can simplify setting up and adjusting multiple Morph Destinations at once.

1. Double-tap one of the Morph Source buttons.

   The Morph Source button flashes continuously, and all LEDs are unlit, with the exception of the Morph Destinations that are associated with this source.

☀ *Press any of the Morph Source buttons to exit Morph Mode.*

When the Morph Mode is active you can:

• Operate any **Morph Destination** to set-up or adjust a morph.

• Hold down the **SHIFT** button and operate a **Morph Destination** to clear it.

LCD Window

The **LCD** is normally used for displaying the current program bank, number, name and category.

When you turn a knob or press a button the associated parameter name and setting will be briefly displayed in the **LCD**.

The **LCD** is also used to display the functions in the System and MIDI menus.

Slot Buttons

Every Program in the Nord Wave stores the settings of two individual synthesizer setups, called Slots. This means that you can quickly change from one sound in Slot A to another sound in Slot B, or to play with the sounds from both slots at the same time in a layer.
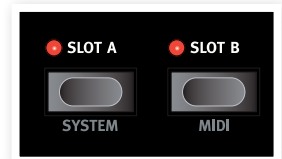
The **Slot** buttons are used to select which one of these two sounds should be controlled from the keyboard. To select both slots at the same time, press both **Slot** buttons at the same time. A slot that is controlled from the keyboard and other performance controls on the Wave has the Keyboard Focus. Either one or both slots can be set to Keyboard Focus.

The Slot Buttons are also used to select which of the two slots should be active on the panel for editing purposes. This is called the Panel Focus, and only one Slot at a time can have the Panel Focus. If two Slots have the Keyboard focus, the slot with the flashing LED has the Panel focus. Press either Slot button to shift the Panel focus from one slot to the other.

System button

Press **Shift** and **Slot A** to enter the System Menu. The System Menu is used for editing system specific settings, these are shown in the **LCD**. The System Menu is described on page 59.

MIDI button

Press **Shift** and **Slot B** to enter the MIDI Menu. The MIDI Menu is used for editing MIDI specific settings, which are shown in the **LCD**. The MIDI Menu is described on page 60.

Chord Button

The **chord** button is used to activate the Chord Memory function. This can be used for memorizing note intervals and automatically adding them to the key(s) you play.
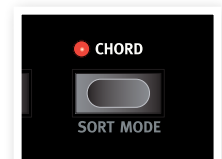
The Chord Memory settings are stored within a Program.

Activating a Chord Memory

① Play a chord and press & hold the **Chord** button.

The display will show the numerical intervals of the notes in the chord from the lowest note (which is displayed as Ø).

☼ *The three lowest keys in the chord will be memorized.*

② Release the **Chord** button first, then the chord.

The note intervals are memorized and the Chord Memory function is activated.

The intervals stored in the Chord Memory will be added automatically to each note you play.

Deactivating a Chord Memory

① Press the **Chord** button to deactivate the Chord Memory function.

Once deactivated, you can at any time press the **chord** button again (without holding any keys down) to re-activate it with the previous chord memory setting.

⚠ *Since you use several notes in the Chord Memory function, the polyphony will be reduced.*

☼ *Only the actual key(s) you play will output MIDI Note information - not the intervals included in the Chord Memory.*

Sort Mode

The Nord Wave allows you to browse for (and load) Program in three different Sort modes. By default, you load a Program by first selecting the Bank with the **Up/Down** buttons and then turning the **Rotary**. The Programs are then displayed (and activated) in a numerical order.

You can also set the Sort mode to be alphabetical or by Category. This selection is made by pressing the **Sort Mode** button (**Shift** + C**hord**) repeatedly.

If the Sort mode is set to numerical (/ alphabetical), pressing the **Up/Down** buttons or scrolling the **Rotary** will select the Programs in a numerical (by category/ alphabetical) fashion.
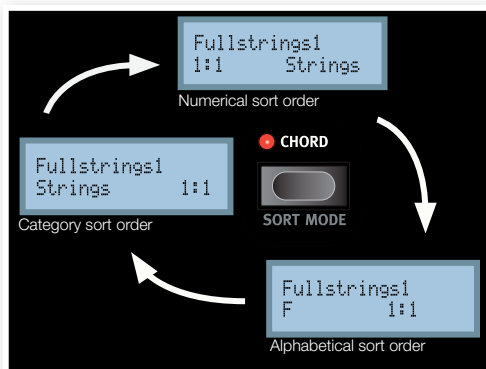
When you have reached the first or last Program in a sort criteria, and continue to scroll with the **Up/Down** buttons, the following Program will be selected. To change Banks, press **Shift** and the **Up/Down** buttons.

List of Categories

Categories		
Acoustic	Organ	Vocal
Bass	Pad	Wind
Drum	Piano	User1
wFantasy	Pluck	User2
Fx	Strings	User3
Lead	Synth	

Vibrato

The **vibrato** function allows you to gradually introduce subtle to dramatic changes in pitch as you play. Press the vibrato button repeatedly to select the desired vibrato functionality.

- The **DLY1**-**3** setting will create a delayed vibrato. The time interval ranges from short to long.
- The **a.t.** setting will introduce the vibrato as you apply after touch on the keyboard (or via MIDI).
- The **Wheel** setting will introduce vibrato as you operate the **Modulation Wheel**.

The vibrato rate can be set in the System Menu.

SAMP Init

By pressing the **SAMP Init** button (**Shift** + **Vibrato** buttons), the settings of the Slot in focus will be initialized and the initialized settings for the selected Sample Instrument in the Program will be activated.

This provides you with a neutral starting point if you want to program a sound from scratch, using the settings that the Sample Instrument creator has applied to the SI. Read more about this on page 51.

- The settings of the program effects will be excluded from the initialization. The effects will be turned off for the Slot but the actual settings will not be changed.

Shift Button

The **Shift** button is used together with other buttons to access secondary functions. The name of these functions are printed below the buttons.

These functions are described together with the primary functions of the buttons in this manual.

LFOs (LFO1 & LFO2)
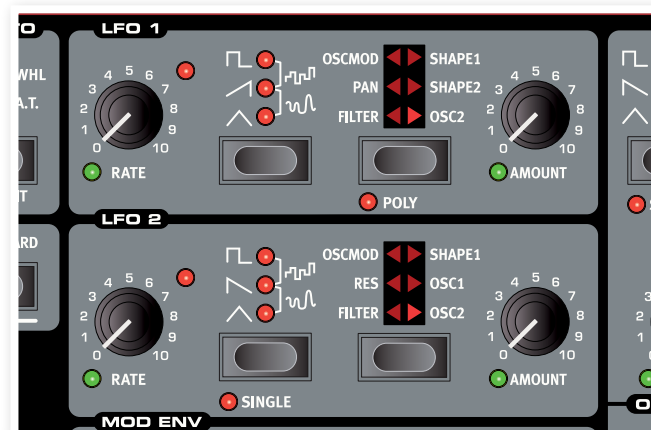
The **LFO** is a Low Frequency Oscillator. An LFO is an oscillator producing waveforms just like an ordinary oscillator, but with a few differences:

- The LFOs are capable of producing waveforms with a very low frequency.
- LFOs are normally not used for generating audible frequencies. Instead the output from the LFO is used for modulating, that is controlling, other functions, like for example the main oscillator frequency (vibrato) or the filter frequency.

The Nord Wave has separate LFOs for each voice, each LFO group (1 & 2) are in fact 18 separate LFOs.

You can sync them to act as a single LFO for all voices if you like. The Nord Wave LFO 2 can also be used in a single-cycle mode, acting like a simple Envelope Generator.

There are two LFOs available, with slightly different features.

Rate knob

The **Rate** knob is used to set the frequency of the LFO.

Range: 0.03 to 523 Hz

The LED to the upper right of the **Rate** knob indicates the rate for each of the LFOs of the 18 voices. This means that when you play several notes after one another, it's the rate of the currently triggered LFO that will be indicated.

Waveform Selector

The Waveform Selector button determines the waveform that is generated by the LFO.

Waveform	Description	LFO1	LFO2
⊓_	**Square** Used for abrupt modulation changes, suitable for trills, distinct tremolos, etc.	✔	✔
◣	**Sawtooth** Used for ramp type modulations.		✔
◢	**Inverted Sawtooth** Used for inverted ramp type modulations.	✔	
∧	**Triangle** Suitable for natural vibrato effects and also used for classic pulse width modulation.	✔	✔
⊓⊔	**Stepped Random** Creates an abrupt modulation with random intensity.	✔	✔
∿	**Smooth Random** Creates a smooth random modulation.	✔	✔

LFO Destination Selector

The LFO Destination determines which parameter(s) the LFO will modulate.

Destination	Description	LFO1	LFO2
Filter	Modulates the Filter Frequency parameter.	✔	✔
Res	Modulates the Filter Resonance parameter.		✔
Pan	Modulates the position of the sound in the stereo panorama.	✔	
OSC MOD	Modulates the Oscillator Modulation Amount.	✔	✔
Shape	Modulates the Oscillator Shape parameter.	✔	✔
OSC1	Modulates the pitch of Oscillator 1.	✔	✔
OSC2	Modulates the pitch of Oscillator 2.	✔	✔

Press the **Destination** selector repeatedly to select the desired destination. The Shape 1 and Shape 2 for the LFO 1 can be selected at the same time, as well as the Osc 1 and Osc 2 for the LFO 2.

☞ *If you press and hold the **Destination** selector, the modulation will be muted - the indicators will start to flash to indicate this state. Press again to reinstate the modulation.*

Amount knob

This is used to set to what extent the signal from the LFO should affect the selected destination.

Range: 0 to 10

Poly mode

In Poly mode, each individual voice will be affected by its own LFO. Poly mode is activated by pressing the **poly** button (**shift** + LFO Destination button). This mode is available to LFO 1 only.

- When Poly is not activated, the LFOs will be synchronized to each other.

Single mode

With single mode activated, the LFO plays a single cycle waveform once without repeating. Single mode is available to LFO 2 only.

- The Single Mode is also a polyphonic mode, each voice will have its own independent LFO.

Modulation Envelope (MOD ENV)

The Modulation Envelope is an envelope with Attack, Decay/Release and Amount controls. It sends out a control signal that can be used to modulate various destinations in the Nord Wave. The modulation from the envelope can be both positive or negative, this is determined with the **Mod Env Amount** knob.
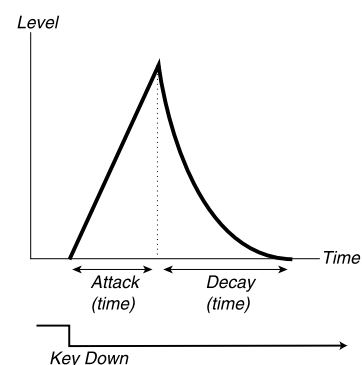
The image above illustrates the Modulation Envelope with Attack and Decay parameters.
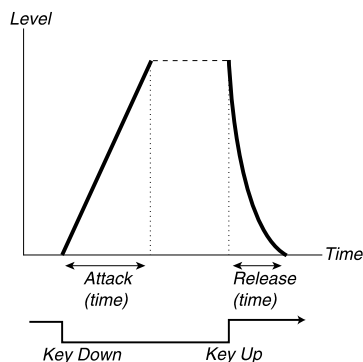
The image above illustrates the Modulation Envelope with Attack and Release parameters.

- The zero level of the Mod Envelope relates to the current setting of the selected target parameter. The maximum modulation amount spans to the intensity set by the **Mod Env Amt** knob.

Attack knob

The **Attack** knob sets the time it should take for the envelope to reach the maximum modulation level after you have pressed a key.

Range: 0.45 ms to 45 s

DEC/REL knob

Sets the decay or the release time of the envelope, depending on whether the Mod Env is set to the AD or the AR mode.

Range: 3.0 ms to 45 s

AR button (Shift + Destination Select button)

The **AR** button toggles between the Attack/Decay or the Attack/Release mode:

AR setting disabled

The **Dec/Rel** knob controls the Decay time of the envelope. This is the time that it takes for the envelope to fall back to zero again after it has completed the attack phase. The envelope has no Sustain Level in this mode.

AR setting enabled

The **Dec/Rel** knob controls the Release time of the envelope. This is the time it takes for the envelope modulation level to fall back to zero again after the key has been released. The envelope's Sustain Level is then set to a maximum amount (according to the Amount parameter).

Amount knob

The **Amount** knob sets the intensity of the modulation.

Range: -10 to +10

- A setting of 0 will produce no modulation.
- A negative value will produce a inverted mod envelope.
- A positive value will produce a positive mod envelope.

Destination selector

The **Destination** selector button selects the destination of the modulation. Press repeatedly to cycle through the various options.

Panel	Description
Filter	The Filter Frequency parameter
OSCMIX	The Oscillator Mix parameter
OSCMOD	The Oscillator Modulation Amount parameter
Shape2	The Shape parameter of oscillator 2
OSC1	The pitch of oscillator 1
OSC2	The pitch of oscillator 2
OSC1 + OSC2	The pitch of both oscillators

☼ *If you press and hold the Destination selector, the modulation will be muted - the indicators will start to flash to indicate this state. Press again to reinstate the modulation.*

Oscillators (OSC1 & OSC2)

The oscillator is the foundation of the sound in a synthesizer. It produces the waveform with a harmonic content. This important property of the sound can be shaped and/or modulated later in the signal path.

Read more about waveforms and harmonic content in the Synthesizer Basic chapter on page 54.

There are two oscillators available; you can use two waveforms simultaneously. You are not limited to just mixing the output of the two, one oscillator can also modulate the other, creating very complex and constantly changing harmonic structures.

Oscillator Waveform selector

Press repeatedly on the **Waveform Selector** button to select the waveform the oscillator will generate.

If the waveform is a multi-type waveform (right side options, oscillator LED lit) you can use the **Waveform Selector** dials to further select what waveform should be generated. The LCD will show the name of the currently selected waveform.

Pulse

The Pulse waveform is available in **OSC1** and **OSC2** and has a hollow character with only odd numbered harmonics. The character can drastically change as the width of the pulse is altered with the Shape parameter. The narrower the pulse width, the more harmonics will be present.

☼ *If you modulate the Shape value using an LFO, you can get very nice "synthesized strings".*

• If **Oscillator Sync** is activated, the **Shape** knob is used for controlling the pitch of the Sync Oscillator. The pulse width is then locked at 33%.

Sawtooth

The Sawtooth waveform is available in **OSC1** and **OSC2** and produces a very rich sound that contains both even and odd numbered harmonics.

• Use the **Shape** parameter to phase shift two super imposed sawtooth waves up to a maximum 180 degrees shift, which creates a perceived one octave shift.

• If **Oscillator Sync** is activated, the **Shape** knob is used for controlling the pitch of the Sync Oscillator.

Triangle

The Triangle waveforms is available in **OSC1** and **OSC2** and has only odd numbered and not very strong harmonics.

• Use the **Shape** parameter to emphasize the available harmonics in the spectrum.

• If **Oscillator Sync** is activated, the **Shape** knob is used for controlling the pitch of the Sync Oscillator.

Wavetable

Wavetables (**WAVE**) are available in **OSC1.** These are single cycle sampled waveforms that provides rich and interesting timbres with various tonal characteristics.

There are 62 wavetables.

• Use the **LED**-dial to select a wavetable. The name of the selected wavetable is briefly shown in the **LCD** window.

• The **Shape** parameter has no function when wavetables are selected.

Sample Instruments

Sample Instruments (**SAMP**) is available to **OSC2** and holds up to 99 Sample Instruments containing samples that are stored in the Flash memory area.
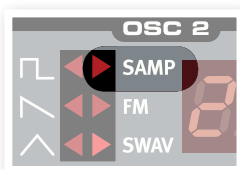
A large selection of high quality samples are installed when the Nord Wave is shipped from the factory, and even more can be downloaded free of charge from the Clavia web site.

The Nord Sample Editor is the application that you use to create and to download Sample Instruments from a computer to the Nord Wave. The Editor is described in detail, in the Nord Sample Editor chapter in this manual.

• Use the **LED**-dial to select a Sample Instrument. The name of the selected Sample Instrument is shown in the **LCD**.

⚠ *A flashing ⁻⁻ character in the LED display indicates that no Sample Instruments at all are available in the Flash memory.*

⚠ *A flashing number in the LED display indicates that the Sample Instrument location that the current Program tried to use, is not available in the Flash memory.*

There is a special **OSC2** only, amplitude decay envelope available when the oscillator 2 is in the Sample Instrument or the Sampled Wave mode. Use the **Shape2/dec** knob to control the decay time of the **OSC2** amplitude envelope.
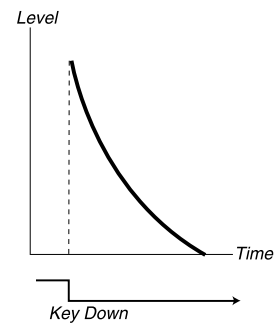
The image above illustrates the phase of the decay envelope.

☼ *By setting the Shape1/DEC knob to the maximum the Decay parameter will have an infinite setting; the envelope will have no effect on your sound.*

• When the **SKIP SMPL ATTACK** (**Shift** + Waveform Selector button) is activated, playback will start at an alternative start point, skipping the attack part of the sound.

Sampled waves

Sampled waves (**SWAV**) are available in **Osc2** and are similar to wavetables, but are made out of recordings of acoustic instruments and still have the attack section of the sample present.
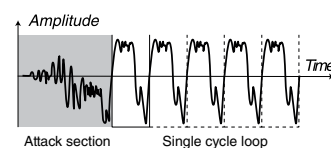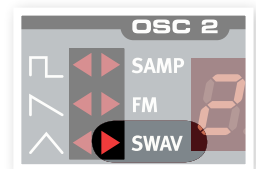
The image above shows the structure of a sampled wave.

• Use the **LED**-dial to select a sampled wave.

• The **Shape** parameter controls the decay time of the **OSC2** amplitude envelope, when this waveform is selected.

FM-Synthesis

FM-Synthesis (**FM**) is available in **OSC1** and **OSC2.** This is a method where the frequency of one Oscillator (referred to as the Carrier) is being modulated by itself using feedback or, by the frequency of additional Oscillators (the Modulators).

=
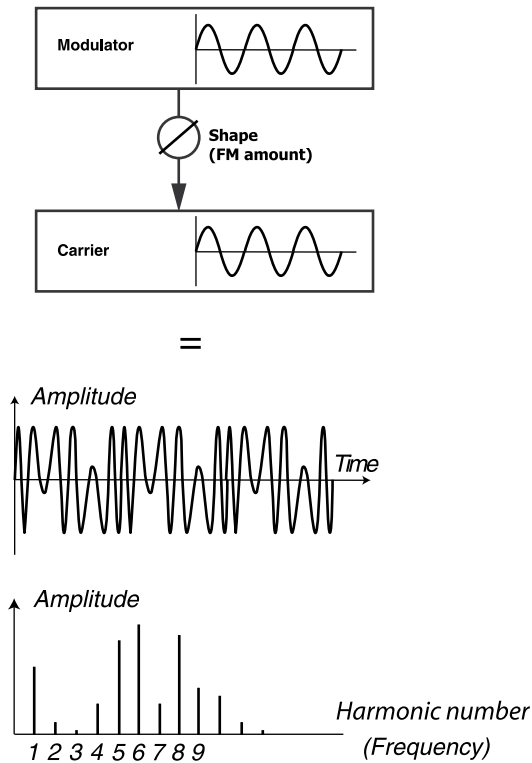
The image above shows a 2 Operator FM-Synthesis setup, and the resulting waveform using a fairly high FM amount setting.

The resulting waveform is far more rich in harmonics than the original Sine waveform, and drastic changes in tonal character are provided by altering the amount of modulation.

There are several FM algorithms available; set-ups with various number of oscillators, feedback and frequency ratio settings between the oscillators.

• Use the **LED**-dial to select FM-algorithm.

• The **Shape** parameter is used for setting the amount of modulation and/or feedback from none to maximum.
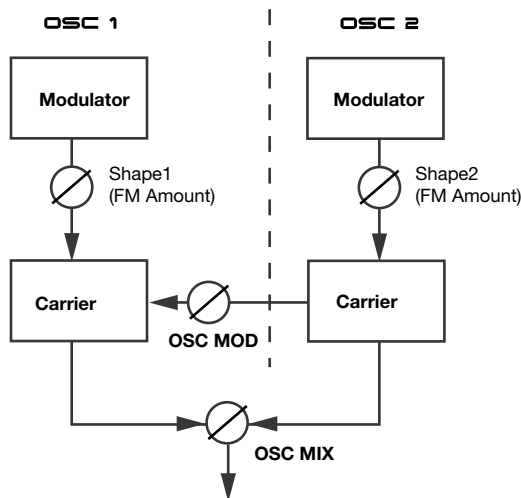
By combining **OSC1** and **OSC2**, up to 6 operators are available, using Oscillator Modulation (**OSC MOD**).

• Oscillator Modulation is described on page 24.

FM Algorithms

LED	LCD	Description (FB = feedback)
CR	1-OP (+FB)	Carrier only, with feedback
1	2-OP 1:1	Carrier + Modulator, same frequency
2	2-OP 2:1	Carrier + Modulator, frequency ratio 2:1
3	2-OP 3:1	Carrier + Modulator, frequency ratio 3:1
4	2-OP 4:1	Carrier + Modulator, frequency ratio 4:1
5	2-OP 5:1	Carrier + Modulator, frequency ratio 5:1
6	2-OP 6:1	Carrier + Modulator, frequency ratio 6:1
7	2-OP 7:1	Carrier + Modulator, frequency ratio 7:1
8	2-OP 8:1	Carrier + Modulator, frequency ratio 8:1
9	2-OP 9:1	Carrier + Modulator, frequency ratio 9:1
1.	2-OP 1:1 (+FB)	Carrier + Mod + FB, same frequency
2.	2-OP 2:1 (+FB)	Carrier + Mod + FB, frequency ratio 2:1
3.	2-OP 3:1 (+FB)	Carrier + Mod + FB, frequency ratio 3:1
4.	2-OP 4:1 (+FB)	Carrier + Mod + FB, frequency ratio 4:1
5.	2-OP 5:1 (+FB)	Carrier + Modulator, frequency ratio 5:1
6.	2-OP 6:1 (+FB)	Carrier + Mod + FB, frequency ratio 6:1
7.	2-OP 7:1 (+FB)	Carrier + Mod + FB, frequency ratio 7:1
8.	2-OP 8:1 (+FB)	Carrier + Mod + FB, frequency ratio 8:1
9.	2-OP 9:1 (+FB)	Carrier + Mod + FB, frequency ratio 9:1
9.	2-OP 9:1 (+FB)	Carrier + Mod + FB, frequency ratio 9:1
11	3-OP 1:1:1	Carrier + Mod + FB, same frequencies
21	3-OP 2:1:1	Carrier + Modulators, frequency ratios 2:1:1
31	3-OP 3:1:1	Carrier + Modulators, frequency ratios 3:1:1
51	3-OP 5:1:1	Carrier + Modulators, frequency ratios 5:1:1
91	3-OP 9:1:1	Carrier + Modulators, frequency ratios 9:1:1
22	3-OP 2:2:1	Carrier + Modulators, frequency ratios 2:2:1
42	3-OP 4:2:1	Carrier + Modulators, frequency ratios 4:2:1
82	3-OP 8:2:1	Carrier + Modulators, frequency ratios 8:2:1
1.1	3-OP 1:1:1(+FB)	Carrier + Mod + FB, same frequencies
1.2	3-OP 1:2:1(+FB)	Carrier + Mod + FB, freq. ratios 1:2:1
1.3	3-OP 1:3:1(+FB)	Carrier + Mod + FB, freq. ratios 1:3:1
1.5	3-OP 1:5:1(+FB)	Carrier + Mod + FB, freq. ratios 1:5:1
1.9	3-OP 1:9:1(+FB)	Carrier + Mod + FB, freq. ratios 1:9:1
1.F	3-OP 1:1:2(+FB)	Carrier + Mod + FB, freq. ratios 1:1:2
2.F	3-OP 2:1:1(+FB)	Carrier + Mod + FB, freq. ratios 2:1:1
3.F	3-OP 3:1:2(+FB)	Carrier + Mod + FB, freq. ratios 3:1:2
5.F	3-OP 5:1:2(+FB)	Carrier + Mod + FB, freq. ratios 5:1:2
9.F	3-OP 9:1:2(+FB)	Carrier + Mod + FB, freq. ratios 9:1:2

Operators

A set-up with 2 oscillators (one Carrier and one Modulator) is called a 2 operator FM-Synthesis, indicated as `2-OP` in the **LCD**. A set-up with 3 oscillators (one Carrier that is being modulated by one Modulator/ Carrier that also is being modulated by another Modulator) is called a 3 operator FM-Synthesis, indicated as `3-OP` in the **LCD**.

☀ *Note that a single Wave oscillator (***OSC1*** or ***OSC2***) in these scenarios actually contains two (or three) oscillators.*

FM-algorithms using only 1 operator (Carrier only) are also available, indicated as `1-OP` in the **LCD**, and `CR` in the **LED** window.

Feedback

The first Operator in the chain can be given feedback to modulate itself, creating more complex harmonics.

• The **Shape** parameter is used to control both the feedback and FM amount simultaneously.
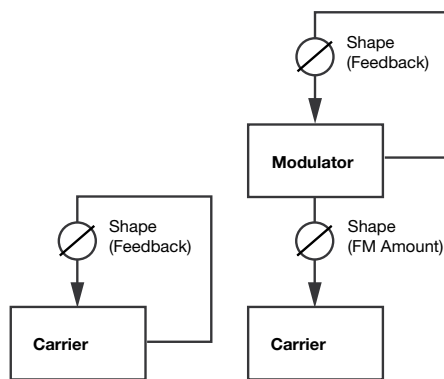
An FM algorithm using Feedback is indicated with `(+FB)` in the **LCD**, and a dot (.) in the **LED** window.

Frequency ratio

By giving the Modulator a different frequency in relationship to the Carrier, you will get different harmonic characteristics.
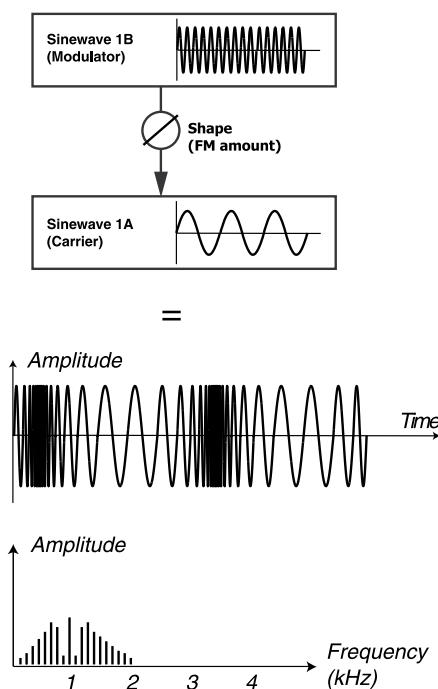
The Image above shows the Modulator having a frequency ratio relation of 9:1 to the frequency of the Carrier, and the resulting waveform using a fairly high FM amount setting.

• Frequency Ratios are indicated by showing e.g. `9:1` in the **LCD**, and simplified `9` in the **LED** display.

Sine

The Sine waveform is not available as a Waveform Type, but can be generated by setting the Waveform Selector to **FM** and setting the **Shape** parameter to zero.

Misc

The Misc category is available in **OSC1** and contains a couple of special noise algorithms and additional waveforms.
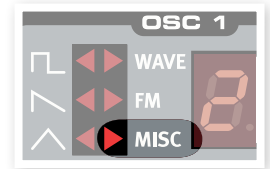
Noise - n1, n2 and n3

When any of the noise algorithms are selected, the oscillator produces noise rather than a pitched waveform.

n1 - The color (aka frequency content) of this noise can be changed with a 12 dB/octave lowpass filter which is controlled by the **SHAPE1** knob. The further you turn the **SHAPE1** knob clockwise, the brighter the noise. At the maximum setting, the frequency content is very close to that of white noise (where all frequencies are represented with equal energy).

n2 - This is a narrow band of noise, which will give it a pitched character. Use the **SHAPE1** knob to go from a wide band of noise to a fluctuating sine wave.

n3 - This produces a noisy signal with a bright metallic timbre. The timbre is created by a dense cloud of short pulses with carefully detuned frequency relations, creating clusters of high pitched partials in its audio spectrum a narrow band of noise, which will give it a pitched character. The **SHAPE1** knob acts like a highpass filter. When turned to the right it will pull the timbre away into the highest parts of the audio range.

SO - This is a shapeable sine wave with addition of odd numbered harmonics. At the minimum Shape setting, the signal is a perfect sine wave and at the maximum setting a lot of odd numbered harmonics have been added.

SA - This is a shapeable sine wave with addition of odd and even numbered harmonics. At the minimum Shape setting, the signal is a perfect sine wave and at the maximum setting a lot of harmonics have been added, giving it a sawtooth character.

SS - This is a synchable sine wave. Use the **SHAPE1** knob to change the pitch of the sync oscillator.

PF - This is a "fixed" pulse waveform where the pulse width is adjusted in absolute time values (with the Shape knob), i.e. the pulse width is constant over the keyboard. This results in a spectrum with fixed formants, similar to the character of many acoustic instruments.

Shape parameter (Shape1 & Shape2/dec)

The Shape parameter is used for altering the waveform generated by the oscillator. The exact functionality varies depending on what type of waveform is generated. This is described for each different waveform on the previous pages.

Range: 0.0 to 10.0

Semi Tones knob

The **Semi Tones** knob is used to adjust the coarse tuning of oscillator 2, relative to oscillator 1. This is done in steps of semi tones, ranging from -24 (-2 octaves) to +24 (+2 octaves) semi tones.

Range: -24 to +24

Fine tune knob

The **Fine tune** knob is used for fine tuning the pitch of Oscillator 2 .

Range: -50 to +50 semitones

☀ *If you have an equal **OSC MIX** setting, and a **Semi Tones** setting of 0; slightly rasing or lowering the fine tune value will produce a "richer" sound.*

☀ *The red LED will light up when the pitch relationship between the two oscillators is not in even octaves. If oscillator 2 is detuned to oscillator 1 the LED will have an inverted state. It will be lit all the time and momentarily go dark when an even octave is selected with the **Semi Tones** knob.*

Oscillator Modulation (Osc Mod)

Oscillator Modulation is about having the waveform produced by oscillator 2 modulating oscillator 1. Oscillator 1 will then produce a richer waveform with more harmonics and these will increase as you apply more modulation.

There are two types of Oscillator Modulation available: Frequency Modulation and Phase Modulation.

☀ *By changing the frequency of oscillator 2 when the Oscillator Modulation is active, you change the harmonic content of oscillator 1 - not its frequency.*
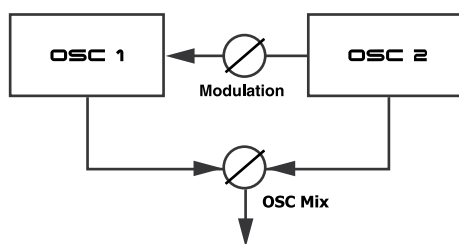
The waveform produced by **OSC2** can be heard if you wish by using the **OSC Mix amount** knob.

Frequency Modulation (FM)

Frequency modulation generates a wider spectrum and the resulting sound is normally perceived as rawer and brighter. The harmonic content changes drastically depending on in what note range you play.
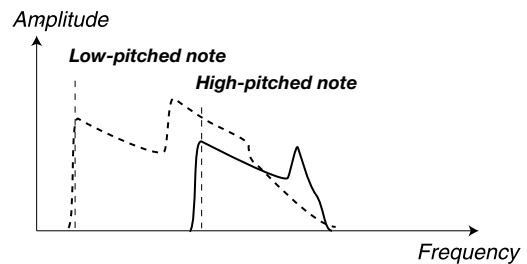
The image above illustrates the harmonic content for a low-pitched note and a high-pitched note using frequency modulation.

⚠ *Some notes can sound more or less out-of pitch using high amounts of frequency modulation; this behavior is considered normal.*

Phase Modulation (PM)

Phase modulation generates the same relative harmonic content regardless of in what note range you play, and is perceived as more fluent, similar to using keyboard tracking with the filter.
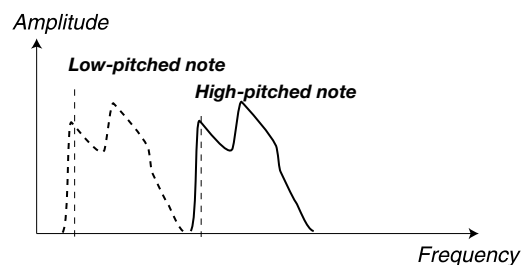
The image above illustrates the harmonic content for a low-pitched note and a high-pitched note using phase modulation.

Amount knob

The **Amount** knob controls the amount of modulation.

Range: 0.0 to 10.0

Type button

Press the type button repeatedly to activate and select the type of modulation.

*Settings: Off, frequency modulation (**FM**) or phase modulation (**PM**).*

Oscillator mix (Osc Mix)

Mix knob

The Oscillator Mix parameter is used for setting the balance in amplitude between oscillator 1 and oscillator 2.

With a setting of either **OSC1** or **OSC2**, only the corresponding oscillator will be heard.

Range: 1:100% to 2:100%

Oscillator Sync (Sync)

When oscillator 1 is set to produce either pulse, triangle or sawtooth waveforms, oscillator sync is available by activating the **Sync** function (**Shift** + **Waveform** Selector button).

When the **Sync** function is activated an additional sync oscillator is available. Each cycle of the waveform produced by the additional oscillator will restart the waveform cycle in the main oscillator.

Only the output of the main oscillator is heard, but since its waveform is constantly restarted, it produces a richer harmonic content.

By altering the frequency of the additional oscillator, a different harmonic content is produced.

• Use the **Shape** knob to change the frequency of the additional oscillator.
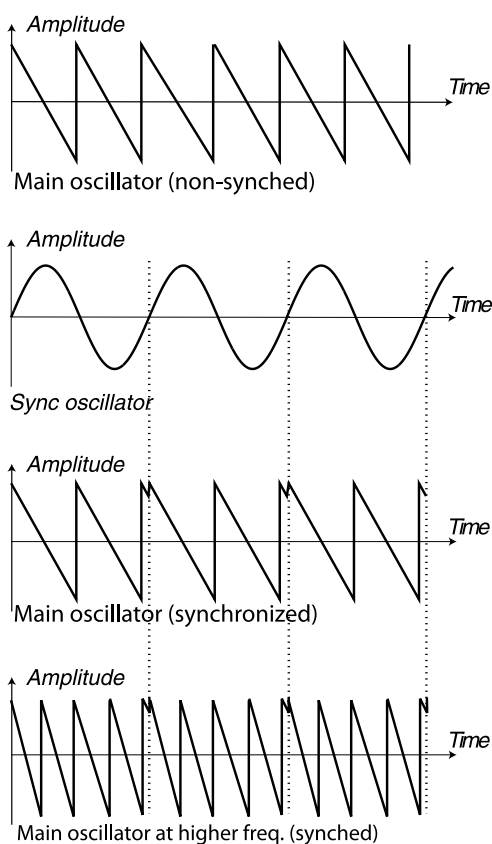
The illustration shows what happens when a sawtooth waveform is synchronized to a sine waveform. The sawtooth restarts its cycle every time the sine passes "zero".
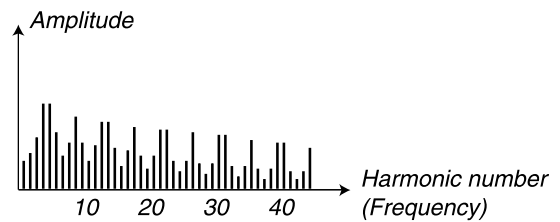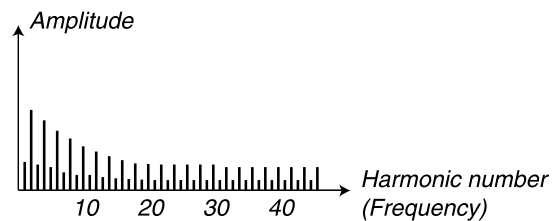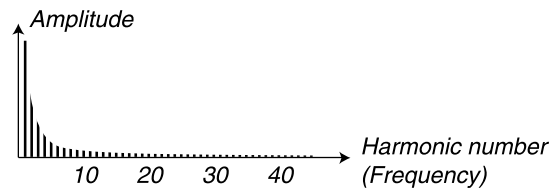
The image above illustrates the harmonic content of the non-synchronized sawtooth waveform compared to the synchronized sawtooth in the previous example.

Amplifier Envelope (AMP ENV)

The Amplifier Envelope is used to control how the amplitude of the sound changes over time. By modulating the amplifier with an envelope, the sound can be given its basic "shape". In fact, the "volume shape" is one of the most important factors to how we identify the sound. By setting up a proper amplifier envelope you can make a sound "soft", "hard", "plucked" "static" etc.
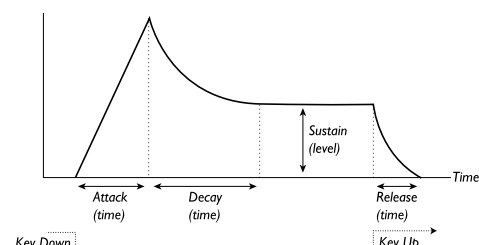
• When a key is pressed, the envelope starts at the zero level, and gradually reaches the maximum level during the time set by the Attack Time (**Attack** knob).

• When it has reached the maximum level the envelope will gradually fade to the Sustain Level (**Sustain** knob), during the time set by the Decay Time (**Decay** knob).

• When the key is released, the sound will instantly start to fade to zero during the time set by the Release Time (**Release** knob). The release phase of the envelope will begin as soon as a key is released.
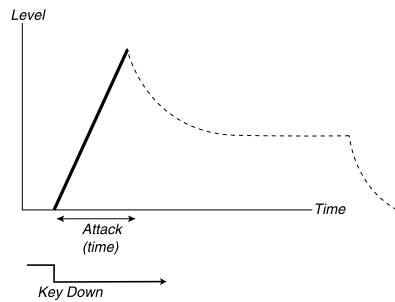
The attack phase is the time it takes for the sound to go from zero to full amplitude after a key has been pressed.

☀ *A very short attack time could produce a click in the beginning of the sound. To eliminate this, just increase the attack time slightly.*
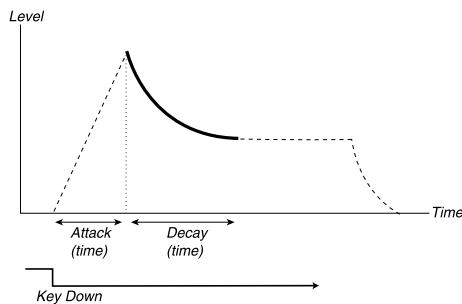
When the attack phase is finished (and you haven't released the key), the decay phase takes over. During the decay phase, the sound decreases in level, and continues to do so until it reaches the Sustain level. With a decay setting of zero the Sustain Level will be reached instantly after the attack phase of the envelope is completed.

☀ *With the Sustain Level set to the maximum, operating the* **Decay** *knob will have no effect.*
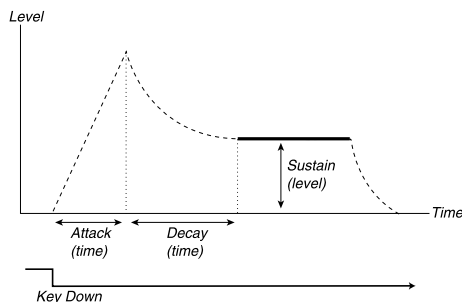
The sustain is the level the sound will reach after the decay phase is finished. Once this has happened, the sound will stay steady at this level until the key is released.

• The Sustain parameter is used to set a level, while Attack, Decay and Release parameters are all used to set times.
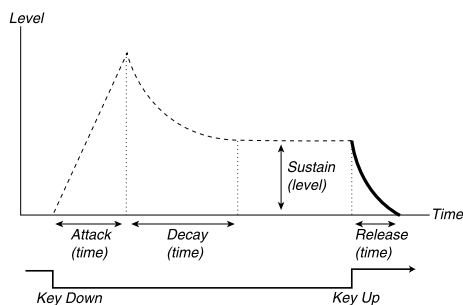
The release phase is the time it will take for the sound to decay from the envelopes current level to silence after you have released the key.

The release phase may start anywhere during the envelopes phases, it will begin as son as a key is released.

☀ *A very short release time could produce a click in the end of the sound. This is a normal physical phenomenon. To eliminate a click, just increase the release time slightly.*

Attack knob

The **Attack** knob sets the time interval for the Attack phase of the envelope. This is time it will take for the sound to go from zero to the full amplitude after a key has been pressed.

Range: 0.5 ms to 45 s

Decay knob

The **Decay** knob sets the time interval for the Decay phase of the envelope. When the Attack phase is finished (and you haven't released the key), the Decay takes over. During the Decay phase, the amplitude of the sound decreases, and continues to do so until it reaches the Sustain level.

Range: 0.5 ms to 45 s

Sustain knob

Use the **Sustain** knob to set the level of the Sustain phase of the Envelope. This is the level the sound will reach after the envelope phase has been completed. Once this has happened, the sound will stay at this level until the key is released. With a setting of zero the amplitude will reach zero after the Decay part of the envelope.

Range: 0.0 to 10.0

Release knob

Use the **Release** knob to set the time interval for the Release phase of the envelope. This is how long it should take for the sound to decay to silence after you have released the key. With a setting of zero the envelope will instantly reach zero when the keys are released.

Range: 3.0 ms to 45 s

Filter

The Filter is one of the most important components to create the overall timbre of the sound. The harmonic content that the oscillators produce can be shaped with the filter and the filter itself can be modulated with various functions. The Nord Wave features a selection of classical synthesizer filters as well as some multi mode filters.

The Filters share the filter parameters: Filter Frequency controls the cutoff frequency, the Resonance controls the filter resonance and the Slope that sets how "steep" the filter slope will be when it is introduced in the audio signal at the cutoff frequency.

☼ *The Slope button has an alternate function for the Comb, Multi and Vocal filter.*

Type button

Press repeatedly on the **Type** button to select the desired filter type. The available filter types are:

Low Pass
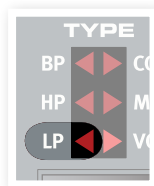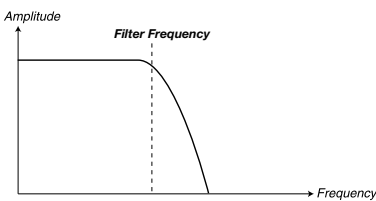
Frequencies above the Filter Frequency setting will be attenuated, frequencies below will not be affected.

High Pass
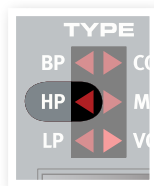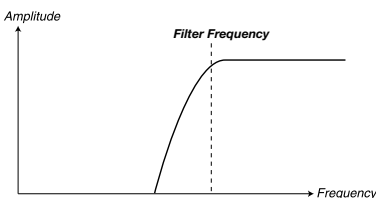
Frequencies below the Filter Frequency setting will be attenuated, frequencies above the cutoff will not be affected.

Band Pass
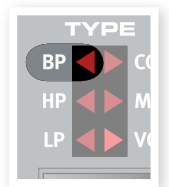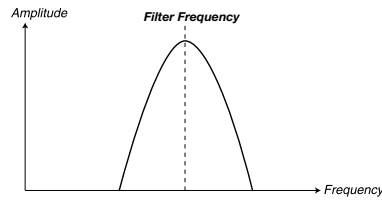
A bandpass filter lets frequencies at the Filter Frequency setting to pass, while frequencies above and below the cutoff will be attenuated.

• The Filter Resonance sets the width of the frequency range that will pass through the band pass filter.

Comb
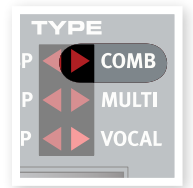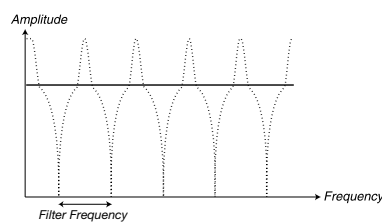
The Comb filter uses a delay line with feedback and a summing mixer to phase out frequencies of the original signal.

A gentle modulation of the **Freq** parameter will produce a classic phaser type effect.

• The **Freq** knob is used for controlling the delay time; perceived as the frequency center of the effect.

• The **Res** knob is used for controlling the level of the summing and the feedback. A setting of zero will produce no summing or feedback which results in the filter having no effect on the sound.
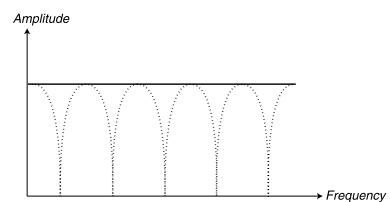
A resonance setting of 0 to 5 will gradually introduce notches in the frequency spectra.
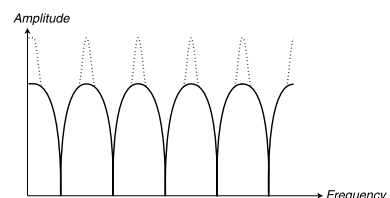
A resonance setting of 5 to 10 will gradually introduce resonant peaks in the frequency spectra.

• The **Slope** button is used for setting the phase of the summation.

• The Comb filter is best experienced with the keyboard tracking (**KB Track**) turned off.

Multi
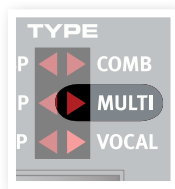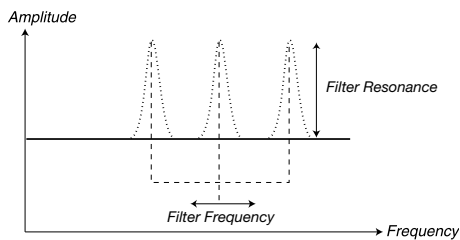
The Multi filter applies three resonant peaks with controllable center frequencies.

• The **Freq** knob is used for controlling the center frequency of the peaks.

• The **Res** knob is used for controlling the resonance . A setting of zero will produce no feedback which means the Multi filter will have no effect to the sound.

• The **Slope** button is used for setting the character of the filter.

☼ *The Multi filter is best perceived with keyboard tracking (**KB Track**) turned off.*

Vocal
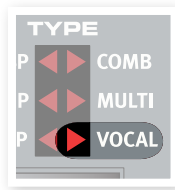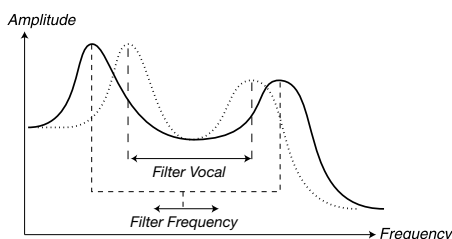
The Vocal filter uses two resonant peaks to give the sound an adjustable vowel character.

• The **Freq** knob is used for controlling the Filter Frequency.

• The **Res** knob is used for controlling the distance between the filter peaks.

• The **Slope** button is used for controlling the filter resonance.

☼ *The Vocal filter is best perceived with keyboard tracking (**KB Track**) turned off.*

Filter Frequency (Freq knob)

The Filter Frequency is used for setting the cutoff frequency point - where in the frequency range the filter begins to process frequencies.

Range: 14 Hz - 21 kHz
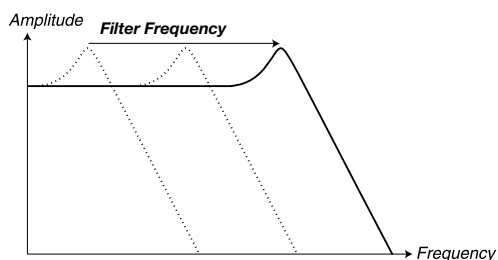
The Image above illustrates three different Filter Frequency settings using a low pass filter.

☼ *For the Multi Mode filters, the function of **Freq** knob varies. Please refer to the section on Filter Types on the previous pages for more information.*

Filter Resonance (Res knob)

Filter Resonance is used to emphasize frequencies around the Filter Frequency, making the sound thinner. Further raising the Filter Resonance will make the sound resonant to a point where the filter adds a ringing quality to the sound. Exactly where in the frequency spectrum this "ringing" occurs, depends on the setting of the Filter Frequency.

Range: 0.0 - 10.0

☼ *The functionality of the **Res** knob varies depending on the selected filter type. Please refer to the section on Filter Types on the previous pages for more information.*

Keyboard Tracking (KB Track button)

Keyboard Tracking is used for adjusting the Filter Frequency cut-off point depending on where in the keyboard range you play.
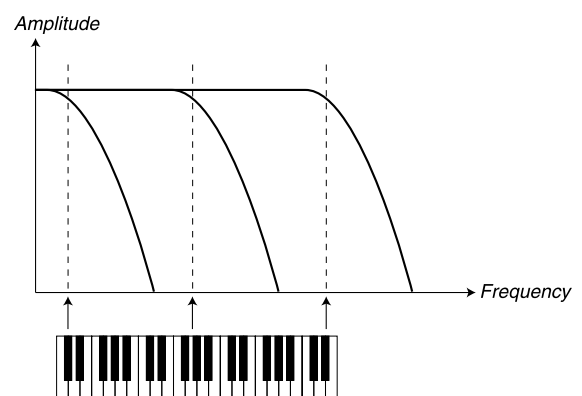
This is related to basic acoustics; if you raise the pitch of a waveform, the harmonics will also increase in frequency. If the cutoff frequency is constant, the sound will be perceived as getting "muddier" the higher up the keyboard you play.

☼ *This function is adjusted in a frequency/octave relationship. A setting of 1 means that the cutoff frequency is moved one octave for every octave you play from the C2 key.*

• With **KB Track** disabled, the Filter Frequency cutoff is constant regardless of where on the keyboard you play.

• With **KB Track** enabled, the Filter Frequency cutoff will be higher for higher notes, and lower for lower notes. The point of reference is the key of C2.

• With **KB Track** at the maximum setting of 1, the cutoff frequency will track the keyboard in a 1:1 relationship.

• With **KB Track** at the 1/3 setting, the cutoff frequency will track the keyboard in a 1:3 relationship.

• With **KB Track** at the 2/3 setting, the cutoff frequency will track the keyboard in a 2:3 relationship.

Filter Slope (Slope button)

The slope of a filter determines how steep the frequency attenuation curve is, when the filter is introduced at the cutoff frequency.
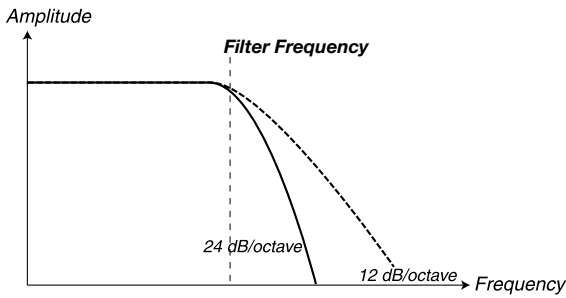
The image above illustrates the difference between the two slopes using a Low Pass filter.

- The **Slope** button toggles the Filter Slope between 24db per octave (4-pole) or 12dB per octave (2-pole).

☼ *The functionality of the Slope button varies in different filter types Please refer to the section on Filter Types on the previous pages for more information.*

Velocity button

The **Velocity** button sets the filter in Velocity mode. In this mode the Filter ENV Amount will change depending on the note velocity data; the harder you play, the more effect will the Filter Envelope have on the Filter Frequency.

- The **Env Amt** knob is used for setting the intensity of the change.
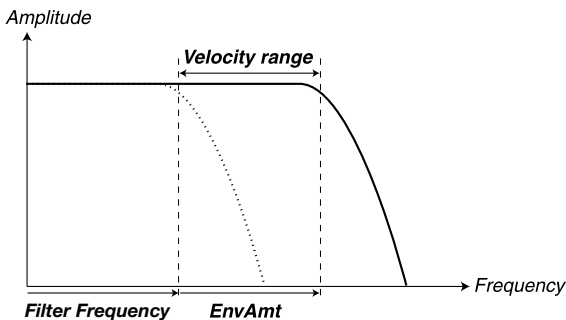
The image above illustrates how the **Env Amt** knob enables note velocity to change the Filter Frequency.

Filter Envelope

The Filter Envelope is used to modulate or control the Filter Frequency cutoff in the time frame from when a key is pressed down, to after it has been released again.

By modulating the filter with an envelope, the sound can be given its harmonic "shape". By setting up a proper filter envelope you can make a sound "soft", "hard", "plucked" "static" etc.
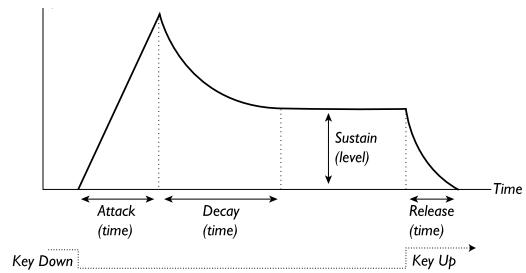
- When a key is pressed, the envelope starts at the zero level, and gradually reaches the maximum level during the time set by the Attack Time (**Attack** knob).

- When it has reached the maximum level the envelope will gradually fade to the Sustain Level (**Sustain** knob), during the time set by the Decay Time (**Decay** knob).

- When the key is released, the modulation will instantly start to fade to zero during the time set by the Release Time (**Release** knob). The release phase of the envelope will begin as soon as a key is released.
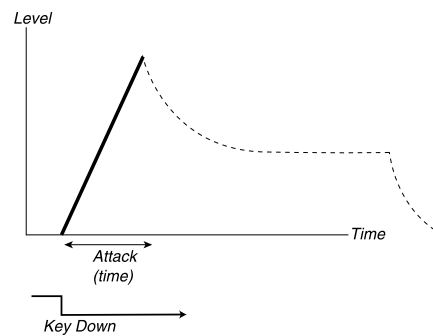
The attack phase is the time it takes for the modulation to go from zero to the maximum modulation after a key has been pressed.

☼ *A very short attack time could produce a click in the beginning of the sound. This is a normal physical phenomenon. To eliminate this, just increase the attack time slightly.*
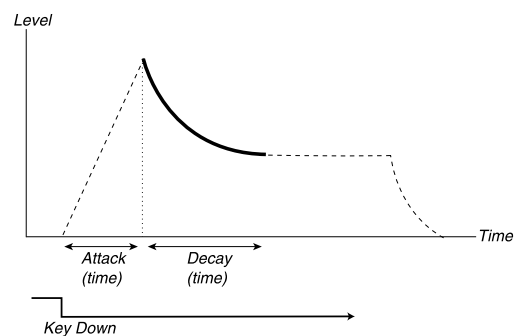
When the attack phase is finished (and you haven't released the key), the decay phase takes over. During the decay phase, the modulation decreases, and continues to do so until it reaches the Sustain level. With a decay setting of zero the Sustain Level will be reached instantly after the attack phase of the envelope is completed.

☼ *With the Sustain Level set to the maximum, operating the **Decay** knob will have no effect.*
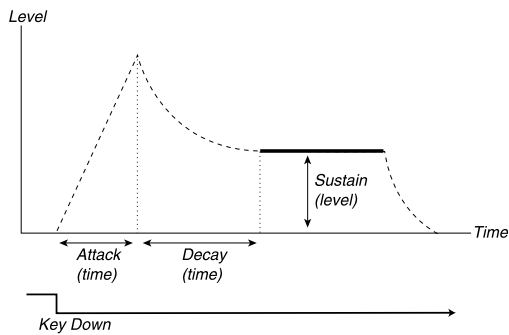
The sustain is the modulation level the envelope will reach after the decay phase is finished. Once this has happened, the modulation will stay steady at this level until the key is released.

• The Sustain parameter is used to set a level, while Attack, Decay and Release parameters are all used to set times.
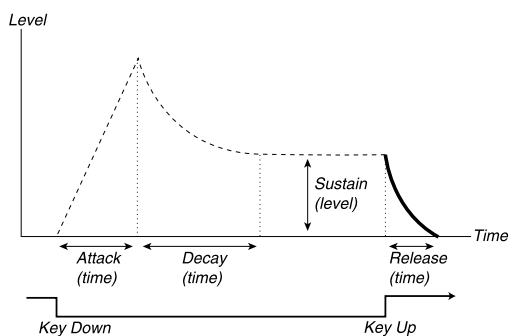
The release phase is the time it will take for the envelope to decay from the envelope's current level to zero level after you have released the key. The release phase may start anywhere during the envelopes phases, it will begin as son as a key is released.

☀ *A very short release time could produce a click in the end of the sound. This is a normal physical phenomenon. To eliminate such a click, just increase the release time slightly.*

Envelope Amount (ENV AMT knob)

Use the ENV AMT knob to determine how much the Filter Envelope should affect the cutoff frequency.

Range: 0.0 to 10.0

Attack knob

The **Attack** knob sets the time interval for the Attack phase of the Filter Envelope. This is time it will take for the modulation to go from zero to the level set by the Envelope Amount knob after a key has been pressed.

Range: 0.5 ms to 45 s

Decay knob

The **Decay** knob sets the time interval for the Decay phase of the Filter Envelope. When the Attack phase is finished (and you haven't released the key), the Decay takes over. During the Decay phase, the modulation decreases, and continues to do so until it reaches the Sustain level.

Range: 0.5 ms to 45 s

Sustain knob

Use the **Sustain** knob to set the level of the Sustain phase of the Filter Envelope. This is the level the modulation will reach after the Decay phase has been completed. Once this has happened, the modulation will stay at this level until the key is released. With a setting of zero the modulation will reach zero after the Decay part of the envelope.

Range: 0.0 to 10.0

Release knob

Use the **Release** knob to set the time interval for the Release phase of the Filter Envelope. This is how long it should take for the modulation to decay to zero after you have released the key. With a setting of zero the envelope will instantly reach zero when the keys are released.

Range: 3.0 ms to 45 s

Output

Level knob

The **Level** knob is used for setting the amplitude (the volume) of the Program. The setting of this parameter is stored when the Program is stored.

☀ *Morph this parameter with velocity of you need to make the amplitude of a sound velocity sensitive.*

⚠ *Note that the **Master level** at the upper left on the panel controls the overall amplitude, where as the Output Level only controls the amplitude of the active Slot.*

Equalizer (EQ)

The 2-band equalizer with a shelving characteristic that can be used for boosting or cutting frequencies in the sound.

Range: from -15dB to +15db

Treble knob

Applies a cut or boost on the treble frequencies of the sound, above 4 kHz.

Bass knob

Applies a cut or boost in the bass frequencies of the sound, below 100 Hz.

☀ *The red LEDs will be lit when the knob's position is set to anything other than 0.*

Chorus

Chorus is an effect that simulates what happens if you have more than one instrument playing the same notes. This effect can make the sound "broader" or warmer.

☀ *The Chorus effect is very subtle in mono operation.*

Chorus button

Press repeatedly on the Chorus button to activate the effect and to select one of the 3 intensity settings.

Range: Off (no LED is lit, 1, 2, and 3 (both LEDs are lit)

☀ *The **Chorus** and **EQ** effects are individual to both the Slots in a Program.*

Program Effects

The Program Effects are 3 effect units that are common to both the Slots in a Program.

Delay

The delay can add an echo effect to the sound. The Delay can operate in mono or in stereo, with the delayed sound appearing in an alternating pattern in the left and right audio channel.

Tempo LED

The **Tempo** LED indicates the time between the repeats in the delay effect.

Tempo knob

The **Tempo** knob sets the time interval between the repeats.

Range: 2.26 s to 64 ms

Feedback button

The **Feedback** button allows you to select the amount of repeats. There are 4 settings to chose from, ranging from one repeat (no active LEDs), to several (1 & 2 LED are lit). Press the feedback button repeatedly to select the desired feedback level.

Stereo button

The **Stereo** button (**Shift** + **Feedback** button) activates the delay in stereo operation. The repeats will appear in the left and then the right audio channel, in an alternating pattern.

Amount knob

The **Amount** knob controls the amount of the delay effect in the audio signal.

Range: 0.0 to 10.0

Tap Tempo button

The **Tap Tempo** button allows you to set a tempo setting of the delay effect by tapping it. By repeatedly tapping this button, the tempo is set to match the interval as you hit the button. The more times you tap, the more accurate will this interpretation be, but two taps may also be sufficient.

On/Off button

Turns the delay effect on or off.

Tube Amp

The **Tube Amp** effect adds a tube-style overdrive to the sound.

Drive knob

The **Drive** knob controls the amount of overdrive.

Range: 0.0 to 10.0

On/Off button

Turns the Tube Amp effect on or off.

Reverb

The **Reverb** effects simulates natural sound reflections in various acoustic environments.

Dry/Wet knob

The **Dry/Wet** knob controls the balance in amplitude between the unprocessed (**dry**) and processed (**wet**) signal.

Reverb button

The **Reverb** button selects the type of reverb effect:

Setting	Description
Room	Small reverberation with room ambiance and a fast decay.
Stage Soft	Medium reverberation with stage ambiance, medium decay and a mellow character.
Stage	Medium reverberation with stage ambiance, medium decay and a bright character
Hall Soft	Full reverberation with a hall ambiance, slow decay and a mellow character.
Hall	Full reverberation with a hall ambiance, slow decay and a bright character.

On/Off button

Turns the Reverb effect on or off.

7 Nord Sound Manager

The Nord Sound Manager is the application that allows you to organize the various memory areas, the partitions in the Nord Wave. It is also used to download samples or programs to the Nord Wave or to upload any of these items - called sounds - from the Nord Wave memory to the computer hard drive. The Nord Sound Manager provides access to various methods to download the sounds to the Wave and a function to backup and restore the entire Nord Wave memory.

System requirements

The Nord Sound Manager is compatible with computers running Mac OSX 10.4 or later, Windows XP and Windows Vista. If you run the Nord Manager on a Windows computer, you also need a Clavia USB Driver of version 2.14 or later installed. The Nord Wave OS has to be 2.0 or later.

❶ *Nord Wave OS Updates, USB drivers and instructions on how to install these are available at the www.nordkeyboards.com website and on the DVD that accompanies this unit.*

Overview

You can work with the contents of the Sample partition and the Program partition. These are accessed from the tabs, conveniently labeled, Samp Lib and Programs.

If no Nord Wave is connected to the computer, pages, icons and memory locations will be grayed out.

⚠ *The actions that take place in the Nord Sound Manager will affect the memories in the Nord Wave. The Manager is on-line with a connected Wave at all times; any changes that you perform in the Manager will immediately be executed in the Nord Wave. If you e.g. delete a sample or a Program from the list in the Nord Sound Manager, that same sample or Program will also be deleted from the Nord Wave Flash memory.*

The Toolbar

The Toolbar gives you direct access to some of the more frequently used functions in the Nord Sound Manager. Clicking on an icon will activate one of these functions, and a dialogue will often appear asking for confirmation or further instructions from you.

The Tabs

Select the partition that you wish to work in with the Tabs. The Samp Lib tab is the sample partition and the Program tab allows you to organize the programs. The individual samples or programs will be referred to as "sounds" in this manual and in the application itself.

☼ *Press Ctrl+Tab on the computer keyboard to cycle between the tabs.*

The lists can be ordered according to location, name, size, version and date, in ascending and descending order. Just click on a headline to select a preferred view.

Partition Memory Indicator

The memory indicator at the bottom of the window indicates how much memory is being used in the selected partition. The red area shows the used memory, green indicates space that is available for new sounds.

Right-Clicking

If you right-click on a sound, a context menu will provide the following options:

Select in Instrument

This will select the chosen sound in the Manager list, to be instantly accessible on the Nord Wave.

Upload

This will upload the selected sound from the Nord Wave to the computer hard drive to a folder of your choice.

Download

This is only available if you right-click on an empty location that does not contain a sound. This allows you to choose a file on the hard drive, to be downloaded to the location in the Nord Wave.

Select In Instrument
Upload...
Download...
Delete
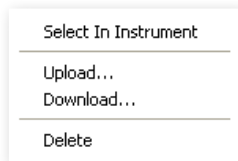
Rename

This allows you to rename, and assign a category to a Program. Characters supported are: a-z, A-Z, 0-9 and a hyphen (-) and the name can contain up to 16 characters. Any other characters will not be displayed in the File Manager lists.

❶ *Samples cannot be renamed, this option will not be available if you right-click on any of these.*

Delete

This will delete the selected sound(s) from the Nord Wave memory.

File Formats

The Nord Sound Manager creates and uses files with the following extensions:

• .nsmp - These are the sample files from the Nord Sample library.

• .nwp - These are the Program files.

• .nwb - This is the extension used for the Nord Wave backup files.

• .nwi - This is an older sample format that previous versions of the Nord Wave Manager created. They can still be used by the Nord Wave (but not the Electro 3) and the Nord Sound Manager.

Just as any other computer file on your hard drive, these files may be renamed, emailed, copied, moved, lost or even stored in a safe location if an evil computer crash suddenly decides to take your hard drive for ride.

The Quick Tour

Let's get acquainted with some of the functions in the Nord Sound Manager.

Transfer samples to the Wave

When the Nord Wave leaves the factory, the sample partition is filled with sounds. In order to be able to download additional samples, you may have to delete some of the factory samples. If you ever want to reload any deleted samples, they are available on the DVD that was included with the Nord Wave, or available as a download from the www.nordkeyboards.com web site, in the Libraries area.

Deleting a sample
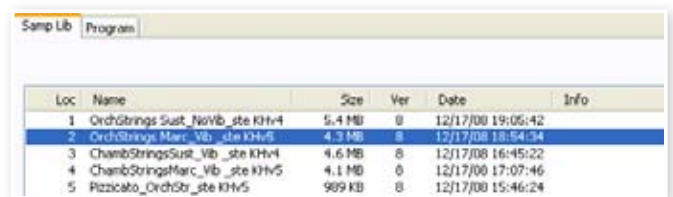
① Connect the Nord Wave to the computer and launch the Nord Sound Manager.

② The Sample tab will open and the current content of the sample partition in the Wave will be displayed.

③ Select a sample to delete and press the Delete icon in the toolbar.

You can also right-click on the sound and choose the Delete option or use the backspace or delete keys on the computer keyboard.

④ You will be asked to confirm your intentions and then the sample in the Wave will be deleted.

Download a new sample
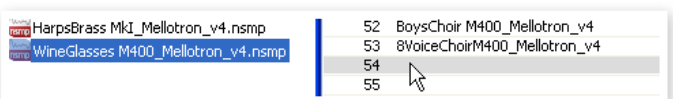
① **Using drag and drop**: Open the folder on the computer hard drive where the new sample (in the .nsmp format) is located.

② Make sure that the File Manager window and the folder are visible on the screen.

③ Drag the new sample to the white area in the File Manager sample list. When the destination location will turn gray, release the mouse button.

④ The Clean Deleted Space process will start to prepare the memory and then the new sample will be downloaded to the Wave. If there isn't enough free space, a message will appear in the lower left text area in the Nord Sound Manager.

☀ *If the Organize option is active in the View menu, you can drop a sound on any free location in the bank. If this function is not active, the new sound will be automatically placed at the first free location in the bank. The various locations are selected using the Type selector on the Nord Wave.*

① **Using the Toolbar or Menu command**: Click on the Sound Down icon in the toolbar. The same command is also available in the File menu: Sound Download (Ctrl-D).

② Browse to the folder on the hard drive where the desired sound is located, select it and click Open. The sample will now be added to its bank.

🔆 *These methods can also be used with any sample or individual programs that you wish to add.*

Upload sounds from the Wave

① Select the desired partition that holds the sounds that you wish to store on the computer hard drive.

② Select the bank and the sound. Shift-click will allow you to select several consecutive sounds; Ctrl-click will allow you to select nonconsecutive sounds. Here we have selected a few of the samples:

Loc ▲	Name	Size
1	OrchStrings Sust_NoVib_ste KHv4	5.4 MB
2	OrchStrings Marc_Vib _ste KHv5	4.3 MB
3	ChambStringsSust_Vib _ste KHv4	4.6 MB
4	ChambStringsMarc_Vib _ste KHv5	4.1 MB
5	Pizzicato_OrchStr_ste KHv5	989 KB

③ Click on the Sound Up tool or right-click on the selected sound(s) and select Upload. The dialogue will prompt you to browse to the desired destination folder on the hard drive. The upload process may take a few moments depending on the size of the sounds.

Upload a complete partition to the hard drive

① Make sure that the desired partition (and bank) is focused in the Nord Sound Manager. You will also have the opportunity to change the source bank in an upcoming dialogue.

② Click on the Bank Up tool, or select the File/Bank Upload menu command (Ctrl-Shift-U). Verify that the source bank is correct and browse to the desired destination folder on the computer hard drive.

You can also select All at the bottom of the sample bank list drop down. This will upload the entire content of the partition to the computer hard drive.

If the Create Subfolders option is checked, a folder structure - partition/bank/sounds - will automatically be created in the destination folder.

Download sounds to the Wave

① Click on the Bank Down tool, or select the File/Bank Download menu command (Ctrl-Shift-D).

② Verify that the destination bank is correct and browse to the desired source folder on the computer hard drive.

ℹ️ *When you click on Download a dialogue appears to inform you that the content of the destination bank in the Nord Wave will be replaced with that of the source file.*

If you select All in the destination bank drop down, you can replace all the sounds in a partition with those on a folder structure on the hard drive. If Search Subfolders is active, you can browse to the top folder of a structure as the parent of the source files.

Organize the program partition

By using drag and drop, you can organize the content of the Program partition with its 128 programs.

① Make sure that Organize is activated in the View menu.

② Select and drag a program from the destination location to the desired location.

If you drop a sound on a free location, the sound will be moved from the source location. If you drop on a location that is occupied, the two sounds will trade places.

③ Select a program and press the Ctrl-key on the computer keyboard. If you now drag this selection, the Program will be copied and pasted at the destination instead of just being moved.

Search Box

① By entering one or several characters in the Search Box, you can filter out the content that is presented in the lists.
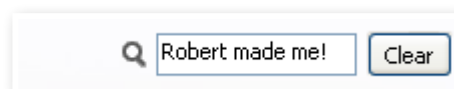
This provides you with a quick way to find duplicate programs, all programs made by the mysterious AD (Ake Danielsson) or all programs with e.g. the phrase "string" in their names.

Auto Select

By clicking on the Auto Select icon in the toolbar, you toggle the Auto Select function on or off.
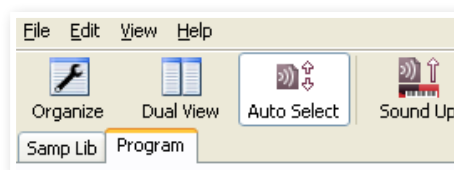
When this is activated and you scroll through the Program or Sample list using the computer keyboard arrow keys, the Program (or Sample) will be automatically selected in the Nord Wave.

🔆 *Double-clicking on a Program or Sample will also select it in the Wave.*

Nord Sound Manager reference

Toolbar
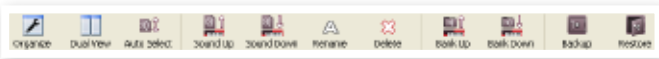
Organize

When this option is active, the lists will show all the available locations in the selected partition/bank and not only the occupied ones. This will for instance make it easier to drag a file to a specific free location in the middle of the list. If this is inactive, only the occupied locations will be shown.

Dual View

When this option is checked, the window will be divided in two lists. The two lists makes it easy to move programs from one location to another. You can make the lists show separate banks with the drop-downs. Rearranging programs is simply a matter of drag and drop. Drag a program from one bank/list to another bank/list in either direction.

Auto Select

With this function active, scrolling through the program list with the computer keyboard arrow keys will automatically select the programs in the Nord Wave.

Sound Up

Use this function to upload one or several sounds from the Nord Wave to the computer hard drive.

Sound Down

Use this function to download one or several sounds from the computer hard drive to the next available location in the selected partition.

Rename

This allows you to rename, and assign a category to a Program. 16 characters can be used, and the supported characters are: a-z, AZ, 0-9 and the hyphen (-). Any other characters will not be displayed in the Manager lists.

❶ *Samples cannot be renamed so this function is not available if you have selected any of these.*

Delete

Allows you to delete one or several selected sounds. You will be asked to confirm your intentions. You may also use the delete or backspace key on the computer keyboard to perform this action.

❶ *Any Program in the Nord Wave that used that particular sample that you deleted will probably not sound at all, since it will be missing an important component.*

The space that a deleted sample occupied is not immediately available to other sounds, even though it is gone from the list and its location is free. The Flash memory needs to be cleaned to free up the space where the deleted sounds have been. When you add a new sample the cleaning process will be initiated automatically. You also have the option to manually start the cleaning process with the Clean Deleted Space command from the File menu.

❶ *A flashing number in the Nord Wave Osc 2 LED display indicates that the sample that the current Program tried to use is not available in the Flash memory. Select another program or download the missing sample to the Wave.*

Bank Up

This function will upload an entire bank of samples or programs to the computer hard drive. The default source will be the currently active bank, but you may choose another partition and bank if you wish. Click on the Choose Folder button to select the destination on the hard drive.

If the Create Subfolders option is checked, a folder structure will automatically be created in the destination folder.

❶ *If a folder with the same name as the source partition/bank already exists in the location on the hard drive, this folder's entire content will be replaced by the uploaded files from the Nord Wave.*

Bank Down

This function will download an entire bank of samples or programs from the computer hard drive to the Nord Wave. The default destination will be the currently active bank, but you may choose another partition and bank if you wish. Click on the Choose Folder button to select the source on the hard drive.

⚠ *The destination bank in the Wave will be replaced by the content of the source folder.*

Backup

This will make a backup of all the samples and programs and Menu settings (System & MIDI menus) in the Nord Wave. The file that is created on the hard drive will have the extension .nwb. Backing up the entire memory content in this manner will take some time, depending on the sizes of the samples.

☀ *Backing up from the Nord Sound Manager is done in an incremental manner. Unless you change the name or the location of the back up file, only the samples and/or programs that have been changed since the previous backup will be saved.*

The Nord Sound Manager will suggest a location for the backup, the first time this function is activated (in My Documents/Nord Sound Manager files/). If you rather save the backup file elsewhere, use the browser to pick another destination.

Restore

To restore a previously saved backup file to the Wave, select this option and browse to a backup file on the hard drive (file extension .nwb) and click Open.

⚠ *The restore function will begin after you have clicked Open and confirmed your intentions in the dialogue. All the content of a connected Nord Wave will then be irrevocably replaced by the content of the backup file.*

Menus

In the Nord Sound Manager, the usual Windows and Mac OSX keyboard commands can be used. The menus can be accessed by pressing the Alt key and the underlined letter in the menu bar.

Most of the commands can also be accessed by pressing the Ctrl (on the Mac - Command) key together with the letter shown next to the command name in the menus.

File

Sound Upload (Ctrl+U)

Use this function to upload one or several sounds from the Nord Wave memory to a folder on the computer hard drive.

Sound Download (Ctrl+D)

Use this function to download one or several sounds from the computer hard drive to the next available location in the selected partition.

Bank Upload (Ctrl+Shift+U)

This allows you to upload an entire bank or partition (samples or programs) to a folder on the computer hard drive. Select the desired source (partition and bank) and the destination folder.

If you select All, all the banks in the partition will be uploaded. The hierarchical folder structure of the chosen partition - partition/bank/sounds - will be automatically created in the destination folder.

Bank Download (Ctrl+Shift+D)

Use this function to download an entire bank (or all banks) from the hard drive to the Nord Wave.

Please note that you need to match the format of the source and the destination, it is e.g. not possible to download a set of programs to any of the sample banks.

❶ *The content of the source folder will replace the selected bank in the Nord Wave.*

Backup (Ctrl+B)

This will make a backup of all the samples, programs and menu settings (System & MIDI menus) in the Nord Wave.

The file that is created on the hard drive will have the extension .nwb.

Backing up the entire memory content in this manner will take some time, depending on the sizes of the samples.

☀ *Backing up from the Nord Sound Manager is done in an incremental manner. Unless you change the name or the location of the back up file, only the samples and/or programs/patches that have been changed since the previous backup will be saved.*

Restore (Ctrl+R)

To restore a previously saved backup file to the Wave, select this option and browse to a backup file on the hard drive (file extension .nwb) and click Open.

⚠ *The restore function will begin after you have clicked Open and confirmed your intentions in the dialogue. All the content of a connected Nord Wave will then be irrevocably replaced by the content of the backup file.*

Clean Deleted Space

This function will clean up the space where any previously deleted samples or programs have been. This is done in order to make this deleted memory space available to new additions.

❶ *Cleaning is automatically done if you download a new sample or program to the Nord Wave, but this menu command makes it possible to manually start the cleaning process.*

Format

This is a radical function; it will format the entire partition that is in focus. All the sounds in the partition will be deleted. You will be asked to confirm your intentions.

Exit (Ctrl+Q)

Exits the Nord Sound Manager application.

Edit

Rename (Ctrl+N)

This allows you to rename, and assign a category to a Program. 16 characters can be used, the supported characters are: a-z, A-Z, 0-9 and the hyphen (-). Any other characters will not be displayed in the Sound Manager lists.

❶ *Samples cannot be renamed so this function is not available if you have selected these.*

Delete

Allows you to delete a selected item(s) from the Nord Wave memory. You will be asked to confirm your intentions.

Select All (Ctrl+A)

Select all items in a bank/partition.

Invert Selection

This will deselect the original selection and then select all the other items in the list.

View

Organize (Ctrl+O)

When this option is checked, the lists will show all the available locations in the selected partition/bank and not only the occupied ones. This will for instance make it easier to drag a file to a specific free location in the middle of the list. If this is unchecked, only the occupied locations will be shown.

Dual View (Ctrl+L)

When this option is checked, the window will be divided in two lists. The two lists makes it easy to move programs from one location to another. You can make the lists show separate banks with the dropdowns. Rearranging programs is simply a matter of drag and drop. Drag a program from one bank/list to another bank/list in either direction.

☀ *Press the Ctrl-key on the computer keyboard to copy a selection to the destination during a drag and drop operation.*

Auto Select (Ctrl+K)

When this function is active, programs will be automatically selected in the Nord Wave when you browse through the Programs in the Manager list, with the computer keyboard arrow keys.

Help

About

Brings up the About box with a information regarding the version of the Nord Sound Manager. You will also see a list of compatible instruments and OS versions.
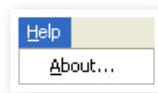
Tabs

Samp Lib - Program

Use the tabs to select the desired partition. Type Ctrl+Tab on the computer keyboard to cycle between the two tabs. The drop down menu is used to select the desired bank within the Program partition. The content of the partition will be presented in the list.

Search Box

Enter a phrase to quickly present any samples or programs that contains the characters. Press Clear to clear the filtering and show all entries again.

Loc - Location

The banks are organized in locations; the number of locations varies for the different bank types.

Name

The name of the item.

Category

Shows the assigned category for the Programs.

Size

Shows the file size of the samples. This may be useful if you need to know how much space e.g. a particular sample occupies in the sample partition. This unit is not shown in the program list.

Ver – Version Number

This indicates the version number of the actual sample or program format.

Info

This area may contain error information about broken, corrupted or rejected files, if e.g. something has happened with a particular sample in the Wave.

Footer Area
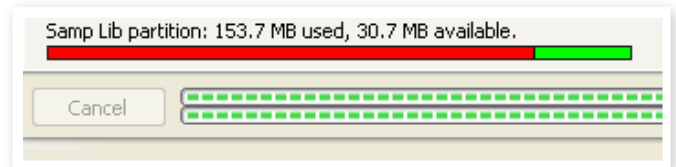
The footer area is located at the bottom of the Nord Sound Manager window.

Partition Memory Indicator

This indicates the usage of the selected partition's memory. The red area shows the used memory and the green area indicates space that is available for additional sounds.

Cancel Button

Use this function if you need to cancel a process that is in progress. Certain functions like e.g. a restore process cannot be cancelled.

Progress Bars

The two progress bars indicate the progress of an ongoing process. The upper bar shows the progression of the individual processes, and the lower indicates the status of the entire task.

Message/Text Area

The left part of the text area will present any confirmations or error messages from the Nord Sound Manager.

The right part will indicate of a Nord Wave is connected to the computer and in communication with the Nord Sound Manager. The OS version of the connected Wave will also be displayed here.

Updates and samples

Please visit our website at http://www.nordkeyboards.com to download any updates of the Nord Sound Manager and sounds that have been released for the Nord Wave. These items will be available as free downloads in the Nord Wave download area.

8 Nord Sample Editor

What is the Nord Sample Editor?

The Nord Sample Editor is the application that allows you to edit, create and load collections of samples to and from the sample memory area of a Sample Library compatible Nord instrument.

The Nord Sample Editor will assist you in your editing efforts; it contains powerful tools for various actions that can be applied to a sample. These tools will for instance help you in setting a start point of a sample, creating a loop and other tasks that are essential in making the samples ready for use in the Nord Wave. The Editor also has functions for automatic mapping of samples across the keyboard and much more.

Non-destructive editing

Any editing that takes place in the Nord Sample Editor software is completely non-destructive. The audio files on your hard disk will not be altered in any way even though the Nord Sample Editor will e.g. truncate samples before they are downloaded to the Nord instrument. If you edit any audio file that is used by the Nord Sample Editor with some other application, that edit will also affect that particular file in the Nord Sample Editor.

System Requirements

Windows PC

The Nord Sample Editor requires a computer with Windows XP or Vista. Additionally you need one free USB port plus a DVD ROM drive if you want to install the software from the DVD.

Mac

The Nord Sample Editor requires a Mac with one USB-port, a DVD ROM unit to install the software and OSX 10.4 or later.

Nord

You will also need a Sample Library compatible Nord instrument to be able to download the samples. The Nord units that are compatible with the Sample Editor and the Nord Sample Library are: Nord Wave with OS v2.x and later and the Nord Electro 3 with OS 1.x or later.

Getting Started

Let's begin with a brief description of the terminology used in this chapter, followed by a typical workflow scenario to give you an overview of the functions of the Nord Sample Editor.

Project, sample memory

All the parts that are needed to assemble a sample waveform in the Nord Wave – references to audio files, samples, mappings, start-, stop- and loop markers etc. - are organized in Projects.

All Project related settings is done on your computer, and you can preview edits via the computer audio card. A Project links to the actual audio files on the hard drive, if you e.g. delete or edit an audio file that is included in a Project, that Project will be affected.

You can save Project files on the hard drive, just like any other computer file. When you are satisfied with a Project, you can generate a Sample Instrument, which can be downloaded to the Flash memory in the Nord Wave.

WYDIWYH

What You Do Is What You Hear. Every function in the Nord Sample Editor can be applied to a sample in real time. If the sample is playing back through the computer audio card, you can e.g. listen to how the loop changes if you move the loop markers or if you adjust the cross-fade settings or the start point of the sample.

Working offline

Project or sample editing does not require a connected Nord unit; you can create and edit Projects using only the computer and then connect to the unit at some other time in order to download the result of the Project to the Nord Wave.

Sample, Zone

When an audio file is added to a Project, it can be used as the source for one or several samples. A sample can be assigned to a range on the keyboard; this range is called a Zone. The sample parameters that determine the range of its zone is the Root Key and the Upper Key.

Sample Instrument

A set of samples with zone settings is a Sample Instrument; the maximum number of zones in a Sample Instrument is 91. The Sample Instrument can be selected in the Nord Wave oscillator 2 as a waveform and by choosing the SampLib type and model in the Electro 3.

Any kind of sample may be assigned to any zone, which means that a Sample Instrument can consist of several different sounds, mapped across the keyboard. You can e.g. create a drum type Sample Instrument with one sound for each key, or create multiple splits by assigning different samples to different keyboard ranges – e.g. bass samples in the lower register, followed by piano samples higher up on the keyboard.

Sample editing, loop markers, crossfade

Setting a starting point for a sample to e.g. eliminate any unwanted audio at the beginning, is a one-click function in the Nord Sample Editor.

The Editor has some very powerful loop functions that make creating perfect, seamless loops a breeze. The loop makes it possible to use shorter samples that still can be played for a duration that is longer than the sample itself. The loop functions also includes a crossfade option that can be monitored in real time, with various options for the length, crossfade curves etc.

Generate, upload, download

When a Project is completed, you can generate a Sample Instrument and automatically download the wave data to the Flash memory in the Nord Wave. The real estate of the Flash memory has a fixed capacity and to keep track on how much room you have left, there is an indicator in the Nord Sample Editor that will help you to manage the available space.

Installation

Installation of the USB driver

Before the Nord Wave can communicate with a Windows PC, you need to install a Clavia USB driver for the Windows operating system. Mac users may skip this paragraph. To install the USB driver, follow these instructions:

1. Insert the 'Nord DVD' installation DVD into the DVD-ROM drive or get the driver from the Nord Wave download area at www.nordkeyboards.com.

2. Connect the USB cable between the Nord Wave and the computer and power up the unit. The 'Found New Hardware' wizard should appear, accompanied by its reassuring alert sound.

3. Let the wizard search the installation DVD for the USB driver and install it, or point the wizard to the folder where the driver is.

Installation Windows PC

1. Insert the 'Nord DVD' into the DVD-ROM drive.

2. Run the Install Nord Sample Editor v2.xx.exe and follow the instructions in the setup program.

3. The Nord Sample Editor will be installed in the Program Files folder on the hard disk.

During the installation you will have the option to select an alternative location for the application.

4. Confirm every window in the installation procedure by clicking on the Next button. The installation may be aborted at any time by clicking on Cancel. When the installation is complete, click the Close button to return to the Windows desktop.

Installation Mac OSX

1. Insert the 'Nord DVD' into the DVD-ROM drive.

2. Open the image file (.dmg) that is located in the Nord Sample Editor folder on the DVD and drag the Nord Sample Editor v2.xx.app to the Applications folder.

☀ *When new versions of the Nord Sample Editor are released, they will be available as a free download at www.nordkeyboards.com.*

The Quick Tour

Let us go through a few things we know you are curious about and get acquainted with the Nord Sample Editor at the same time.
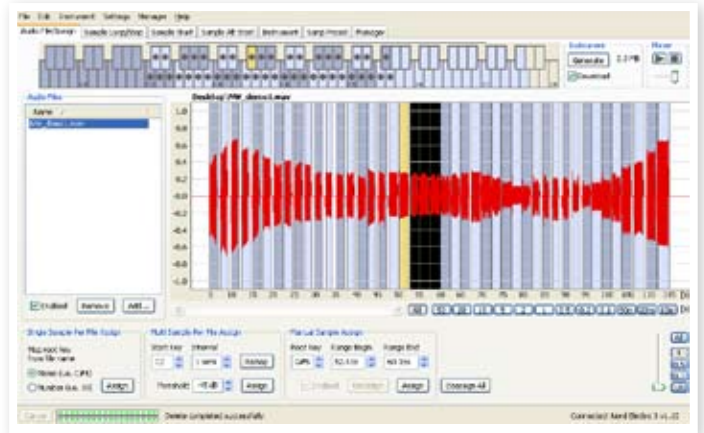
Nord Sample Editor Audio File/Assign tab with an audio file, with assigned samples

First Light

1. Make sure that the Nord Wave is powered up, and connected to the computer, to a USB port.

2. Launch the Nord Sample Editor from the Program Files folder or the Start Menu (PC) or from the Applications folder (Mac OSX).

During the start-up procedure, the Editor will automatically try and establish contact with the Nord Wave.

If a Nord Wave is not connected, you can still work on a Project with sample editing, mapping and other functions. When the Editor finds a Nord Wave, this will be indicated at the lower, right corner of the Editor window and the Manager tab will open automatically. A list with all the current Samples in the Flash memory will appear in the Nord Sample Editor window.
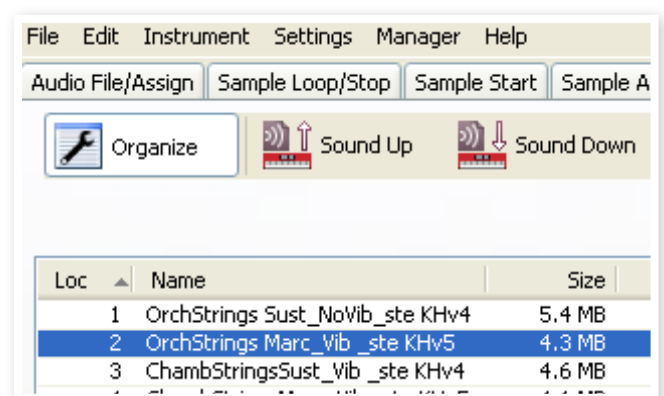
☀ *In order for the Nord Sample Editor to be able to playback samples, you need to select a driver for your audio card. This is done in the Settings/Audio menu.*

❶ *On a XP or Vista system, select an available Direct X driver. In order to be compatible with as many XP and Vista computer systems as possible, the Nord Sample Editor uses Direct X drivers.*

Download Sample Instruments

You can find new Sample Instruments at the www.nordkeyboards.com website. These can be downloaded from the website free of charge. Here's how to download a Sample Instrument from the computer hard drive to the Nord unit:

1. Browse to www.nordkeyboards.com and go to the Nord Sample Library area.

2. Select the Sample Instrument(s) that you wish to get and save the file (or folder) to a location on your hard drive and unzip it.

The file extension of the file will be .nsmp for Sample Instruments. Read more about the different file formats that the Nord Sample Editor uses on page 53.

3. In the Nord Sample Editor, open the Manager tab.

4. Select the Organize option in the Manager menu and you will see a grid with all the available memory locations.

To add new Sample Instruments to the Nord Wave, just drag the files from the hard drive to an empty location in the list of Sample Instruments in the Browser tab.

⚠ *Audio files have to be added to a Project in the Audio File/Assign tab and "generated" to become a Sample Instrument before they can be used in the Nord Wave. Only Sample Instruments in the .nsmp format can be downloaded using the method described above.*

Upload Sample Instruments

Using the Nord Sample Editor, it is very easy to upload samples from the Nord Wave to the computer hard drive. These actions also take place in the Manager tab.

1. Open the Manager tab.

2. Right-click on a sample and select Upload.

The data will be saved in the same folder as the Editor application lives in or in a folder chosen by you. Sample Instruments will be saved as .nsmp files. Read more about the file types the Editor uses on page 53.

☀ *By combining the techniques for down- and uploading the Sample Instruments, you are now able to share Sample Instruments with other Nord Wave or Nord Electro 3 users if you wish.*

Create a new Sample Instrument

Time to get creative; let's create a new Sample Instrument.

1. Copy the NW_demo1.wav file from the Nord DVD to the folder where the Nord Sample Editor is installed.

You may of course use any other audio file in the .wav format but this particular file will demonstrate a very powerful feature of the Nord Sample Editor.

2. Open a new Project from the File menu.

Only one Project can be open in the Editor, you will be prompted to save any changes before any Project that has been edited is closed.

☀ *A quick way to open a new Project is to hit Ctrl+N on the computer keyboard. Ctrl+S will save the current Project. The name you give to a Project will also be the name of the Sample Instrument that is downloaded to the Nord Wave.*

3. Select the Audio File/Assign tab.
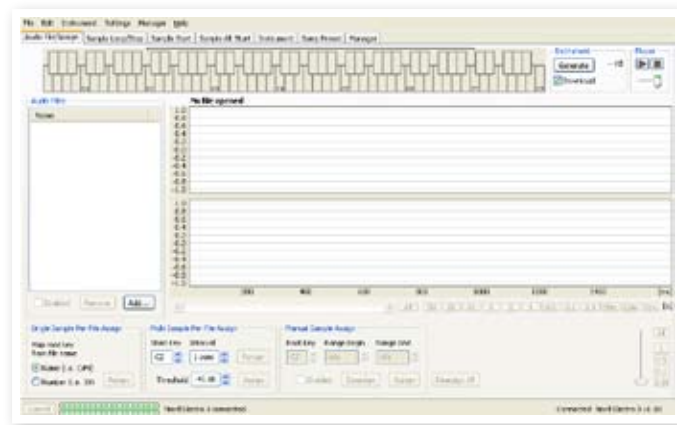
4. Click on the Add button below the Audio Files area or type Ctrl+F. Browse to the location of the NW_demo1.wav file and click Open.

The two progress bars at the lower left corner of the Project window will indicate that the file(s) are added to the Project. The amount of time it takes to add one or several files will vary, depending on the file size(s) and your computer.

☀ *You can select and add several samples at once, as long as they are in the same location on your hard drive. To add all the audio files from an entire folder, use the Add Folder (Ctrl+D) command from the File menu.*

5. When a file has been added, you will see a representation of its content as a waveform graph in the Editor window.

Please note that the NW_demo1.wav is one file, which consists of several recorded notes from a Nord C1 organ. Nothing fancy, just some simple sounds to show you a cool feature. Let's do some magic now and have the Editor create several samples, mapped in Zones across the keyboard from this audio file.
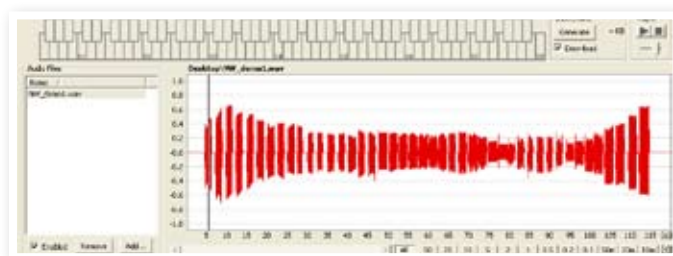
6. Locate the section labeled Multi Sample Per File Assign at the lower part of the Editor window. Set the Start Note to C2, the interval to 1 semi, the Threshold to -45 dB and then click on Assign.

When the Nord Sample Editor has completed the analysis of the file, samples with Root Key and Upper Key settings are created and these settings are translated into zones. These zones will be indicated in the Keyboard Grid at the top of the Editor window.
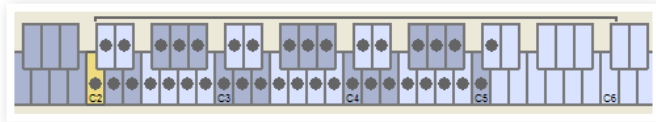
7. The sample that is highlighted in yellow is the focused sample.

This means that this sample is active for further editing and ready for playback.

☀ *Pressing the space bar on the computer keyboard, or clicking on the ▶ symbol in the Player at the upper right corner will start the playback of the file.*

8. The dot-marker on a key (●) in the keyboard display indicates that this is the Root Key of a sample. The sample is also assigned to the corresponding range that surrounds the dot-marked key, indicated in grey or blue.

If you right-click on a dotted key, you can disable a sample temporarily from the Project which will be indicated with a circle (○). You can also de-assign the sample – this means that it will be removed from the Project.

☀ *Disabling a sample from a zone is a great way to determine how many samples you need in order to cover a particular range of a multi sampled instrument or sound. Any settings that have been made to a sample will be kept even if it is disabled. When you re-enable a sample, these settings will be restored.*

☀ *You can use the arrow keys on the computer keyboard to quickly move the focus from one sample to another.*

9. Save the Project by selecting Save in the File menu or type Ctrl+S on the computer keyboard.

Adding Audio files with individual samples

You may want to add audio files that only contain one sample each. Here is how you assign individual samples to Zones:

1. Open a new Project, select the Audio Files/Assign tab and click the Add button.

☀ *The Nord Wave can use stereo or mono audio files as sample sources, with up to 44.1 kHz sample rate, 24 bits resolution.*

2. Navigate to a folder that contain the audio files you wish to use, select the files and click Open to add them to the Project.

3. The files will be listed, one by one in the Audio Files area. Select the first file that you wish to assign to a zone.

The waveform graph will show a representation of the audio file.
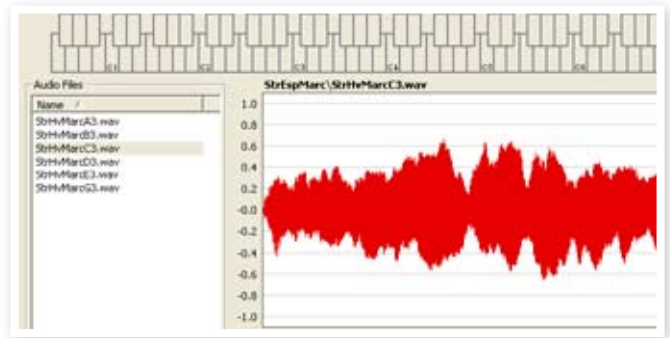
4. Click and drag to select the entire waveform in the graph, and look at the Manual Sample Assign area in the lower part of the window.
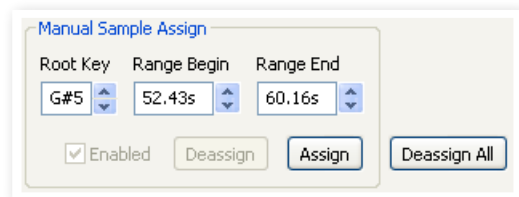
5. Enter the Root Key; the key where the sample will play back at its original pitch, and click Assign.

6. Select the next file and click and drag in the waveform graph to select the entire audio snippet.

7. Enter the Root Key for the next sample/zone.

☀ *The first zone that you create will span a range of two octaves above the Root Key. The range of a zone is determined by two parameters, the Root Key and the Upper Key for each sample. The range is also depending on any other sample that may be assigned further down on the keyboard. A zone's lower key will reach all the way down to any previous sample's Upper Key or the F0 key if it is the "first" sample assigned. A sample will always reach down to the previous sample's Upper Key.*

☀ *A zone in a range cannot be empty, i.e. without an assigned sample. If you want to have some keys that are silent somewhere in a Sample Instrument, just make a selection in the waveform graph of an area that is silent (or Add an audio file that is short, and contains no audio data). Then map this silent sample to a range of keys.*

Single Sample Per File Assign

If you have audio files on your hard drive where the file name contains an identifier or marker of the file's pitch, the Single Sample Per File Assign function can automatically map these samples.

1. Use the Add function to add some audio files to the Project.

The Single Sample Per File Assign function can use identifiers that refer to a pitch name – if the file name is e.g. cello_C#4.wav – or note number – like e.g. cello_39.wav.

2. Select all the files in the File List that has these indicators and click on Assign.
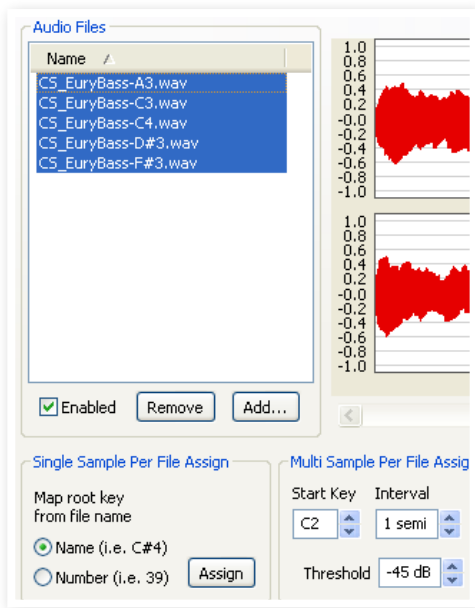
③ The samples will be mapped to zones according to the markers in the file names.

Editing

Let's continue to edit a sample; in order to prepare it a bit more before we download the Sample Instrument to the Nord Wave:

① Make sure that you have at least one sample in the Project and that this sample is assigned to a zone and in focus.

② Click on the Instrument tab.

This is where you can adjust the gain, and fine-tune the pitch of the entire Sample Instrument or any individual samples. You adjust these functions by entering values in the input boxes or by using the increment/decrement buttons.
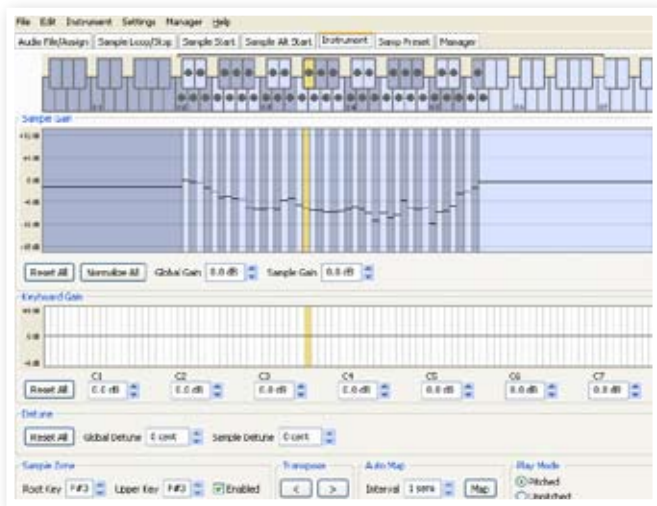
☀ *Move the sample focus by using the horizontal arrow keys on the computer keyboard.*

③ Click on the Sample Start tab.

This is where you can adjust the starting point of the sample. This is useful if you have audio files that contain unwanted material before the actual sound begins. The Nord Sample Editor will automatically place a starting point when a sample is assigned to a zone.

This marker can easily be changed if you prefer to have manual control of this function. You can manually set the start point by entering a value in the Start input box, using the slider or by simply clicking in the waveform graph.
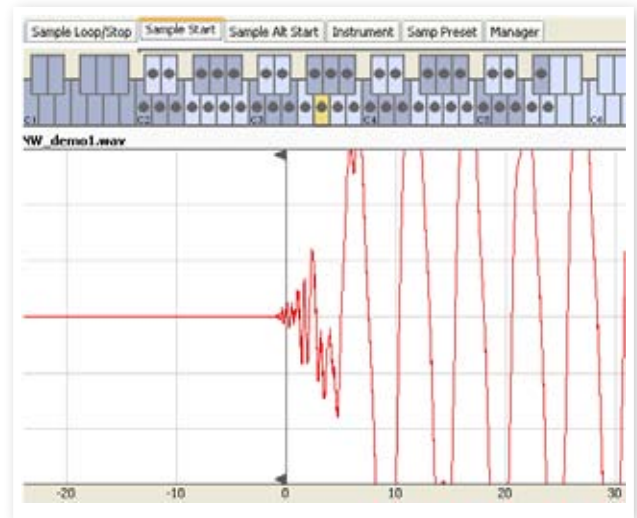
☀ *When the Sample Start tab is opened, the Editor will zoom in closer in the waveform graph to make it easier to distinguish noise from the actual sound. You can change the zoom settings by using the buttons below the waveform graph for the horizontal axis, and the slider or the buttons to the right, for the vertical axis.*

Looping

Loops are very useful in order to make a sample play back or sound beyond its own length. Loops will also reduce a sample's size, since everything after the loop end marker will be discarded when you download a Sample Instrument to the Nord Wave.

Let's take a closer look at a loop.

A loop is automatically generated when a sample is assigned to a zone.

① To view or edit the loop settings, just click on the Sample Loop/ Stop tab. The loop is indicated in the waveform graph as a colored area.
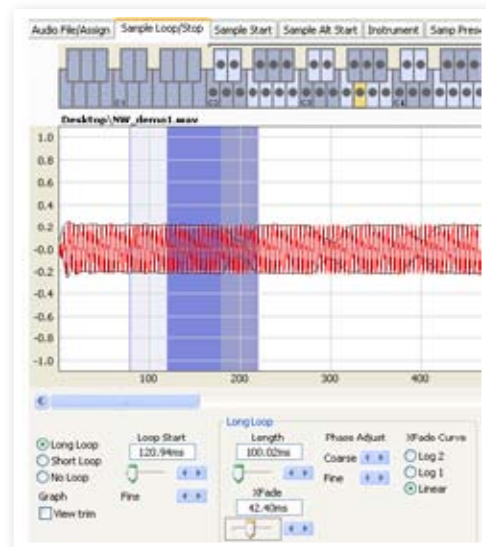
To set a new beginning of the loop - the loop Start marker - just click on the waveform graph. To set the length of the loop, just right-click anywhere to the right of the indication of the loop start. You can also enter values for these parameters in the input boxes or use the sliders.

There are three loop options available, Long Loop, Short Loop and No Loop.

The Long Loop option is useful for various instrument samples and sounds which contain non-periodic variations. When you select this option, a loop start marker and a loop end marker are created. These two loop markers will be separated by the actual loop section which is indicated as the blue area in the waveform graph.

The long Loop option will also include a crossfade to ensure that the loop will sound as smooth as possible. The two segments of the cross-fade are indicated as the light grey area immediately before the loop start marker, and the darker area before the loop end marker.

☀ *Hit the space bar on the computer keyboard to start the playback and adjust the settings for the crossfade or move the loop markers by clicking in the waveform graph. What You Do Is What You Hear, any change you make will be monitored in real time during playback.*

The Short Loop option will create a loop from one single period in the sample. This option can be successful on sounds where the harmonic content changes a lot. It can also be very efficient in reducing the size of a sample. If you have concerns about making as many samples fit in the Nord Wave as possible, this should be explored.

The Short Loop option uses either a pitch estimate or the Root Key as the reference for its length, since the length will have consequences on the pitch of the sound when it is looping.

☀ *If you can find a smooth short loop early in a sample, the envelope generators in the Nord Wave can be used to emulate a natural decay, and you can save lots of space in the Flash memory.*

The No Loop option may seem self explanatory, but the important thing here is to remember that no sample data after the end marker will be downloaded to the Flash memory. Click on the waveform graph to position the end marker.

Please go to page 47 for a detailed description of all the functions in the Loop/Stop tab.

Generate a Sample Instrument

When you have added all the audio files to the Project and are satisfied with the sample edits, it is time to create a Sample Instrument and to download this to the Nord Wave.

① If you haven't saved your Project, now would be a good time to do so.

By saving and giving a Project a name, you are also providing the name for the Sample Instrument when it is downloaded to the Flash memory.

☀ *If you change your mind about the current name on the Project, use Save As… to give it a new one. A Sample Instrument that is created from an unsaved Project will get the default name "Untitled" in the Nord Wave.*

② Go to the Instrument Menu and select Generate Only.

A Sample Instrument with all the samples, zones and edits that you have made in this Project will be generated and automatically saved to the hard drive as a "Project name".nsmp file.

③ If you select Generate and Download, the Sample Instrument will also be downloaded to the Flash memory in the Nord Wave.

Sample Instruments are added incrementally to the Flash memory, to the first available free location.
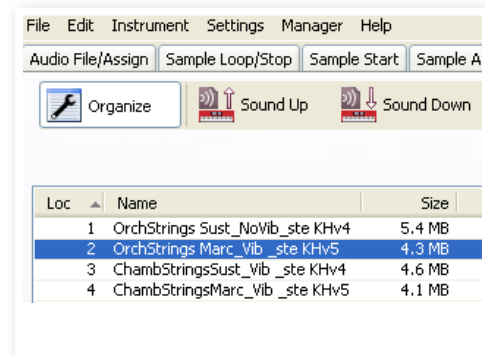
☀ *All of the tabs – except the Manager tab – have an Instrument area, up to the right in the Editor window. If Download is checked, the Sample Instrument will automatically be downloaded to the Nord Wave when it is generated.*

After a Project have been generated and downloaded to the Wave, the sample will be automatically selected as the waveform for oscillator 2 in the instrument.

You can also double-click on a sample in the list, in order to select it as the waveform for oscillator 2.

This concludes our guided tour; we hope you have enjoyed the show so far. The rest of this chapter contains the Editor Reference section where all the functions in the Nord Sample Editor will be explained in detail.

Menu Reference

File Menu

In the Nord Sample Editor, the usual Windows XP and Mac OSX keyboard commands are available. The drop-down menus can be accessed by pressing the Alt key and the underlined letter in the menu bar.

Most of the commands can also be accessed by pressing the Ctrl (Command on the Mac) key together with the letter shown next to the command name in the drop-down menus.

New Project [Ctrl+N]

Creates a new, empty Project window.

Open Project... [Ctrl+O]

Brings up the file selector and allows you to open a Project file from a storage device on the computer. If another Project is already open you will be prompted to save any unsaved changes before it is closed.

Save Project [Ctrl+S]

This command will save the current Project to a storage device on the computer. A Project file has the extension .nwiproj.

Save Project As...

This command will prompt you for a file name and destination folder before saving the Project to a storage device on the computer. This is useful for renaming a Project file before saving it, leaving any original Project intact on the storage device.

Close Project [Ctrl+W]

Closes the current Project. You will be prompted to save any unsaved changes before it is closed.

Add Files... [Ctrl+F]

Brings up the Add Files dialog where you select the audio files to be added to your project. Multiple files can be selected. The same functionality is available in the Audio File/Assign tab by pressing the Add button. The added audio files will appear in the Audio File/Assign tab, in the Audio Files list.

⚠ *Audio data is not copied to the actual Project when you add a file; a Project has only references to the audio files. Any changes you make to an original audio file on the hard drive will affect your project.*

Add Folder... [Ctrl+D]

Brings up the Add Folder dialog where you can browse to and select an entire folder to be added to your project. All supported audio files within that folder will be added. The added audio files will appear in the Audio File/Assign tab, in the Audio Files list.

The Nord Sample Editor can use audio files in the .wav format, up to a 24 bit, 44.1 kHz resolution.

Exit [Ctrl+Q]

Closes the Nord Sample Editor. You will be prompted to save any unsaved changes to an open Project.

Edit Menu

Select All [Ctrl+A]

This command will select all available items, e.g. all the audio files or all the Sample Instruments.

Instrument Menu

Generate And Download [Ctrl+G]

Creates a Sample Instrument from the current Project and stores it on the hard drive as an .nsmp file. The Sample Instrument will also be downloaded to the first available location in a connected Nord Wave.

This process automatically encodes the samples with Clavia's proprietary lossless compression algorithm, in order to reduce the sizes of the samples. Samples will also be cropped before the sample start points and after the loop end marker.

The duration of this process may take several minutes depending on the amount of samples being used. You can use this file to share your Sample Instrument with other Nord Wave or Nord Electro 3 users.

Generate Only [Ctrl+Y]

Creates a Sample Instrument from the current Project and stores it on the hard drive as an .nsmp-file. This process automatically encodes the samples with Clavia's proprietary lossless compression algorithm, in order to reduce the sizes of the samples.

The audio will also be cropped before the start points and after the loop end marker. The duration of this process may last several minutes depending on the amount of samples being used. The file is saved in the same folder as your Project. Use this file type if you want to share your Sample Instrument with other Nord Wave or Nord Electro 3 users.

Settings Menu

Audio...

Brings up the Audio Settings dialog box where you select the driver for any audio card that is connected to or installed in your computer. The output level can also be set in this dialog. The selected audio card will be used to play back samples by the Nord Sample Editor.

The Nord Sample Editor is compatible with Direct X drivers on a Windows XP or Vista system, and with the native Mac OSX drivers.

Manager Menu

Sound Upload

Use this function to upload one or several sounds from the Nord Wave to the computer hard drive

Sound Download

Use this function to download one or several Sample Instruments from the computer hard drive to the Nord Wave.

Delete

Allows you to delete a selected Sample Instrument from the Nord Wave memory.

Organize

When this option is checked, the list will show all the available locations in the memory and not only the occupied ones. This will for instance make it easier to drag a file to a specific free location in the middle of the list. If this is unchecked, only the occupied locations will be shown.

Refresh F5

This function refreshes the content of the current window in the Nord Sample Editor.

Clean Deleted Space

This function will clean up the space where any deleted Sample Instruments have been before they were removed. If nothing has been deleted, this button will be blanked out.

Format

This is a radical function; it will format the entire Sample memory in the Wave and prepare it for some brand new content. You will be asked to confirm this action.

Help Menu

About...

Brings up the About box with information regarding the version of the Nord Sample Editor. You will also see a list of compatible instruments and OS versions.
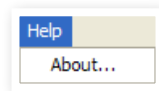
Tab Reference

Each of the tabs opens up a set of functions that will assist you in mapping the samples, setting the start point of samples, loop the samples and to manage the Sample Instruments in the Flash memory in the Nord Wave.

☼ *You can select the different tabs one after each other, by typing Ctrl+Tab on the computer keyboard.*

Common area

The common area will be present at the top of all the tabs except for the Manager tab. It contains functions that are used to view the mapping, to change the focus of the samples, to generate a Sample Instrument and to start and stop playback.
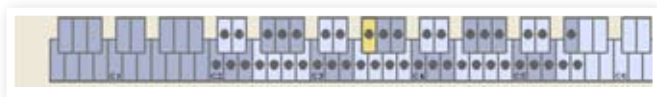
The Keyboard Grid

The Keyboard Grid represents the total keyboard range that the Zones can cover - from F0 to C8. The middle C on the Nord Wave - when the Octave Shift is set to 0 - is the C4 key, MIDI Note Number 60.

- A key with a dot (●) indicates the Root Key - a sample is assigned to this key and the sample plays back at its original pitch. The Zone that this sample is assigned to is presented in a color scheme, with alternating blue and gray colors to separate the Zones from each other.

- A key with a circle (O) indicates that the sample that has been mapped to this zone is de-assigned, but may be re-assigned with its settings intact.

- A key that is yellow indicates that this sample is in focus - this sample is the active sample that you edit with the other functions in the Nord Sample Editor.

If a Nord Wave is connected to the computer, any keys you play on the unit, will be indicated in the keyboard area of the Editor.

You can use the horizontal arrow keys on the computer keyboard to move the focus. When a sample is in focus, the audio file that the sample originated from will be automatically selected in the Audio File list and the corresponding part of the waveform in the graph will be also is presented in the yellow color.

Instrument area

This is a shortcut to the Generate functions that also is available in the Instrument Menu. If the Download box is checked, clicking on the Generate button will generate a Sample Instrument from the current Project, and automatically download this to the Nord Wave.

Player

This contains two standard transport buttons, for starting and stopping the playback of the sample in focus. You can also set the output level of the audio card in your computer with the slider. Pressing the space bar on the computer keyboard will also start and stop the playback.

The Footer

The footer area is located at the bottom of the Nord Sample Editor window.
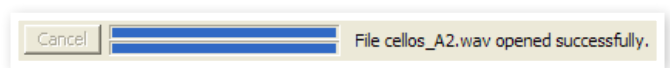
The footer contains mostly informational stuff, and a Cancel button that can be used to abort some of the ongoing processes.

Progress bars

When you start a task in the Nord Sample Editor, the execution may take a few moments, depending on what it is you want to do. One major task may consist of several smaller tasks, and the progress of these is displayed with the Progress bars.

Cancel button

Use this button to cancel any ongoing task that the Nord Sample Editor is in the process of performing.

Upper Progress bar

The upper Progress bar will show the progress of the current task being performed, the name of which is displayed in the message area, to the immediate right of the Progress bar.

Lower Progress bar

The lower Progress bar will show the progress of an ongoing task.

Nord Wave

In the lower right corner is an indication that tells you if a Nord Wave is connected to the computer, or not.

Audio File/Assign Tab
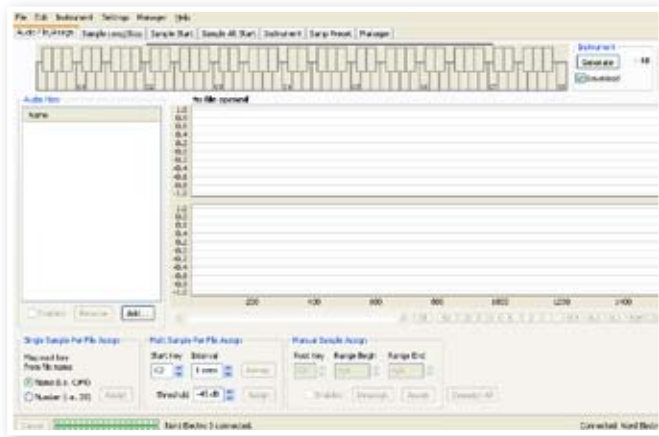
This area is used to add audio files to your project, and assign sections within the audio file to be used as samples.

Several scenarios to automatically analyze and assign samples are available in the Nord Sample Editor. You can either add a group of audio files, where each file contains a single note and has a name identifying the note by name or number, or you can add a single file containing several notes one after the other.

Audio Files

This section contains the list of audio files that are included in the current Project. The list will be empty when you create a new Project, if you open a previously saved Project there may be files in the list.

It is in this list that you select the referenced audio file you wish to use to create samples and assign these samples to Zones. When a file is selected, a graphical representation of its waveform will appear in the waveform graph if the Enabled box is checked.

Only audio files or parts of the audio files that have been assigned as samples in the Project are included when a Sample Instrument is generated.

Name

The files in the list may be sorted alphabetically in an ascending or descending manner by selecting Name and changing direction by clicking on the arrow.

Add Button

Brings up the Add Files dialog where you choose audio files, to be added to your project. Multiple files can be selected.

❶ *A Project uses references to the audio files on the hard drive, and does not copy or load any actual audio data. Any changes that you do to the original audio files will also affect the Project.*

Remove Button

To remove an audio file from the Project, click on the Remove button. This will also remove any samples from the Project that are associated with this audio file.

Enabled box

To temporarily remove an audio file from the Project, un-check the Enabled box. All samples from the audio file in the Project will be disabled. All the Zones that have these samples assigned to them will be removed. The neighboring zones will cover the ranges, which the disabled samples used to occupy. The settings of the disabled samples

and zones will be retained, when the box is checked, the samples and zones will be restored.

Waveform graph

This is a visual representation of the audio file that is selected in the file list. This graph will appear in other tabs as well, with minor alterations in order to assist you in the editing process. If the audio file is in mono, a single graph is drawn, if the audio file is in stereo, the left and right channel will be presented in two parallel graphs. You can select a part of, or an entire audio file by a standard click-and-drag procedure with the mouse.
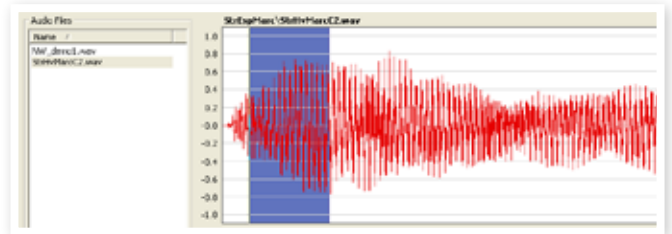
If the entire duration of the audio file will not fit in the waveform graph, you can scroll the content of the graph by using the scroll bar below the graph display.

Waveform Graph Colors

Colors are used to define areas and elements in the graph. The actual waveform data is drawn in red. An undefined area is illustrated by a gray background; a selected (but unassigned) area will have a dark blue background.

If you right-click on a selected area, you can assign this selection as a sample, with the Root Key setting from the Manual Sample Assign area.

When one or several parts of a audio file has been assigned as one or several samples, this will be indicated in the waveform with alternating lighter and darker colors, in the same fashion as the zones are indicated in the Keyboard Grid. If the sample is in focus, this will be illustrated with a yellow color.

Zoom buttons and slider

Zoom in on the waveform using the zoom buttons and the zoom slider.

The buttons below the graph labeled All, 50, 20 etc are the zoom buttons for the X-axis - the duration of the audio expressed in seconds. If you select All, the entire duration will fit in the graph, if you e.g. select 2, 2 seconds of the audio will fit in the graph. Clicking on the 50m, 20m or 10m buttons will show 50, 20, and 10 milliseconds sections of the audio file.

The zoom factor for the Y-axis - the amplitude - is done with the selectors and/or the slider at the lower, right corner. The level of 1.0 represents the full amplitude - 0 dBFS- relative to the bit depth of the audio file.
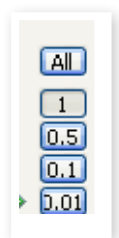
Single Sample Per File Assign

This function allows you to easily map samples to a Zone, where the Root Key of the sample is based on a certain string of characters in the audio file's filename.
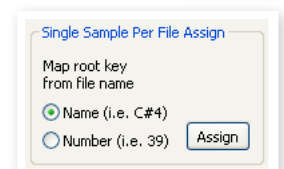
Name

This function use a naming convention where the pitch or note name is indicated in the actual file name. A file that has the name celloC#4.wav will be mapped with the Root Key on C sharp, in the middle octave - when the Octave Shift on the Nord Wave is set to 0. The function can interpret the Root Key, a sharp sign (#) and the octave.

Number

Uses a number in the file name and interprets this as a Root Key number. The middle C, C4 on the Nord Wave keyboard - when the Octave Shift on the Nord Wave is set to 0 - is key number 60.

Select one or several audio files in the Audio File list and click on Assign to assign the samples to Zones. You can use the Ctrl key (or right-click) to select nonconsecutive files in the list.

Multi Sample Per File Assign

This function can create several samples and assign these to zones from a single audio file with recordings of several individual notes, one after the other.
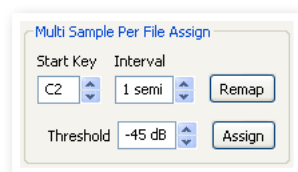
Start Note

Set this to the match the pitch of the first recorded note in the audio file.

Range: F0 - C8

Interval

Set this to match the intervals between the recorded notes in the audio file.

Range -48 - 48 semitones

Threshold

The threshold setting is used to distinguish or separate the individual notes from one and another in the audio file.

Range: -80 - 0 dB

Remap button

Select this to map the audio file again.

Assign button

This activates the assignment of the selected audio file, using the settings you have entered for the parameters for the Multi Sample Assign function.

Manual Sample Assign

This function can create and assign a sample from a selection in the current audio file. Click and drag in the waveform graph to select a part of, or the entire current audio file.
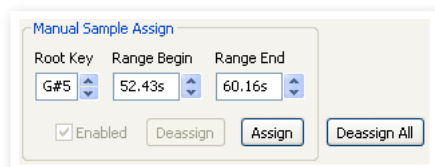
Root Key

This is the note where the sample will play back at its original pitch (or speed if the sample is non-pitched or a performance loop). If you make consecutive selections, the setting will increase in steps of one semi tone for each time you have assigned a sample.

You can also use this setting to adjust the Root Key of a mapped sample. Put the sample in focus and adjust the value to the next available key.

Range: F0 - C8

It is not possible to assign two samples to the same key.

Range Begin

This will indicate where the selection you have made in the graph begins. Use the increment/decrement buttons to adjust the beginning of the selection.

Range End

This will indicate where the selection you have made in the graph ends. Use the increment/decrement buttons to adjust the end of the selection.

Enabled box

This enables or disables the assignment of the sample in focus. It will default to the checked state when you click the Assign button. Uncheck it to temporarily disable an assignment to the sample in focus. The sample and the settings will be kept in the Project, just check the box again to put it right back in business.

Assign button

This activates the assignment of the selected audio file, using the settings you have entered for the parameters for the Manual Sample Assign function.

Deassign

This deactivates the assignment of the sample that is in focus.

Deassign All

Clicking on this button will permanently de-assign the mapping of the focused sample, and also all the other samples that originates from the same audio file. Use this function with care, to quickly start with a clean slate with a previously mapped audio file.

Sample Loop/Stop Tab
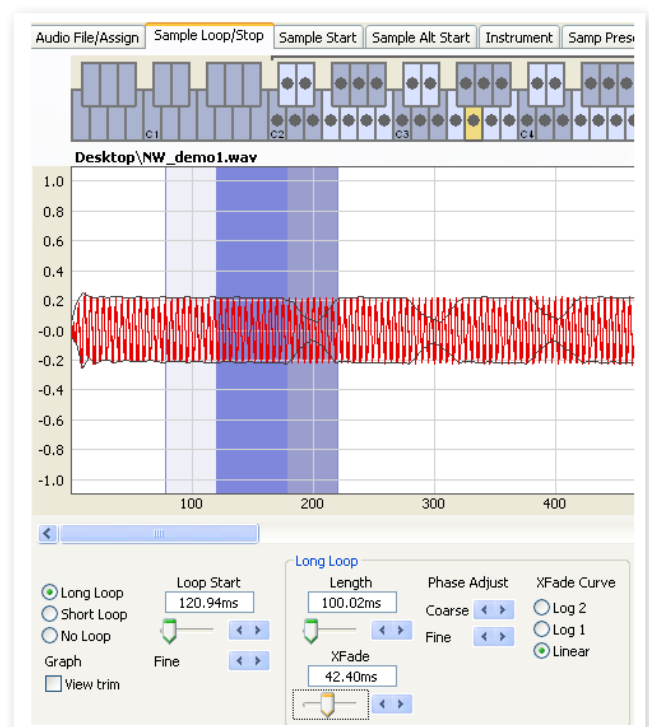
This tab contain the functions that will assist you in finding a loop for the sample that is currently in focus, as indicated by the yellow color in the Keyboard Grid. As soon as an audio file or a selection from an audio file is assigned as a sample, loop markers will automatically be created by the Nord Sample Editor.

A loop in a sample consists of two positional markers in the audio, the loop start and the loop end markers. Visualize the playback of a sample as a horizontal journey from the start of the waveform at the extreme left, towards the end at the right.

Somewhere along the line you will pass the loop start marker, making a mental note of its location. You continue to travel towards the end of the audio file but when you reach the loop end marker, you immediately go back to the loop start marker and resume the path towards the end. And then you hit the loop end marker again, go back to the loop start, and so on.

Creating a perfect, seamless loop can sometimes be a bit difficult. Sometimes the audio at the loop start is very different compared to the audio at the loop end marker, which will produce audible and perhaps unwanted artifacts in the sound.

In order to minimize certain loop artifacts, a crossfade function can be used. This uses audio that is before the loop start marker, and mixes this with audio that is before the loop end marker when the loop is playing back.

A crossfade has usually several parameters to set the length of the crossfade, and to adjust the taper of how these two sound bites will blend into each other during playback. This can help to smooth things out and create a better sounding loop.

⚠ *Any audio data after the loop end point will be automatically discarded by the Nord Sample Editor when you create the Sample Instrument from the Project.*

Waveform graph colors

The waveform graph presents the loop by showing certain areas in different colors. The position of the loop start marker is at the left edge of the blue area. The position of the loop end marker is at the right end of the darker blue area.
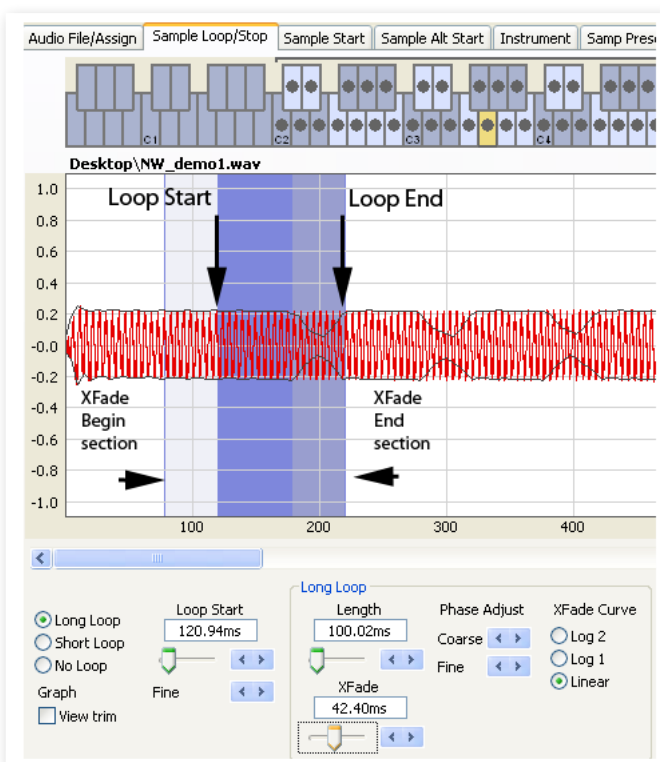
A crossfade's first section is indicated with the light blue area that is before the loop start, to the left of the blue area. The crossfade's end section is the darkest area immediately to the left of the loop end marker. As these settings are changed by you, the indication in the graph will change as well.

You can set the position of the loop start marker by clicking anywhere in the graph. If you right-click to the right of the loop start marker, you can set a new loop end marker – and change the actual loop length.

View Trim

The graph in the Sample Loop/Stop tab can be augmented with a more detailed display of the waveform at the loop start and the loop end markers. This is activated by checking the View Trim box at the lower, left corner of the Editor window.
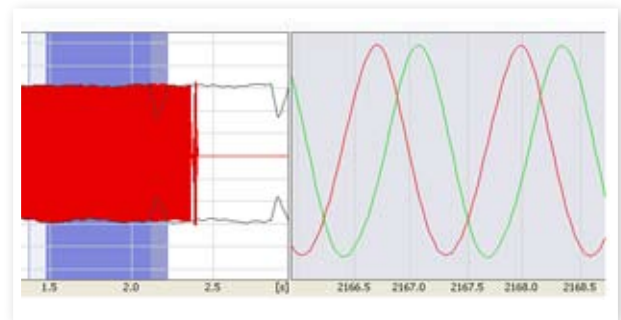
The red waveform shows the audio immediately before and at the loop end marker. The green waveform is the audio at, and immediately after the loop start marker. If these two waveforms meet at the same level, chances are good that this will indicate a loop without any clicks in it.

If a crossfade is used, the two waveforms will be superimposed on top of each other, like the illustration above. This provides a nice visual confirmation of what happens if you fine-tune the length.

☀ *Start with the crossfade set to a small value and see how these two waveforms are presented. When the two colored peaks and valleys are in phase with each other, chances are good that you have a pretty good loop. Any changes you do can always be monitored in real time if you activate the playback.*

Loop Options

There are three available loop options: Long Loop which is the default loop that is applied to a sample when it is assigned to a zone, Short Loop which creates a loop with a single waveform period and finally the No Loop, which gives you an opportunity to set an end marker to the sample.

Loop Start

You can enter a loop start position expressed in seconds in the value box, confirming this by pressing enter, using the slider or fine-tune the position with the increment/decrement buttons. Clicking in the graph will also position the loop start marker.

Long Loop

This section contains the settings for the Long Loop parameters.

Length

You can enter a loop length expressed in seconds in the value box, confirming this by pressing enter, using the slider or set the length with the increment/decrement buttons, in a coarse- or a fine-tune fashion.

Right-clicking in the graph will position the loop end marker, which together with the position of the loop start marker sets the loop length. Make sure that you right-click to the right of the loop start, it is not possible to position the loop end before the loop start marker.

Xfade

You can enter a crossfade length expressed in seconds in the value box, confirming this by pressing enter or by using the slider. Any changes you do will be immediately heard if you are playing back the sample and also presented in the waveform graph. To disable the crossfade, set the crossfade length to 0.

Xfade Curve

There are three available curves for the crossfade: Log1, Log2, and Linear. These are used to compensate for any amplitude changes that might occur in a crossfade as a result of cancellations when harmonics are out of phase with each other.

Short Loop

When using the Short Loop option, the loop length is set to a single waveform period. As the length of a single period is relative to the pitch of the sample, you can use an algorithm that analyzes the pitch of the sample, or use a length correlating to the pitch of the sample's Root Key.

Loop Length based on

These are the two alternatives on how to determine what constitutes as a single period in the sample. If a short loop produces a different pitch than the actual sample, you may need to try the Root Key option.

The Pitch Estimate is the default, but there may be occasions when this is unsuitable. If a sample has strong harmonics (that are stronger than the fundamental), the Root Key option may be better suited.

Xfade

The short loop also has provisions for using a crossfade, with a selection of fixed lengths: 25% or 10% of the loop length. Set this to Off if no crossfade should be used.

No Loop

This provides you with the option to set a marker where the sample will end. You can also set a fade out time.

Stop

You can enter the position of where the sample will end expressed in seconds in the value box, confirming this by pressing enter or by using the slider. You can also click in the graph to set the sample end marker when this loop option is selected.

Fade Out

Enter the Fade Out time expressed in seconds in the value box, confirming this by pressing enter or by using the slider. This is the time in seconds leading up to the sample end during which the amplitude will gradually fade out.

Apply on All

The loop settings that you have made can be applied to all other samples in the project. In order to compensate for any artifacts that might occur when you e.g. play a chord, as a result of several loops with identical settings, you have the option to apply a variation to the loop length.

Loop Length Variation

Set the variation to the loop length to all the individual samples loops, expressed as a percentage. Enter the value in the box, confirm this by pressing enter or use the slider.

Apply Loop

Click this button to apply the variation setting to all of the loops in the current project.

Sample Start Tab
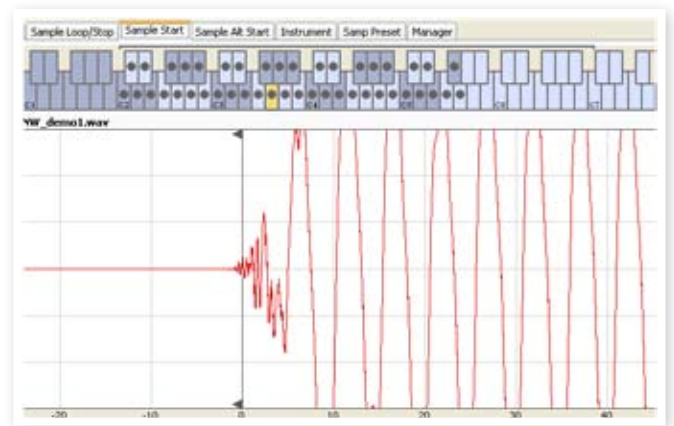
When the Sample Start tab is opened, the waveform graph will zoom in to give you a better view of what is happening at the very beginning of the sample. As soon as a sample is assigned by the Nord Sample Editor, a Start point will be automatically set. This will be indicated in the Start tab by the marker.

Start

Enter the start position in the sample expressed in seconds in the value box, confirming this by pressing enter or by using the slider. You can also set a start point by clicking in the waveform.

Use the zoom controls if you need to back out of the view, or get closer to the actual waveform representation.

Sample Alt Start Tab

This tab allows you to set the alternate start marker of the sample in the same fashion as the "normal" sample start. This alternate start point will be activated when you select the Skip Samp Attack function on the Nord Wave panel.

❶ *The alternate sample start functionality is not available in a Nord Electro 3*

Instrument Tab

This is where you can change individual settings to all the samples that are mapped in the current Project. You can adjust the amplitude with the gain controls, tune the samples and apply a couple of powerful functions that will assist you with the final mapping of the samples. The familiar Keyboard Grid is here to assist you with a clear overview of how the samples are mapped across the keyboard range.

Sample Gain grid

All the individual samples will be presented here, as zones or slices that correspond to the map settings that are presented in the Keyboard Grid. The sample in focus will be indicated in yellow, the other samples in a alternating pattern of blue and gray to provide you with an easy-to-use overview.

The zones can be changed by clicking and dragging on the zone boundaries in the grid, grab the upper limit of a zone and move it to a new key.

❶ *One zone's Upper Key cannot be pushed on top of or above another zone's Root Key.*

The amplitude of any individual sample is indicated with the black horizontal marker in each slice. With the controls below this grid, you can adjust the global gain of the entire Sample Instrument or an individual gain for every sample. This can be used to increase or attenuate the overall loudness of the Sample Instrument.

Reset All

Click on this to reset all the samples to their original amplitude, as they were when they were added to the Project.

Normalize All

This allows you to set all the samples to the 0 dB amplitude in the grid. This represents the maximum amplitude in the audio file, in relation to the bit depth of the audio. There is however headroom available in the Nord Sample Editor and the Nord Wave, that allows you to increase the amplitude beyond this level if you need.
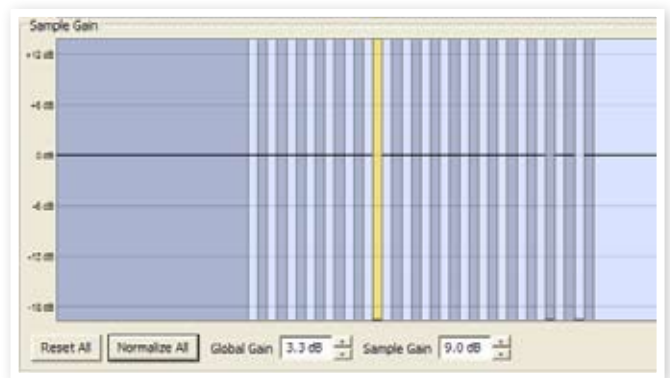
Global Gain

This can set a global increase or attenuation of the amplitude of the entire Sample Instrument. Any individual amplitude differences between the samples will not be altered. Set the value expressed in dB:s in the value box, confirming this by pressing enter, or with the increment/decrement buttons.

Range: -9.0 to + 9.0 dB

Sample Gain

This allows you to change the amplitude on each individual sample. The amplitude after a gain change will be indicated with the horizontal line in the Grid. Set the value expressed in dB:s in the value box, confirming this by pressing enter, or with the increment/decrement buttons.

Range: -9.0 to + 9.0 dB

Keyboard Gain graph

This graph will reflect any changes that you make with the Keyboard Gain controls. These settings will affect the entire Sample Instrument, and can be used to apply various adjustments that will change the amplitude across the range of the keyboard. If for example the lower range in the Sample Instrument is too loud, you can apply an attenuation that begins at a chosen octave. The sample in focus will be indicated as a yellow slice.
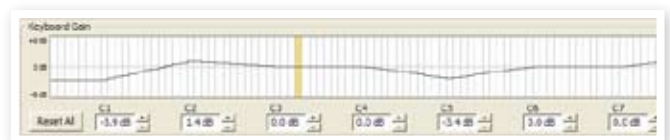
Reset All

This will reset any settings that you have made using the octave gain controls.

Octave gain controls

Allows you to apply a gain change to a range, which will start at the preset keys C1, C2, C3 etc.

C4 represents the middle C on the Nord Wave, when the Octave Shift control is set to 0. Set the value expressed in dB:s in the value box, confirming this by pressing enter, or with the increment/decrement buttons.

Ranges: -9.0 to + 9.0 dB

Detune

You can change the overall tuning of the samples, either on a global scale or for any individual samples. This provides you with the means to fix any problems with samples that are out of tune, or to adjust an entire Sample Instrument. The unit is in cents, 100 cent is the range between two semitones.
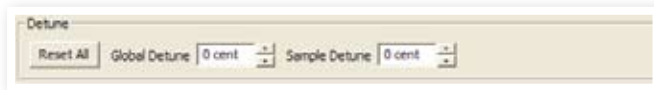
Reset All

This will reset any changes that you have made using the Detune controls.

Global Detune

Sets the overall tuning of the Sample Instrument. Enter the value expressed in cents in the value box, confirming this by pressing enter, or with the increment/decrement buttons.

Range: -50 to 50 cents

Sample Detune

This allows you to detune the sample in focus in the Sample Instrument. Set the value expressed in cents in the value box, confirming this by pressing enter, or with the increment/decrement buttons. Each and every sample in the Project can be de-tuned.

Range: -50 to 50 cents

Sample Zone

These controls makes it very easy to change the focused sample's Root Key and Upper Key, in order to edit the assignment. The focused sample will be highlighted in yellow, and you can quickly select focus by clicking on the keys in the Keyboard grid or by scrolling through the samples using the horizontal arrow keys on the computer keyboard.

Root Key

Sets a new Root Key for the focused sample. There can only be one sample assigned to each Root Key, the value will automatically skip to the next available note.

Range: F0 to C8
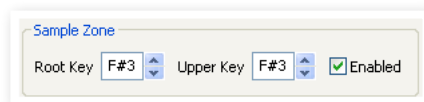
Upper Key

Sets a new Upper Key for the focused sample. The available range may be limited by samples that occupy a Root Key higher up on the keyboard. The Upper Key can not be a key that is located lower than the Root Key on the keyboard.

Range: F0 to C8

Enabled

This allows you to disable and re-enable the focused sample.

Transpose

Use the buttons to transpose the entire Sample Instrument in semi tone steps.

Auto Map

This function can be used to quickly enable and disable samples at certain intervals in order to reduce the amount of memory used by the Sample Instrument. This is a great way to quickly experiment with the Sample Instrument without having to delete and/or re-assign samples.

Interval

Set the interval or range between the samples that will be kept enabled. The end result will depend on how the original ranges are mapped. Samples will not be moved from one key to another, any gaps across the keyboard range will be filled by any adjacent samples. A setting of 0 will disable all the samples.

Range: 0 to 48 semi tones
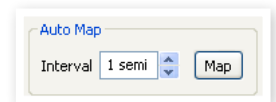
Map

Map the samples according to the Interval setting.

Play Mode

This allows you to choose if a sample should be pitched according to the standard 12 tone interval when you play the keys it has been assigned to, or to play back at its original pitch, regardless of what key you play.

If you e.g. have some drum samples that span several keys, they could be set to Unpitched if you want them to play at the same, original pitch.

Samp Preset Tab

This tab allows you to set some useful functions to be applied to the Sample Instrument. These settings will be recalled when you perform the Samp Init function on the Wave - by pressing Shift + Vibrato. Use these setting to provide a default starting point for each individual Sample Instrument.

Velocity Controlled Dynamics

The functions in this area determines how a Sample Instrument should respond to velocity. This functionality is achieved by using the Morph.

Amplitude

This allows you to determine if the amplitude of the Sample Instrument should respond to keyboard velocity.

Range: None, Low, High

Filter

This allows you to determine if a keyboard velocity controlled low pass filter should be applied to the Sample Instrument. This allows you to make the sound brighter, when you play with a higher velocity.

Range: None, 600Hz, 150Hz

Attack Time

This controls if a velocity controlled attack time should be applied to the Sample Instrument. Higher velocities will shorten the attack time.

Range: None, Short, Long

Vel Dyn Enabled

Check this box if you wish to have the velocity sensitivity turned on in the Nord Electro 3 as the default setting when the Sample Instrument is selected. This function is not available in a Nord Wave.

Keyboard Controlled Amplifier Envelope

Decay Time

This can apply an amplitude decay to a sound, in order to e.g. have a amplitude decay on a looped sound.

Range: None, Short, Long

Release Time

This sets the release time that will be set when the Samp Init function is activated.

Range: Short, Medium 1. Medium 2, Long

Octave Shift

This sets the octave shift that will be set when the Samp Init function is activated.

Manager Tab
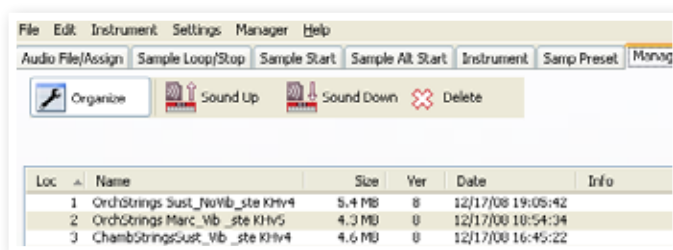
This is where you find the function of the Nord Sample Editor to manage the content of the Sample Instrument memory. If no Nord Wave is connected to the computer, the memory locations will be grayed out.

⚠ *The actions that take place in the Manager tab will affect the memories in the unit. The Nord Sample Editor is online with the Nord at all times, so any changes that you perform in the Editor will immediately be echoed in the Nord Wave or Electro 3. If you e.g. delete a Sample Instrument from the list in the Nord Sample Editor, that same SI will also be deleted from the Nord Wave memory, without any warnings or confirmation dialogs.*

Manager Toolbar

The icons on the Tool bar gives you instant access to three functions.

Organize

When this option is active, the list will show all the available locations in the memory and not only the occupied ones. This will for instance make it easier to drag a file to a specific free location in the middle of the list. If this is unchecked, only the occupied locations will be shown.

Sound Up

This will upload a selected Sample Instrument to the computer hard drive. It will be saved as a .nsmp file.

Sound Down

This allows you to choose a file on the hard drive, to be downloaded to the next available free location in the Nord Wave.

Delete

This will delete the selected Sample Instrument from the Nord Wave memory.

Sample list

There are 99 possible locations for Sample Instruments in the Nord Wave memory. The Flash capacity is approx. 180 MB, and this is allocated dynamically. You can have one Sample Instrument, that contains one sample that is using up all the memory capacity, or you can have 99 Sample Instruments with several samples each, as long as the combined sizes of these are kept within the 180 MB limit.

When you generate a Sample Instrument from a Project in the Nord Sample Editor, and download this to the Nord Wave, this Sample Instrument will be saved at the first available location in the Flash memory.

If the locations are occupied one after the other in a consecutive manner, it will then appear at the end of the list in the Manager tab. If there is an empty location in the middle of the list, it will be saved to this location.
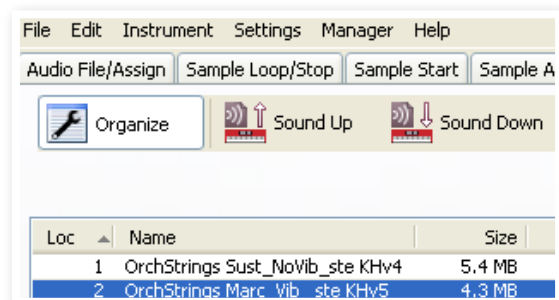
The Sample Instrument list may be ordered by location, alphanumerical by name, according to sizes, or versions by clicking on the appropriate heading.

Right-click

If you right-click on a Sample Instrument in the list, you will get the following options:

Upload – This will upload the Sample Instrument to the computer hard drive. It will be saved as a .nsmp file.

Just as any other computer file on your hard drive, this .nsmp file may be renamed, emailed, copied, moved, lost or even stored in a safe location if an evil computer crash suddenly decides to take your hard drive for ride.

⚠ *If you want to rearrange the order of the Sample Instruments, there are a few things to consider. A Program in the Nord Wave that uses a Sample Instrument does not know what the sound of the SI is. The Program is only referring to a Sample Instrument location number.*

Download – This is only available if you right-click on an empty location that does not contain a sound. This allows you to choose a file on the hard drive, to be downloaded to the location in the Nord Wave.

Delete – This will delete the Sample Instrument from the Nord Wave memory. Any Program in the Nord Wave that used that particular Sample Instrument will probably sound very different, since it will be missing an important component.

⚠ *A flashing number in the OSC2 LED display on the panel indicates that the Sample Instrument location that the current Program tried to use is not available in the Flash memory.*

List headlines

Loc - location

The Sample Instruments in the list are numbered; these numbers correspond to what you select with the Type selector in the Nord Wave.

Name

The Sample Instrument gets its name from the name of the Project that gave birth to it. If a Project has not been saved – being nameless that is - and you generate a Sample Instrument, it will get the default name: Untitled.

If a Sample Instrument is uploaded to the computer hard drive, the resulting .nsmp file name will be same as the SI name. Change the file name, and the SI name is also changed when that file is downloaded to the Nord Wave.

⚠ *Two Sample Instruments in the Nord Wave cannot have the exact same name. If you happen to generate two Sample Instruments without e.g. having saved the Projects, then the second Sample Instrument called Untitled will overwrite the first one that had that same name. If you try to drag an .nsmp file from the hard drive to the list and it has the same name as a SI in the list, that operation will not be allowed.*

Size

Indicates the size of the Sample Instrument. This may be useful if you are short on memory and wants to know if a particular SI occupies a certain amount of space in the Flash memory.

Ver

This indicates a version number of the .nsmp file format.

Footer Memory Indicator

This will give you a numerical and a visual indication of how the Flash memory space is being used. Red indicates the spaced used by the samples, green is the space that is free to use for new Sample Instruments.
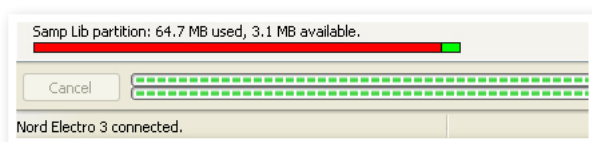
File Types and Names

Files associated with the Nord Wave and the Nord Sample Editor use the following extensions:

.nwiproj – Nord Sample Editor Project file

This is a file containing the Project settings. Audio files are not included in this file - any changes to the original audio files will affect you project. This file type will be created when you save a Project.

These files will be needed if you want to change any settings in a particular Sample Instrument at a later stage, so save often and keep copies in a safe location.

.nsmp - Nord Sample Instrument file

This is a file containing the cropped and encoded audio and the Project settings for one Sample Instrument. This file type will be created and saved to the hard drive when you generate a Sample Instrument from the Instrument menu (or with the Generate button in the Editor window). You can also create .nsmp files when you upload Sample Instruments from the Nord Wave, in the Manager tab in the Editor.

Use this file type to share Sampled Instruments with other Nord Wave users. The .nsmp file can not be opened or edited; it can only be down- or uploaded to and from a Nord Sample compatible unit. To edit any content or setting in a Sample Instrument you must go back to the original Nord Sample Editor Project file (.nwiproj), do the edits there and then re-generate the Sample Instrument.

9 Synthesis Basics

Introduction

Subtractive synthesis is one of the oldest and most widely spread forms of synthesizing sounds. It is the method employed in classics as the Moog synthesizers, the Sequential Prophet-5 and 10, Arp synthesizers, most Oberheim synthesizers, the Roland Jupiter models, the TB-303 etc; the list is practically endless. Even new digital instruments such as workstations and sample playback devices employ many of the basic principles of subtractive synthesis.

With the first Nord Lead, Clavia introduced a new concept: a modern digital instrument that combined a faithful reproduction of the behavior of the old analog favorites with the convenience and stability of the newer designs. The Nord Wave takes this concept even further, adding valuable new features and functionality such as FM, Wavetable and sample playback.

The purpose of this chapter is to give you a quick introduction to this world of subtractive synthesis as used in the Nord Wave and its analog predecessors. If you'd like to know even more, there are number of text books or web based info that will expand on this subject.

The "building blocks"

Subtractive synthesis started its life in modular synthesizers, large cabinets housing separate electronic modules, connected via patch cords. With the advancement of technology, the functionality of many of these modules could be put onto one single circuit board. But functionality-wise, subtractive synthesizers are still built out of the same modules (or building blocks) as they were decades ago. Subtractive by the way, comes from the way a filter traditionally behaves; by subtracting harmonics from a waveform.

We will now take a closer look at these building blocks. Let's first talk about the three that actually create and process sound:

Oscillator

The Oscillator is actually the only thing in a synthesizer that actually produces any sound, (all the other modules only shape the sound from the oscillator.) The oscillator is a bit like the string on a string instrument, it vibrates to create sound.

Filter

The signal from the oscillator is sent through the Filter which shapes the timbre of the sound to make it "bright", "dull", "thin", etc.

Amplifier

The Amplifier shapes the volume of the sound making it "soft" or "hard", "slow", "plucked" or "short".

Modulation

In addition to these main modules all synthesizers also have "modulators", devices that can make the volume, timbre pitch and other qualities of sound vary continuously over time when you play a key.

It is these modulators that basically add animation to the sound, taking it from a dull organ drone to a dynamic and interesting timbre. The two most common modulators are Envelopes and LFOs.

Envelopes

An envelope is used to give a sound a "shape". If you apply an envelope to the amplifier (which controls the volume) you are able to make the sound for example slowly fade in and then fade out when you press and hold a key.

LFOs

LFO is an abbreviation for Low Frequency Oscillator. It is used for repeating variations in a sound, such as vibrato or tremolo.

Connections

There are many ways in which the modules outlined below can be connected in a synthesizer, but the one in the picture below is a basic and common one, used in the Nord Wave (although the illustration depicts far from all the possibilities in this instrument!)
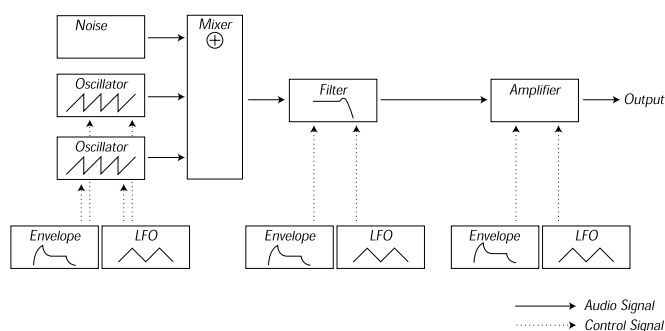
Note that the horizontal lines indicate the way the sound travels. The vertical lines indicate control signals.

The envelopes for example only modulate (control) the oscillator, filter and amplifiers, they do not affect the sound directly.

The Oscillators and waveforms

The two basic qualities of an oscillator is its waveform and its pitch.

Pitch

The picture of the sawtooth on the Nord Wave front panel displays a sawtooth during one period of sound. During this time, the wave raises gradually up to maximum level and then instantly drops back to minimum level.

The length of the period determines the pitch (frequency) of the sound. The shorter the period, the higher the pitch. If you for example make the oscillator play at a frequency of 440Hz, there will be 440 periods of identical Sawtooth waves generated per second.
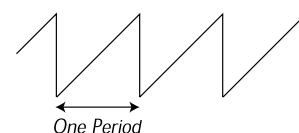
Normally there are three ways to change the frequency of an oscillator:

- By making settings on the front panel. On the Nord Wave for example, you have an "Oct Shift" that will affect both oscillators and separate Semitone and Fine Tune adjustments for Oscillator 2.

- By playing the keyboard. The keyboard is if course connected to the oscillator so that pressing different key produces different pitches.

- By Modulation. Modulation allows you to make the pitch vary "automatically". The most common example is probably to use an LFO to make pitch go up and down, to create a vibrato. But you can also put the pitch under envelope control, or make the pitch vary with your striking force (velocity).

Waveform

The waveform of the oscillator affects its harmonic content and thereby its "sound quality" (timbre). The three most common waveforms are sawtooth, pulse wave and triangle.

Looking at the shape of a waveform tells very little about how it sounds. Instead, there's a better way to draw or visualize it, called a spectrum. Let's introduce some quick theory:

Mathematically, all periodic waveforms can be considered as built from a number of harmonics, added together.

Each of the harmonics represents a sine wave, the purest and simplest waveform there is (a sine wave has no harmonics at all). In other words, if you add a number of sine waves together, each one with its own pitch (frequency) and volume (amplitude), then you can build any waveform you like.

The lowest harmonic is called the fundamental. The fundamental determines the basic pitch of the sound.

If the fundamental has a frequency of 440Hz, we will perceive the entire sound as having a pitch of 440Hz.

Other harmonics are then added to the fundamental, called overtones. The first overtone appears at a frequency twice the fundamental (in our example 880 Hz). The next harmonic appears at a frequency three times the fundamental (in our example 1320Hz) and so on.

In a spectral display of a waveform you can see the frequency (pitch) of each harmonic and its amplitude (level). This is done by drawing each harmonic as a line raising up from a horizontal scale.

Each line's position on this scale indicates the harmonic's frequency. The line furthest to the left is the fundamental, the next is the first harmonic etc. To make life easier, one usually doesn't label the horizontal scale with frequency in Hz, but rather with the number of the harmonic.

The height of each line represents the amplitude of each harmonic.

If you understand the principle, you also understand that if the harmonics with high numbers have a high amplitude, the sound will be perceived as bright.

Let's take a look at some common waveforms and their spectra.

In the illustrations below, only some of the first harmonics are displayed. In reality, waveforms like these have an infinite amount of harmonics.

Sawtooth

The Sawtooth wave has a simple spectrum. All harmonics are present in the wave, in proportional values.
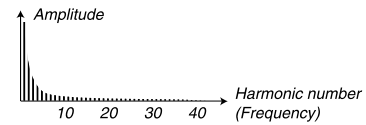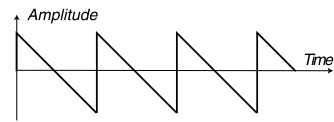
As you can see, the high harmonics have a fairly high amplitude, which makes this waveform sound bright.

Triangle

The triangle wave does not have very strong harmonics. Furthermore they only appear at odd harmonic numbers.
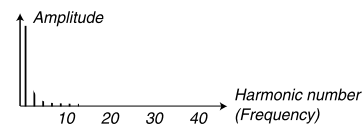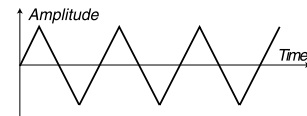
The first fact makes the tone pure, a bit like a flute, and the second fact gives the sound a slightly "hollow" character.

Pulse wave

The pulse wave is slightly more complicated, because it is not one waveform, it is many different ones. A pulse wave is a waveform that during one period jumps once between full positive amplitude and full negative and then back. The thing that can be varied is where within the period you jump from maximum to minimum amplitude. Let's look at two examples:
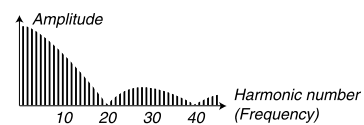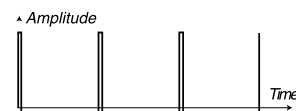
In the first, the jump happens 1% in from the beginning of the period. This is referred to as a pulse wave with a 1% pulse width (sometimes called duty cycle).
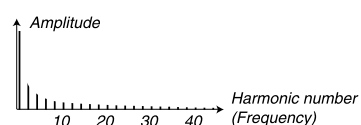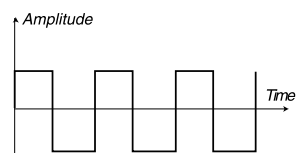
The second wave has a pulse width of 50%.

This second example is a special case of the pulse wave, called a square wave, and this has one peculiarity, it only contains odd number harmonics, which gives it a "hollow" quality.

On many synthesizers (including the Nord Wave) the pulse width can be adjusted, to set the timbre of the pulse wave. The more narrow the pulse width, the more "thin" the sound will be.

You can also have the pulse width vary continuously, for example from an LFO or envelope. This is referred to as pulse width modulation. Modulating pulse widths from an LFO creates a rich, chorus-like effect often used in "string" sounds.

About in-harmonic spectra

We have only discussed spectra where the overtones appear at perfect harmonics so far. While this is true for the basic waveforms discussed above, it is definitely not true for all sound. If you for example use the frequency modulation (FM, PM) capabilities in the Nord Wave, with the two oscillators set to an "unusual" interval (not octaves or fifths, for example), you will get a spectrum where the overtones appear at frequencies somewhere between the perfect harmonics. This results in an in-harmonic sound, which often sounds "metallic".

Sync

One some synthesizers, one oscillator can be synchronized to another. If you for example synchronize oscillator 2 to oscillator 1, oscillator 2 will start over with a new period of the waveform, each time oscillator 1 does so. If oscillator 2 then has a higher frequency than 1, it will get a complex waveform that depends both on its own pitch and on that of the other oscillator.
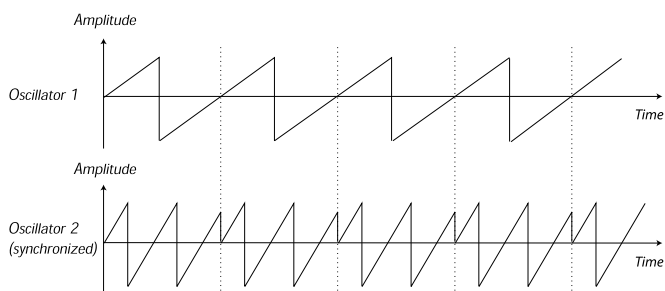
When sync is applied, the basic pitch of Oscillator 2 is locked to that of Oscillator 1. If you change the pitch of Oscillator 1 you will affect the basic pitch of both oscillators. Furthermore, when you vary the pitch of the synchronized oscillator (Oscillator 2), this will be perceived as a change in timbre, rather than in pitch.

This leads to a spectrum with deep resonances at Osc2's harmonics, like this:
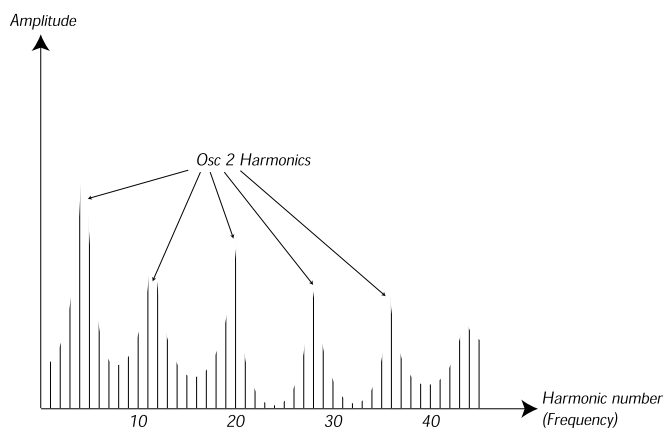
If you go even further and let the pitch of the synchronized oscillator vary continuously, for example from an LFO or envelope, you will change the harmonic content of the sound in an interesting and very characteristic way.

The Filter

The filter in a synthesizer is used to remove or emphasize frequencies in a spectrum. A filter is a bit like an amplifier (a volume control) that is applied differently to different parts of the spectrum. For example, a filter might make low frequencies louder, while at the same time making high frequencies weaker. Applying such a filter would make a sound have more bass and less treble.

Let's imagine a sound with a spectrum where all harmonics are available at full level. It would look like this:
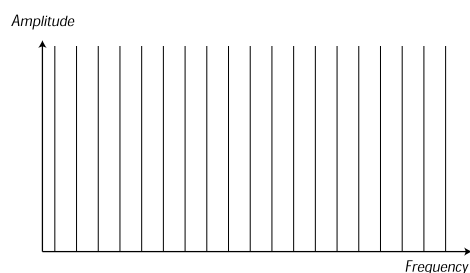
Let's now pass this spectrum through a lowpass filter (this type of filter is discussed in more detail below).
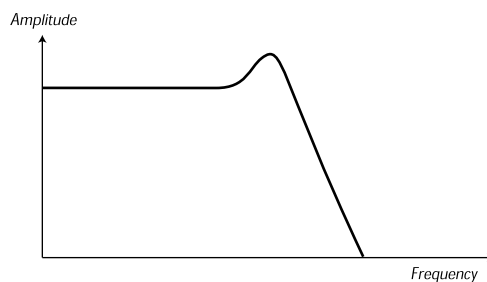
The filter has a characteristic, which can be drawn as a curve.

As you can see the curve is flat in the low register (which means it doesn't affect this part of the spectrum at all) and then, at a certain point, gradually starts falling. When applied to the wave above, this filter cuts away some of the high frequency material in the wave, like this:
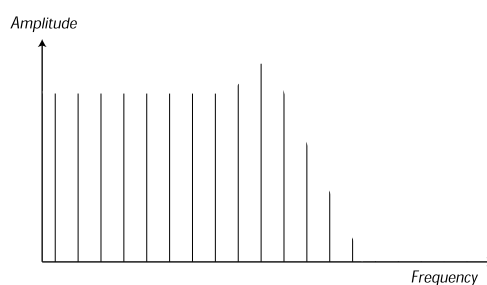
Filter types

There are many types of filters, all with their different purposes. Let's discuss the three most common ones, that are found in the Nord Wave. As you may already have noticed, the filters are explained in detail in the Panel Reference chapter

Lowpass filter

The lowpass filter dampens high frequencies and allows low frequencies to pass through unaffected, as in the example above. It is the most common synthesizer filter, since it can be used to "round off" the sharp sound of sawtooth waves and pulse waves.

Highpass filter

This is the opposite of the lowpass filter. It allows the high frequencies of the sound to pass through and cuts off the low frequencies. This removes "bass" from a sound, without affecting the high end.

Bandpass filter

This allows frequencies in a certain range of the spectrum (the band) to pass through while dampening frequencies both below and above this range. This accentuates the mid-range of a sound.

Slope

Filters of one and the same type (lowpass, highpass etc) can have different characteristics. One of the factors determining the exact filter curve is the roll-off, which is measured in dB/Octave ("decibels per octave") or poles. The simplest possible filter has a roll-off of 6dB/octave, which is referred to as "1 pole".

The next step up is 12dB (2 poles), 18db (3 poles) etc.

The most common synth filters are the 12dB and 24dB lowpass filters. The difference between the two can be studied in the graph below. The 12dB filter let's more of the high frequency pass through which gives the sound a brighter and "buzzier" character than the 24dB filter does.
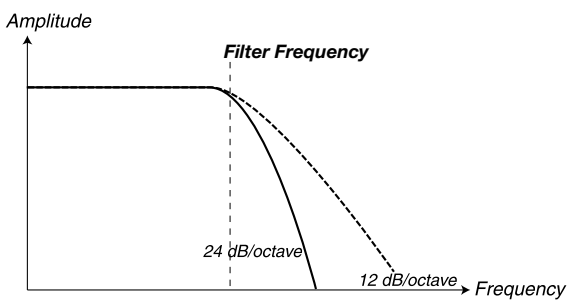
In the Nord Wave, the lowpass filter can be switched between 12 and 24dB modes.

Cutoff frequency

The most important parameter for a filter is its cutoff frequency, which is the setting that determines where in the frequency material it should start cutting. If the cutoff frequency in a low pass filter is set to a very low value, only the lowest harmonics (the bass) will pass through. If you raise the cutoff all the way up, all frequencies will be let through, as the figure below illustrates.
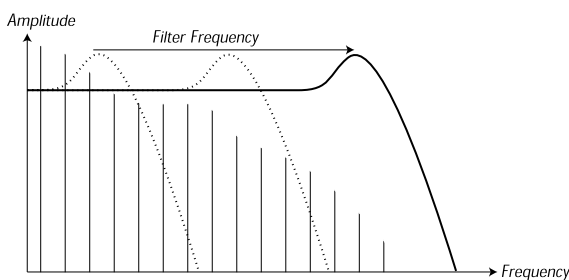
Changing the cutoff frequency is often referred to as "sweeping the filter". This is probably one of the most important ways of shaping the timbre of a synthesizer sound. By using an envelope you can for example have a high cutoff at the beginning of a sound which is then gradually lowered (the filter "closes" as the sound decays). This would emulate the way most plucked string sound (piano, guitar etc) behave; the amplitude of the harmonics decreases as the sound decays.

Keyboard tracking

When you play different pitches, the oscillators produce different frequencies. This means that the overtones in the waveform appear at different frequencies. The cutoff frequency of the filter however, is fixed.

This means that different overtones will be cut off at different pitches. To be more precise, the further up the keyboard you play, the muddier the sound will be.

To remedy this problem many synthesizers have a para-meter called Filter Keyboard Tracking. When this is activated, the filter Cutoff Frequency varies with which key you play, just as the oscillator frequency does. This ensures a constant harmonic spectrum for all keys.
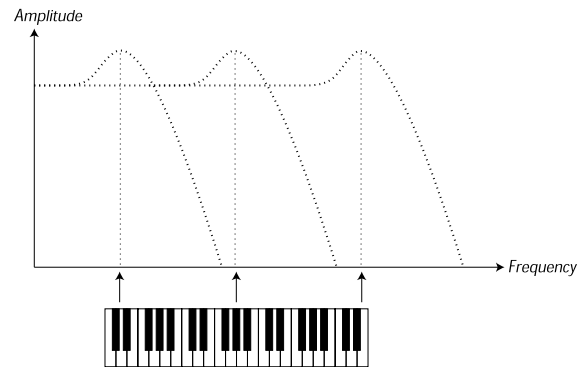
Resonance

Resonance in a filter is created by increasing the routing of the output from the filter to its own input. The amount of feedback is then controlled with a Resonance function on the front panel of the instrument.
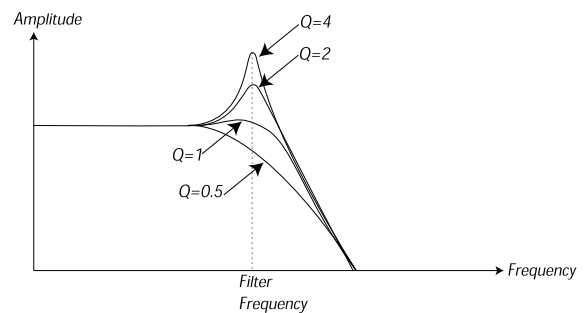
When you apply resonance, the frequencies just around the cutoff point of the filter will be emphasized (louder). As you increase the resonance further and further, the filter will start to behave more an more like a bandpass filter, where only the frequencies around the cutoff point are let through. The filter will start to "ring", which means it almost sounds like it is adding frequencies to the sound. If the Resonance is then raised even further (on some synthesizers) the filter will start to self-oscillate, that is produce sound of its own, just like an oscillator.

High resonance values are also visible in the waveform. They appear as a "superimposed" waveform with a frequency equivalent to the filter's cutoff frequency.

If you add resonance to a sound and then vary the Cutoff frequency (for example with an envelope) you will get a very typical synthesizer sound.

The Amplifier

An amplifier is most often used at the final stage of a synth signal chain, to control volume. By modulating the amplifier with an envelope, the sound can be given its basic "shape". In fact, the "volume shape" is one of the most important factors to how we identify the sound. By setting up a proper volume envelope you can make a sound "soft", "hard", "plucked" "static" etc.

Envelopes

ADSR-envelope

Envelopes are used to modulate pitch, amplitude, filter cutoff and other parameters in a sound. This is used to give the sound a varying character from the moment the key is pressed to the moment it is released.

The classic synthesizer envelope has four parameters, Attack, Decay, Sustain and Release, and is therefore often referred to as an "ADSR-envelope".
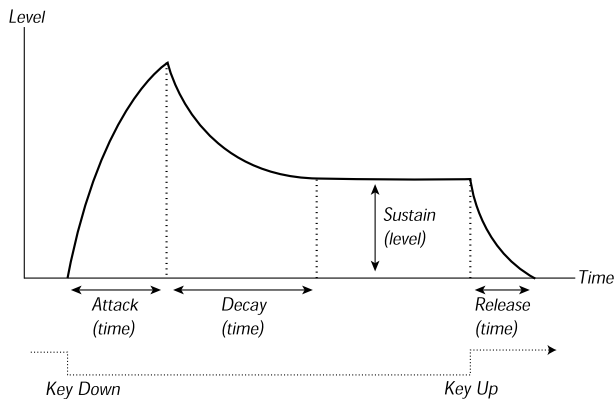
When you press a key, the envelope is triggered. This means is starts from zero and rises to the maximum level.

How long this should take, depends on the Attack setting. If the Attack time is set to "0", the envelope will instantly reach full level. If the attack time is higher it will take longer.

If you for example have an envelope controlling volume, raising the attack will give the sound a "softer" character. If you have the envelope routed to the filter, it might give the sound a "wah" type of start.

After the envelope has reached full level, it starts to fall back again. How long this should take, is set with the Decay parameter.

The level of the envelope does not necessarily have to fall all the way back to zero level at the end of the Decay. Instead, the ADSR-envelope has a Sustain setting used to determine the level the envelope should rest at, after the Decay.

If you for example want to create a flute sound, you would have a fairly high Sustain setting on your amplifier envelope, since a flute tone basically stays at a steady level for as long as you blow it. On the other hand, for a piano sound, you would want a Sustain level of "0", since a piano sound decays to silence if you hold the key long enough.

Please note that the Sustain parameter represents a level, but all other envelope parameters represent times.

As described above, the envelope stays at the Sustain level until the key is released. It then falls back to zero level. The time it should take for this to happen is set with the Release parameter, which works just as the Decay, but it is not applied until you lift your finger off the keys.

- If you set Sustain to full level, the Decay setting is of no importance since the volume of the sound is never lowered:

- If you set Sustain to 0, the sound will become silent after the Decay phase is finished. With short Attacks moderate Decay times, this can be used to simulate the behavior of a plucked string instrument (guitar, piano etc) where the sound always decays to silence after a while:

- If you release a key before the envelope has reach its sustain, it will immediately "jump" to the Release.

The effect of this can be studied in the illustration below:
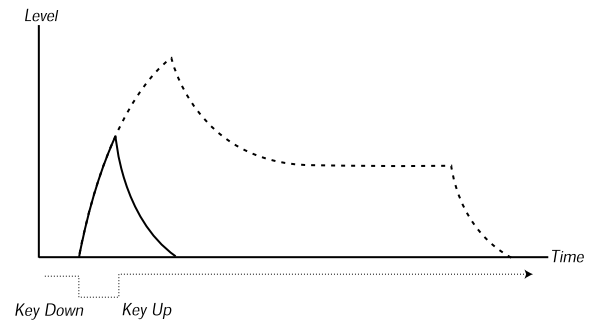
Often envelope amounts can be made to vary with how hard you play the keys. This is used to make a sound vary with your playing style, for example to make the sound brighter (filter envelope) or louder (amplifier envelope).

AD-envelope

A simpler form of envelope has Attack and Decay parameters only, and is therefore called an AD-envelope. A version of this has attack and release parameter, an A/R-envelope.

In effect, the AD-envelope behaves like an ADSR-envelope with Sustain set to 0 (see the picture at the top of this page). This type of envelope, often with amount and inversion controls, is suitable when you want to affect the start of the sound only.

On the Nord Wave, the Modulation Envelope is of AD/R-type. Typically, it can be made to modulate the FM amplitude or the pitch of Oscillator 2, to create a different timbre during the attack part of the sounds.

LFOs

An LFO is an oscillator, just like the ones that produce the sound in a synthesizer, but with two main differences:

- The LFO produces very low frequencies, most often below the hearing range (up to 20Hz).

- The LFO is not used to produce sound, instead it is connected to other modules to provide modulation of parameters. If you for example route an LFO to pitch, you get a vibrato. And if you route it to the amplifier of an instrument you get a tremolo.

The three basic parameters for an LFO are Waveform, Rate (frequency) and Amount:

- The waveform determines the type of vibrato, for example "regular" (triangle or sine), ramp (sawtooth) or random.

- The Rate determines the speed of the vibrato.

- The Amount controls to what degree the LFO affects its destination.

10 System Menu

System Menu

The System Menu is used for editing system specific settings, which are shown in the **LCD**.

Press **Shift** and **Slot A** to enter the System Menu. Use the **Up/Down** buttons to change pages.

• Hold an **Up/Down** button down to scroll quickly through the pages.

• Use the **Rotary** to change the settings.

Transpose

Default value: 0

–6 - +6	Transposes the keyboard in semi tones. This will also affect the MIDI output.

Fine tune

Default value: 0

–50 - +50	Fine-tunes the Nord Wave in cents.

Pitch Bend

Default value: 2

1 – 12	Sets the range of the Pitch Bend in semi tones.

Vibrato rate

Default value: 5.60

4.0 – 8.0	Sets the vibrato rate in Hz.

Sustain Pedal Polarity

Default value: CLOSED

OPEN	Open polarity; use this setting with a pedal with open polarity.
CLOSED	Closed polarity; use this setting with a pedal with closed polarity.

Control Pedal Type

Default value: ROLAND

This function allows you to match the control pedal characteristics for various manufacturers.

ROLAND
YAMAHA
ERNIE BALL
FATAR

☼ *If the manufacturer of your pedal is not listed above, you can try operating the pedal to it's end positions. The pedal range is briefly shown in the* **LCD** *as a value between 0 and 100. Select the setting that best matches the range of your pedal.*

Control Pedal Destination

Default value: VOLUME

Controls the destination for the Control Pedal input.

VOLUME	Control pedal will control the overall volume.
MORPH	Control pedal will used as a Morph source.

Display Mode Hold

Default value: OFF

Determines for how long a parameter setting is shown in the **LCD** when you change a value.

ON	Parameters are shown indefinitely.
OFF	Parameters are shown temporarily.

Memory Protect

Default value: ON

ON	Store function disabled.
OFF	Store function enabled.

11 MIDI

MIDI Menu

Press **Shift** and **Slot B** to enter the MIDI Menu. The MIDI Menu is used for editing MIDI specific settings, which are shown in the **LCD**.

• Use the **Up/Down** buttons to change pages.

• Hold a **Up/Down** button down to scroll quickly through the pages.

• Use the **Rotary** to change the settings.

MIDI Control Local

Default value: ON

Determines if the unit should respond to local controls (the Nord Wave **keyboard**, **pitch bend**, **modulation wheel**, knobs and buttons etc).

ON	Local control is enabled.
OFF	Local control is disabled.

MIDI Channel

Default value: 1

Determines on which MIDI channel MIDI messages are transmitted and received via **MIDI In** and **MIDI Out**.

BI-TIMB	Messages are transmitted and received on the Slots individual channels in a bi-timbral fashion..
1 - 16	Messages are transmitted and received on the selected MIDI channel.

MIDI Ctrl A Channel

Default value: AUTO(1)

Determines on which MIDI channel MIDI Control Change messages are transmitted and received via **MIDI In** and **MIDI Out** for **Slot A**.

Since the Nord Wave with the two slots have more physical controls than there are available MIDI CC addresses, this and the following option allows you to transmit and receive the knobs and buttons from the two slots, on separate MIDI channels.

If the MIDI Channel parameter is set to Bi-Timb, this Ctrl A channel will be the MIDI channel that Slot A will use for receiving (and transmitting) note messages.

OFF	Messages are neither transmitted nor received.
AUTO (N)	Messages are transmitted and received on the same MIDI channel as the one set in the MIDI Channel option.
1 - 16	Messages are transmitted and received on the selected MIDI channel.

MIDI Ctrl B Channel

Default value: AUTO(2)

Determines on which MIDI channel MIDI messages are transmitted and received via **MIDI IN** and **MIDI Out** for **slot b**.

If the MIDI Channel parameter is set to Bi-Timb, this Ctrl B channel will be the MIDI channel that Slot B will use for receiving (and transmitting) note messages.

OFF	Messages are neither transmitted nor received.
AUTO (N)	Messages are transmitted and received on the first available MIDI channel after the one set in the MIDI Channel option.
1 - 16	Messages are transmitted and received on the selected MIDI channel.

MIDI Control Change Mode

Default value: SEND & RCV

Determines how Control Change messages are handled via MIDI.

SEND & RCV	Messages are both transmitted and received.
RCV	Messages are received only.
SEND	Messages are transmitted only.
OFF	Messages are neither transmitted nor received.

MIDI Program Change Mode

Default value: SEND & RCV

Determines how Program Change messages are handled via MIDI.

SEND & RCV	Messages are both transmitted and received.
RCV	Messages are received only.
SEND	Messages are transmitted only.
OFF	Messages are neither transmitted nor received.

⚠ *Program Change messages are transmitted and received on both* **Slot A** *and* **Slot B***'s MIDI channel setting.*

MIDI Send CC

Press **store** to send all parameter settings as MIDI Continuous Controller messages on each of the two slots separate MIDI Channels.

⚠ *Messages are not transmitted if the MIDI channel setting is set to* OFF*.*

MIDI Dump One

Press **Store** to transmit the currently active Program as a Sysex Dump.

MIDI Send Bank

Press **Store** to transmit the selected Program Bank as a Sysex Dump.

1 - 8	The selected bank is transmitted.
ALL	All banks are transmitted.

⚠ *The current Program needs to be saved if it has been edited, or it will be excluded from the dump.*

MIDI Receive Bank

Press **Store** to erase the selected Program Bank to prepare the Nord Wave to receive a Sysex Dump via MIDI. The actual transmission of the Sys Ex has to be initiated from the transmitting device.

1 - 8	The corresponding bank is erased.
ALL	All banks are erased.

⚠ *The selected Program Bank is erased as soon as Store is pressed, even if no Sysex Data is received.*

MIDI Controller list

On the next page is a list of the MIDI Controller numbers used for all the knobs and buttons on the Nord Wave front panel.

The reception and transmission of Controllers can be turned on/off in the MIDI Menu as described earlier on this page.

- Buttons that control "on/off" functions have a Controller value of "0" corresponding to the "off" position and a value of "127" corresponding to the "on" position.
- Buttons that step through various possibilities start with a Controller value of "0" for the "lowest" setting and then increment for each step upwards. The "size" of the increments depends on how many possible settings there are to the function.

Nord Wave Parameter	MIDI Controller	MIDI Controller Name
Oct Shift	17	General Purpose #2
Mono Mode	17	Undefined
Glide	5	Portamento Time
Vibrato	56	LSB, Controller 24
LFO 1 Wave sel.	20	Undefined
LFO1 Dest.	21	Undefined
LFO 1 Poly	83	General Purpose #8
LFO 1 Rate	19	General Purpose #4
LFO 1 Amount	22	Undefined
LFO 2 Wave Sel.	85	Undefined
LFO 2 Dest.	24	Undefined
LFO 2 Single	87	Undefined
LFO2 Rate	23	Undefined
LFO 2 Amount	25	Undefined
Mod Env Attack	26	Undefined
Mod Env Decay	27	Undefined
Mod Env Amount	29	Undefined
Mod Env Dest.	28	Undefined

Nord Wave Parameter	MIDI Controller	MIDI Controller Name
Mod Env Rel Mode	109	Undefined
Osc 1 Waveform	30	Undefined
Osc 1 Wave FM Selection	47	LSB, Controller 15
Osc 1, Misc Selection	48	LSB, Controller 16
Osc 1, Wavetable Selection	49	LSB, Controller 17
Osc 1 Shape	79	Sound Controller 10
Osc 2 Waveform	31	Undefined
Osc 2 Wave FM Selection	93	Effect 3 Depth
Osc 2, Misc Selection	118	Undefined
Osc 2, Samp. Instr. Sel.	50	LSB, Controller 18
Osc 2 Skip Attack	51	LSB, Controller 19
Osc 2, Samp Decay	52	LSB, Controller 20
Osc 2 Semi Tones	78	Sound Controller 9
Osc 2 Fine Tune	33	LSB, Controller 1
Osc 2 Shape	102	Undefined
Osc 1 Sync	35	LSB, Controller 3
Osc Mod Selector	105	Undefined
Osc Mod Amount	70	Sound Controller 1
Osx Mix	8	Balance
Amp Env Attack	73	Sound Controller 4
Amp Env Decay	36	LSB, Controller 4
Amp Env Sustain	37	LSB, Controller 5
Amp Env Release	72	Sound Controller 3
Filt Env Attack	38	LSB, Controller 6
Filt Env Decay	39	LSB, Controller7
Filt Env Sustain	40	LSB, Controller 8
Filt Env Release	41	LSB, Controller 9
Filter Mode	44	LSB, Controller 12
Filt Keyb Tracking	46	LSB, Controller 14
Filter Slope	58	LSB, Controller 26
Filt Velocity	45	LSB, Controller 13
Filter Frequency	74	Sound Controller 5
Filter Resonance	42	LSB, Controller 10
Filter Envelope Amount	43	LSB, Controller 11
Output Level	71	Sound Controller 2
EQ Treble	113	Undefined
EQ Bass	114	Undefined
Chorus	53	LSB, Controller 21
Tube Amp Enable	92	Effect 2 Depth
Tube Amp Drive	89	Undefined
Delay Tempo	77	Sound Controller 8
Delay Feedback	116	Undefined
Delay Stereo	117	Undefined
Delay Amount	76	Sound Controller 7
Delay Enable	80	General Purpose #5
Reverb Model	96	Data Increment
Reverb Amount	95	Effects 5 depth
Reverb Enable	97	Data Decrement
Slot Focus	119	Undefined
Layer Mode	115	Undefined
Chord Enable	112	Undefined

MIDI Implementation Chart

Function		Transmitted	Recognized	Remarks
Basic Channel Default Channel		1 - 16 1 - 16	1 - 16 1 - 16	Indiv. channels for Slot A & B
Mode	Default Message Altered	Mode 1, 3 X ***************	Mode 1, 3 X	
Note Number	True Voice	0-127	0-127	
Velocity	Note ON Note Off	O, v= 1 - 127 X	O, v= 1 - 127 X	
After Touch	Key's Channel	X O	X O	
Pitch Bender		O	O	
Control Change		O	O	See MIDI CC on page 60
Program Change True#		O, 0-127	O, 0-127	Bank Sel: CC 32
System Exclusive		O	O	Mode
System Common	Song Pos Song Sel Tune	X X X	X X X	
System Realtime	Clock Commands	X X		Mode
Aux Message	Local on/off All notes off Active Sense Reset	Mode	Mode	Mode
Number	True Voice	Mode	Mode Mode	Mode

Mode 1: Omni On, Poly - Mode 2: Omni O, Mono - Mode 3: Omni Off, Poly - Mode 4: Omni Off, Mono - O = Yes - X = No

12 Appendix

Specifications

General

4 octave (49-keys) velocity and aftertouch sensitive keyboard

- 189Mb Flash Memory (approx. 180Mb for user samples)
- 18 stereo voices
- Wooden Pitch Stick
- Modulation Wheel
- LCD-window and Value Dial
- Master Level Control
- 3 Morph Sources (Modulation Wheel / Control Pedal, Note Number, Note Velocity)

Synth Section

2 part multitimbral synth section:

- OSC1: Triangle, Square, Saw (with sync), 62 wavetables, 2 and 3-operator FM, Noise and Misc. waveforms.
- OSC2: Triangle, Square, Saw, up to 99 Sampled Instruments (user defined), 2 and 3-operator FM, 22 Sampled Waves. Transpose and Fine Tune.
- Oscillator Modulation: Frequency Modulation or Phase Modulation with Amount Control.
- Filter: 6 types of single or multi mode filters with Frequency, Resonance, Keyboard Tracking and Envelope control.
- Amplifier Envelope: ADSR controls.
- Modulation Envelope: selectable AD or AR controls.
- LFO 1 Waveforms: Square, inverted Saw, Triangle, Random and Soft Random.
- LFO 2 Waveforms: Square, Saw, Triangle, Random and Soft Random.
- Mono Mode: Mono or Legato with Glide-function.
- Chorus: 3 intensity settings.
- EQ: 2-band
- Output Level

Program Section

- 1024 program locations
- Slot A & B buttons
- Octave Shift

Effect Section

- Tube style Overdrive
- Stereo Delay with tap-tempo function.
- Reverb with 5 algorithms

Connections

- 2 Line Level Audio Outputs
- Stereo Headphone Output
- Sustain Pedal
- Control Pedal
- USB-interface
- MIDI in & out

Dimensions and weight

- 870 x 274 x 98mm, 34.3 x 10.8 x 3.9 inches
- 6 kg, 13.3 lbs.

Description of Program Categories

ACOUSTIC	Sounds with an acoustic character like accordion, ethnic sounds, mallets etc. Doesn't necessarily have to be emulations of existing instruments.
BASS	All sorts of bass sounds.
DRUM	Drum and percussion sounds.
FANTASY	Melodic effects sounds and textures, often with rhythmic modulations.
FX	Atonal effects sounds like water, laser guns, explosions etc. Sometimes with heavy modulations.
LEAD	Sounds meant for the soaring lead lines. Monophonic sounds and also lead "chord memory" sounds.
ORGAN	Different types of organ sounds.
PAD	Melodic polyphonic "chord" sounds with fairy slow attacks.
PIANO	Piano type sounds like Wurlitzer emulations and also sampled and FM based pianos.
PLUCK	Sounds with a fast attack like guitar, synths - anything that reacts really quick when you hit a key.
STRINGS	Strings and string section sounds.
SYNTH	All sorts of melodic polyphonic synth sounds .
VOCAL	Sample Instruments or synthesized sounds with a distinct vocal character.
WIND	Wood wind and brass instruments.
USER1	The User categories are meant for your own categorization purposes.
USER2	
USER3	

Mellotron Sound Library

Some of the Sample Instruments in the Nord Wave Flash memory comes from the legendary Mellotron, a classic keyboard instrument that changed the music history. We are very proud to be able to incorporate the first part of the Mellotron Soundbank for the Nord Wave.

Please visit our website at www.nordkeyboards.com for further news on the release of additional sound banks for the Nord Wave.

What about those sounds?

The original sounds from the various Mellotron models could be called the very first sample library, before anyone even knew what these words were going to mean. These sounds have a very distinct and wonderful quality to them - earthy, organic and different are words that come to mind.

The sounds in the Nord Wave library originates from the master tapes that Clavia has licensed. These tapes were then used to create original sound banks for a brand new Mellotron, manufactured with original tape heads, capstans, electronics etc. And from this brand new, exquisite instrument, the sounds were recorded using state of the art technology.

After many hours of editing and looping with the Nord Sample Editor, the samples finally made it to a Nord Wave, and then to this CD.

The idea of using the vintage master tapes instead of sampling a vintage instrument is to faithfully recreate the original sounds the way they used to be, and is a natural step in Clavia's long striving effort to make the sounds of classic keyboard instruments available to keyboard players once again.

Condensed Mellotron story

Tape replay keyboard instruments were invented in the late 1950's by Harry Chamberlin. In the early 1960's one of his employees took a Chamberlin Musicmaster 600 (a dual-manual machine with 36 sounds) to the UK. This became the blueprint of the Mellotron MkI. It had the same basic layout as the Chamberlin 600 with 2 manuals, the left one having rhythm tracks to be played as a background, and the right one having lead sounds like strings, flute and lots of organ sounds.

It was basically intended to be a home organ, like a home entertainment center where someone without music skills could sound like an orchestra. Unfortunately it was very hard to play rhythms like that, even for trained musicians, and together with some technical flaws and bad engineering it wasn't too much of a success - many of the first series of instruments had to be taken back to the factory and upgraded from MkI to MkII. Luckily young and creative professional musicians had become interested in the Mellotron, and the MkII became extremely popular amongst pop/rock groups in the late 1960's: Manfred Mann, Beatles, Rolling Stones, Moody Blues, King Crimson and others.

The Mellotron company later created the M400, a smaller instrument very similar to the one used in this presentation. This instrument was used on the road and in the studio during the 1970's by Led Zeppelin, Pink Floyd, Genesis, Yes, Deep Purple, Aerosmith, Wings, David Bowie, Kraftwerk and others. During later years it has been used by Oasis, Primal Scream, Radiohead, Smashing Pumpkins, Red Hot Chili Peppers, U2, Nelly Furtado, Air, REM, Manic Street Preachers etc. Through the extremely successful music of these groups and artists the Mellotron sound has been widely spread, and even though most people don't know that it's a Mellotron, they've heard it's sound.

History of the Mellotron sounds

The MkI instrument had two 35 key manuals, the left one having 6 banks of rhythms and fills and the right one lead sounds. The tapes were 3/8" 3-track just like the Chamberlin 600. The recordings for the Mellotron MkI were made during 1962 and 1963 and were supervised by big band leader Eric Robinson, who also had substantial involvement in the Mellotron company. They consisted of 18 rhythms and fills sounds and 18 leads sounds. There were also some more rhythms and fills recorded that were not used for the MkI.

When the MkI was upgraded into the MkII the decision was made to re-record many of the sounds. The only lead sounds that were kept were the Flute, the Vibraphone and the French Accordion. Also the 3 Violins sound from the Chamberlin 600 was used in a slightly eq'd form, and ironically this became by far the most widely used Mellotron sound. Among the rhythms the Afro Cuban was replaced by the Cuban, the Slow Fox Trot and the Samba was re-recorded, the rhythms 6/8 tempo in F and Twist in C were added and numerous of the fills were changes.

During 1966 the decision was made to create an entirely new single-manual instrument that was named the M300. It had a 52 key A-C keyboard making another re-recording of all sounds necessary. The left 17 keys mostly had rhythms and fills and the remaining 35 lead sounds. The machine had 2-track 1/4" tape and 6 banks.

These recordings were made during 1966 and 1967. The only sounds that covered the whole keyboard were the strings, the piano and the organ sound. The M300 was produced between 1968 and 1970 and towards the end, some of the sounds were replaced. The string sound was changed and the Bossa Nova, the Medium Foxtrot and the low part of the strings were replaced with Pop1 and Pop2 rhythms and a 6/8 tempo rhythm. The leader of these recordings was also in this case Eric Robinson.

In 1970 the M400 Mellotron was created. It had a single manual 35 key G-F keyboard, meaning that the MkI and MkII sound libraries could be used. The machine used 3-track 3/8 tape and had interchangeable tape frames. That meant that the sound library could be expanded according to taste. This instrument was also the first Mellotron specifically made for professional musicians.

The new sounds for the M400 library were recorded during the 70's, but of course some MkII sounds were still used, most notably the 3 Violins, the Flute and the MkII Brass. The most well known sound introduced with the M400 was the 8 Voice Choir, even giving the Mellotron company a sales boost.

Use of the Mellotron sounds

Although the Mellotron had been used earlier by some British bands, the song Strawberry Fields Forever by the Beatles (Flute) and Nights in White Satin by the Moody Blues (3 Violins) in 1967 became the first Mellotron 'hits' both in Europe, the US and the rest of the World, forever making a mark in popular culture. The Rolling Stones used the 3 violins it in the song 10 000 Lightyears from Home, David Bowie in Space Oddity and numerous Britsh pop and 'Progressive' rock bands started using the Mellotron.

Among those were King Crimson (3 Violins, MkII Brass and Cello) Yes (3 Violins, 8 Voice Choir, Vibraphone, Flute etc) and Genesis (3 Violins, MkII Brass, 8 Voice Choir etc). It was also widely used in German 'Electronic' music such as Kraftwerk's Trans Europe Express (3Violins) and Tangerine Dream, who used not only the standard Mellotron sounds, but also Oboe, Bassoon, Saxophone and different string sounds.

Led Zeppelin also used it live on Stairway to Heaven, in Kashmir and The Rain Song. Even ABBA used it on Another Town, Another Train.

During the 80's the Mellotron remained virtually unused. Most notable exceptions are Talk Talk in Life's what You Make it and OMD's Enola Gay and other songs by these bands.

The Mellotron experienced a renaissance during the 1990's when numerous bands and artists like Red Hot Chili Peppers, Lenny Kravitz, Oasis, Radiohead, Air, Monster Magnet, REM and Manic Street Preachers. After 2000 the Mellotron is gaining even more popularity and has been used on hits by Dido, Nelly Furtado, Daniel Powter, Robyn, The Black Eyed Peas and The Strokes to name a few.

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Soundlist with comments

Mk I Lead sounds

15 original sounds,18 total:

MkI Clarinet

MkI French Horn

MkI Marimba

MkI Trombone *Very different from MkII*

MkI Hammond Organ

(MkI French Accordion *Same as MkII*)

(MkI Flute *Same as MkII*)

MkI Acoustic Nylon Guitar

MkI Piano *Very different from MkII*

MkI Tenor Sax *Very different from MkII*

MkI Harpsichord/Trumpet+trombone split

MkI Reverb Organ

MkI Mandolin *Mandola-like*

MkI Organ

(MkI Vibraphone *Same as MkII*)

MkI Trumpet

MkI Tibia Organ

MkI Church Organ

MkII Lead sounds

18 sounds:

MkII Flute *Beatles, Stones, Led Zeppelin, Pink Floyd, ABBA, Chili Peppers, etc*

MkII 3 Violins *Led Zeppelin, Moody Blues, Stones, etc, etc*

MkII Acoustic Steel Guitar

MkII Trombone *Beatles*

MkII Organ 1

MkII French Accordion

MkII Rock Guitar

MkII Brass *Genesis, King Crimson, Moody Blues, Stones, Beatles*

MkII Piano

MkII Muted Brass *Moody Blues*

MkII Harpsichord

MkII Accordion *Genesis*

MkII Organ 2

MkII Tenor Sax

MkII Vibraphone *Gracious*

MkII Mandolin *Beatles*

MkII Tibia Organ

MkII Church Organ

M300 Lead sounds

7 sounds:

M300 Strings *David Bowie*

M300 2 Violins *Barclay James Harvest*

M300 Solo Violin

M300 Slow Vibraphone

M300 Bass Flute

M300 Clarinet

M300 Celeste

M400 Lead sounds

25 sounds:

M400 Solo Cello *Oasis, King Crimson, Chili Peppers etc.*

M400 Solo Viola

M400 16 Violins *Air*

M400 String Section I

M400 String Section II

M400 8Voice Choir *Radiohead, Genesis, Chili Peppers, Tangerine Dream etc.*

M400 4Voice Female Choir

M400 4Voice Male Choir

M400 Mixed Custom Choir

M400 Male Solo Voice

M400 Boys Choir

M400 Pipe Organ

M400 Oboe *Tangerine Dream*

M400 English Horn

M400 Bassoon *Tangerine Dream*

M400 Alto Sax *Tangerine Dream*

M400 Clavichord

M400 2Brass

M400 2Saxes

M400 Recorder

M400 Wine Glasses

M400 Vibes w/o Vibrato

M400 Tubular Bells

M400 Celeste

M400 Hammond C3

A total of 65 different sounds.

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