Operation Manual

NUENDO 4

Advanced Audio and Post Production System

steinberg

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About this manual

Welcome!

This is the Operation Manual for Steinberg's Nuendo. Here you will find detailed information about all the features and functions in the program.

About the program versions

The documentation covers two different operating systems or "platforms"; Windows and Mac OS X.

Some features and settings are specific to one of the platforms, Windows or Mac OS X. This is clearly stated in the applicable cases. In other words:

⇨ If nothing else is said, all descriptions and procedures in the documentation are valid for both Windows and Mac OS X.

The screenshots are taken from the Windows version of Nuendo.

About the Nuendo Expansion Kit

The Nuendo Expansion Kit adds a number of music composition functions from Steinberg's Cubase (the "Cubase Music Tools") to the standard Nuendo application. The Nuendo Expansion Kit (NEK) is a separate product and can be purchased through your Steinberg dealer.

Whenever procedures in this manual use functions available only when the NEK is installed, this is indicated in the text by "Nuendo Expansion Kit only".

Key command conventions

Many of the default key commands in Nuendo use modifier keys, some of which are different depending on the operating system. For example, the default key command for Undo is [Ctrl]-[Z] under Windows and [Command]-[Z] under Mac OS X.

When key commands with modifier keys are described in this manual, they are shown with the Windows modifier key first, in the following way:

[Win modifier key]/[Mac modifier key]-[key]

For example, [Ctrl]/[Command]-[Z] means "press [Ctrl] under Windows or [Command] under Mac OS X, then press [Z]".

Similarly, [Alt]/[Option]-[X] means "press [Alt] under Windows or [Option] under Mac OS X, then press [X]".

⇨ Please note that this manual often refers to right-clicking, e.g. to open context menus, etc. If you are using a Mac with a single-button mouse, hold down [Ctrl] and click.

2

VST Connections: Setting up input and output busses

About this chapter

Nuendo uses a system of input and output busses to transfer audio between the program and the audio hardware.

- Input busses let you route audio from the inputs on your audio hardware into the program. This means that when you record audio, you will always do this through one or several input busses.
- Output busses let you route audio from the program to the outputs on your audio hardware. When you play back audio, you will always do this through one or several output busses.

As you can see, the input and output busses are vital when you work with Nuendo. This is why you find this chapter in the beginning of the Operation Manual – once you understand the bus system and set up the busses properly, it will be easy to go on with recording, playing back, mixing and doing surround work.

Setting up busses

Strategies

You can create any number of busses in Nuendo, in virtually any channel configuration – mono, stereo or a number of surround formats.

⇨ The bus configuration is saved with the projects – therefore it's a good idea to add and set up the busses you need and save these in a template project (see "Save as Template" on page 488).

When you start working on new projects, you start from this template. That way you get your standard bus configuration without having to make new bus settings for each new project. If you need to work with different bus configurations in different projects, you can either create several different templates or store your configurations as presets (see "Other bus operations" on page 14). The templates can of course also contain other settings that you regularly use – sample rate, record format, a basic track layout, etc.

So, which type of busses do you need? This depends on your audio hardware, your general audio setup (e.g. surround speaker setup) and what kind of projects you work with.

Here's an example:

Let's say you are using audio hardware with eight analog inputs and outputs and digital stereo connections (10 inputs and outputs all in all). Furthermore, you work with a surround setup in 5.1 format. Here's a list of busses you may wish to add:

Input busses

- Most likely you need at least one stereo input bus assigned to an analog input pair. This would let you record stereo material. If you want to be able to record in stereo from other analog input pairs as well, you could add stereo input busses for these too.
- Although you can record mono tracks from one side of a stereo input, it may be a good idea to add a dedicated mono input bus. This could be assigned to an analog input to which you have connected a dedicated microphone pre-amp for example. Again, you can have several different mono busses.
- You probably want a dedicated stereo input bus assigned to the digital stereo input, for digital transfers.
- If you want to transfer surround material directly to a surround track, e.g. from surround-configured location recording equipment, you need an input bus in that surround format – in this example, this would be a 5.1 input bus.

Output busses

- You will need one or several stereo output busses for routing stereo mixes to master recorders or other destinations.
- For digital transfers, you need a stereo bus assigned to a digital stereo output as well.
- You need a surround bus in the format of your speaker configuration (in this example, 5.1) assigned to the correct outputs (which in turn are connected to the correct speakers).
- You may want additional surround busses if you tend to work in different surround formats.

Preparations

Before you set up busses, you should name the inputs and outputs on your audio hardware. For example, if you are using a 5.1 surround speaker setup, you should name the outputs according to which speaker they are connected to (Left, Right, Center and so on).

The reason for this is compatibility – it makes it easier to transfer projects between different computers and setups. For example, if you move your project to another studio, the audio hardware may be of a different model. But if both you and the other studio owner have given your inputs and outputs names according to the surround setup (rather than names based on the audio hardware model), Nuendo will automatically find the correct inputs and outputs for your busses and you will be able to play and record without having to change the settings.

Use the Device Setup dialog to assign names to the inputs and outputs of your audio hardware:

1. Open the Device Setup dialog from the Devices menu.

2. Make sure that the correct driver for your audio hardware is selected on the VST Audio System page, so that the audio card is listed in the Devices list.

3. Select your audio card in the list.
The available input and output ports on your audio hardware are listed on the right.

4. To rename a port, click its name in the “Show as” column and enter a new name.

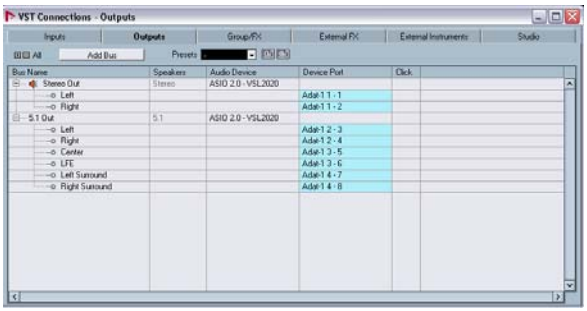
- If needed, you can also disable ports by deactivating them in the “Visible” column.
Disabled ports won’t show up in the VST Connections window when you are making bus settings. If you attempt to disable a port that is used by a bus, you will be asked whether this is really what you want – note that this will remove the port from the bus!

5. Click OK to close the Device Setup dialog.

⇨ If you open a project created on another computer and the port names don’t match (or the port configuration isn’t the same – e.g. the project is created on a system with multi-channel i/o and you open it on a stereo in/out system), the Pending Connections dialog will appear.
This allows you to manually re-route ports used in the project to ports available in your system.

The VST Connections window

You add and set up busses in the VST Connections window, opened from the Devices menu.



This window contains the following tabs:

- The Inputs and Outputs tabs are for viewing input busses or output busses, respectively.
- The Group/FX tab allows you to create Group and FX channels/tracks and to make output assignments for these. See “Setting up Groups and FX channels” on page 17.
- The External FX tab allows you to create effect send/return busses for connecting external effects which can then be selected via the effect pop-up menus from inside the program. See “External instruments/effects” on page 17 and “Using external effects” on page 182 for further information.
- The External Instruments tab allows you to create input/output busses for connecting external instruments. See “External instruments/effects” on page 17 and the chapter “VST Instruments and Instrument tracks” on page 189 for further information.
- The Studio tab is where you enable and configure the Control Room. See the chapter “Control Room” on page 151.

For the time being, we shall focus on how to set up input and output busses.

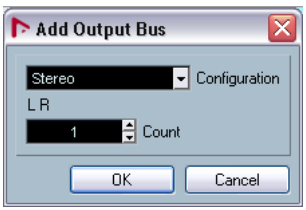
Depending on which tab you have selected, Inputs or Outputs, the window lists the current input or output busses, with the following columns:

Column	Description
Bus Name	Lists the busses. You can select busses and rename them by clicking on them in this column.
Speakers	Indicates the speaker configuration (mono, stereo, surround formats) of each bus.
Audio Device	This shows the currently selected ASIO driver.
Device Port	When you have "opened" a bus (by clicking its + button in the Bus Name column) this column shows which physical input/output on your audio hardware is used by the bus.
Click	You can route the click to a specific output bus, regardless of the actual Control Room output, or indeed when the Control Room is disabled.

Adding a bus

1. Click the Inputs or Outputs tab depending on which you want to add.

2. Click the Add Bus button.
A dialog appears.



3. Select the desired (channel) configuration.
The pop-up menu contains Mono and Stereo options as well as several surround formats. To select another surround format, use the "More…" submenu.

- Alternatively you can right-click in the VST Connections window and add a bus in the desired format directly from the context menu that appears.

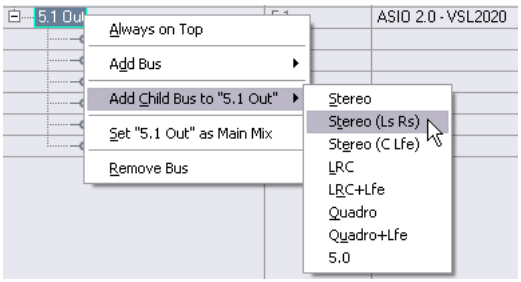
The new bus appears with the ports visible.

4. Click in the Device Port column to select an input/output port for a channel in the bus.
The pop-up menu that appears lists the ports with the names you have assigned in the Device Setup dialog. Repeat this for all channels in the bus.

Adding a child bus

A surround bus is essentially a set of mono channels – 6 channels in the case of 5.1 format. If you have a mono track in the project, you can route it to a separate speaker channel in the bus (or route it to the whole surround bus and use the surround panner to position it in the surround image). But what if you have a stereo track that you simply want to route to a stereo channel pair within the bus (Left and Right or Left Surround and Right Surround for example)? For this you need to create a child bus.

1. Select the surround bus in the list and right-click on it.
A pop-up menu appears.



2. Select a channel configuration from the "Add Child Bus" submenu.
As you can see, you can create stereo child busses (routed to various speaker channel pairs in the surround bus) or other surround bus formats (with fewer channels than the "parent bus").

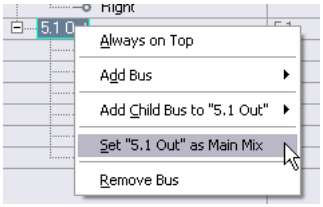
The child bus you created will be available for direct routing in the mixer. It's a part of the parent surround bus, which means there will be no separate channel strip for it.

Although child busses are probably most useful in output busses, you can also create child busses within a surround input bus – for example if you want to record a stereo channel pair (e.g. front left-right) in the surround bus to a separate stereo track.

Setting the Main Mix bus (the default output bus)

The Main Mix is the output bus that each new channel in the mixer will be assigned to when it is created.

Any one of the output busses in the VST Connections window can be the default output bus. By right-clicking on the name of an output bus, you can set this bus as the Main Mix bus.



Setting the default output bus in the VST Connections window.

When creating new audio, group or FX channels in the mixer, they will automatically be routed to the default bus.

⚠ The default bus is indicated by an orange colored speaker icon next to its name in the VST Connections window.

Other bus operations

- To change the port assignment for a bus, you proceed as when you added it – make sure the channels are visible (by clicking the "+" button next to the bus, or by clicking the "+ All" button at the top of the window) and click in the Device Port column to select ports.
- To remove a bus you don't need, select it in the list, right-click and select "Remove Bus" from the pop-up menu, or press [Backspace].
- You can store and recall bus presets with the pop-up menu at the top of the window.

To store the current configuration as a preset, click the Store "+" button and enter a name for the preset. You can then select the stored configuration directly from the Presets pop-up menu at any time. To remove a stored preset, select it and click the "-" button.

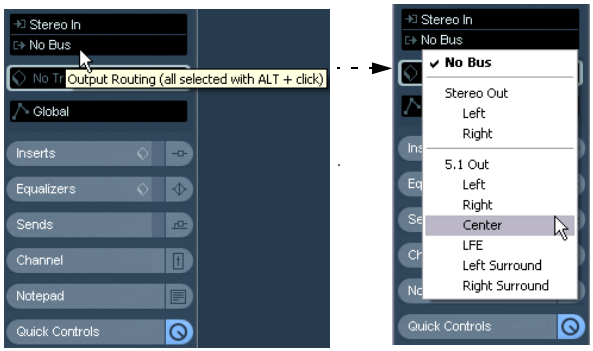
Using the busses

This section describes briefly how to use the input and output busses you have created. For details refer to the chapters "Recording" on page 64 and "The mixer" on page 122.

Routing

When you play back an audio track (or any other audio channel in the mixer – VST Instrument channels, ReWire channels, etc.), you route it to an output bus. In the same way, when you record on an audio track you select from which input bus the audio should be sent.

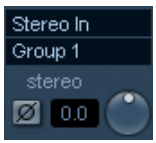
- You can select input and output busses in the Inspector, using the Input and Output Routing pop-up menus.



For audio-related channel types other than audio track channels (i.e. VST Instrument channels, ReWire channels, Group channels and FX channels), only the Output Routing pop-up menu is available. Select one of its subtracks in the Track list to open it.

- You can also select busses in the Routing panel at the top of each channel strip in the mixer.

Again, for VST Instrument channels, ReWire channels, Group channels and FX channels you will only be able to select output busses.



- If you press [Alt]/[Option] and select an input or output bus in the Mixer Routing View, it will be chosen for all selected channels.

This makes it easy to quickly set several channels to use the same input or output. Similarly, if you press [Shift] and select a bus, the following selected channels will be set to use incrementing busses – the second selected channel will use the second bus, the third will use the third bus and so on.

⇨ If the Routing panel isn't shown, click the Show Routing button in the extended common panel or open the Mixer context menu and select "Show Routing View" from the Window submenu.

The "Show Routing" button in the extended common panel of the Mixer.

When selecting an input bus for a track you can only select busses that correspond to the track's channel configuration. Here are the details for input busses:

- Mono tracks can be routed to mono input busses or individual channels within a stereo or surround input bus.
- Mono tracks can be routed to External Inputs that are configured in the Studio tab of the VST Connections window. These can be mono or individual channels within a stereo or surround input bus. They can also be routed to the Talkback input.
- Mono tracks can also be routed to mono output busses, mono group output busses or mono fx channel output busses, provided that these will not lead to feedback.
- Stereo tracks can be routed to mono input busses, stereo input busses or stereo child busses within a surround bus.
- Stereo tracks can be routed to External Inputs that are configured in the Studio tab of the VST Connections window. These can be mono input busses or stereo input busses. They can also be routed to the Talkback input.
- Stereo tracks can also be routed to mono or stereo output busses, mono or stereo group output busses and mono or stereo fx channel output busses, provided that these will not lead to feedback.
- Surround tracks can be routed to surround input busses.
- Surround tracks can be routed to External Inputs that are configured in the Studio tab of the VST Connections window, provided that these have the same input configuration.
- Surround tracks can also be routed to output busses, provided that these have the same input configuration or will not lead to feedback.

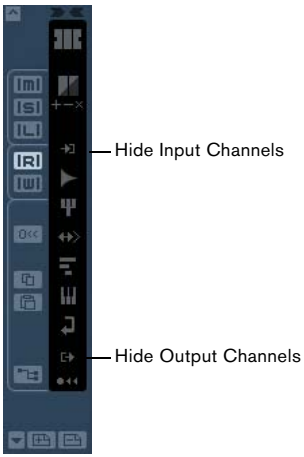
For output busses any assignment is possible.

⚠ Assignments that will lead to feedback are not available in the pop-up menu. This is also indicated by a one-way symbol.

To disconnect input or output busses, select "No Bus" from the corresponding pop-up menu.

Viewing the busses in the mixer

In the mixer, busses are represented by input and output channels (shown in separate panes to the left and right in the window). You can show or hide these independently by clicking the Hide Input Channels and Hide Output Channels buttons in the common panel:



Input channels

The input channels are shown to the left in the mixer. As you can see, each input channel resembles a regular mixer channel strip. Here you can do the following:

- Check and adjust the recording level using the Input Gain knobs and/or the level fader.
See "Setting input levels" on page 69.

- Change the phase of the input signal.
This is done by clicking the Input Phase button next to the Input Gain control.

- Add effects or EQ to the input bus.
See "Recording with effects" on page 76 for an example of how to add effects to your recording at the input bus stage.

⚠ The settings you make in the input channel strip will be a permanent part of the recorded audio file!

Output channels

The output channels are shown to the right in the mixer. Here you can do the following:

- Adjust the output level for the busses with the faders.

- Add effects or EQ.
These will affect the whole bus. Examples of effects you may want to add here include compressors, limiters and dithering. See the chapter "Audio effects" on page 168.

- Using Sends, send varying amounts of one output bus to any other output bus that is to the right of the selected output bus in the mixer.

Setting up Groups and FX channels

The Group/FX tab in the VST Connections window shows all Group channels and FX channels in your project. You can create new Group or FX channels by clicking the corresponding Add button. This is the same as creating Group channel tracks or FX channel tracks in the Project window (see “Using group channels” on page 142 and the chapter “Audio effects” on page 168).

However, the VST Connections window also allows you to create child busses for Groups and FX Channels. This is useful e.g. if you have Groups or FX Channels in surround format and want to route stereo channels to specific channel pairs in these.

To create a child bus for a Group channel or FX channel in surround format, proceed as follows:

1. Open the VST Connection window and select the Groups/FX tab.

2. Select the Group or FX channel in the list and right-click it.

3. Select a channel configuration from the “Add Child Bus” submenu.

The child bus you created will be available for direct routing in the mixer. It’s a part of the parent Group or FX channel, which means there will be no separate channel strip for it.

About monitoring

By default, monitoring is done via the Control Room (see the chapter “Control Room” on page 151). When the Control Room is disabled on the Studio tab of the VST Connections window, the Main Mix bus (see “Setting the Main Mix bus (the default output bus)” on page 14) will be used for monitoring.

Setting the monitoring level

When you are using the Control Room for monitoring, this is set in the Control Room Mixer, see the chapter “Control Room” on page 151. When you are monitoring via the Main Mix bus, you can adjust the monitoring level in the regular Project Mixer.

When auditioning or scrubbing in the Sample Editor, you can also set the monitoring level using the small fader on the Sample editor toolbar.

External instruments/effects

Nuendo supports the integration of external effect devices and external instruments, e.g. hardware synthesizers, into the sequencer signal flow.

You can use the External Instruments tab and the External FX tab in the VST Connections window to define the necessary send and return ports and access the instruments/effects through the VST Instruments window.

⚠ External Instruments and effects are indicated by an “x” icon in the list next to their names in the respective pop-up menus.

Requirements

- To use external effects, you need audio hardware with multiple inputs and outputs. To use external instruments, a MIDI interface must be connected to your computer.
  An external effect will require at least one input and one output (or input/output pairs for stereo effects) – in addition to the input/output ports you use for recording and monitoring.

- As always, audio hardware with low-latency drivers is a good thing to have.
  Nuendo will compensate for the input/output latency and ensure that the audio processed through external effects isn’t shifted in time.

Connecting the external effect/instrument

To set up an external effect or instrument, proceed as follows:

1. Connect an unused output pair on your audio hardware to the input pair on your external hardware device.
In this example, we assume that the hardware device has stereo inputs and outputs.

2. Connect an unused input pair on your audio hardware to the output pair on your hardware device.

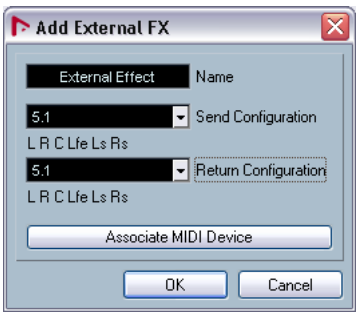
⚠ Please note that it is possible to select input/output ports for external effects/instruments that are already used (i.e. that have been selected as inputs/outputs in the VST Connections window). If you select a used port for an external effect/instrument, the existing port assignment will be broken. Note that you will not get a warning message!

Once the external device is connected to the audio hardware of your computer, you have to set up the input/output busses in Nuendo

Setting up external effects

1. Open the VST Connections window from the Devices menu.

2. Open the External FX tab and click “Add External FX”.



3. In the dialog that appears, enter a name for the external effect and specify the Send and Return configurations. If you want to set up a MIDI device corresponding to the external effect, click the “Associate MIDI Device” button.
Depending on the type of effect, you can specify mono, stereo or surround configurations. When clicking “Associate MIDI Device”, you can use the MIDI Device Manager functions to create a new MIDI device for the effect. Note that delay compensation will only be applied for the effect when you use MIDI devices. For information about the MIDI Device Manager and user device panels see the separate PDF document “MIDI Devices”.

4. Click OK. This adds a new External FX bus.

5. Click in the Device Port column for the Send Bus “Left” and “Right” ports and select the outputs on your audio hardware that you connected in step 1 above.

6. Click in the Device Port column for the Return Bus “Left” and “Right” ports and select the inputs on your audio hardware that you connected in step 2 above.

7. If you like, make additional settings for the bus.
These are found in the columns to the right. Note however that you can adjust these while actually using the external effect – which may be easier as you can hear the result. You have the following options:

Setting	Description
Delay	If your hardware effect device has an inherent delay (latency), you should enter this value here, as it allows Nuendo to compensate for that delay during playback. You can also let the delay value be determined by the program by right-clicking in the Delay column for the effect and selecting “Check User Delay”. Note that you don’t have to take the latency of the audio hardware into account – this is handled automatically by the program.
Send Gain	Allows you to adjust the level of the signal being sent to the external effect.
Return Gain	Allows you to adjust the level of the signal coming in from the external effect. Note however that excessive output levels from an external effect device may cause clipping in the audio hardware. The Return gain setting cannot be used to compensate for this – you have to lower the output level on the effect device instead.
MIDI Device	When you click in this column, a pop-up menu opens where you can either disconnect the effect from the associated MIDI device, select a MIDI device, create a new device or open the MIDI Device Manager in Nuendo to edit the MIDI device. When Studio Manager 2 is installed, you may also select an OPT editor to access your external effect.
Used	Whenever you insert an external effect into an audio track, this column shows a check mark (“x”) to indicate that the effect is being used.

8. When you are done, close the VST Connections window.

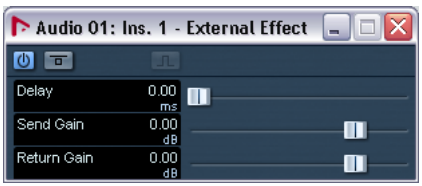
⇨ Note that external device ports are exclusive, see "Connecting the external effect/instrument" on page 18.

How to use the external effect

If you now click an insert effect slot for any channel and look at the effect pop-up menu, you will find the new external FX bus listed on the "External Plug-ins" submenu.

When you select it, the following happens:

- The external FX bus is loaded into the effect slot just like a regular effect plug-in.
- The audio signal from the channel will be sent to the outputs on the audio hardware, through your external effect device and back to the program via the inputs on the audio hardware.
- A parameter window appears, showing the Delay, Send Gain and Return Gain settings for the external FX bus. You can adjust these as necessary while playing back. The parameter window also provides the "Measure Effect's Loop Delay for Delay Compensation" button. This is the same function as the "Check User Delay" option in the VST Connections window. It provides Nuendo with a Delay value to be used for delay compensation. When you have defined a MIDI device for the effect, the corresponding Device window will be opened. When Studio Manager 2 is installed, and you have set up a corresponding OPT editor, this OPT editor will be displayed.



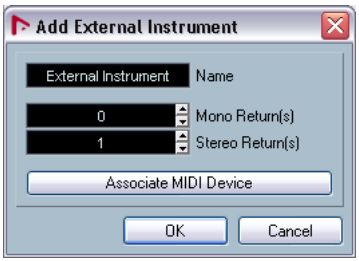
The default parameter window for an external effect

Like any effect, you can use the external FX bus as an insert effect or as a send effect (an insert effect on an FX channel track). You can deactivate or bypass the external effect with the usual controls.

Setting up external instruments

1. Open the VST Connections window from the Devices menu.

2. Open the External Instrument tab and click "Add External Instrument".



3. In the dialog that appears, enter a name for the external instrument and specify the number of required mono and/or stereo returns. If you want to set up a MIDI device corresponding to the external instrument, click the Associate MIDI Device button.
Depending on the type of instrument, a specific number of mono and/or stereo return channels is required. When clicking "Associate MIDI Device", you can use the MIDI Device Manager functions to create a new MIDI device. For information about the MIDI Device Manager and user device panels see the separate PDF document "MIDI Devices".

4. Click OK. This adds a new external instrument bus.

5. Click in the Device Port column for the Return Bus "Left" and "Right" ports and select the inputs on your audio hardware to which you connected the external instrument.

6. If you like, make additional settings for the bus.
These are found in the columns to the right. Note however that you can adjust these while actually using the external instrument – which may be easier as you can hear the result. You have the following options:

Setting	Description
Delay	If your hardware device has an inherent delay (latency), you should enter this value here. This allows Nuendo to compensate for that delay during playback. Note that you don't have to take the latency of the audio hardware into account – this is handled automatically by the program.
Return Gain	Allows you to adjust the level of the signal coming in from the external instrument. Note however that excessive output levels from an external device may cause clipping in the audio hardware. The Return gain setting cannot be used to compensate for this – you have to lower the output level on the device instead.

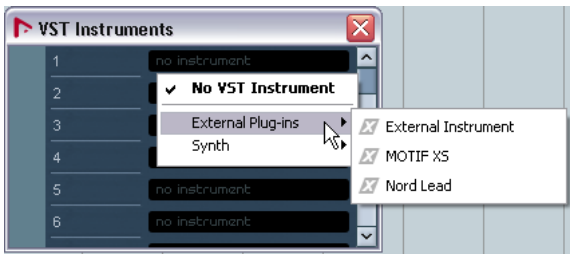
Setting	Description
MIDI Device	When you click in this column, a pop-up menu opens where you can either disconnect the instrument from the associated MIDI device, select a MIDI device, create a new device or open the MIDI Device Manager in Nuendo to edit the MIDI device. When Studio Manager 2 is installed, you may also select an OPT editor to access your external instrument.
Used	Whenever you insert the external instrument into a VST Instrument slot, this column shows a chicanery ("x") to indicate that the instrument is being used.

7. When you are done, close the VST Connections window.

⇨ Note that external device ports are exclusive, see "Connecting the external effect/instrument" on page 18.

How to use the external instrument

Once you have set up the external instrument in the VST Connections window, you can use it as a VST Instrument. Open the VST Instruments window and click on an empty instrument slot. In the instrument pop-up menu, your external instrument is listed on the External Instruments submenu:



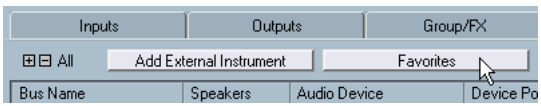
When you select the external instrument in the VST Instruments window, the following happens:

- A parameter window for the external device is opened automatically. This may either be the Device window, allowing you to create a generic device panel, an OPT editor window or a default editor. For information about the Device window, the MIDI Device Manager and User device panels, see the separate PDF document "MIDI Devices".
- To send MIDI notes to the external instrument, open the output pop-up menu in the Inspector for the corresponding MIDI track and select the MIDI device to which the external instrument is connected. This ensures use of delay compensation. The instrument will now play any MIDI notes it receives from this track and return them to Nuendo through the return channel(s) you have set up.

The external instrument will behave like any other VST Instrument in Nuendo.

About the Favorites buttons

In the VST Connections window, both the External FX tab and the External Instruments tab feature a Favorites button.



The Favorites button on the External FX tab

Favorites are device configurations that you can recall at any time, like a library of external devices that are not constantly connected to your computer. They also allow you to save different configurations for the same device, e.g. a multi-effect board or an effect that provides both a mono and a stereo mode.

To save a device configuration as a favorite, proceed as follows:

- When you have added a new device in the VST Connections window, select it in the Bus Name column and click the Favorites button.
  A context menu is displayed showing an option to add the selected effect or instrument to the Favorites.
- You can recall the stored configuration at any time by clicking the Favorites button and selecting the device name from the context menu.

About the “plug-in could not be found” message

When you open a project that uses an external effect/instrument, you may get a “plug-in could not be found” message. This will happen when you remove an external device from the VST Connections window although it is used in a saved project, or when transferring a project to another computer on which the external device is not defined. You may also see this message when opening a project last saved with version 3.0 of Nuendo.

In the VST Connections window, the broken connection to the external device is indicated by an icon in the Bus Name column.

To reestablish the broken connection to the external device, simply right-click the entry for the device in the Bus Name column and select “Connect External Effect”. The icon is removed, and you can use the external device within your project as before.

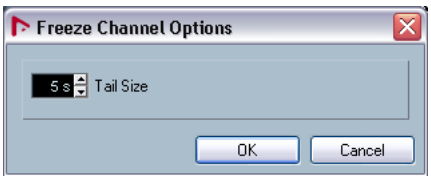
⚠ Note that busses set up for external effects or external instruments are saved “globally”, i.e. for your particular computer setup.

Freezing external effects/instruments

Just as when working with regular VST instruments and effects, you can also choose to freeze external effects and instruments. The general procedure is described in detail in the chapters “Audio effects” on page 168 and “VST Instruments and Instrument tracks” on page 189.

⚠ Note that you have to perform Freeze in realtime. Otherwise external effects will not be taken into account.

When freezing external instruments or effects, you can adjust the corresponding tail value in the Freeze Channel Options dialog:



- Use the arrow buttons next to the Tail Size value field to set the desired Tail length, i.e. the range after the part boundary that should also be included for the freeze. You can also click directly in the value field and enter the desired value manually (the maximum value being 60 s).
- When the Tail Size is set to 0 s (default), the freezing will only take into account the data within the Part boundaries.

3

The Project window

Background

The Project window is the main window in Nuendo. This provides you with an overview of the project, allowing you to navigate and perform large scale editing. Each project has one Project window.

About tracks

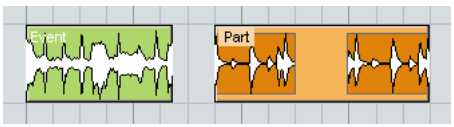
The Project window is divided vertically into tracks, with a timeline running horizontally from left to right. The following track types are available:

Track type	Description
Audio	For recording and playing back audio events and audio parts. Each audio track has a corresponding audio channel in the mixer. An audio track can have any number of automation "subtracks" for automating mixer channel parameters, insert effect settings etc.
Folder	Folder tracks function as containers for other tracks, making it easier to organize and manage the track structure. They also allow you to edit several tracks at the same time. See "Folder tracks" on page 105.
FX Channel	FX channel tracks are used for adding send effects. Each FX channel can contain up to eight effect processors – by routing effect sends from an audio channel to an FX channel, you send audio from the audio channel to the effect(s) on the FX channel. Each FX channel has a corresponding channel strip in the mixer – in essence an effect return channel. See the chapter "Audio effects" on page 168. An FX channel can also have any number of automation subtracks for automating mixer channel parameters, effect settings etc. All FX channel tracks are automatically placed in a special FX channel folder in the Track list, for easy management.
Group Channel	By routing several audio channels to a Group channel, you can submix them, apply the same effects to them, etc. (see "Using group channels" on page 142). A Group channel track contains no events as such, but displays settings and automation curves for the corresponding Group channel. Each Group channel track has a corresponding channel strip in the mixer. In the Project window, Group channels are organized as subtracks in a special Group Tracks folder.
Instrument	This allows you to create a track for a dedicated instrument, making e.g. VST instrument handling easier and more intuitive. Instrument tracks have a corresponding channel strip in the mixer. Each instrument track can have any number of automation subtracks in the Project window. However, Volume and Pan are automated from within the mixer. It is possible to edit Instrument tracks directly in the Project window, using the Edit In-Place function (see "Edit In-Place" on page 381). For more information on instrument tracks, see "VST Instruments and Instrument tracks" on page 189.
MIDI	For recording and playing back MIDI parts. Each MIDI track has a corresponding MIDI channel strip in the mixer. It's possible to edit MIDI tracks directly in the Project window, using the Edit In-Place function (see "Edit In-Place" on page 381). A MIDI track can have any number of automation "subtracks" for automating mixer channel parameters, insert and send effect settings etc.
Marker	The Marker track displays markers which can be moved and renamed directly in the Project window (see "Using the Marker track" on page 111). A project can have only one marker track.
Arranger	The Arranger track is used for arranging your project, by marking out sections in the project and determining in which order they should be played back. See "The Arranger track" on page 98.
Ruler	Ruler tracks contain additional rulers, displaying the timeline from left to right. You can use any number of ruler tracks, each with a different display format if you wish. See "The ruler" on page 31 for more information about the ruler and the display formats.
Transpose	The Transpose track allows you to set global key changes. A project can only have one transpose track. See "The Transpose functions" on page 114.
Video	For playing back video events. A project can only have one video track.

About parts and events

Events are the basic building blocks in Nuendo. Different event types are handled differently in the Project window:

- Video events and automation events (curve points) are always viewed and rearranged directly in the Project window.
- MIDI events are always gathered in MIDI parts, containers for one or more MIDI events. MIDI parts are rearranged and manipulated in the Project window. To edit the individual MIDI events in a part, you have to open the part in a MIDI editor (see "About editing MIDI" on page 364).
- Audio events can be displayed and edited directly in the Project window, but you can also work with audio parts containing several events. This is useful if you have a number of events which you want to treat as one unit in the project. Audio parts also contain information about the time position in the project.



An audio event and an audio part.

Audio handling

When you work with audio files, it is crucial to understand how audio is handled in Nuendo:

When you edit or process audio in the project window, you always work with an audio clip that is automatically created on import or when you record audio. This audio clip refers to the audio file on the hard disk that remains untouched. This means, that audio editing and processing is “non-destructive”, in the sense that you can always undo changes or revert to the original versions.

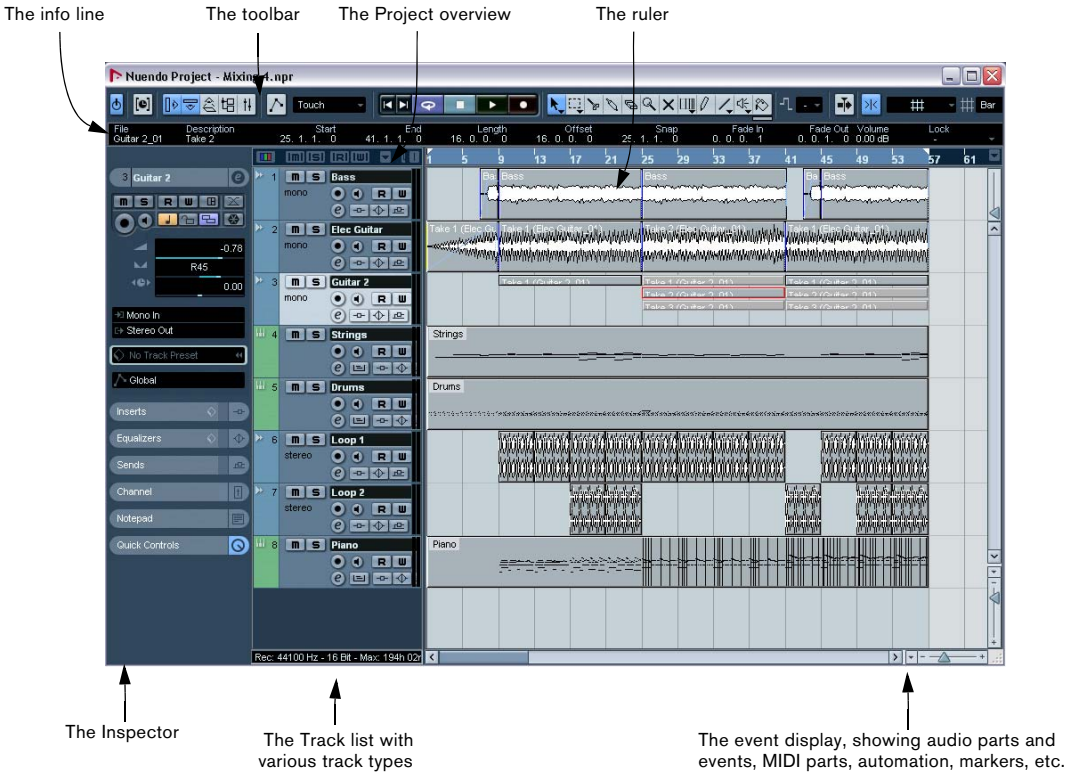
The **audio clip** does not necessarily refer to just one original audio file! If you apply e.g. some processing to a section of an audio clip, this will actually create a new audio file that contains only the section in question. The processing will then be applied to the new audio file only, leaving the original audio file unchanged. Finally, the audio clip is automatically adjusted, so that it refers both to the original file and to the new, processed file. During playback, the program will switch between the original file and the processed file at the correct positions. You will hear this as a single recording, with processing applied to one section only. This feature makes it possible to undo processing at a later stage, and to apply different processing to different audio clips that refer to the same original file.

The **audio event** is the object that you place on a time position in Nuendo. If you make copies of an audio event and move them to different positions in the project, they will still all refer to the same audio clip. Furthermore, each audio event has an Offset value and a Length value. These determine at which positions in the clip the event will start and end, i.e. which section of the audio clip will be played back by the audio event. For example, if you resize the audio event, you will just change its start and/or end position in the audio clip – the clip itself will not be affected.

An **audio region** is a section within a clip with a length value, a start time, and a snap point. Audio regions are shown in the pool and are best created and edited in the Sample Editor.

⇨ If you want to use one audio file in different contexts, or if you want to create several loops from one audio file, you should convert the corresponding regions of the audio clip to events and bounce them into separate audio files. This is necessary since different events that refer to the same clip access the same clip information.

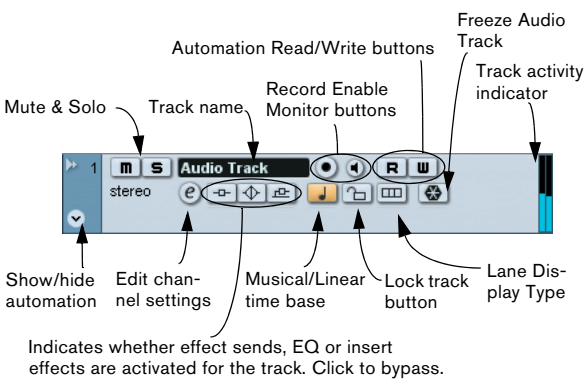
Window Overview



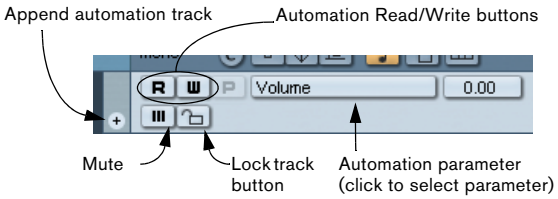
The Track list

The Track list displays all the tracks used in a project. It contains name fields and settings for the tracks. Different track types have different controls in the Track list. To see all the controls you may have to resize the track in the Track list (see "Resizing tracks in the Track list" on page 35).

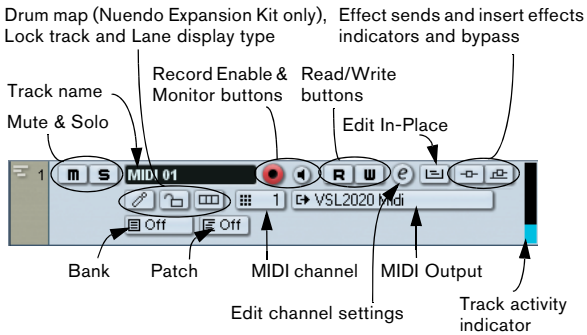
- The Track list area for an audio track:



- The Track list area for an automation subtrack (opened by clicking the Show/Hide Automation button on a track):



- The Track list area for a MIDI track:



The Inspector

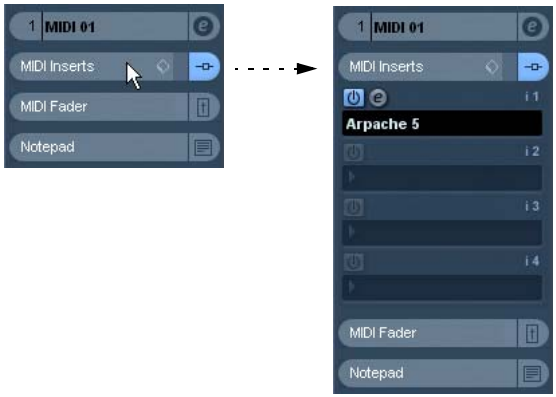
The area to the left of the Track list is called the Inspector. This shows additional controls and parameters for the track you have selected in the Track list. If several tracks are selected (see "Handling tracks" on page 38), the Inspector shows the setting for the first (topmost) selected track.

To hide or show the Inspector, click the Inspector icon in the toolbar.

The Inspector icon.

- For most track classes, the Inspector is divided into a number of sections, each containing different controls for the track. You can hide or show sections by clicking on their respective names.

Clicking the name for a hidden section brings it into view and hides the other sections. [Ctrl]/[Command]-clicking the section name allows you to hide or show a section without affecting the other sections. Finally, [Alt]/[Option]-clicking a section name shows or hides all sections in the Inspector.



- You can also use key commands to show different Inspector sections.

These are set up in the Key Commands dialog, see "Setting up key commands" on page 518.

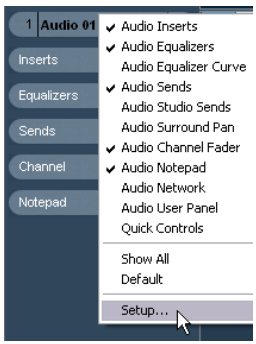
⇨ Hiding a section does not affect its functionality.

In other words, if you have set up a track parameter or activated an effect for example, your settings will still be active even if you hide the respective Inspector section.

Which sections are available in the Inspector depends on the selected track.

⇨ Please note that not all Inspector tabs are shown by default. You can show/hide Inspector sections by right-clicking on an Inspector tab and activating/deactivating the desired option(s).

Make sure you right-click on an inspector tab and not on the empty area below the Inspector, as this will open the Quick context menu instead.



The Inspector Setup context menu.

Sections

The Inspector contains the controls that can be found on the Track list, plus some additional buttons and parameters. In the table below, these additional settings and the available sections are listed. Which sections are available for which track type is described in the following sections.

Parameter	Description
Auto Fades Settings button	Opens a dialog in which you can make separate Auto Fade settings for the track. See “Making Auto Fade settings for a separate track” on page 97.
Edit Channel settings	Opens the Channel Settings window for the track, allowing you to view and adjust effect and EQ settings, etc. See “Using Channel Settings” on page 137.
Volume	Use this to adjust the level for the track. Changing this setting will move the track’s fader in the mixer window, and vice versa. See “Setting volume in the mixer” on page 132 to learn more about setting levels.
Pan	Use this to adjust the panning of the track. As with the Volume setting, this corresponds to the Pan setting in the mixer.
Delay	This adjusts the playback timing of the audio track. Positive values delay the playback while negative values cause the track to play earlier. The values are set in milliseconds.
Input Routing	This lets you specify which Input bus or MIDI input the track should use (see “Setting up busses” on page 11 for information about Input busses).
Output Routing	Here you decide to which output the track should be routed. For audio tracks you select an output bus (see “Setting up busses” on page 11) or Group channel, for MIDI tracks you select a MIDI output.
Inserts section	Allows you to add insert effects to the track, see the chapter “Audio effects” on page 168. The Edit button at the top of the section opens the control panels for the added insert effects.
Equalizers section	Lets you adjust the EQs for the track. You can have up to four bands of EQ for each track, see “Making EQ settings” on page 138. The Edit button at the top of the section opens the Channel Settings window for the track.
Equalizer Curve section	Lets you adjust the EQs for the track graphically, by clicking and dragging points in a curve display.
Sends section	Allows you to route an audio track to one or several FX channels (up to eight), see the chapter “Audio effects” on page 168. For MIDI tracks, this is where you assign MIDI send effects. The Edit button at the top of the section opens the control panel for the first effect in each FX channel.
Studio Sends	The Studio Sends are used to route cue mixes to Control Room Studios. For a detailed description of Studios and Studio Sends, see the chapter “Control Room” on page 151.
Surround Pan	When the Surround Panner is used for a track, this is also available in the Inspector. For further information, see “Using the Surround Panner” on page 208.
Channel section	Shows a duplicate of the corresponding mixer channel strip. The channel overview strip to the left lets you activate and deactivate insert effects, EQs and sends.
Notepad section	This is a standard text notepad, allowing you to jot down notes about the track. If you have entered any notes about a track, the icon next to the “Notepad” heading will light up to indicate this. Moving the pointer over the icon will display the Notepad text in a tool tip.
Network section	This contains controls related to the Network functions of the program. For further information, see the separate PDF document “Networking”.
User Panel	Here you can display device panels, e.g. for external MIDI devices, audio track panels or VST insert effect panels. For information on how to create or import MIDI device setups, see the separate PDF document “MIDI Devices”.
Quick Controls	Here you can configure quick controls, e.g. to use remote devices. See the chapter “Track Quick Controls” on page 338.

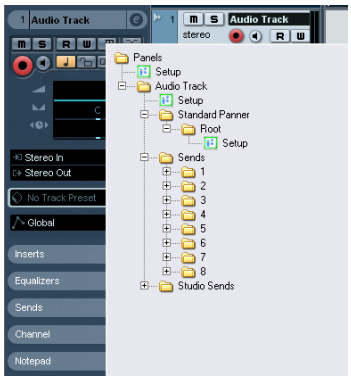
Audio tracks

For audio tracks, all settings and sections listed above are available.

- User Panels for audio tracks can display panels for channel controls (such as input phase or the linked panner option) or for VST effects currently inserted in the channel.

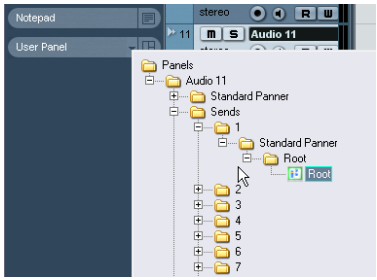
- User Panels for audio tracks are accessed by clicking the Open Device Panels button (found in the topmost Inspector section, next to the Read/Write buttons).

This opens up a menu listing all the device panels available for the audio track. If panels have not been created yet, you will see “Setup” panels in the menu. Double-cicking on one of these will open the Device window for that audio track. Here you will be able to create user panels for any parameter of the audio track, including VST effects that have been inserted. For more information on how to create device and user panels, see the separate PDF document “MIDI Devices”.



The device panel browser.

Once panels have been created, they are available from the User Panel section of the Inspector. Click on the arrow button at the top right of the User Panel section to view the available panels.



The User Panel menu in the Inspector

⚠ The Inspector can only display inspector sized user panels. Panels of larger sizes will not be available in the Inspector.

MIDI tracks

When a MIDI track is selected, the Inspector contains a number of additional sections and parameters, affecting the MIDI events in real time (e.g. on playback). Which sections are available for MIDI tracks is described in the chapter “MIDI realtime parameters and effects” on page 342.

Marker tracks

When the marker track is selected, the Inspector shows the marker list. See “The Marker window” on page 110.

Video tracks

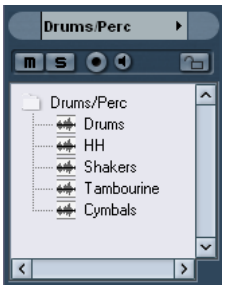
When a video track is selected, the Inspector contains a lock button for locking the track (see “Locking events” on page 50), a Mute button for interrupting video playback and two settings for how the video thumbnails are shown: Show Frame Numbers and Snap Thumbnails (see “Playing back a video file” on page 472).

Video tracks make use of the Notepad and Network Inspector tabs.

Folder tracks

When a folder track is selected, the Inspector shows the folder and its underlying tracks, much like a folder structure in the Windows Explorer or Mac OS X Finder.

⇨ You can click one of the tracks shown under the folder in the Inspector to have the Inspector show the settings for that track.
This way, you don't have to "open" a folder track to make settings for tracks within it.



Here, an audio track within the folder is selected.

FX channel tracks

When an FX channel track is selected, the following controls and sections are available:

- Edit button.
- Volume control.
- Pan control.
- Output routing pop-up menu.
- Inserts section.
- Equalizers section.
- Equalizer Curve section.
- Sends section.
- Studio Sends section.
- Surround Pan section.
- Channel section.
- Notepad section.

FX channel folder tracks

FX channel tracks are automatically placed in a special folder, for easier management. When this folder track is selected, the Inspector shows the folder and the FX channels it contains. You can click one of the FX channels shown in the folder to have the Inspector show the settings for that FX channel – this way you don't have to "open" a folder track to access the settings for the FX channels in it.

Group channel tracks

When a Group channel track is selected, the following controls and sections are available:

- Edit button.
- Volume control.
- Pan control.
- Output routing pop-up menu.
- Inserts section.
- Equalizers section.
- Equalizer Curve section.
- Sends section.
- Studio Sends section.
- Surround Pan section.
- Channel section.
- Notepad section.

Group channel folder tracks

Just like FX channel tracks, all Group channel tracks are placed in a separate folder – when this is selected, the Inspector shows the folder and the Group channels it contains. You can click one of the Group channels shown in the folder to have the Inspector show the settings for that Group channel – this way, you don't have to "open" a folder track to access the settings for the Group channels in it.

Ruler tracks

For ruler tracks, the Inspector isn't used.

Transpose track

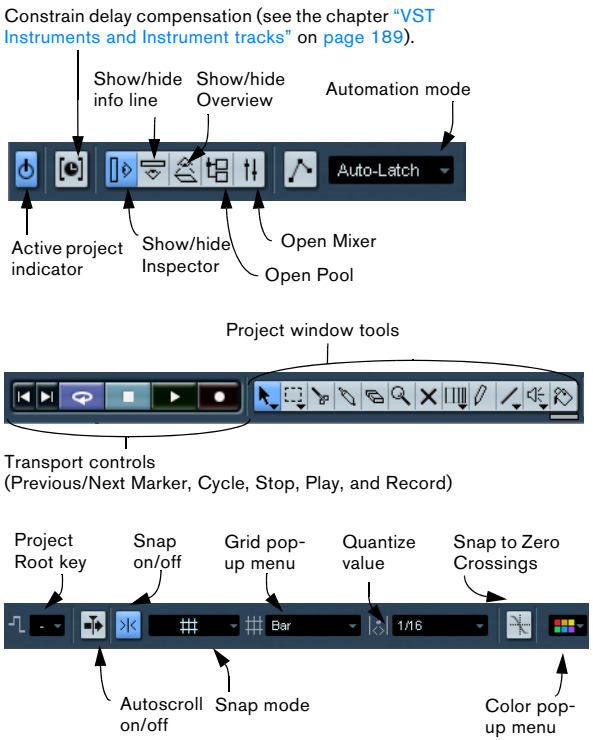
When the transpose track is selected, the following controls and sections are available:

- Mute button.
- Keep Transpose in Octave range.
- Toggle Timebase button.
- Lock button.
- Notepad section.
- Network section.

The Transpose track controls are described in detail in the chapter "The Transpose functions" on page 114.

The toolbar

The toolbar contains tools and shortcuts for opening other windows and various project settings and functions:



⇨ In addition to these, the toolbar can contain a number of other tools and shortcuts, not visible by default. How to set up the toolbar and specify which tools should be displayed or hidden is described in the section "The Setup dialogs" on page 506.

The info line

The info line shows information about the currently selected event or part in the Project window. You can edit almost all values on the info line using regular value editing. Length and position values are displayed in the format currently selected for the ruler (see "The ruler" on page 31).

- To hide or show the info line, click the Show Event Info-line button on the toolbar.

The following elements can be selected for display and editing on the info line:

- Audio events.
- Audio parts.
- MIDI parts.
- Video events.
- Markers.
- Automation curve points.
- Transpose events.
- Arranger events.

When several elements are selected

- If you have several elements selected, the info line will show information about the first item in the selection. The values will be shown in yellow to indicate that several elements are selected.

- If you edit a value on the info line, the value change is applied to all selected elements, relatively to the current values.

If you have two audio events selected and the first is one bar long and the other two bars long, the info line shows the length of the first event (one bar). If you now edit this value to 3 bars in the info line, the other event will be resized by the same amount – and will thus be 4 bars long.

- If you press [Ctrl]/[Command] and edit on the info line, the values will be absolute instead. In our example above, both events would be resized to 3 bars. Note that [Ctrl]/[Command] is the default modifier key for this – you can change this in the Preferences (Editing–Tool Modifiers page, under the Info Line category).

Editing Transpose and Velocity for MIDI parts

When one or several MIDI parts are selected, the info line contains Transpose and Velocity fields.

- Adjusting the Transpose field transposes the selected parts in semitone steps.

Note that this transposition doesn't change the actual notes in the part – it's just a "play parameter", affecting the notes on playback. The transposition you specify for a part on the info line is added to the transposition set for the whole track. For more information on transposing, see the chapter "The Transpose functions" on page 114.

- Adjusting the Velocity field shifts the velocity for the selected parts – the value you specify is added to the velocities of the notes in the parts.

Again, this velocity shift only affects the notes on playback, and again, the value you specify is added to the Vel.Shift. value set for the whole MIDI track in the Inspector.

⚠ Audio events can also be transposed – see "Real-time pitch-shifting of audio events" on page 288.

Getting on-the-fly info with the Arrow tool

If the option "Select Tool: Show Extra Info" is activated in the Preferences (Editing–Tools page), a tool tip will be shown for the Arrow tool, displaying information depending on where you point it. For example, in the Project window event display, the tool will show the current pointer position and the name of the track and event you're pointing at.

The ruler

The ruler at the top of the event display shows the timeline. Initially, the Project window ruler uses the display format specified in the Project Setup dialog (see "The Project Setup dialog" on page 33), as do all other rulers and position displays in the project. However, you can select an independent display format for the ruler by clicking the arrow button to the right of it and selecting an option from the pop-up menu that appears (you can also bring up this pop-up menu by right-clicking anywhere in the ruler).

Option	Positions and lengths displayed as
Bars+Beats	Bars, beats, sixteenth notes and ticks. By default there are 120 ticks per sixteenth note but you can adjust this with the "MIDI Display Resolution" setting in the Preferences (MIDI page).
Seconds	Hours, minutes, seconds and milliseconds.
Timecode	This format displays hours, minutes, seconds and frames. The number of frames per second (fps) is set in the Project Setup dialog (see "The Project Setup dialog" on page 33). You can choose between 24, 25, 29.97 and 30 fps or 29.97 and 30 dfps ("drop frame").
Feet+Frames 16mm	Feet and frames, with 40 frames per foot.
Feet+Frames 35mm	Feet, frames and 1/4 frames, with 16 frames per foot.
Samples	Samples.
User	Hours, minutes, seconds and frames, with a user definable number of frames per second. You set the desired number of fps in the Preferences (Transport page).
Time Linear	When this is selected, the ruler will be linear relative to time. This means that if there are tempo changes on the Tempo track, the distance between the bars will vary in Bars+Beats mode.
Bars+Beats Linear	When this is selected, the ruler will be linear relative to the meter position – bars and beats. This means that if there are tempo changes on the Tempo track, there still will be the same distance between bars in Bars+Beats mode. If the ruler is set to a time-based mode, the distance between seconds will vary depending on the tempo changes.

- The selection you make here affects the ruler, the info line and tool tip position values (which appear when you drag an event in the Project window).

You can also select independent formats for other rulers and position displays.

- To set the display format globally (for all windows), use the primary display format pop-up on the Transport panel, or hold down [Ctrl]/[Command] and select a display format in any ruler.

- If you use the “Timecode” or “User” options and the option “Show Timecode Subframes” is activated in the Preferences (Transport page), the frames will also display subframes.

There are 80 subframes per frame.

- For the “Feet+Frames” settings, there is an option in the Preferences (Transport page) called “Feet’n’Frames Count from Project Start”.

When this is activated, time displays and rulers in Feet+Frames format will always start with 0’00 at the beginning of the project – regardless of any Start offset settings in the Project Setup dialog.

Using multiple rulers – ruler tracks

As described above, the Nuendo Project window contains a main ruler at the top of the event display, displaying the timeline from left to right.

If needed, you can have several rulers in the Project window, by adding ruler tracks to the project. Each ruler track contains an additional ruler.

- To add a ruler track, select “Add Track” from the Project menu and from the submenu that appears, select “Ruler”.

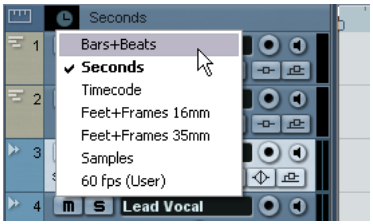
A ruler track showing an additional ruler is added to the Track list.

A ruler track set to the display format “Seconds”.

You can add any number of ruler tracks to a project, and position them as needed by dragging them up or down in the list. Each of the rulers can show a separate display format:

- To select a display format for a ruler track, click on its name in the track list and select an option from the pop-up menu.

The different display formats are described above.



Note that ruler tracks are completely independent from the main event display ruler, as well as rulers and position displays in other windows. This means that:

- Ruler tracks can all have independent display formats.
- Ruler tracks are not affected by the display format setting in the Project Setup dialog (see “The Project Setup dialog” on page 33).
- Ruler tracks are not affected if you set the display format globally with the primary time display in the Transport panel.

⇨ Ruler tracks are affected by the option “Show Timecode Subframes” in the Preferences (see above).

Operations

Creating a new project

You create a new project in the following way:

1. Select “New Project” from the File menu.

A dialog appears, listing a number of project templates, including any custom templates you may have created (see “Save as Template” on page 488).

2. Select a template and click OK.

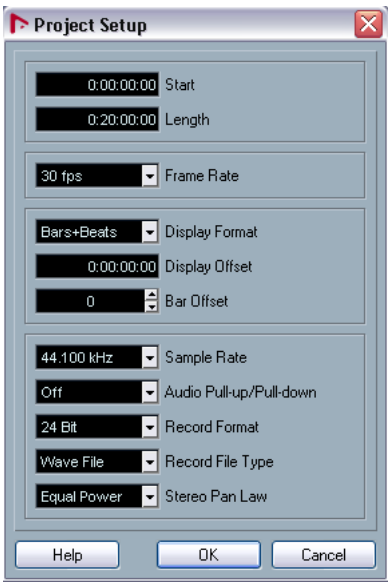
A file dialog appears, allowing you to specify a location for the project folder. This will contain all files related to the project.

3. Select an existing folder or type the name of a new one. Click OK.

A Project window appears. The new project will be based on the selected template, and include tracks, events and settings from the template.

The Project Setup dialog

General settings for the project are made in the Project Setup dialog. This is opened by selecting “Project Setup…” from the Project menu.



The following settings are available in the Project Setup dialog:

Setting	Description
Start	The start time of the project. Allows you to have the project start at another time than zero. Also used for setting the sync start position when synchronizing Nuendo to external devices (see “Setting up Nuendo for external sync to timecode” on page 451). The format of this value is always in timecode. When you change this setting you will be asked whether you want to keep the project content at its timecode positions. “Yes” means that all events will stay at their original timecode positions – i.e. they will be moved in relation to the start of the project. “No” means that all events keep their position relative to the project start. See also the note on Feet+Frames in the section “The ruler” on page 31.
Length	The length of the project. Nuendo is capable of having longer lengths than 24 hours since the timecode includes a “day” field. This can be handy when creating projects that use “time of day” timecode and cross over the 24 hour mark. The maximum project length is 10 days.
Frame Rate	Used when synchronizing Nuendo with external equipment. If Nuendo is slave, this value is automatically set to the frame rate of the incoming sync signal. If Nuendo is the master, this determines the frame rate of the sent sync signal. See “Setting the Frame Rate” on page 448.
Display Format	This is the global display format used for all rulers and position displays in the program, except ruler tracks (see “Ruler tracks” on page 29). However, you can make independent display format selections for the individual rulers and displays if you like. For descriptions of the different display format options, see “The ruler” on page 31.
Display Offset	Offsets the time positions displayed in the ruler etc., allowing you to compensate for the Start position setting. Typically, if you synchronize Nuendo to an external source starting at a frame other than zero, you set the Start position to this value. However, if you still want the display in Nuendo to start at zero, set the Display Offset to the same value too.
Bar Offset	This works just like “Display Offset” described above, in that it offsets the time positions in the ruler by a number of bars, allowing you to compensate for the Start position setting. The difference is that Bar Offset is only used when the “Bars+Beats” display format is selected (see “The ruler” on page 31).
Sample Rate	The sample rate at which Nuendo records and plays audio.
Pull-up/Pull-down	When working with film transfers, this option is used to synchronize sound and images correctly. This is described in detail in the section “Working with film transfers” on page 476.
Record Format/ File Type	When you record audio in Nuendo, the files that are created will be of this resolution and file type. See “Selecting a recording file format” on page 67.

Setting	Description
Stereo Pan Law	Decides whether panning should use power compensation or not (see "About the "Stereo Pan Law" Preference (audio channels only)" on page 136).

⚠ While most Project Setup settings can be changed at any time, you should select a sample rate once and for all when starting with a new project! All audio files must be of this sample rate to play back correctly.

Zoom and view options

Zooming in the Project window is done according to the standard zoom techniques, with the following special notes:

- When you are using the Zoom tool (magnifying glass), the result depends on the option "Zoom Tool Standard Mode: Horizontal Zooming Only" in the Preferences (Editing–Tools page).

If this is activated and you drag a selection rectangle with the Zoom tool, the window will only be zoomed horizontally (track height will not change). If the option is off, the window will be zoomed both horizontally and vertically.

- When using the vertical zoom sliders, the tracks are scaled relatively.

In other words, if you have made any individual track height adjustments (see below), the relative height differences are maintained.

You find the following options are available on the Zoom submenu on the Edit menu:

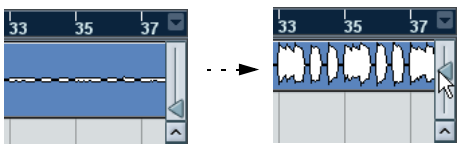
Option	Description
Zoom In	Zooms in one step, centering on the project cursor.
Zoom Out	Zooms out one step, centering on the project cursor.
Zoom Full	Zooms out so that the whole project is visible. "The whole project" means the timeline from the project start to the length set in the Project Setup dialog (see above).
Zoom to Selection	Zooms in horizontally and vertically so that the current selection fills the screen.
Zoom to Selection (Horiz)	Zooms in horizontally so that the current selection fills the screen.
Zoom to Event	This option is available only in the Sample Editor (see "Zooming" on page 265).
Zoom In Vertical	Zooms in one step vertically.
Zoom Out Vertical	Zooms out one step vertically.
Zoom In Tracks	Zooms in on the selected track(s) one step vertically.
Zoom Out Tracks	Zooms out the selected track(s) one step vertically.
Zoom Selected Tracks	This zooms in vertically on the selected track(s) and minimizes the height of all other tracks.
Undo/Redo Zoom	These options allow you to undo/redo the last zoom operation.

- If the option "Zoom while Locating in Time Scale" is activated in the Preferences (Transport page), you can also zoom by clicking in the main ruler and dragging up or down with the mouse button pressed.

Drag up to zoom out; drag down to zoom in.

- You can zoom the contents of parts and events vertically, using the waveform zoom slider in the top right corner of the event display.

This is useful when viewing quiet audio passages.



⚠ To get an approximate reading on the level of the audio events by viewing the waveforms, make sure this slider is all the way down. Otherwise, zoomed waveforms may be mistaken for clipped audio.

- If you activate the option Quick Zoom in the Preferences (Editing page), the contents of parts and events will not be continuously redrawn when you zoom manually.

Instead, the contents are redrawn once you have stopped changing the zoom – activate this if screen redraws are slow on your system.

Resizing tracks in the Track list

- You can change the height of an individual track by clicking on its lower border in the Track list and dragging up or down.

To change the height of all tracks simultaneously, hold down [Ctrl]/[Command] and resize one of the tracks in this way. If "Snap Track Heights" is activated on the Track scale pop-up (see below), the track height will change in fixed increments when you resize it.

⚠ This behavior is different when "Enlarge Selected Track" is activated on the Edit menu (see below).

- You can also change the width of the Track list area, by dragging the border between the Track list and the event display.

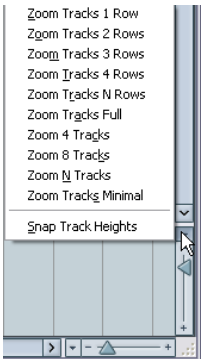
- By default, the controls shown for tracks in the Track list will adapt to the track size. This means that when resizing a track's height or width the controls will be placed where they best "fit in".

If you prefer to have the controls in fixed positions, you can deactivate the option "Wrap Controls" in the Track Controls settings dialog (see "Customizing track controls" on page 507).

- You can decide for each track type what controls should be shown in the Track list – see "Customizing track controls" on page 507.

- You can use the Track scale pop-up (opened by clicking the arrow button above the vertical zoom control) to set the number of tracks to view in the current Project window.

The track height will be adjusted to show only the number of tracks specified on the pop-up menu. By selecting "Zoom N Tracks" from the pop-up you can manually set the number of tracks to fit in the current Project window.



- Tracks can also be divided vertically in lanes – see "Editing in Lane Display mode" on page 51.

The Enlarge Selected Track option

When this option is activated on the Edit menu (or in the Preferences, Editing–Project & Mixer page), the selected track is enlarged automatically. This is useful if you are stepping through the tracks in the track list, to check or edit the settings. The tracks will revert to the size they had before when they are deselected. You can adjust the size directly in the Track list if the default enlargement factor does not suit you.

While this is the program behavior you will want in most cases, it may be a disadvantage when changing the track height you started out with for one or more tracks (i.e. their "original" height, before "Enlarge Selected Track" was activated). As soon as you try to resize a track, it is selected and automatically enlarged. Instead of turning off "Enlarge Selected Track", resizing the desired track(s) and the activating "Enlarge Selected Track" again, you can resize a track in the Track list without selecting it.

1. Move the mouse pointer over the lower border of the (unselected) track you want to resize.

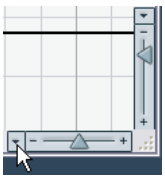
The mouse pointer turns into a divider symbol.

2. Hold down [Alt]/[Option] and drag the lower border of the track until it reaches the desired height.

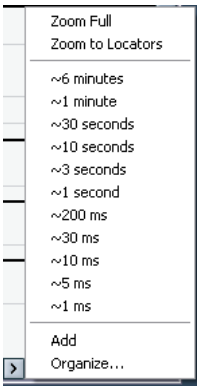
Now, when you select this track, (and "Enlarge Selected Track" is activated), it will be enlarged. It will revert to the changed size, when you select a different track.

Zoom presets and Cycle markers

The pop-up menu to the left of the horizontal zoom control allows you to select, create and organize zoom presets. These are useful if you want to toggle between different zoom settings (e.g. one where the whole project is displayed in the project window and another with a high zoom factor for detailed editing). With this pop-up menu, you can also zoom in on the area between cycle markers in the project.



Click here…



…to open the context menu.

The upper part of the menu lists the zoom presets:

- To store the current zoom setting as a preset, select Add from the pop-up menu.
  A dialog appears, allowing you to type in a name for the preset.
- To select and apply a preset, select it from the pop-up menu.
- The “Zoom Full” preset is always available. Selecting this option zooms out so that the whole project is visible. “The whole project” means the timeline from the project start to the length set in the Project Setup dialog (see “The Project Setup dialog” on page 33).
- If you want to delete a preset, select “Organize…” from the pop-up menu.
  In the dialog that appears, select the preset in the list and click the Delete button. The preset is removed from the list.
- If you want to rename a preset, select “Organize…” from the pop-up menu.
  In the dialog that appears, select the desired preset in the list and click the Rename button. A second dialog opens, allowing you to type in a new name for the preset. Click OK to close the dialogs.

⚠ Zoom presets are global for all projects, i.e. they are available in all projects you open or create.

The middle part of the pop-up lists any cycle markers you have added in the project:

- If you select a cycle marker from this menu, the event display is zoomed in to encompass the marker area (see “Zooming to cycle markers” on page 112).
- You cannot edit the cycle markers in this pop-up menu. For information on editing markers, see “The Marker window” on page 110.

⚠ Only the cycle markers you create in the current project are available on the menu.

The Zoom history

Nuendo maintains a history of recent zoom stages, allowing you to undo and redo zoom operations. This way you can zoom in several steps and then easily go back to the zoom stage at which you started.

There are two ways to invoke Undo Zoom and Redo Zoom:

- Use the items on the Zoom submenu on the Edit menu.
  You can also assign key commands for these.
- Double-click with the Zoom tool (magnifying glass) to Undo Zoom.
  Press [Alt]/[Option] and double-click to Redo Zoom.

Adjusting how parts and events are shown

The Preferences on the File menu (the Nuendo menu, under Mac OS X) contains several settings for customizing the display in the Project window.

The Event Display page contains common settings for all track types:

Option	Description
Colorize Event Background	Determines whether the backgrounds or "contents" (waveforms, etc.) of parts and events will be colorized. See "Handling tracks" on page 38.
Show Event Names	Determines whether the names of parts and events should be shown in the Project window.
Transparent Events	When this is activated, events and parts will be transparent, showing the waveforms and MIDI events only.
Show Data on Small Track Heights	If this is activated, the contents of events and parts will be shown, even if the height of a track is very small.

The Event Display–Video page contains settings for video events:

Option	Description
Show Video Thumbnails	When this is activated, thumbnail frames of the video contents are shown on the Video track.
Video Cache Size	This determines how much memory is available for video thumbnails. If you have long video clips and/or work with a large zoom factor (so that a lot of frames are shown in the thumbnails), you may have to raise this value.

The Event Display–Audio page contains settings for audio events:

Option	Description
Interpolate Audio Images	If the option is deactivated, single sample values are drawn as "steps". If the option is activated they are interpolated to form "curves".
Wave Image Style	Determines whether audio waveforms should be displayed as solid images, frames or "inverted" images (solid+frame). This selection affects all waveform images in the Project window, Sample Editor and Audio Part Editor. Note that the "Framed" and "Solid and Framed" styles are more demanding for the computer. If the system feels slower in these modes, please switch back to "Solid" wave image style.
Show Event Volume Curves Always	If this is activated the "volume curves" created with the volume and fade handles are always shown – if not, the curves are only shown for selected events.
Fade Handles always on top	When this option is activated, the fade handles stay at the top of the event, and vertical help lines indicate the exact end or start points of fades.
Thick Fade Lines	If this option is activated, the fade lines and volume curves are thicker, increasing their visibility.
Show Waveforms	Determines whether audio waveforms should be shown at all.
Background Color Modulation	When this is activated, the backgrounds of audio waveforms are displayed in a different way, reflecting the waveform dynamics. This is especially useful to get an overview when working with small track heights.

The Event Display–MIDI page contains settings for MIDI parts:

Option	Description
Default Edit Action	Determines which editor should be opened when you double-click a MIDI part or select it and press [Ctrl]/[Command]-[E]: the Key or List editor.
Part Data Mode	Determines if and how events in MIDI parts should be shown in the Project window: as score notes, as drum notes (Nuendo Expansion Kit only) or as lines. If "No Data" is selected, events will not be shown at all. Nuendo Expansion Kit only: Note that this setting is overridden for tracks with drum maps if the option "Edit as Drums when Drum Map is assigned" (see below) is activated.
Show Controllers	Governs whether non-note events (controllers, etc.) should be shown in MIDI parts in the Project window.
Edit as Drums when Drum Map is assigned (Nuendo Expansion Kit only)	If this is activated, parts on MIDI tracks with drum maps assigned will be shown with drum note symbols in the Project window. Also, the parts will automatically open in the Drum editor when double-clicked (overriding the Default Edit Action setting above).
Note Name Style	Determines how MIDI note names (pitches) should be displayed in editors, etc.

Zooming and navigating in the overview line

By clicking the Show Overview button on the toolbar, an extra pane appears under the toolbar; the project overview line.

Show Overview button

In the overview line, events and parts on all tracks are displayed as boxes. You can use the overview line to zoom in or out, and for navigating to other sections of the project. This is done by moving and resizing the track view rectangle in the overview line:

- The track view rectangle indicates the section of the project currently displayed in the event display.
- You zoom in or out horizontally by resizing the rectangle.

Resize it by dragging the edges of the rectangle.

- You can drag the track view rectangle to view other sections of the project.

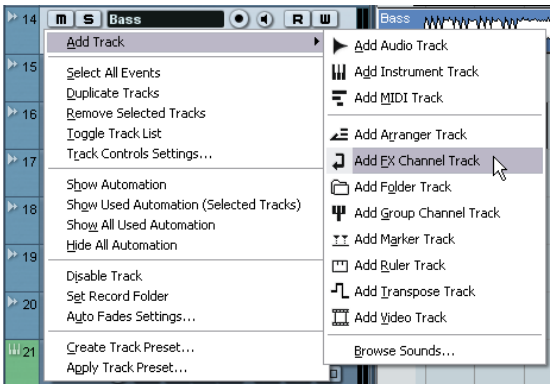
This can also be done by clicking anywhere in the upper part of the overview – the track view rectangle will be moved to where you clicked. The number of tracks shown will not change.

Handling tracks

To add a track to the project, select “Add Track” from the Project menu and select a track type from the submenu that appears. The new track is added below the currently selected track in the Track list.

- The items on the “Add Track” submenu are also available on the Quick menu.

This is accessed by right-clicking in the Track list.



- If you select Audio, MIDI, Group Channel or Instrument from the Add Track submenu, a dialog opens, allowing you to insert several tracks in one go.

Just enter the desired number of tracks in the value field.

- For audio and group channel tracks, the channel configuration – mono, stereo or a surround configuration – can be set in the Configuration pop-up.
- The Browse Sounds option in the Add Track dialog is described in the chapter “Track Presets” on page 327.
- In the Preferences (Editing–Project & Mixer page, you can find the option “Auto Track Color Mode”.

This offers you several options for automatically assigning colors to tracks that are added to the project.

Once you have created tracks, you can manipulate and rearrange them in various ways:

- To rename a track, double-click in the name field and type in a new name.

If you hold down any modifier key when pressing [Return] to close the name field, all events on the track will get the name you entered.

- To select a track, click on it in the Track list.

A selected track is indicated by a light gray color in the Track list.

It is possible to select several tracks, by pressing [Ctrl]/[Command] and clicking them. To select a continuous range of tracks, use [Shift]-clicking.

- To move a track, click and drag it up or down in the list.

- To duplicate a track, complete with all contents and channel settings, right-click in the Track list and select "Duplicate tracks" from the context menu, or select "Duplicate tracks" from the Project menu.

The duplicated track will appear below the original track.

- You can select a default color for a track by activating "Show Track Colors" above the Track list and selecting a color from the Color pop-up menu on the toolbar. This color will be used for all events on the track and will also be shown in the Mixer. You can override the default track color for individual events and parts by using the Color tool or the Color Selector pop-up menu.

The option "Colorize Event Background" in the Preferences dialog (Event Display page) determines whether the backgrounds or waveforms of events will be colorized.

- To remove a track, right-click on it in the Track list and select "Remove Selected Tracks" from the context menu.

You can also remove multiple selected tracks, by selecting "Remove Selected Tracks" either from the Project menu or from the context menu. Furthermore, you can remove all tracks not containing any events by selecting "Remove Empty Tracks" from the Project menu.

- To change the track height of an individual track, click on its lower border in the Track list and drag up or down, see "Resizing tracks in the Track list" on page 35.

⇨ Note that you can also automatically enlarge the selected track, see "The Enlarge Selected Track option" on page 35.

Disabling tracks

Tracks can be disabled by selecting "Disable Track" from the Track list context menu. Disabling a track is similar to muting it (see "Muting events" on page 50), since a disabled track will not be played back. However, disabling a track not only "zeroes" the output volume from the track, but actually shuts down all disk activity for it. See "About track disable/enable" on page 62 for more information.

Track folding

On the Project menu you will find the Track Folding submenu, allowing you to quickly show, hide or invert what is displayed in the Project window event display. This enables you for example to divide the project into several parts (by creating several folder tracks for the different project elements) and showing/hiding their contents by selecting a menu function (or using a key command). You can also fold in automation subtracks this way. The following options are available:

- Toggle Selected Track

When you select this menu option, the fold state of the selected track is reversed, i.e. if the track was folded in (its elements (subtracks) were hidden), it is now unfolded (all subtracks displayed) and vice versa.

- Fold Tracks

Select this menu option to fold in all open folder tracks in the Project window. Please note that the exact behavior of this function depends on the "Deep Track Folding" setting in the Preferences, see below.

- Unfold Tracks

Select this menu option to unfold all folder tracks in the Project window. Please note that the exact behavior of this function depends on the "Deep Track Folding" setting in the Preferences, see below.

- Flip Fold States

Select this menu option to flip the fold states of the tracks in the Project window. This means that all tracks that were folded in will be unfolded and all unfolded tracks will be folded in, respectively.

⇨ You can assign key commands for these menu options in the Key Commands dialog (Project category).

In the Preferences (Editing–Project & Mixer page), you can find the following option affecting the track folding behavior:

- Deep Track Folding

When this is activated, any folding settings you make in the Track Folding submenu of the Project menu also affect the sub-elements of the tracks, i.e. if you fold in a folder track which contains 10 audio tracks 5 of which have several automation subtracks open, all these audio tracks within the folder track will be folded in as well.

Dividing the Track list

It is possible to divide the Track list into two parts. Both sections will have independent zoom and scroll controls (if needed), but resizing the window vertically will affect the lower section only (if possible). This is useful if you're working with a video track along with multi-track audio for example. This way, you can place the video track in the upper Track list, letting you scroll the audio tracks separately in the lower Track list, referencing them against the video track.

- To divide the Track list, click the "Divide Track List" button in the top right corner of the Track list.

The "Divide Track List" button.

- To revert to a single Track list, click the button again.

When the Track list is divided into two parts, the following applies:

- If you add tracks from the Add Track submenu of the Project menu, Video tracks, Marker tracks and Arranger tracks will automatically be placed in the upper part of the Track list.

If the Track list already contains tracks of the type Video, Marker or Arranger, these will automatically be moved to the upper part when you divide the Track list. All other types of tracks will be placed in the lower part.

- If you add tracks from the context menu invoked by right-clicking in the Track list, tracks will be added to the part of the Track list in which you click.

- You can move any type of track from the lower Track list to the upper and vice versa by right-clicking it in the Track list and selecting "Toggle Track List" from the context menu.

- You can resize the upper part by clicking and dragging the divider between the Track lists.

Switching between musical and linear time base

Tracks can be either musical (tempo) or linear (time) based.

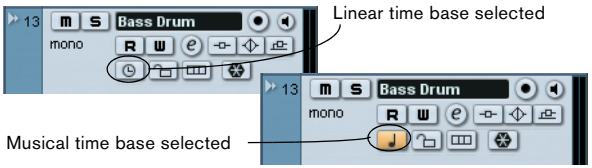
- On a track using linear time base, the events will be positioned on specific time positions – changing the playback tempo will not affect the time position of events.

- On a track using musical time base, the positions of events are represented as meter values (bars, beats, 1/16th notes and ticks, with 120 ticks per 1/16th note). If you change the playback tempo, the events will play back at an earlier or later time.

- In the Preferences (Editing page), you can find the option "Default Track Time Type".

This allows you to specify the default track time type for new tracks (Audio, Group/FX, MIDI and Marker tracks). When you change this setting, all new tracks will use the selected time type. You can choose between "Musical", "Time Linear" and "Follow Transport Main Display". Selecting "Musical" will cause all added tracks to be set to musical time type. When you select "Time Linear", all new tracks will use linear time base. The third option uses the primary time format setting on the Transport panel. When this is set to "Bars+Beats", tracks with musical time base will be added. When this is set to any of the other options (Seconds, Timecode, Samples, etc.), all new tracks will use linear time base.

Whether to use musical or linear time base depends on the type of project and recording situation. You can always change this setting individually for each track, by clicking the musical/linear time base button in the Inspector or Track list. Musical time base is indicated by a note symbol, while linear time base is indicated by a clock symbol.



⚠ Internally, events on musical time based tracks use the same high precision for positioning (64 bit floating point values) as linear time based events. However, switching between linear and musical time base results in a very small loss of precision (introduced by the mathematical operations used for scaling values in the two different formats). Therefore you should avoid switching repeatedly between the two modes.

For more information about tempo changes, see "Background" on page 415.

Adding events to a track

There are a number of ways to add events to a track:

- By recording (see "Basic recording methods" on page 65).

This is possible for audio and MIDI tracks.

- By selecting "Audio File…" or "Video File…" from the Import submenu on the File menu.

This opens a file dialog, allowing you to locate the file you wish to import. When you import a file this way, a clip is created for the file and an event that plays the whole clip is inserted on the selected track, at the position of the project cursor.

You can also import MIDI files by using the Import submenu, but this works in a slightly different way (see "Exporting and importing standard MIDI files" on page 498).

- By grabbing audio CD tracks and converting them to audio files (see "Importing audio CD tracks" on page 491).

- By importing only the audio portion of a video file and converting it to an audio file (see "Extracting audio from a video file" on page 472).

- By using Copy and Paste on the Edit menu.

This allows you to copy all kinds of events between projects. You can also copy events within the project, from the Audio Part Editor or Sample Editor.

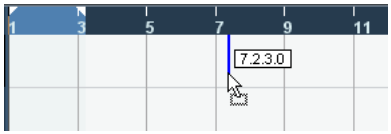
- By drawing.

Some types of events (markers and automation events) can be drawn directly into the Project window. For audio and MIDI tracks, you can draw parts (see "Creating parts" on page 42).

- By dragging files and dropping them on the track at the desired position.

You can create events by dragging and dropping from the following locations:

- The desktop.
- The MediaBay.
- The Pool.
- A library (a Pool file that is not attached to a project).
- The "Find media" dialog.
- The Project window of another open project.
- The Audio Part Editor of any open project.
- The Sample Editor of any open project – press [Ctrl]/[Command] and drag to create an event of the current selection, or click in the left column of the region list and drag to create an event from a region.



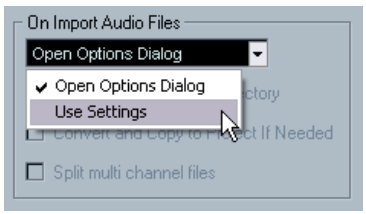
While you drag the clip in the Project window, its position will be indicated by a marker line and a numerical position box. See also "By using drag and drop" on page 302.

Audio file import options

When you are importing audio files there are a number of options concerning how the files should be treated by Nuendo:

- You can choose to copy the file into the audio folder of the project and have the project make reference to the copied file rather than the original file. This helps you keep your project "self-contained".
- You can choose to split stereo and multi-channel files into a number of mono files.
- Furthermore, you may want all files in the project to have the same sample rate and sample size (resolution).

The Preferences (Editing–Audio page) contains a setting that lets you decide which options, if any, to use. Select the desired option on the "On Import Audio Files" pop-up:



- Open Options Dialog.

An Options dialog appears when you import, allowing you to select whether you want to copy the files to the Audio folder and/or convert them to the project settings. Note:

– When importing a single file of a format other than the project settings, you can specify which properties (sample rate and/or resolution) should be changed.

– When importing multiple files at the same time, you can select to convert the imported files automatically if necessary, i.e. if the sample rate is different than the project's or the resolution is lower than the project setting.

- Use Settings.

No Options dialog will appear when you import. Instead, you can choose to make any of the options below the pop-up the standard action(s). Activate any number of the following options to have them performed automatically each time you import audio files:

Option	Description
Copy Files to Working Directory	If files are not already in the project's audio folder they are copied there before being imported.
Convert and Copy to Project If Needed	If files are not already in the project's audio folder they are copied there before being imported. Furthermore, if the files have a different sample rate or a lower resolution than the project settings, they are automatically converted.
Split multi channel files	If you import a multi-channel audio file (including two-channel stereo files), it will be split into a number of mono files – one for each channel – which are placed on separate, automatically created mono tracks.

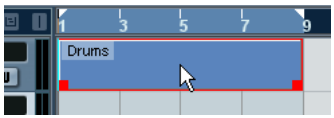
Creating parts

Parts are containers for MIDI or audio events. If you record MIDI, a MIDI part is automatically created, containing the recorded events. You can also create empty audio or MIDI parts and later add events to them. There are two ways to do this:

- Draw a part on a MIDI or audio track with the Pencil tool.

You can also draw parts by pressing [Alt]/[Option] and using the Arrow tool.

- Double-click with the Arrow tool on a MIDI or audio track, between the left and right locator.



To add events to a MIDI part, you use the tools and functions in a MIDI editor (see "The Key Editor – Overview" on page 366). Adding events to audio parts is done in the Audio Part Editor (see "Window overview" on page 291) by pasting or by using drag and drop.

- You can also gather existing audio events into a part, by using the "Events to Part" function on the Audio menu.

This creates an audio part containing all selected audio events on the same track. To remove the part and make the events appear as independent objects on the track again, select the part and use the "Dissolve Part" function on the Audio menu.

Auditioning audio parts and events

Audio parts and events can be auditioned in the Project window with the Speaker tool:

⚠ When auditioning, audio will be routed directly to the Control Room, if the Control Room is activated. When the Control Room is deactivated, the audio will be routed to the default output bus, bypassing the audio channel's settings, effects and EQs.

1. Select the Play tool.

Note that the Play tool and the Scrub tool share the same tool button. If the tool icon on the toolbar doesn't show a speaker symbol, first click on the icon to select it, then click again and select "Play" from the pop-up menu that appears.

2. Click where you want playback to start, and keep the mouse button pressed.

Only the track on which you click is played back, starting at the click position.

3. Release the mouse button to stop playback.

Scrubbing

The Scrub tool allows you to locate positions in the audio by playing back, forwards or backwards, at any speed:

1. Select the Scrub tool.

Note that the Play tool and the Scrub tool share the same tool button. If the tool icon on the toolbar doesn't show a "scrub symbol", first click on the icon to select it, then click again and select "Scrub" from the pop-up menu that appears.

2. Click at the desired position and keep the mouse button pressed.

The project cursor is moved to the position at which you click.

3. Drag to the left or right.

The project cursor follows the mouse pointer and the audio is played back. The speed and pitch of the playback depend on how fast you move the pointer.

You can adjust the responsiveness of the Scrub function in the Preferences (Transport–Scrub page).

⇨ It is also possible to "scrub" the whole project with the Jog wheel on the Transport panel.
See "Project scrubbing – the Jog Wheel" on page 62.

- Note that scrubbing can be quite a burden on your system. To avoid playback problems, you will find the "CPU Saving Scrub Mode" option in the Preferences (Transport–Scrub page).
When you activate this option, scrubbing will be less demanding on the processor. This can be very useful when scrubbing in a large project, where the "normal" scrub behavior leads to processing overloads. When "CPU Saving Scrub Mode" is activated, the effects are disabled for scrubbing and the resampling quality is lower.

Editing parts and events

This section describes techniques for editing in the Project window. If not explicitly stated, all descriptions apply to both events and parts, even though we use the term "event" for convenience.

⇨ When you are using the tools for editing, you can in many cases get additional functions by pressing modifier keys (e.g. pressing [Alt]/[Option] and dragging with the Arrow tool creates a copy of the dragged event).
On the following pages, the default modifier keys are described – you can customize these in the Preferences (Editing–Tool Modifiers page), see "Setting up tool modifier keys" on page 524.

Selecting events

Selecting events is done using any of the following methods:

- Use the Arrow tool.
The standard selection techniques apply.

- Use the Select submenu on the Edit menu.
The options are:

Option	Description
All	Selects all events in the Project window.
None	Deselects all events.
Invert	Inverts the selection – all selected events are deselected and all events that were not selected are selected instead.
In Loop	Selects all events that are partly or wholly between the left and right locator.
From Start to Cursor	Selects all events that begin to the left of the project cursor.
From Cursor to End	Selects all events that end to the right of the project cursor.
Equal Pitch	These are available in the MIDI Editors (see "Selecting notes" on page 372).
Select Controllers in Note Range	This is available in the MIDI Editors (see "Selecting controllers within the note range" on page 372).
All on Selected Tracks	Selects all events on the selected track.
Select Event	This is available in the Sample Editor (see "Window overview" on page 260).
Left/Right Selection Side to Cursor	These two functions are only used for range selection editing (see "Creating a selection range" on page 52).

⚠ Note that these functions work differently when the Range Selection tool is selected (see "Creating a selection range" on page 52).

- Select all events on a track by right-clicking in its Track list and selecting "Select All Events" from the pop-up menu that appears.

- You can also use the arrow keys on the computer keyboard to select the closest event to the left, right, above or below.
If you press [Shift] and use the arrow keys, the current selection will be kept, allowing you to select several events.

- If the option "Auto Select Events under Cursor" is activated in the Preferences (Editing page), all events on the selected track(s) that are "touched" by the project cursor are automatically selected.
This can be helpful when rearranging your project, since it allows you to select whole sections (on all tracks) by selecting all tracks and moving the project cursor.

- It is also possible to select ranges, regardless of the event and track boundaries.
This is done using the Range Selection tool (see "Range editing" on page 52).

- Note that in the Preferences (Editing page), you can find the option “Use Up/Down Navigation Commands for selecting Tracks only”.

By default, tracks are selected with the up/down arrow keys on the computer keyboard. However, these are also used for selecting events (see above) which can lead to confusing results in some cases. Since track selection is a most vital operation in both editing and mixing, you have the option to use the navigation controls for track selection only. The following applies:

- When this option is deactivated and no event/part is selected in the Project window, the up/down arrow keys on the computer keyboard are used to step through the tracks in the Track list – just as you would expect this to work.
- When this option is deactivated and an event/part is selected in the Project window, the up/down arrow keys still step through the tracks in the Track list – but on the currently selected track, the first event/part will automatically be selected as well. If this is not the desired behavior, you have to activate “Use Up/Down Navigation Commands for selecting Tracks only”.
- When this option is activated, the up/down arrow keys are only used to change the track selection – the current event/part selection in the Project window will not be altered.

- Also in the Preferences (Editing–Tools page), you can find the Cross Hair Cursor options section.

This allows you to display a cross hair cursor when working in the Project window and editors, facilitating navigation and editing, especially when arranging in large projects. You can set up the colors for the line and the mask of the cross hair cursor, and define its width. The cross hair cursor works as follows:

- When the Selection tool (or one of its subtools) is selected, the cross hair cursor appears when you start moving/copying a part/event, or when using the event trim handles.
- When the Pencil tool, the Scissors tool or any other tool that makes use of this function is selected, the cross hair cursor appears as soon as you move the mouse over the event display.
- The cross hair cursor is only available for tools where such a function is of any use. The Mute tool for example does not use a cross hair cursor, as you have to click directly on an event to mute it.

Moving events

To move events in the Project window, use the following methods:

- Click and drag to a new position.

All selected events will be moved, maintaining their relative positions. You can only drag events to tracks of the same type. If Snap is activated, this determines to which positions you can move the events (see “Snap” on page 55).

Note also that you can restrict movement to be either horizontal or vertical only, by holding down [Ctrl]/[Command] while dragging.

⚠ You will note that there is a slightly delayed response when you move an event by dragging. This helps you avoid accidentally moving events when you click on them in the Project window. You can adjust this delay with the Drag Delay setting in the Preferences (Editing page).

- Select the event and edit the Start position in the info line.

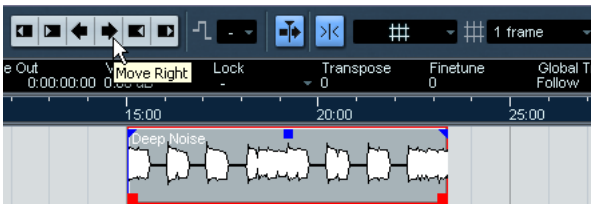
- Use the “Move to” functions on the Edit menu.

The following functions are available:

Function	Description
Move to Cursor	Moves the selected event to the project cursor position. If there are several selected events on the same track, the first event will start at the cursor, and the following will be lined up end-to-start after the first one.
Move to Origin	Moves the selected events to their original positions, i.e. the positions at which they were originally recorded.
Move to Front, Move to Back	This function doesn’t actually change the position of the events, but moves the selected events to the front or back, respectively. This is useful if you have overlapping events, and want to see one that is partially obscured. For audio events, this is an extra important feature, since only the visible sections of events will be played back. Moving an obscured audio event to front (or moving the obscuring event to back) will allow you to hear the whole event on playback (see also “Overlapping events” on page 292). Note that it is also possible to use the “To Front” function on the event context menu for this (although this works in a different way, see “Create Events mode (Preferences)” on page 74).

- Use the Nudge buttons in the toolbar.

These move the selected events to the left or right. The amount of movement depends on the selected display format (see "The Project Setup dialog" on page 33) and the value set on the Grid pop-up menu.



Here, clicking this button will move the event 2 frames to the right.

⚠ When the Range Selection tool is used, the Nudge buttons move the selection range (see "Moving and duplicating" on page 54).

⇨ The Nudge buttons are not visible in the toolbar by default.

You can decide which items should be visible by right-clicking in the toolbar and checking them in the pop-up menu that appears. See "The Setup dialogs" on page 506 for more information.

Aligning events

Nuendo provides shortcuts to quickly align audio events and parts in the project window. You can align to selected parts, events or ranges or to the cursor.

⚠ When the snap point is set, it will be used as a reference when you align events.

To align audio events or parts to selected parts or events, proceed as follows:

1. Select an event or part of any type on any track.

This will be taken as a reference for aligning.

2. With the arrow tool selected, point on the audio event or part you want to move, press one of the modifiers listed in the table below and click.

The mouse pointer will change its shape and the audio event or part will be aligned to the selected part or event.

To align audio events or parts to selection ranges, proceed as follows:

1. Make a selection range on any track.

This will be taken as a reference for aligning.

2. With the range selection tool selected, point on an audio event or part, press one of the modifiers listed in the table below and click.

The mouse pointer will change its shape and the audio event or part will be aligned to the selected range.

⚠ Note that the functions depend on where you point with the mouse.

In both cases, the following modifiers are available:

Modifier	Pointer	Description
[Ctrl]/[Command]		This aligns the start of the audio event/part to the start of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] +[Alt]/[Option]		This copies the audio event/part and aligns its start to the start of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command]		This aligns the end of the audio event/part to the start of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] +[Alt]/[Option]		This copies the audio event/part and aligns its end to the start of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] +[Shift]		This aligns the start of the audio event/part to the end of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] +[Shift] +[Alt]/[Option]		This copies the audio event/part and aligns its start to the end of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] +[Shift]		This aligns the end of the audio event/part to the end of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] +[Shift] +[Alt]/[Option]		This copies the audio event/part and aligns its end to the end of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.

You can also align audio events or parts to the project cursor. This is done in the following way:

1. Set the cursor to the position where you want to move the audio part or event.
This will be taken as a reference for aligning.

2. Make sure that nothing is selected in your project.

3. With the arrow tool selected, point on the audio event or part you want to move, press one of the modifiers listed in the table below and click.
The mouse pointer will change its shape and the audio event or part will be aligned to the cursor.

For aligning audio events or parts to the cursor, the following modifiers are available:

Modifier	Icon	Description
[Ctrl]/[Command]		This aligns the start of the audio event/part to the cursor. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] +[Alt]/[Option]		This copies the audio event/part and aligns its start to the cursor. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command]		This aligns the end of the audio event/part to the cursor. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] +[Alt]/[Option]		This copies the audio event/part and aligns its end to the cursor. This function is available when you move the mouse on the end of the non-selected event.

⇨ You can change the modifiers in the Preferences dialog (Editing–Tool Modifiers page).

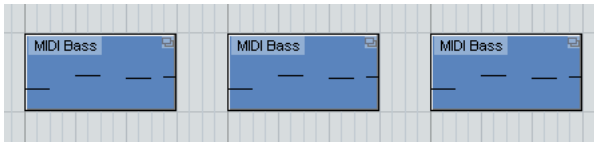
Duplicating events

Events can be duplicated in the following ways:

- Hold down [Alt]/[Option] and drag the event to a new position.
If Snap is activated, this determines to which positions you can copy the events (see "Snap" on page 55).

⚠ If you hold down [Ctrl]/[Command] as well, movement direction is restricted to either horizontal or vertical. That means if you drag an event vertically it can not be moved horizontally at the same time.

- Audio and MIDI parts can also be duplicated by pressing [Alt]/[Option] + [Shift] and dragging.
This creates a shared copy of the part. If you edit the contents of a shared copy, all other shared copies of the same part are automatically edited in the same way.



Shared copies are indicated by an icon in the right corner of the part.

Note:

- When you duplicate audio events, the copies are always shared. This means that shared copies of audio events always refer to the same audio clip (see "Audio processing" on page 239).

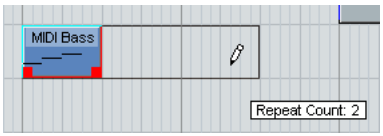
- You can convert a shared copy to a real copy by selecting "Convert to Real Copy" from the Edit menu. This creates a new version of the clip (that can be edited independently) and adds this to the Pool. Note that no new files are created by this operation – for that you need to use the "Bounce Selection" function from the Audio menu (see "Exporting regions as audio files" on page 308).

- Selecting "Duplicate" from the Edit menu creates a copy of the selected event and places it directly after the original.
If several events are selected, all of these are copied "as one unit", maintaining the relative distance between the events.

- Selecting "Repeat…" from the Edit menu opens a dialog, allowing you to create a number of copies (regular or shared) of the selected event(s).
This works just like the Duplicate function, but you can specify the number of copies.

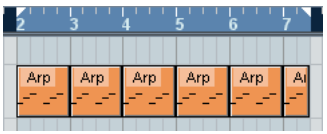
- You can also perform the Repeat function by dragging: Select the event(s) to repeat, press [Alt]/[Option], click the handle in the lower right corner of the last selected event and drag to the right.

The longer to the right you drag, the more copies are created (as shown by the tooltip).



- Selecting “Fill Loop” from the Edit menu creates a number of copies starting at the left locator and ending at the right locator.

The last copy is automatically shortened to end at the right locator position.



Using Cut, Copy and Paste

You can cut or copy selected events, and paste them in again, using the functions on the Edit menu.

- When you paste an event it is inserted on the selected track, positioned so that its snap point is aligned with the cursor position.

If the selected track is of the wrong type, the event will be inserted on its original track. See “Snap” on page 55 for information about the snap point.

- If you use the “Paste at Origin” function, the event is pasted at its original position (the position from which you cut or copied it).

Using Cut Head and Cut Tail

You can cut everything to the left or right of the cursor or a selected range:

- If you use “Cut Head”, everything to the left of the cursor/selection range will be deleted. No data will be kept in the clipboard.

- If you use “Cut Tail”, everything to the right of the cursor/selection range will be deleted. No data will be kept in the clipboard.

Renaming events

By default, audio events show the name of their clip, but you can enter a separate descriptive name for separate events if you like. This is done by selecting the event and typing in a new name in the “Description” field in the info line, or by using the Rename Object command from the Edit menu.

- You can also give all events on a track the same name as the track by changing the track name, holding down a modifier key and pressing [Return].

See “Handling tracks” on page 38.

- The Rename Objects command is useful when renaming multiple events at the same time. Select one or more events. Then choose “Rename…” from the Edit menu. You have several options for renaming events automatically using sequential numbers, timestamps and more (see “Renaming clips or regions in the Pool” on page 300).

Splitting events

You can split events in the Project window in the following ways:

- Click with the Scissors tool on the event you want to split.

If Snap is activated, this determines the exact split position (see “Snap” on page 55). You can also split events by pressing [Alt]/[Option] and clicking with the Arrow tool.

- Select “Split at Cursor” from the Edit menu.

This splits the selected events at the position of the project cursor. If no events are selected, all events (on all tracks) that are intersected by the project cursor will be split.

- Select “Split Loop” from the Edit menu.

This splits events on all tracks at the left and right locator positions.

⇨ If you split a MIDI part so that the split position intersects one or several MIDI notes, the result depends on the option “Split MIDI Events” in the Preferences (Editing–MIDI page).

If the option is activated, the intersected notes will be split (creating new notes at the beginning of the second part). If it is deactivated, the notes will remain in the first part, but “stick out” after the end of the part.

Gluing events together

You can glue events together using the Glue Tube tool. There are three possibilities:

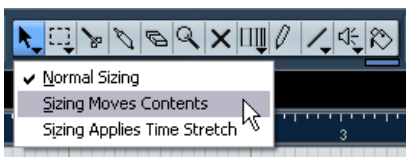
- Clicking on an event with the Glue Tube tool glues it together with the next event on the track. The events do not have to touch one another.
  The result is a part containing the two events, with one exception: If you first split an event and then glue the two sections together again (without moving or editing them first), they become a single event again.
- You can select several events on the same track and click on one of them with the Glue Tube tool.
  A single part is created.
- When you hold down [Alt]/[Option] while clicking on an event with the Glue Tube tool, this event will be glued together with all following events on this track.
  You can change the default key command for this in the Preferences (Editing–Tool Modifiers page).

Resizing events

Resizing events means to move their start or end positions individually. In Nuendo, there are three types of resizing:

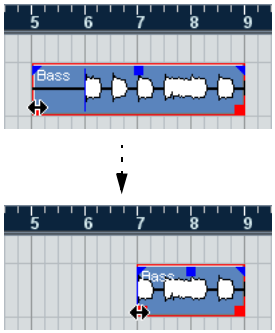
Resizing type	Description
Normal Sizing	The contents of the event stay fixed, and the start or end point of the event is moved to "reveal" more or less of the contents.
Sizing Moves Contents	The contents follow the moved start or end of the event (see the figure below).
Sizing Applies Time Stretch	The contents will be time stretched to fit the new event length (see the separate description on "Resizing events using time stretch" on page 49).

To select one of the resizing modes, select the Arrow tool and then click again on the Arrow tool icon on the toolbar. This opens a pop-up menu from which you can select one of the resizing mode options.

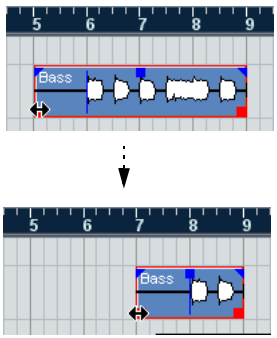


The icon on the toolbar will change, indicating the selected resizing mode.

The actual resizing is done by clicking and dragging the lower left or right corner of the event. If Snap is activated, the Snap value determines the resulting length (see "Snap" on page 55).



Normal sizing.

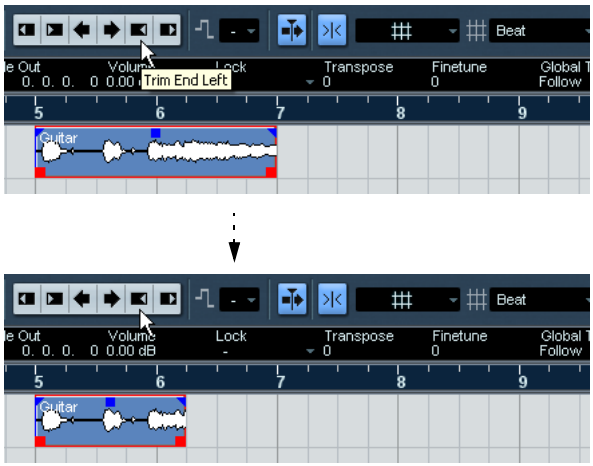


Sizing moves contents.

- If several events are selected, all will be resized in the same way.
- You can also resize events with the Scrub tool.
  This works just the same as when resizing with the Arrow tool, but the audio under the pointer is played back (scrubbed) while you drag.

- It is also possible to resize events by using the Trim buttons (located in the Nudge palette) on the toolbar.

This will move the start or end position of the selected Event(s) by the amount set on the Grid pop-up menu. The sizing type currently selected applies to this method too, with the exception of “Sizing Applies Time Stretch” which is not possible with this method. You can also use key commands for this (by default, press [Ctrl]/[Command] and use the left and right arrow key).



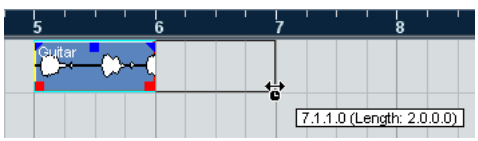
⇨ Note that the Nudge palette is not visible in the toolbar by default. See “The Setup dialogs” on page 506 for instructions on how to show and hide items in the toolbar.

Resizing events using time stretch

If you want to resize a part and make its contents “fit” the new size, you should use this option. Proceed as follows:

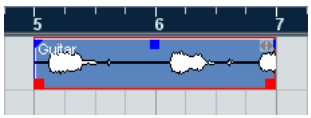
1. Click the Arrow icon on the toolbar and select the “Sizing Applies Time Stretch” option from the pop-up menu.
2. Point close to the end point of the part you want to stretch.
3. Click and drag left or right.

When you move the mouse, a tooltip shows the current mouse position and length of the part. Note that the snap value applies, as with any part operation.



4. Release the mouse button.

The part is “stretched” or “compressed” to fit the new length.



- For MIDI parts, this means that the note events are stretched (moved and resized).

Controller data will be moved.

- For audio parts, this means that the events are moved, and that the referenced audio files are time stretched to fit the new length.

A dialog box shows the progress of the time stretch operation.

⇨ You can adjust which algorithm should be used for the time stretch algorithm in the Preferences (Editing–Audio page).

For more information about time stretch, see “Time Stretch” on page 248.

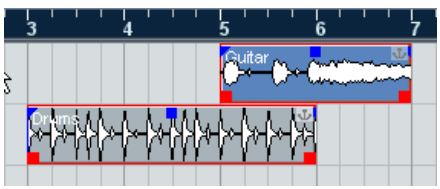
Sliding the contents of an event or part

You can move the contents of an event or part without changing its position in the Project window. By default, this is done by pressing [Alt]/[Option]+[Shift], clicking in the event or part and dragging to the left or right.

⚠ When sliding the contents of an audio event, you cannot slide past the start or end of the actual audio clip. If the event plays the whole clip, you cannot slide the audio at all.

Grouping Events

Sometimes it is useful to treat several events as one unit. This can be done by grouping them: Select the events (on the same or different Tracks) and select “Group” from the Edit menu.



Grouped events are indicated by a group icon in the right corner.

If you edit one of the grouped events in the Project window, all other events in the same group are affected too (if applicable).

Group editing operations include:

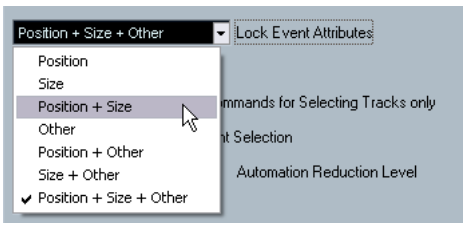
- Selecting events.
- Moving and duplicating events.
- Resizing events.
- Adjusting fade-in and fade-out (audio events only, see “Creating fades” on page 87).
- Splitting events (splitting one event will automatically split any other grouped events that are intersected by the split position).
- Locking events.
- Muting events (see below).
- Deleting events.

Locking events

If you want to make sure you don’t edit or move an event by accident, you can lock it. Locking can affect one (or any combination) of the following properties:

Lock Options	Description
Position	If this is locked, the event cannot be moved.
Size	If this is locked, the event cannot be resized.
Other	If this is locked, all other editing of the event is disabled. This includes adjusting the fades and event volume, processing, etc.

- To specify which of these properties should be affected by the Lock function, use the “Lock Event Attributes” pop-up menu in the Preferences (Editing page).



- To lock events, select them and select “Lock…” from the Edit menu.

The events will be locked according to the options specified in the Preferences.

The padlock symbol indicates that one or more of the lock options are activated for the event.

- You can adjust the lock options for a locked event by selecting it and selecting “Lock…” from the Edit menu again.

This opens a dialog in which you can activate or deactivate the desired lock options.

- To unlock an event (turn off all lock options), select it and select “Unlock” from the Edit menu.

- It is also possible to lock a whole track, by clicking the padlock symbol in the Track list or in the Inspector.

This disables all editing of all events on the track.

Muting events

To mute individual events in the Project window, proceed as follows:

- To mute or unmute a single event, click on it with the Mute tool.

- To mute or unmute several events, select them – either by using the standard selection techniques, or by using one of the options on the Select submenu on the Edit menu – and click on one of the selected events with the Mute tool.

All selected events will be muted.

- You can also click in an empty area with the Mute tool and drag a selection rectangle around several events you want to mute or unmute, and then click on one of them with the Mute tool.

- You can mute events by selecting them and selecting “Mute” from the Edit menu.

Similarly, you can unmute the selected events by selecting “Unmute” from the Edit menu.

- You can also change the mute status of selected events on the info line.

Muted events can be edited as usual (with the exception of adjusting fades), but are not played back.

Muted events are “grayed out”.

- You can also mute whole tracks by clicking the Mute (“M”) button in the Track list, the Inspector or the mixer.

Clicking the Solo (“S”) button for a track mutes all other tracks. Note that there are two modes for the track solo function:

If the option “Enable Solo on Selected Track” is activated in the Preferences (Editing–Project & Mixer page) and you have soloed a track, selecting another track in the track list will automatically solo that track instead – the solo state “moves” with the track selection.

If the option isn’t activated, the track you solo stays soloed, regardless of the selection.

Removing events

To remove an event from the Project window, use any of the following methods:

- Click on the event with the Eraser tool.

Note that if you press [Alt]/[Option] while you click, all following events on the same track will be deleted, but not the event you clicked and all events before it.

- Select the event(s) and press [Backspace], or select “Delete” from the Edit menu.

Creating new files from events

An audio event plays a section of an audio clip, which in turn refers to one or more audio files on the hard disk. However, in some situations you may want to create a new file that consists only of the section played by the event. This is done with the function “Bounce Selection” on the Audio menu:

1. Select one or several audio events.
2. Set up fade in, fade out and event volume (on the info line or using the volume handle) as desired.

These settings will be applied to the new file. For details on fades and event volume, see “Creating fades” on page 87.

3. Select “Bounce Selection” from the Audio menu.

You are asked whether you want to replace the selected event or not.

- If you click “Replace”, a new file is created, containing only the audio in the original event. A clip for the new file is added to the Pool, and the original event is replaced by a new event playing the new clip.
- If you click “No”, a new file is created and a clip for the new file is added to the Pool.

The original event is not replaced.

You can also apply the Bounce Selection function to an audio part. In that case, the audio from all events in the part will be combined into a single audio file. If you choose “Replace” when asked, the part will be replaced with a single audio event playing a clip of the new file.

Editing in Lane Display mode

When you are recording in Stacked cycle recording mode, each take ends up on a separate lane on the track, see “Recording audio in Stacked mode” on page 75 and “Cycle Record mode: Stacked/Stacked 2 (No Mute)” on page 80. However, you can also select this lane mode manually for individual tracks, and use it when editing in the Project window. This makes it easier to view and handle overlapping events and parts.

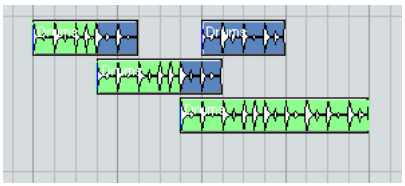
Audio tracks

1. In the Track list or in the Inspector for the selected track, click the Lane Display Type button and select “Lanes Fixed” from the pop-up menu.

The audio track is divided vertically into two lanes. By default, all audio events end up in the first (top) lane.

2. Now you can move events or parts between lanes, either by dragging or by using the “Move to Next Lane/Previous Lane” commands on the Edit menu or Quick menu.

Note that if there are overlapping audio events, the audio on the lowest lane has playback priority – moving events between lanes affects what will be heard!



If the vertical zoom factor is sufficiently high, the sections that will be heard on playback are indicated in green.

- Note that there will always be an extra, empty lane at the bottom of the track – moving an event there always will add another lane.

Depending on the number of lanes used, you may want to adjust the vertical zoom for the track – simply drag the track edges in the track list.

3. After rearranging the overlapping events so that you hear what you want, you can select all events and select “Delete Overlaps” from the Advanced submenu on the Audio menu.

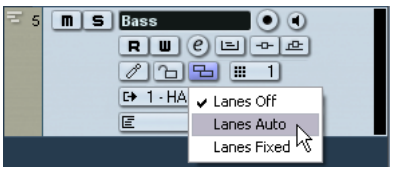
This puts all events in the top lane and resizes events so that overlapping sections are removed.

4. To turn off Lanes mode, select “Lanes Off” from the Lane Display Type pop-up menu.

If you do this without using the “Delete Overlaps” function, all overlapping sections will be kept. However, the sections that were green will now be the sections visible (“on top”) and thus the sections that will be heard.

MIDI tracks

1. In the Track list or in the Inspector for the selected track, click the Lane Display Type button and select “Lanes Auto” or “Lanes Fixed”.



2. Click the Lane Display Type button and select “Lanes Auto” or “Lanes Fixed”.

- In Lanes Auto mode, extra lanes will automatically be added where necessary – if two MIDI parts overlap, they will automatically be put on separate lanes.

- In Lanes Fixed mode, you have to move MIDI parts between lanes manually (by dragging them or by using the “Move to Next Lane/Previous Lane” commands on the Edit menu or Quick menu).

In this mode, there will always be an extra, empty lane at the bottom of the track – if you move a part there, another lane will be added and so on.

3. You can edit the overlapping parts as usual – by cutting, deleting or muting sections in the Project window or by opening them in a MIDI editor.

In an editor, parts on different lanes will be treated just like parts on different tracks – you can use the part list pop-up menu to select an active part for editing, etc.

Note that there is no playback priority between lanes on a MIDI track – all unmuted parts will be heard during playback.

4. To merge all overlapping parts into one, make sure the MIDI track is selected, position the left and right locator around the parts and select “Merge MIDI in Loop” from the MIDI menu.

In the dialog that appears, activate the Erase Destination option and click OK. This merges all unmuted MIDI between the locators to a single part.

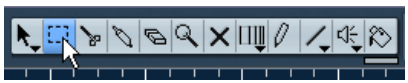
5. To turn off Lanes mode, select “Lanes Off” from the Lane Display Type pop-up menu.

Range editing

Editing in the Project window isn’t necessarily restricted to handling whole events and parts. You can also work with selection ranges, which are independent from the event/part and track boundaries.

Creating a selection range

To make a selection range, drag with the Range Selection tool.



When the Range Selection tool is selected, the Select submenu on the Edit menu has the following items for making selection ranges:

Option	Description
All	Makes a selection that covers all tracks, from the start of the project to the end (as defined by the Length setting in the Project Setup dialog).
None	Removes the current selection range.
Invert	Only used for event selection (see “Selecting events” on page 43).
In Loop	Makes a selection between the left and right locator, on all tracks.
From Start to Cursor	Makes a selection on all tracks, from the start of the project to the project cursor.
From Cursor to End	Makes a selection on all tracks, from the project cursor to the end of the project.

Option	Description
All on Selected Tracks	Only used for event selection (see "Selecting events" on page 43).
Select Event	This is available in the Sample Editor (see "Using the Select menu" on page 267).
Left Selection Side to Cursor	Moves the left side of the current selection range to the project cursor position.
Right Selection Side to Cursor	Moves the right side of the current selection range to the project cursor position.
Range to Next Event	Moves the selection range to the next event head or tail on the selected track(s) and turns it to a zero selection
Range to Previous Event	Moves the selection range to the previous event head or tail on the selected track(s) and turns it to a zero selection.
Enlarge Range to Next Event	Moves the right side of the current selection range to the next event head or tail on the selected track(s).
Enlarge Range to Previous Event	Moves the left side of the current selection range to the previous event head or tail on the selected track(s).

- Double-clicking on an event with the Range Selection tool creates a selection range encompassing the event.

If you hold down [Shift] you can double-click several events in a row, and the selection range will expand to encompass them all. Double-clicking a second time on an event opens it for editing in the Sample Editor.

Adjusting the size of the selection range

You can adjust the size of a selection range in the following ways:

- By dragging its edges.

The pointer takes the shape of a double arrow when you move it over an edge of the selection range.

- By holding down [Shift] and clicking.

The closest selection range edge will be moved to the position at which you clicked.

- By adjusting the selection range start or end position on the info line.
- By using the Trim buttons on the toolbar.

The left Trim buttons will move the start of the selection range and the right buttons will move the end. The edges will be moved by the amount specified on the Grid pop-up.

Clicking this Trim button…

…will move the start of the selection range to the right by 1 beat.

- By using the Nudge buttons on the toolbar.

These will move the whole selection range to the left or the right. The amount of movement depends on the selected display format (see "The Project Setup dialog" on page 33) and the value specified on the Grid pop-up menu.

⚠ Note that the contents of the selection are not moved – using the Nudge buttons is the same as adjusting the start and end of the selection range at the same time, by the same amount.

⇨ The Trim buttons and the Nudge buttons are located in the Nudge palette, which is not visible in the toolbar by default.

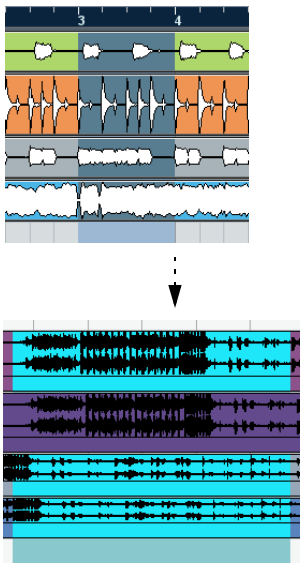
See "The Setup dialogs" on page 506 for instructions on how to show and hide items in the toolbar.

Making selection ranges for several non-contiguous tracks

You can create selection ranges that cover several tracks by pressing [Alt]/[Option]+[Shift]. However, it is also possible to exclude tracks from a selection range:

1. Create a selection range from the first to the last desired track.

2. Press [Alt]/[Option] and click in the selection range on the tracks you want to exclude from the selection.



3. In the same manner, you can add a track to the selection range by [Alt]/[Option]-clicking in the selection range area on the track.

Moving and duplicating

- To move a selection range, click and drag it to a new position.

This will move the contents of the selection range to the new position. If the range intersected events or parts, these will be split before moving, so that only the sections within the selection range are affected.

- To duplicate a selection range, hold down [Alt]/[Option] and drag.

You can also use the Duplicate, Repeat and Fill Loop functions, just as when duplicating events (see "Aligning events" on page 45).

Using Cut, Copy and Paste

When working with selection ranges, you can either use Cut, Copy and Paste on the Edit menu, or use the functions "Cut Time" and "Paste Time" on the Range submenu on the Edit menu. These work differently to their related functions on the Edit menu:

Function	Description
Cut	Cuts out the data in the selection range and moves it to the clipboard. The selection range is replaced by empty track space in the Project window, meaning that events to the right of the range keep their positions.
Copy	Copies the data in the selection range to the clipboard.
Paste	Pastes the clipboard data at the start position and track of the current selection. Existing events are not moved to make room for the pasted data.
Paste at Origin	Pastes the clipboard data back at its original position. Existing events are not moved to make room for the pasted data.
Cut Time	Cuts out the selection range and moves it to the clipboard. Events to the right of the removed range are moved to the left to fill out the gap.
Paste Time	Pastes the clipboard data at the start position and track of the current selection. Existing events are moved to make room for the pasted data.
Paste Time at Origin	Pastes the clipboard data back at its original position. Existing events are moved to make room for the pasted data.

Deleting selection ranges

Again, you can either use "regular" Delete or "Delete Time":

- If you use the Delete function on the Edit menu (or press [Backspace]), the data within the selection range is replaced by empty track space.

Events to the right of the range keep their position.

- If you use "Delete Time" on the Edit menu's Range submenu, the selection range is removed and events to the right are moved to the left to close up the gap.

Other functions

On the Range submenu on the Edit menu, you will find three more range editing functions:

Function	Description
Split	Splits any events or parts that are intersected by the selection range, at the positions of the selection range edges.
Crop	All events or parts that are partially within the selection range are cropped, that is, sections outside the selection range are removed. Events that are fully inside or outside the selection range are not affected.
Insert Silence	Inserts empty track space from the start of the selection range. The length of the silence equals the length of the selection range. Events to the right of the selection range start are moved to the right to “make room”. Events that are intersected by the selection range start are split, and the right section is moved to the right.

Region operations

Regions are sections within a clip, with various uses. While regions are perhaps best created and edited in the Sample Editor (see “Working with regions” on page 269), the following region functions are available in the –Advanced submenu of the Audio menu:

Function	Description
Event or Range as Region	This function is available when one or several audio events or selection ranges are selected. It creates a region in the corresponding clip, with the start and end position of the region determined by the start and end position of the event or selection range within the clip.
Events from Regions	This function is available if you have selected an audio event whose clip contains regions within the boundaries of the event. The function will remove the original event and replace it with event(s) positioned and sized according to the Region(s).

Options

Snap

The Snap function helps you to find exact positions when editing in the Project window. It does this by restricting horizontal movement and positioning to certain positions. Operations affected by Snap include moving, copying, drawing, sizing, splitting, range selection, etc.

- You turn Snap on or off by clicking the Snap icon in the toolbar.

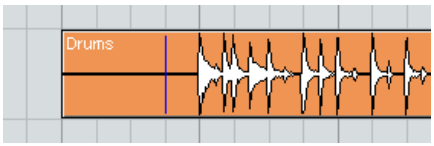
Snap activated.

⇨ When you are moving audio events with Snap activated, it isn’t necessarily the beginning of the event that is used as Snap position reference. Instead, each audio event has a snap point, which you can set to a relevant position in the audio (such as a downbeat, etc.).

The snap point is preferably set in the Sample Editor since it allows for a higher degree of precision (see “Adjusting the snap point” on page 266). You can however also set the snap point directly in the Project window, in the following way:

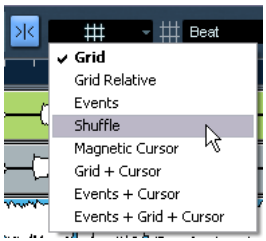
1. Select an event.
2. Place the project cursor at the desired position within the selected audio event.
3. Pull down the Audio menu and select “Snap Point To Cursor”.

The snap point is set at the cursor position.



The snap point for an event is displayed as a blue line in the Project window.

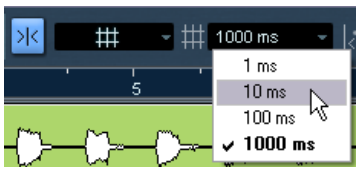
Exactly how Snap works depends on which mode is selected on the Snap mode pop-up menu.



The following sections describe the different Snap modes:

Grid

In this mode, the Snap positions are set with the Grid pop-up menu to the right. The options depend on the display format selected for the ruler. For example, if the ruler is set to show bars and beats, the grid can be set to bars, beats or the quantize value set with the next pop-up menu to the right. If a time or frame-based ruler format is selected, the grid pop-up menu will contain time or frame-based grid options, etc.



When Seconds is selected as ruler format, the grid pop-up menu contains time-based grid options.

Grid Relative

When you move events and parts in this mode they will not be “magnetic” to the grid. Rather, the grid determines the step size for moving the events. This means that a moved event will keep its original position relative to the grid.

For example, if an event starts at the position 3.04.01 (one beat before bar 4), Snap is set to Grid Relative and the Grid pop-up is set to “Bar”, you can move the event in steps of one bar – to the positions 4.04.01, 5.04.01 and so on. The event will keep its relative position to the grid, i.e. stay one beat before the bar lines.

- This only applies when dragging existing events or parts – when you create new events or parts this mode works like the Grid mode.

Events

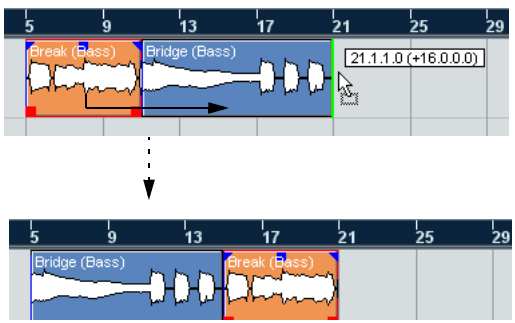
In this mode, the start and end positions of other events and parts become “magnetic”. This means that if you drag an event to a position near the start or end of another event, it is automatically aligned with the start or end of the other event. For audio events, the position of the snap point is also magnetic (see “Adjusting the snap point” on page 266).

- Note that this includes marker events on the marker track.

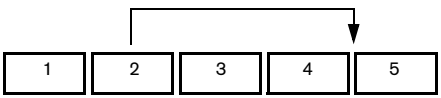
This allows you to snap events to marker positions, and vice versa.

Shuffle

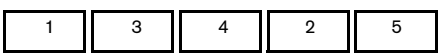
Shuffle mode is useful when you want to change the order of adjacent events. If you have two adjacent events and drag the first one to the right, past the second event, the two events will change places.



The same principle works when changing the order of more than two events:



Dragging event 2 past event 4…



…changes the order of events 2, 3 and 4.

Magnetic Cursor

When this mode is selected, the project cursor becomes “magnetic”. Dragging an event near the cursor causes the event to be aligned with the cursor position.

Grid + Cursor

This is a combination of the “Grid” and “Magnetic Cursor” modes.

Events + Cursor

This is a combination of the “Events” and “Magnetic Cursor” modes.

Events + Grid + Cursor

This is a combination of the “Events”, “Grid” and “Magnetic Cursor” modes.

Snap to Zero Crossing

When this option is activated in the Preferences (Editing–Audio page), splitting and sizing of audio events is done at zero crossings (positions in the audio where the amplitude is zero). This helps you avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

⚠ This setting affects all windows in all open projects – with the exception of the Sample Editor (which has its own “Use Snap” button for this).

Autoscroll

Autoscroll activated.

When this option is activated, the waveform display will scroll during playback, keeping the project cursor visible in the window.

- If the option “Stationary Cursors” is activated in the Preferences (Transport page), the project cursor will be positioned in the middle of the screen (if possible).

4

Playback and the Transport panel

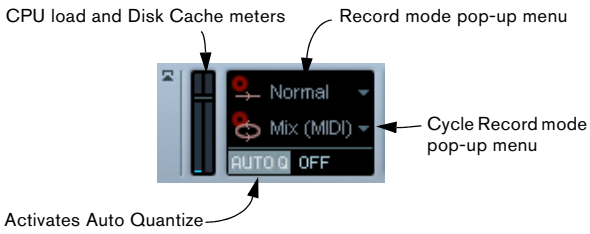
Background

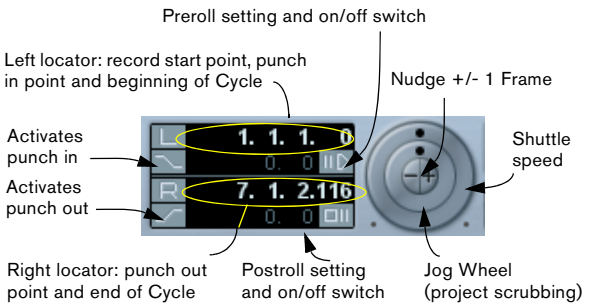
This chapter describes the various methods available for controlling Playback and Transport functions in Nuendo.

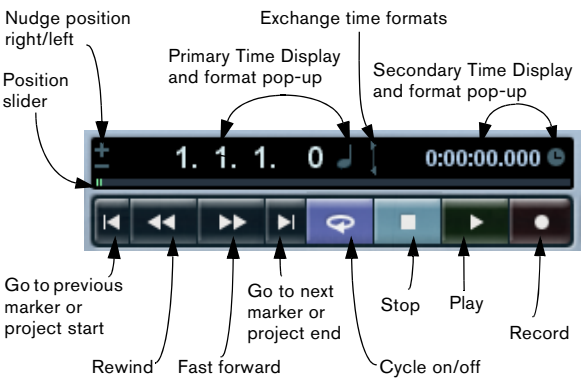
The Transport panel

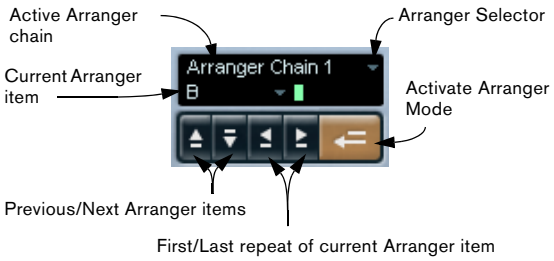
Below you can find a brief description of each item on the Transport panel.

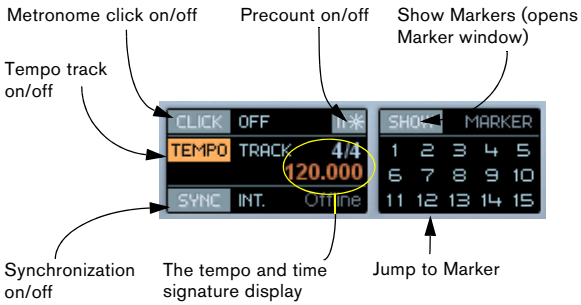
The pictures below show the Transport panel with all controls visible and in their default position. The Transport panel is divided into sections, from left to right.

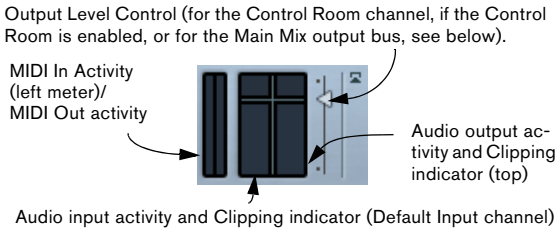












⇨ Note that the Output Activity and Clipping indicator as well as the Output Level Control refer to the Control Room channel if the Control Room is activated. If the Control Room is disabled, these controls refer to the Main Mix Output bus as defined on the Outputs tab in the VST Connections window. For information on the Control Room, see the chapter "Control Room" on page 151.

- The main Transport functions (Cycle/Stop/Play/Record) can also be shown on the toolbar.

In addition, various play options are available on the Transport menu.

Hiding and showing the Transport Panel

The Transport panel is shown by default when you launch a new project. To hide or show it, select “Transport Panel” on the Transport menu (or use a key command – by default [F2]).

About Preroll and Postroll

These items are described in the chapter “Recording”, see “About Preroll and Postroll” on page 83.

Changing the Transport panel setup

You can customize the appearance of the Transport panel by right-clicking anywhere on the panel and selecting/deselecting the desired options on the pop-up menu that appears.

This is described in detail in the section “Customizing via the setup context menus” on page 506.

The numeric keypad

In the default Key Command settings, various Transport panel operations are assigned to the numeric keypad on the computer keyboard. The keypads are slightly different on PC and Macintosh computers:

Numeric Key	Function
[Enter]	Play
[+]	Fast Forward
[-]	Rewind
[*]	Record
[÷] (Win)/[/] (Mac)	Cycle On/Off
[,]	Return to Zero
[0]	Stop
[1]	Go to Left Locator
[2]	Go to Right Locator
[3-9]	Go to marker 3 to 9

Operations

Setting the project cursor position

There are several ways to move the project cursor position:

- By using Fast Forward and Rewind.
- By using the Jog/Shuttle/Nudge control on the Transport panel (see “The Shuttle Speed control” on page 62).
- By dragging the project cursor in the lower part of the ruler.
- By clicking in the ruler.

Double-clicking in the ruler moves the cursor and starts/stops playback.

- If the option “Locate when Clicked in Empty Space” is activated in the Preferences (Transport page) you can click anywhere in an empty section of the Project window to move the cursor position.
- By changing the value in any of the position displays.
- By using the position slider above the transport buttons in the Transport panel.

The range of the slider relates to the Length setting in the Project Setup dialog. Hence, moving the slider all the way to the right will take you to the end of the project.

- By using markers (see “About markers” on page 110).
- By using playback options (see “Playback functions” on page 63).
- By using the Arranger function (see “The Arranger track” on page 98).
- By using functions on the Transport menu.

The following functions are available:

Function	Description
Locate Selection/ Locate Selection End	Moves the project cursor to the beginning or end of the current selection. For this to be available, you must have selected one or more events or parts, or made a selection range.
Locate Next/ Previous Marker	This moves the project cursor to the closest marker to the right or left (see “About markers” on page 110).
Locate Next/ Previous Event	This moves the project cursor forwards or backwards respectively, to the closest beginning or end of any event on the selected track(s).

⇨ If Snap is activated when dragging the project cursor, the Snap value is taken into account. This is helpful for finding exact positions quickly.

⇨ There are also numerous key commands available for moving the project cursor (in the Transport category in the Key Commands dialog).
For example, you can assign key commands to the “Step Bar” and “Step Back Bar” functions, allowing you to move the project cursor in steps of one bar, backwards and forwards.

About the Transport panel display formats

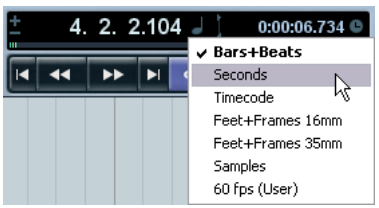
Primary time display (left) and secondary time display (right).

The time unit shown in the ruler can be independent from the time unit shown in the main time display on the Transport panel. This means that you can display timecode in the transport position display and bars and beats in the ruler, for example. In addition, there is a secondary time display to the right of the primary time display which is also independent, giving you three different time units shown at the same time (in the Project window, you can also create additional ruler tracks – see “Using multiple rulers – ruler tracks” on page 32).

The following rules apply:

- If you change the time format of the primary time display on the Transport panel, the time format of the ruler will be changed as well.
This is the same as changing the display format in the Project Setup. Therefore, to have different display formats in the ruler and the main time display you should change the format in the ruler.

- The primary time display format is set on the pop-up menu to the right in the main position display.



- This setting also determines the time format displayed for the left and right locators on the Transport panel.

- The secondary time display is completely independent, and the display format is set on the pop-up menu to the right in the secondary time display.

- You can swap time formats between the primary and secondary time displays by clicking the double arrow symbol between them.

The left and right locators

The left and right locators are a pair of position markers used for specifying punch-in and punch-out positions during recording, and as boundaries for cycle playback and recording.

⇨ When cycle mode is activated on the Transport panel, the area between the left and right locator will be repeated (cycled) on playback.
However, if the right locator is positioned before the left, this will work as a “jump” or “skip mode” – when the project cursor reaches the right locator it will immediately jump to the left locator position and continue playback from there.

There are several ways to set locator positions:

- To set the left locator, press [Ctrl]/[Command] and click at the desired position in the ruler.
Similarly, pressing [Alt]/[Option] and clicking in the ruler sets the right locator. You can also drag the locator “handles” directly in the ruler.

The locators are indicated by the “flags” in the ruler. The area between the locators is highlighted in the ruler and in the Project window (see “Appearance” on page 511). Note that if the right locator is before the left locator, the color of the ruler between the locators will change (from blue to red).

- Click and drag in the upper half of the ruler to “draw” a locator range.
If you click on an existing locator range, you can drag to move it.

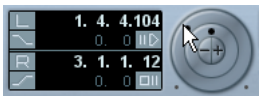
- Pressing [Ctrl]/[Command] and pressing [1] or [2] on the numeric keypad sets the left or right locator to the project cursor position.
Similarly, you can press [1] or [2] on the numeric keypad (without [Ctrl]/[Command]) to set the project cursor position to the left or right locator position. Note that these are default key commands – you can change these if you like.

- By creating cycle markers you can store any number of left and right locator positions, which can be recalled by simply double-clicking on the corresponding marker (see “About cycle markers” on page 111).

- The “Locators to Selection” item on the Transport menu (default key command [P]) sets the locators to encompass the current selection.
This is available if you have selected one or several events or made a selection range.

- You can also adjust the locators numerically on the Transport panel.
Clicking the L/R buttons in the locator section on the Transport panel will move the project cursor to the respective locator. If you press [Alt]/[Option] and click the L or R button, the corresponding locator will be set to the current project cursor position.

The Shuttle Speed control

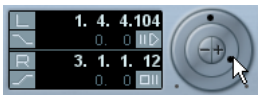


The shuttle speed control (the outer wheel on the Transport panel) allows you to play the project at any playback speed, forwards or backwards. This provides a quick way to locate or “cue” to any position in the project.

- Turn the shuttle speed wheel to the right to start playback.
The further to the right you move the wheel, the faster the playback speed.

- If you turn the wheel to the left instead, the project will play backwards.
Similarly, the playback speed depends on how far to the left you turn the wheel.

Project scrubbing – the Jog Wheel



The middle wheel on the Transport panel serves as a jog wheel. By clicking and dragging it to the right or left you will move the playback position manually forwards or backwards – much like scrubbing on a tape deck. This helps you pinpoint exact locations in the project.

- Note that the jog wheel is an “endless dial” – you can turn it as many times as needed to move to the desired location.
The faster you turn the wheel, the faster the playback speed.

- If you click the jog wheel during playback, playback will automatically stop.

The nudge position buttons

The + and – buttons in the middle of the Shuttle/Jog section allow you to nudge the project cursor position to the right or left, respectively. Each time you click a nudge button, the project cursor is moved by one frame.

Options and Settings

The “Return to Start Position on Stop” preference

This setting is found on the Transport page in the Preferences (found on the File menu under Windows, or on the Nuendo menu under Mac OS X).

- If “Return to Start Position on Stop” is activated when you stop playback, the project cursor will automatically return to the position where recording or playback last started.

- If “Return to Start Position on Stop” is deactivated, the project cursor will remain at the position where you stop playback.
Pressing Stop again will return the project cursor to the position where recording or playback last started.

About track disable/enable

For audio tracks, the track context menu contains an item named “Disable Track”. This shuts down all disk activity for the track, as opposed to using Mute, which merely turns down the output volume for a track. For example, if you often record “alternative takes” you can easily build up a large number of takes on different tracks. Even though these tracks are muted, they are actually still “playing back” from the hard disk during playback. This puts an unnecessary load on your disk system, so using “Disable Track” is recommended for such situations.

- Select “Disable Track” for tracks that you want to keep in the project for later use (but don’t want to play back now).
Select “Enable Track” from the track context menu to re-enable disabled tracks.

Playback functions

Apart from the standard transport controls on the Transport panel, you can also find a number of functions that can be used to control playback on the Transport menu. The items have the following functionality:

Option	Description
Postroll from Selection Start/End	Starts playback from the beginning or end of the currently selected range and stops after the time set in the Postroll field on the Transport panel.
Preroll to Selection Start/End	Starts playback from a position before the start or end of the currently selected range and stops at the selection start or end, respectively. The playback start position is set in the Preroll field on the Transport panel.
Play from Selection Start/End	Activates playback from the beginning or end of the current selection.
Play until Selection Start/End	Activates playback two seconds before the start or end of the current selection and stops at the selection start or end, respectively.
Play until Next Marker	This activates playback from the project cursor and stops at the next marker.
Play Selection Range	This activates playback from the start of the current selection and stops at the selection end.
Loop Selection	This activates playback from the start of the current selection and keeps starting over again when reaching the selection end.

⚠ The functions listed above (except “Play until Next Marker”) are only available if you have selected one or more events or made a selection range.

⇨ In the Preferences dialog (Editing–Audio page) you will find the option “Treat Muted Audio Events like Deleted”. When you activate this option, any events overlapped by a muted event will become audible.

About Chase

Chase is a function that makes sure your MIDI instruments sound as they should when you locate to a new position and start playback. This is accomplished by the program transmitting a number of MIDI messages to your instruments each time you move to a new position in the project, making sure all MIDI devices are set up correctly with regard to program change, controller messages (such as MIDI Volume), etc.

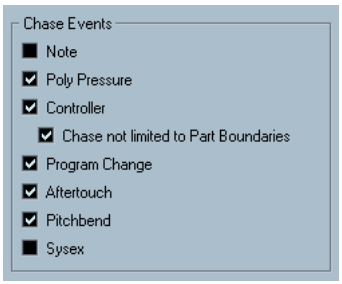
For example, let’s say you have a MIDI track with a program change event inserted at the beginning. This event makes a synth switch to a piano sound.

At the beginning of the first chorus you have another program change event which makes the same synth switch to a string sound.

You now play back the song. It begins with the piano sound and then switches to the string sound. In the middle of the chorus you stop and rewind to some point between the beginning and the second program change. The synth will now still play the string sound although in this section it really should be a piano!

The Chase function takes care of that. If program change events are set to be chased, Nuendo will track the music back to the beginning, find the first program change and transmit it to your synth, setting it to the correct sound.

The same thing can apply to other event types as well. The Chase Events settings in the Preferences (MIDI page) determine which event types will be chased when you locate to a new position and start playback.



⇨ Event types for which the checkbox is activated here will be chased.

- In the Chase Events section of the Preferences (MIDI page), you will find the option “Chase not limited to Part Boundaries”.

When you activate this option, MIDI controllers are also chased outside the part boundaries, i.e. the Chase will be performed on the part touched by the cursor as well as on all the parts to the left of it. Please note that this option should be deactivated for very large projects, as it considerably slows down operations such as positioning and soloing. When you deactivate this option, the MIDI controllers are only chased within the parts under the position cursor.

5

Recording

Background

This chapter describes the various recording methods that you can use in Nuendo. As it is possible to record both audio and MIDI tracks, both recording methods are covered in this chapter.

Before you start

This chapter assumes that you are reasonably familiar with certain basic recording concepts, and that the following initial preparations have been made:

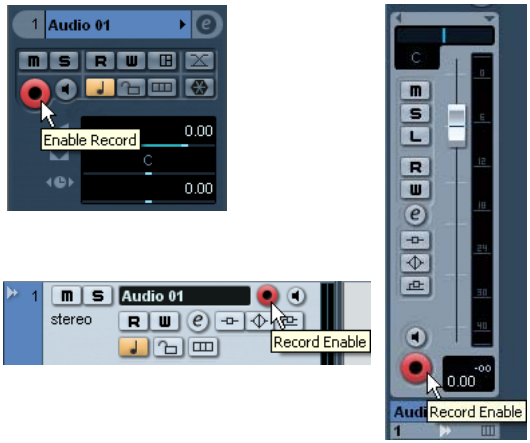
- You have properly set up, connected and calibrated your audio hardware.
- You have opened a project and set the project setup parameters to your specifications.
  Project setup parameters determine the record format, sample rate, project length etc. that affect the audio recordings you make during the course of the project. See "The Project Setup dialog" on page 33.
- If you plan to record MIDI, your MIDI equipment should be set up and connected correctly.

Basic recording methods

This section describes the general methods used for recording. However, there are additional preparations and procedures that are specific to audio and MIDI recording respectively. Make sure to read these sections before you start recording (see "Audio recording specifics" on page 67 and "MIDI recording specifics" on page 77).

Record-enabling a track

Nuendo can record on a single track or on several tracks (audio and/or MIDI) simultaneously. To make a track ready for recording, click the Record Enable button for the track in the Track list, in the Inspector or in the mixer. When activated, the button(s) turn red, indicating record ready mode.



Record Enable in the Inspector, Track list and mixer.

⇨ If the option "Enable Record on Selected Track" is activated in the Preferences (Editing–Project & Mixer page), tracks are automatically record-enabled when you select them in the Track list.

⇨ The exact number of audio tracks you can record simultaneously depends on your computer CPU and hard disk performance.
In the Preferences (VST page), you can find the option "Warn on Processing Overloads". When this is activated, a warning message will be displayed as soon as the CPU clip indicator (on the Transport panel) lights up during recording.

Manually activating recording

You activate recording by clicking the Record button on the Transport panel or toolbar or by using the corresponding key command (by default [*] on the numeric keypad).

Recording can be activated in Stop mode (from the current cursor position or from the left locator) or during playback:

- If you activate recording in Stop mode, and the option "Start Record at Left Locator" is activated on the Transport menu, recording will start from the left locator.
  The preroll setting or the metronome count-in will be applied (see "About Preroll and Postroll" on page 83).
- If you activate recording in Stop mode, and "Start Record at Left Locator" is deactivated, recording will start from the current project cursor position.

- If you activate recording during playback, Nuendo will immediately enter Record mode and start recording from the current project cursor position.
This is known as “manual punch in”.

Activating recording in Sync mode

If you are synchronizing the Nuendo transport to external equipment (Sync is activated on the Transport panel) and you activate recording, the program will go into “record ready” mode (the record button on the Transport panel will light up). Recording then starts when a valid timecode signal is received (or when you click the Play button). See the chapter “Synchronization” on page 445 for more information.

Automatically activating recording

Nuendo can automatically switch from playback to recording at a given position. This is known as “automatic punch in”. A typical use for this would be if you need to replace a section of a recording, and want to listen to what is already recorded, up to the recording start position.

1. Set the left locator to the position where you want recording to start.
2. Activate the Punch In button on the Transport panel.

Punch In activated.

3. Activate playback from some position before the left locator.
When the project cursor reaches the left locator, recording is automatically activated.

Stopping recording

Again, this can be done automatically or manually:

- If you click the Stop button on the Transport panel (or use the corresponding key command, by default [0] on the numeric keypad), recording is deactivated and Nuendo goes into Stop mode.
- If you click the Record button (or use the key command for recording, by default [*]), recording is deactivated but playback continues.
This is known as “manual punch out”.
- If the Punch Out button is activated on the Transport panel, recording will be deactivated when the project cursor reaches the right locator.
This is known as “automatic punch out”. By combining this with automatic punch in, you can set up a specific section to record – again very useful if you want to replace a certain part of a recording. See also “Stop after Automatic Punch Out” on page 83.

Punch In and Out activated.

Cycle recording

Nuendo can record and play back in a cycle – a loop. You specify where the cycle starts and ends by setting the left and right locators. When the cycle is active, the selected section is seamlessly repeated until you hit Stop or deactivate cycle mode.

- To activate cycle mode, click the cycle button on the Transport panel.
If you now start playback, the section between the left and right locator is repeated indefinitely until you stop.

Cycle activated

- To record in cycle mode, you can start recording from the left locator, from before the locators or from within the cycle, in Stop mode or during playback.
As soon as the project cursor reaches the right locator, it will jump back to the left locator and continue recording a new lap.
- The results of cycle recording depend on the selected cycle record mode and are different for audio (see “Recording audio in cycle mode” on page 73) and MIDI (see “Recording MIDI in cycle mode” on page 80).

Audio pre-record

This feature allows you to capture up to 1 minute of any incoming audio you play in Stop mode or during playback, “after the fact”. This is possible because Nuendo can capture audio input in buffer memory, even when not recording.

Proceed as follows:

1. Open the Preferences (Record-Audio page).

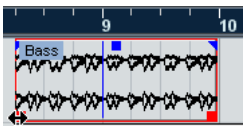
2. Specify a time (up to 60 seconds) in the “Audio Pre-Record Seconds” field.
This activates the buffering of audio input, making Pre-Record possible.

3. Make sure an audio track is record-enabled and receives audio from the signal source.

4. When you have played some audio material you want to capture (either in Stop mode or during playback), click the Record button.

5. After a few seconds stop the recording.
An audio event is created, starting at where the cursor position was when you activated recording. This means that if you were in stop mode, and the cursor was at the beginning of the project, you may have to move the event to the right in the next step. If you were playing along to a project you should leave the event where it is.

6. Select the Arrow tool and place the cursor on the bottom left edge of the event so that a double arrow appears, then click and drag to the left.
Now the event is extended and the audio you played before activating record is inserted – this means that if you played along during playback, the captured notes will end up exactly where you played them in relation to the project.



The recording was activated at the start of bar 9. This is indicated by a blue line in the audio event.

Audio recording specifics

Selecting a recording file format

The format for recorded files is set in the Project Setup dialog on the Project menu. There are three settings: sample rate, record format (bit depth) and record file type. While the sample rate is set once and for all when you start working on a new project, the bit depth and file type can be changed at any time.

Record file type

The Record File Type setting determines which type of files will be created when you record:

File type	Description
Wave File	Wave files have the extension “.wav” and are a common file format on the PC platform.
Wave 64 File	Wave64 is a proprietary format developed by Sonic Foundry Inc. Audio-wise it is identical to the Wave format, but the internal file structure makes much larger file sizes possible. This is useful e.g. for long live recordings in surround format, where the audio files can become huge.
Broadcast Wave File	In terms of audio content, the same as regular Wave files, but with embedded text strings for supplying additional information about the file (see below).
AIFF File	Audio Interchange File Format, a standard defined by Apple Computer Inc. AIFF files have the extension “.aif” and are used on most computer platforms. Like Broadcast Wave files, AIFF files can contain embedded text strings (see below).

- If you select Broadcast Wave File or AIFF format, you can specify Author, Description and Reference text strings that will be embedded in the recorded file.
This is done on the Record–Audio–Broadcast Wave page in the Preferences.

Record format (bit depth)

The available options are 16 bit, 24 bit and 32 bit float. Use the following guidelines:

- Normally, select the record format according to the bit depth delivered by your audio hardware.
For example, if your audio hardware has 20 bit A/D converters (inputs), you may want to record at 24 bit resolution to capture the full bit depth. On the other hand, if your hardware has 16 bit inputs, it’s pointless to record with a higher bit depth – this will only make the audio files larger, with no difference in audio quality. The exception is if you record with effects – see “Recording with effects” on page 76.

- The higher the bit depth, the larger the files and the more strain is put on the disk system.
If this is an issue, you may want to lower the record format setting.

⚠ For further information on the options in the Project Setup dialog, see "The Project Setup dialog" on page 33.

Setting up the track

Creating a track and selecting the channel configuration

Audio tracks can be configured as mono, stereo or surround tracks, with almost any combination of channels (CRS, 5.1, 7.1, 10.2, etc). This allows you to record or import a file containing multiple channels and treat it as one entity, with no need to split it up into several mono files etc. The signal path for an audio track maintains its channel configuration all the way from the input bus, via EQ, level and other mixer settings to the output bus.

You specify the channel configuration for a track when you create it:

1. Select "Add Audio Track" from the Track list context menu or the Project menu (or double-click in an empty area of the Track list when an audio track is selected – when a MIDI track is selected, double-clicking in the Track list creates a new MIDI track).
A dialog appears with a channel configuration pop-up menu.

2. Select the desired format from the pop-up menu.
The most common formats are listed directly on the pop-up menu, with the remaining surround formats listed on the "More…" submenu. For a list of the available surround formats, see "Output bus configuration" on page 205.

- The Browse item in this dialog allows you to browse your disk(s) for created Track Presets, which can be used as a basis (or template) for tracks.
This is described in detail in the chapter "Track Presets" on page 327.

3. Click OK.
A track appears, set to the specified channel configuration. In the mixer, a corresponding channel strip appears. You cannot change the channel configuration for a track.

Selecting an input bus for a track

Here we assume that you have added and set up the required input busses (see "Setting up busses" on page 11). Before you record, you need to specify from which input bus the track should record. You can do this in the Inspector or in the mixer:

- In the Inspector, you select an input bus on the Input Routing pop-up menu in the top section.
As described in the section "The Inspector" on page 26, the Inspector by shows the settings for the selected track. You show or hide the Inspector clicking the "Show/Hide Inspector" button on the Project window toolbar.

Click here to show/hide the Inspector.

Click here to select an input bus for the track.

- In the mixer, you select an input bus on the Input Routing pop-up menu at the top of the track's channel strip.
If this pop-up menu isn't shown, you need to open the Mixer Routing View by clicking the "Show Routing" button in the extended Mixer common panel or by selecting "Show Routing View" from the Window submenu on the Mixer context menu. See "Configuring the mixer" on page 126 for more information about the mixer.

Click here to show or hide the input and output settings.

Click here to select an input bus for the track.

Recording from busses

You can also select an output bus, a group bus or an FX channel bus as an Input for your recording.

Let's assume you want to create a downmix of separate tracks, e.g. bass drum, hihats, snare etc.

Proceed as follows:

1. Set up your separate tracks as desired and add a group track.
2. For each of the drum tracks, open the Output Routing pop-up menu and select the Group track as output.
3. Create a new audio track, open the Output Routing pop-up menu for it and select the Group track as input for this audio track.
4. Record enable this audio track and start recording.

Now, the output of the group track will be recorded on the new track and you will get a mix of your separate tracks.

Note that you can also select an FX channel as recording source. In this case, only the output of the FX channel will be recorded.

For more information about the routing possibilites, see "Routing" on page 14.

Selecting a folder for the recorded audio files

Each Nuendo project has a project folder containing (among other things) an "Audio" folder. By default, this is where recorded audio files are stored. However, you can select record folders independently for each audio track if needed:

1. To select the same record folder for several audio tracks, select them by pressing [Shift] or [Ctrl]/[Command] and clicking on them in the Track list.
2. Right-click in the Track list for one of the tracks to bring up the track context menu.
3. Select "Set Record Folder".
4. Use the file dialog that appears to navigate to the desired folder (or create a new folder with the Create button).
Tip: if you want to have separate folders for different types of material (speech, ambient sounds, music, etc.), you can create subfolders within the Project's "Audio" folder and assign different tracks to different subfolders. This way, all audio files will still reside within the project folder, which will make managing the Project easier.

- It's possible to have different tracks record to totally different locations, even on different disks. However, if you need to move or archive the project, there is a risk of missing some files. The solution is to use the "Prepare Archive" function in the Pool to gather all external files into the project folder first, see "Prepare Archive" on page 309.

Setting input levels

When recording digital sound, it's important to set the input levels correctly – loud enough to ensure low noise and high audio quality, but not so loud that clipping (digital distortion) occurs.

Clipping typically occurs in the audio hardware when a too loud analog signal is converted to digital in the hardware's A/D converters.

- It is also possible to get clipping when the signal from the input bus is written to a file on your hard disk.
This is because in Nuendo, you can make settings for the input bus, adding EQ, effects, etc. to the signal as it is being recorded. This may raise the level of the signal, causing clipping in the recorded audio file.

To check the level of the “unprocessed” signal coming into the audio hardware, you need to switch the level meters to “Meter Input”. In this mode, the input channel level meters will show the level of the signal at the input of the bus, before any adjustments such as input gain, EQ, effects, level or pan:

1. Right-click in the Mixer window.
The Mixer context menu appears.

2. Select the Global Meter Settings submenu and make sure “Meter Input” is activated.

3. Play back the audio and check the level meter for the input channel.
The signal should be as loud as possible without exceeding 0 dB (the Clipping indicator for the input bus should not light up).

The Clipping indicator.

4. If necessary, adjust the input level in one of the following ways:

- Adjust the output level of the sound source or external mixer.

- Use the audio hardware’s own application program to set the input levels (if possible).
See the documentation for the audio hardware.

- If your audio hardware supports the ASIO Control Panel function, it may be possible to make input level settings.
To open the ASIO control panel, open the Device Setup dialog via the Devices menu and, in the list to the left (below "VST Audio System"), select your audio card. When this is selected, you can open the Control Panel by clicking on the Control Panel button in the settings section to the right.

The next step is to check the level of the audio being written to a file on your hard disk. This is only necessary if you have made any adjustments to the input channel (level settings, EQ, insert effects, etc.). Note also:

- If you record in 32 bit float format, the bit depth will not be reduced – which means there’s no risk of clipping at this stage.
Also, this preserves the signal quality perfectly. Therefore, you should consider using 32 bit float format when you are recording with effects (see “Recording with effects” on page 76).

- If you record in 16 or 24 bit format, the available headroom is lower, which means clipping can occur if the signal is too loud. To avoid this, set the signal level in the following way:

1. Bring up the mixer context menu and select “Meter Post-Fader” from the Global Meter Settings submenu.

2. Set up the input channel, by adding EQ and/or effects as desired.
With some effects you may want to adjust the level of the signal going into the effect – use the Input Gain knob for this. Note that you need to press [Shift] or [Alt]/[Option] to adjust the Input Gain.

3. Play back the audio and check the level meter of the input channel.
The signal should be reasonably loud but should not reach 0 dB (the Clipping indicator for the input bus should not light up).

4. If necessary, use the input channel fader to adjust the signal level.

Monitoring

In this context, “monitoring” means listening to the input signal during recording. There are three fundamentally different ways to do this: via Nuendo, externally (by listening to the signal before it reaches Nuendo), or by using ASIO Direct Monitoring (which is a combination of both other methods – see below).

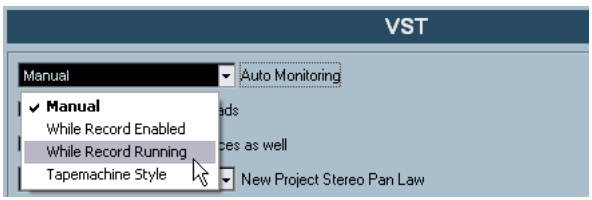
Monitoring via Nuendo

If you monitor via Nuendo, the input signal is mixed in with the audio playback. The advantage of this is that you can adjust the monitoring level and panning in the mixer, and add effects and EQ to the monitor signal just as during playback (using the track’s channel strip – not the input bus!).

The disadvantage of monitoring via Nuendo is that the monitored signal will be delayed according to the latency value (which depends on your audio hardware and drivers). Therefore, monitoring via Nuendo requires an audio hardware configuration with a low latency value. You can check the latency of your hardware in the Device Setup dialog (VST Audio System page).

⇨ If you are using plug-in effects with large inherent delays, the automatic delay compensation function in Nuendo will increase the latency.
If this is a problem, you can use the Constrain Delay Compensation function while recording, see “VST Instruments and Instrument tracks” on page 189.

When monitoring via Nuendo, you can select one of four Auto Monitoring modes in the Preferences (VST page):



- Manual.

This option allows you to turn input monitoring on or off by clicking the Monitor button in the Inspector, the Track list or in the mixer.

- While Record Enabled.

With this option, you will hear the audio source connected to the channel input whenever the track is record enabled.

- While Record Running.

This option switches to input monitoring only during recording.

- Tapemachine Style.

This option emulates standard tapemachine behavior: input monitoring in Stop mode and during recording, but not during playback.

- In the Preferences (VST–Metering page) you can find the option “Map Input Bus Metering to Audio Track (in Direct Monitoring)”.

When Direct Monitoring is activated in the Device Setup dialog, this option allows you to map the input bus metering to monitor-enabled audio tracks. This gives you the opportunity to watch the input levels of your audio tracks when working in the Project window.

When Direct Monitoring is activated in the Device Setup dialog, this function works as follows:

- When “Map Input Bus Metering to Audio Track (in Direct Monitoring)” is activated, audio tracks show the metering signal from the input bus they are routed to as soon as the track is record-enabled.
  Note that the tracks are mirroring the input bus signal, i.e. you will see the same signal in both places. When using mapped metering, any functions (e.g. trimming) you apply to the audio track are not reflected in its meters.
- When “Map Input Bus Metering to Audio Track (in Direct Monitoring)” is not activated, metering works as usual.

External monitoring

External monitoring (listening to the input signal before it goes into Nuendo) requires some sort of external mixer for mixing the audio playback with the input signal. This can be a stand-alone physical mixer or a mixer application for your audio hardware, if this has a mode in which the input audio is sent back out again (usually called “Thru”, “Direct Thru” or similar).

When using external monitoring, you cannot control the level of the monitor signal from within Nuendo or add VST effects or EQ to the monitor signal. The latency value of the audio hardware configuration does not affect the monitor signal in this mode.

⇨ If you want to use external monitoring, you need to make sure that monitoring via Nuendo isn’t activated as well.
Select the “Manual” monitoring mode in the Preferences (VST page) and don’t activate the Monitor buttons.

ASIO Direct Monitoring

If your audio hardware is ASIO 2.0 compatible, it may support ASIO Direct Monitoring. In this mode, the actual monitoring is done in the audio hardware by sending the input signal back out again. However, monitoring is controlled from Nuendo. This means that the audio hardware's direct monitoring feature can be turned on or off automatically by Nuendo, just as when using internal monitoring.

⇨ If you are using RME Audio Hammerfall DSP audio hardware, make sure that the pan law is set to -3dB in the card's preferences.

- To activate ASIO Direct Monitoring, open the Device Setup dialog on the Devices menu and activate the Direct Monitoring checkbox on the page for your audio hardware.
  If the checkbox is grayed out, your audio hardware (or its driver) doesn't support ASIO Direct Monitoring. Consult the audio hardware manufacturer for details.

- When ASIO Direct Monitoring is activated, you can select a monitoring mode in the Preferences (VST page), as when monitoring via Nuendo (see "Monitoring via Nuendo" on page 71).

- Depending on the audio hardware, it may also be possible to adjust monitoring level and panning from the mixer.
  Consult the documentation of the audio hardware if in doubt.

- VST effects and EQ cannot be applied to the monitor signal in this mode, since the monitor signal doesn't pass through Nuendo.

- Depending on the audio hardware, there may be special restrictions as to which audio outputs can be used for direct monitoring.
  For details on the routing of the audio hardware, see its documentation.

- The latency value of the audio hardware configuration does not affect the monitor signal when using ASIO Direct Monitoring.

Recording

Recording is done using any of the general recording methods (see "Basic recording methods" on page 65). When you finish recording, an audio file is created in the Audio folder within the project folder. In the Pool, an audio clip is created for the audio file, and an audio event that plays the whole clip appears on the recording track. Finally, a waveform image is calculated for the audio event. If the recording was very long, this may take a while.

⇨ If the option "Create Audio Images During Record" is activated in the Preferences (Record-Audio page), the waveform image will be calculated and displayed during the actual recording process.
This real-time calculation uses some processing power – if your processor is slow or you are working on a CPU-intensive project, you should consider turning this option off.

Undoing recording

If you decide that you don't like what you just recorded, you can delete it by selecting Undo from the Edit menu. The following will happen:

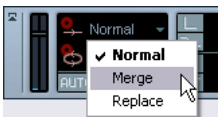
- The event(s) you just created will be removed from the Project window.
- The audio clip(s) in the Pool will be moved to the Trash folder.
- The recorded audio file(s) will not be removed from the hard disk.

However, since their corresponding clips are moved to the Trash folder, you can delete the files by opening the Pool and selecting "Empty Trash" from the Media menu, see "Deleting from the hard disk" on page 302.

Recording overlapping events

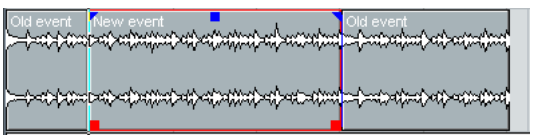
The basic rule for audio tracks is that each track can play back a single audio event at a time. This means that if two or more events are overlapping, only one of them will be heard at any given time.

What happens when you record overlapping events (record in an area where there are already events on the track) depends on the Linear Record Mode setting on the Transport panel:



- In “Normal” or “Merge” mode, recording where something has already been recorded creates a new audio event that overlaps the previous one(s).
  When you record audio, there is no difference between “Normal” and “Merge” mode – the difference only applies to MIDI recording (see “About overlap and the Record Mode setting” on page 79).

- In “Replace” mode, existing events (or portions of events) that are overlapped by the new recording will be removed.
  This means that if you record a section in the middle of a longer existing recording, that original event will be cut into two events with a gap for the new event.



Which event will be heard?

If two or more events are overlapping, you will only hear the events (or portions of events) that are actually visible. Overlapped (hidden) events or sections are not played back.

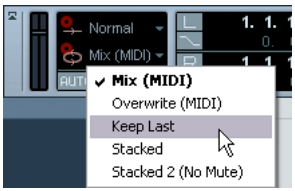
- The functions “Move to Front” and “Move to Back” on the Edit menu (see “Moving events” on page 44) are useful for managing overlapping events, as is the “To Front” function (see below).

Recording audio in cycle mode

If you are recording audio in cycle mode, the result depends on two factors:

- The “Cycle Record Mode” setting on the Transport panel.
- The “Audio Cycle Record Mode” setting in the Preferences (Record-Audio page).

Cycle Record Modes on the Transport panel



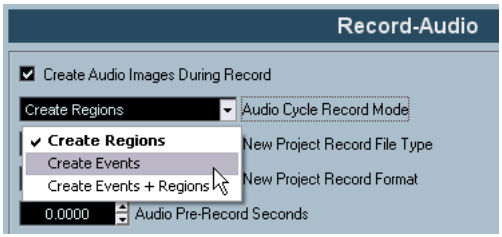
There are five different modes on the Transport panel, but the first two modes only apply to MIDI recording. For audio cycle recording, the following applies:

- If “Keep Last” is selected, the last complete “take” (the last completely recorded lap) is kept as an audio event.
  In reality, all laps you recorded are saved in one audio file divided into regions – one region for each take. You can easily select a previous take for playback – this is done as when recording in “Create Regions” mode (see “Create Regions mode (Preferences)” on page 74).

- If “Stacked” is selected, each take will appear as an event on a separate “lane” on the track.
  This is useful when you want to view and edit the different takes and eventually combine them to one recording. In this mode, the Audio Cycle Record Mode preference doesn’t matter. Stacked 2 (No Mute) is the same as Stacked, except that all the takes will be audible. See “Recording audio in Stacked mode” on page 75.

- If any of the other cycle recording modes is selected, the result depends entirely on the “Audio Cycle Record Mode” setting in the Preferences (Record-Audio page).
  These options are described below.

Create Events mode (Preferences)



When “Audio Cycle Record Mode” is set to “Create Events” in the Preferences (Record-Audio page), the following will happen when you record audio in cycle mode:

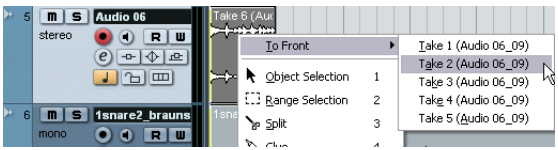
- One continuous audio file is created during the entire recording process.
- For each recorded lap of the cycle, one audio event is created.

  The events will have the name of the audio file plus the text “Take *”, where “*” indicates the number of the take.
- The last take (the last recorded lap) will be on top (and will thus be the one you hear when you activate playback).

To select another take for playback, proceed a follows:

1. Right-click the event and select “To Front” from the pop-up menu that appears.

   A submenu appears, listing all the other (obscured) events.



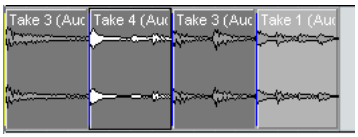
2. Select the desired take.

   The corresponding event is brought to front.

This method allows you to quickly combine the best parts of each take, in the following way:

1. Use the Scissors tool to split the events in several sections, one for each part of the take.

   For example, if you recorded four lines of vocals (in each take), you can split the events so that each line gets a separate event.



The events after splitting. Note that since the original take events overlap each other, clicking with the Scissors tool will split all takes at the same position.

2. For each section of the take, use the “To Front” function to bring the best take to the front.

   This way, you can quickly combine the best sections of each take, using the first vocal line from one take, the second line from another take and so on.

You can also compile a “perfect” take in the Audio Part Editor, see “Assembling a “perfect take”” on page 294.

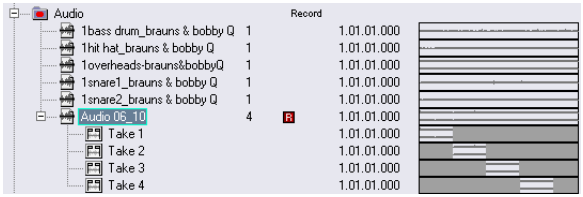
Create Regions mode (Preferences)

When Audio Cycle Record Mode is set to “Create Regions” in the Preferences (Record-Audio page), the following will happen when you record audio in cycle mode:

- One continuous audio file is created during the entire recording process.
- The audio event in the Project window shows the name of the audio file plus the text “Take *” (with “*” being the number of the last completed cycle lap).
- If you play back the recorded event, you will only hear what was recorded during the last lap of the cycle recording.

  The previous “takes” recorded in the cycle are still available, however.
- The audio clip is divided into regions (called takes), one for each lap of the cycle that was recorded.

  If you locate the audio file you just recorded in the Pool, and click on the plus sign beside it, you can see the regions that have been created, one for each lap of the cycle that was completed during recording.



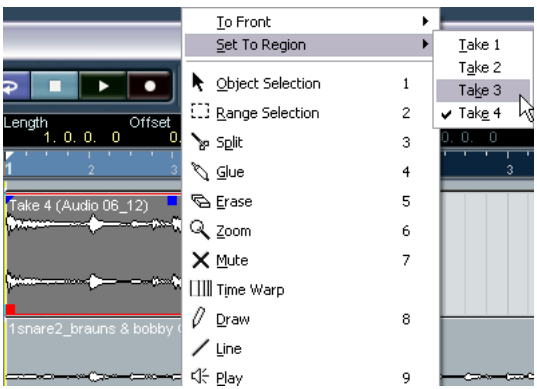
"Take" regions in the Pool window.

To play back the different "takes", proceed as follows:

1. In the Project window, right-click the event that was created during cycle recording.
The Quick menu appears.

2. Select the "Set To Region" menu item.
A submenu appears with the takes you recorded during cycle record.

3. Now you can select any of the takes from the submenu and it will replace the previous take event in the Project window.



Use this method to listen through the various takes. Select the best single take, or compile a "perfect" take by cutting out the best bits from each take and putting them together (see "Assembling a "perfect take"" on page 294).

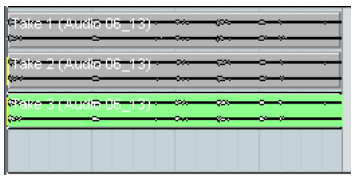
Create Events + Regions mode (Preferences)

In this mode, both events and regions are created. If you work with the takes as events in this mode, you can edit the events freely (e.g. splitting them), see "Create Events mode (Preferences)" on page 74. However, in case you want to go back to the original takes, they are still available as regions (on the "Set To Region" submenu, in the Pool or in the Sample Editor).

Recording audio in Stacked mode

When you record audio in cycle mode and the "Stacked" Cycle Record Mode is selected on the Transport panel, the following happens:

- Each complete recorded cycle lap is turned into a separate audio event.
- The track is divided into "lanes", one for each cycle lap.
- The events are stacked above each other, each on a different lane.



This makes it easy to create a "perfect take" by combining the best parts from the different cycle laps:

1. Zoom in so you can work comfortably with the stacked events.

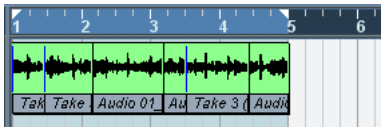
If you play back the recorded section, only the lowest (last) take will be heard.

2. To audition another take, either mute the lower take(s) with the Mute tool or move the takes between the lanes.
This can be done by dragging or by using the functions Move to Next Lane/Previous Lane on the Quick menu or the Edit menu.

3. Edit the takes so that only the parts you want to keep can be heard.
You can cut events with the Scissors tool, resize them, mute them or delete them.

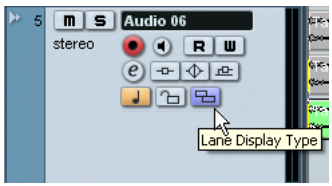
The sections that will be heard are indicated in green.

4. When you are satisfied with the result, select all events on all lanes and select "Delete Overlaps" from the Advanced submenu on the Audio menu.
This puts all events back on a single lane and resizes events so that overlapped sections are removed.



5. To turn off the lane display mode for the track, click the Lane Display Type button in the track list and select “Lanes Off”.

If the button is hidden, you can bring it to view in the Track Controls Settings dialog – see “Customizing track controls” on page 507.



The Lane Display Type button.

Recording with effects

Normally you record the audio signals “dry” and add effects non-destructively during playback as described in the chapter “Audio effects” on page 168. However, Nuendo also allows you to add effects (and/or EQ) directly while recording. This is done by adding insert effects and/or making EQ settings for the input channel in the mixer. Note:

⇨ This will make the effects become part of the audio file itself – you cannot change the effect settings after recording.

About the record format

When you record with effects, you should consider setting the record format (bit depth) to 32 Bit Float. This is done in the Project Setup dialog on the Project menu. Note that this isn’t required in any way – you can also record with effects in 24 or 16 Bit format. However, there are two advantages to 32 Bit Float format:

- With 32 Bit Float recording, you don’t risk clipping (digital distortion) in the recorded files.

This can of course be avoided with 24 or 16 Bit recording as well, but requires more care with the levels.

- Nuendo processes audio internally in 32 Bit Float format – recording in the same format means the audio quality will be kept absolutely pristine.

The reason is that the effect processing in the input channel (as well as any level or EQ settings you make there) is done in 32 Bit Float format. If you record at 16 or 24 Bit, the audio will be converted to this lower resolution when it’s written to file – with possible signal degradation as a result.

Note also that it doesn’t matter at which actual resolution your audio hardware works. Even if the signal from the audio hardware is in 16 Bit resolution, the signal will be 32 Bit Float after the effects are added in the input channel.

An example

This example shows how to apply the “SoftClipper” effect while recording. Note that this is only an example. The principle is the same for all effects (or combinations of effects).

1. Set up an audio track for recording and select the desired input bus.

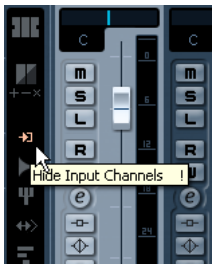
For best results, you should also activate monitoring as this allows you to hear and try out your settings before actually recording. See “Monitoring via Nuendo” on page 71 for a description of monitoring via Nuendo.

2. Open the Mixer and make sure the full extended view is shown.

To show the extended mixer view, either click the arrow icon (“Show Extended Mixer”) in the Common Panel, select “Show Extended View” from the Window submenu on the Mixer context menu or use a key command (this can be set in the Key Commands dialog, see “Setting up key commands” on page 518).

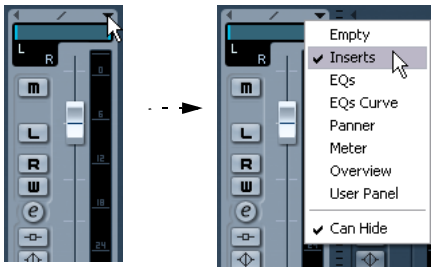
3. Locate the input channel (bus) from which you record.

If the input channels are hidden, click on the Show/Hide Input Channels button to the left.



4. Check the input level (of the signal coming into the audio hardware) as described in the section “Setting input levels” on page 69 and adjust the level of the source audio if necessary.

5. Pull down the View Options pop-up menu for the input channel and select “Inserts”.



The View Options pop-up menu is opened by clicking the arrow button between the fader panel and the extended panel.

Now the extended panel for the input channel shows the insert slots.

6. Click on an insert slot and select an effect from the pop-up menu that appears.

As you see, the included effects are sorted into submenus – you will find the SoftClipper effect on the “Distortion” submenu.

The effect is loaded and activated and its control panel is automatically opened.

7. Adjust the effect parameters to your liking.

For detailed information on the Effect parameters, see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

8. When the effect is set up as desired, you can check the level of the input channel by setting the Meters to post-fader (see “Setting input levels” on page 69).

Use the input channel fader to adjust the level if needed.

9. Activate recording.

10. When you’re finished, you can play back the recorded audio track.

As you can hear, the effect you applied is now a part of the actual audio file.

11. If you don’t want to record more with the same plug-in, you should deactivate it by clicking in the insert slot and selecting “No Effect”.

MIDI recording specifics

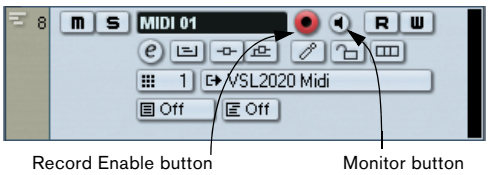
Activating MIDI Thru

Normally, when working with MIDI, you will have MIDI Thru activated in Nuendo, and Local Off selected in your MIDI Instrument(s). In this mode, everything you play during recording will be “echoed” back out again on the MIDI output and channel selected for the recording track.

1. Make sure the option “MIDI Thru Active” is activated in the Preferences (MIDI page).

2. Record enable the track(s) on which you want to record.

Now, incoming MIDI is “echoed” back out again for all record-enabled MIDI tracks.



⇨ If you just want to use the Thru function for a MIDI track without recording, activate the monitor button for the track instead.

This is useful e.g. if you want to try out different sounds or play a VST instrument in real time without recording your playing.

Setting MIDI channel, input and output

Setting the MIDI channel in the instrument

Most MIDI synthesizers can play several sounds at the same time, each on a different MIDI channel. This is the key to playing back several sounds (bass, piano etc.) from the same instrument. Some devices (such as General MIDI compatible sound modules) always receive on all 16 MIDI channels. If you have such an instrument, there’s no specific setting you need to make in the instrument. On other instruments, you will have to use the front panel controls to set up a number of “Parts”, “Timbres” or similar so that they receive on one MIDI channel each. See the manual that came with your instrument for more information.

Naming MIDI ports in Nuendo

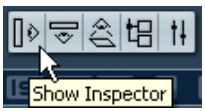
MIDI inputs and outputs are often displayed with unnecessarily long and complicated names. However, you can rename your MIDI ports to more descriptive names:

1. Open the Device Setup dialog from the Devices menu.
2. Select the MIDI Port Setup item in the Device list.
The available MIDI inputs and outputs are listed. Under Windows, which device to choose depends on your system.
3. To change the name of a MIDI port, click in the "Show As" column and type in a new name.
After closing the dialog, the new name will appear on the MIDI Input and Output Routing pop-up menus.

Setting the MIDI input in the Inspector

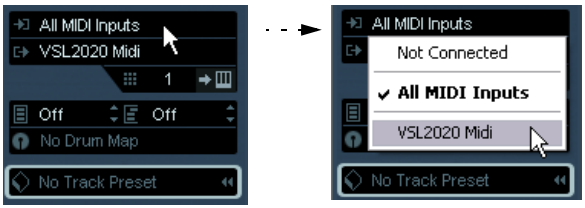
You select MIDI inputs for tracks in the Inspector (the area to the left of the Track list in the Project window):

1. If the Inspector is hidden, click the Show Inspector button on the toolbar.



2. Select the track(s) by clicking in the Track list.
To select multiple tracks, press [Shift] or [Ctrl]/[Command] and click. The Inspector shows the settings for the first selected track (for details, see "The Inspector" on page 26).
3. Click the track name in the Inspector to make sure the topmost section is shown.

4. Pull down the Input Routing pop-up menu and select an input.
The available MIDI inputs are shown. The items on the menu depend on the type of MIDI interface you are using, etc.

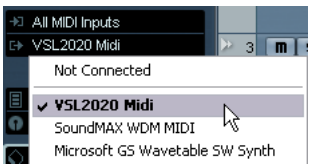


- If you select the "All MIDI Inputs" option, the track will receive MIDI data from all available MIDI inputs.
- If you hold down [Alt]/[Option] and select a MIDI input, this is selected for all selected MIDI tracks.

Setting the MIDI channel and output

The MIDI channel and output settings determine where the recorded MIDI is routed during playback, but are also relevant for MIDI Thru in Nuendo. Channel and output can be selected in the Track list or in the Inspector. The procedure below describes how to make the settings in the Inspector, but it can be done in largely the same manner in the Track list as well.

1. To select the track(s) and show the settings in the Inspector, proceed as when selecting a MIDI input (see above).
2. Pull down the Output routing pop-up menu and select an output.
The available MIDI outputs are shown. The items on the menu depend on what type of MIDI interface you are using etc.



- If you hold down [Alt]/[Option] and select a MIDI output, this is selected for all selected MIDI tracks.

3. Use the channel pop-up menu to select a MIDI channel for the track.

- If you set the track to MIDI channel “Any”, each MIDI event on the track will be sent out on the channel stored in the event itself.
In other words, the MIDI material will be played back on the channel(s) used by the MIDI input device (the MIDI instrument you play during recording).

Selecting a sound

You can select sounds from within Nuendo by instructing the program to send Program Change and Bank Select messages to your MIDI device. This is done using the “Patch Selector” and “Bank Selector” fields in the Inspector or Track list.

Program Change messages give access to 128 different program locations. If your MIDI instruments have more than 128 programs, Bank Select messages (set in the “Bank Selector” field) allow you to select different banks, each containing 128 programs.

⇨ Bank Select messages are recognized differently by different MIDI instruments. The structure and numbering of banks and programs may also vary. Consult the documentation of your MIDI instruments for details.

⇨ Note that it is also possible to select sounds by name. For descriptions of how to set this up, see the separate “MIDI Devices” PDF document.

Recording

Recording MIDI is done according to the basic recording methods (see “Basic recording methods” on page 65). When you finish recording, a part containing MIDI events is created in the Project window.

About overlap and the Record Mode setting

MIDI tracks are different from audio tracks when it comes to overlapping parts:

⇨ All events in overlapping parts are always played back.
If you record several parts at the same locations (or move parts so that they overlap), you will hear the events in all parts on playback, even though some of the parts are obscured in the Project window.

When recording overlapping parts, the result depends on the Linear Record Mode setting on the Transport panel:

- If the record mode is set to “Normal”, overdub recording works as with audio tracks, i.e. if you record again where something has already been recorded, you get a new part that overlaps the previous one(s).
- If the record mode is set to “Merge”, the overdubbed events are added to the existing part.
- If the record mode is set to “Replace”, the new recording replaces any existing events in the area on that track.

About punch in and out on MIDI tracks

Performing and setting up manual and automatic punch in/out recording for MIDI tracks is done in exactly the same way as for audio tracks. There is one thing to note, however:

- Punching in and out on recordings with Pitch Bend or controller data (modulation wheel, sustain pedal, volume etc.) may lead to strange effects (apparently hanging notes, constant vibrato etc.).
If this happens, you may need to use the Reset item on the MIDI menu (see “The Reset function” on page 81).

About the Automatic MIDI Record Quantize function

If Auto Quantize is activated on the Transport panel (the “Auto Q” button), the notes you record are automatically quantized according to the current Quantize settings. For more information about quantizing, see “The Quantizing functions” on page 352.

Recording MIDI in cycle mode

When you record MIDI in cycle mode, the result depends on which Cycle Record mode is selected on the Transport panel:

Cycle Record mode: Mix (MIDI)

For each completed lap, everything you record is added to what was previously recorded in the same part. This is useful for building up rhythm patterns, for example. Record a hi-hat part on the first lap, the bass drum part on the second lap etc.

Cycle Record mode: Overwrite (MIDI)

As soon as you play a MIDI note (or send any MIDI message), all MIDI you have recorded on previous laps is overwritten from that point on in the part. An example:

1. You start recording in an eight bar cycle.

2. The first take wasn't good enough – you start directly with a new take on the next cycle lap and overwrite the first take.

3. After recording the second take you let the recording roll on and listen, without playing anything.
You find that the take was good up until bar seven, for example.

4. On the next lap, you wait until bar seven and start playing.
This way you will overwrite the last two bars only.

5. Make sure you stop playing before the next lap begins – otherwise you will overwrite the entire take.

Cycle Record mode: Keep Last

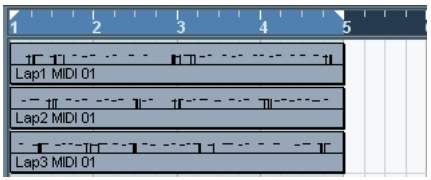
Each completed lap replaces the previously recorded lap. Note:

- The cycle lap must be completed – if you deactivate recording or press Stop before the cursor reaches the right locator, the previous take will be kept.
- If you don't play or input any MIDI during a lap, nothing happens (the previous take will be kept).

Cycle Record mode: Stacked/Stacked 2 (No Mute)

In this mode, the following happens:

- Each recorded cycle lap is turned into a separate MIDI part.
- The track is divided into "lanes", one for each cycle lap.
- The parts are stacked above each other, each on a different lane.
- All takes but the last one are muted (Stacked).
- If Stacked 2 is selected, no muting takes place.



This makes it easy to create a "perfect take" by combining the best parts from the different cycle laps. You can edit the parts in the Project window (by cutting, resizing and deleting) or you can use a MIDI editor as in the following example:

1. Unmute the muted takes by clicking the parts with the Mute tool.

2. Select all takes (parts) and open them in the Key Editor for example.

3. Use the part list pop-up menu on the toolbar to select which part to edit.
See "Handling several parts" on page 365.

4. Remove or edit notes as desired.

5. When you are happy with the result, close the editor.

6. To turn it all into a single MIDI part (containing your "perfect take"), select all parts and select "Merge MIDI in Loop" from the MIDI menu.

7. In the dialog that appears, activate the Erase Destination option and click OK.
The remaining events in the parts are merged together into a single part.

Recording different types of MIDI messages

⚠ You can decide exactly which event types should be recorded by using the MIDI filters – see “Filtering MIDI” on page 82.

Notes

When you press and release a key on your synth or other MIDI keyboard, a Note On (key down) and a Note Off (key up) message are sent out. The MIDI note message also contains the information which MIDI channel was used. Normally, this information is overridden by the MIDI channel setting for the track, but if you set the track to MIDI channel “Any”, the notes will be played back on their original channels.

Continuous messages

Pitch bend, aftertouch and controllers (like modulation wheel, sustain pedal, volume etc.) are considered as MIDI continuous events (as opposed to the momentary key down and key up messages). If you move the Pitch bend wheel on your synthesizer while recording, this movement is recorded together with the key (Note On and Note Off messages), just as you’d expect. But the continuous messages can also be recorded after the notes have been recorded (or even before). They can also be recorded on their own tracks, separately from the notes to which they belong.

Say, for instance, that you record one or several bass parts on track 2. If you now set another track, like track 55, to the same output and MIDI channel as track 2, you can make a separate recording of just pitch bends for the bass parts on track 55. This means that you activate recording as usual and only move the pitch bend wheel during the take. As long as the two tracks are set to the same output and MIDI channel, it will appear to the MIDI instrument as if the two recordings were made at the same time.

Program Change messages

Normally, when you switch from one program to another on your keyboard (or whatever you use to record), a number corresponding to that program is sent out via MIDI as a Program Change message. These can be recorded on the fly with the music, recorded afterwards on a separate track, or manually entered in the Key or List Editors.

System Exclusive messages

System Exclusive (SysEx) is a special type of MIDI message used to send data that only makes sense to a unit of a certain make and type. SysEx can be used to transmit a list of the numbers that make up the settings of one or more sounds in a synth. For more about viewing and editing SysEx messages, see the chapter “Working with System Exclusive messages” on page 410.

The Reset function

The Reset function on the MIDI menu sends out note-off messages and resets controllers on all MIDI channels. This is sometimes necessary if you experience hanging notes, constant vibrato, etc.

- Nuendo can also automatically perform a MIDI reset on stop.
  You can turn this function on or off in the Preferences (MIDI page).

- Also in the Preferences (MIDI page), you can find the option “Insert Reset Events after Record”.
  This is a very handy function for MIDI recording. At the end of each recorded part, a Reset event will be inserted, resetting controller data such as Sustain, Aftertouch, Pitchbend, Modulation, Breath Control, etc. This is useful if a MIDI part is recorded and e.g. the Sustain pedal is still held after stopping recording. Usually, this would cause all following parts to be played with Sustain, as the Pedal Off command was not recorded. This can be prevented by activating “Insert Reset Events after Record”.

Retrospective Record

This feature allows you to capture any MIDI notes you play in Stop mode or during playback and turn them into a MIDI part “after the fact”. This is possible due to the fact that Nuendo can capture MIDI input in buffer memory, even when not recording.

Proceed as follows:

1. Enable the Retrospective Record option in the Preferences (Record-MIDI page).
   This activates the buffering of MIDI input, making Retrospective Record possible.

2. Make sure a MIDI track is record-enabled.

3. When you have played some MIDI material you want to capture (either in Stop mode or during playback), select Retrospective Record from the Transport menu (or use the key command, by default [Shift]-[Pad*]).

The content of the MIDI buffer (i.e. what you just played) is turned into a MIDI part on the record enabled track. The part will appear where the project cursor was when you started playing – this means that if you played along during playback, the captured notes will end up exactly where you played them in relation to the project.

- The Retrospective Record Buffer Size setting in the Preferences (Record-MIDI page) determines how much data can be captured.

MIDI Preferences

There are several other options and settings in the Preferences that affect MIDI recording and playback:

MIDI page

- Length Adjustment

Adjusts the length of notes so that there is always a short time between the end of one note and the start of another (of the same pitch and on the same MIDI channel). The time is set in ticks. By default there are 120 ticks per 1/16 note, but you can adjust this with the MIDI Display Resolution setting on the same page.

Record-MIDI page

- Snap MIDI Parts to Bars

When this is activated, recorded MIDI parts will automatically be lengthened to start and end at whole bar positions. If you are working in a Bars+Beats-based context, this can make editing (moving, duplicating, repeating, etc.) easier.

- Solo Record in MIDI Editors

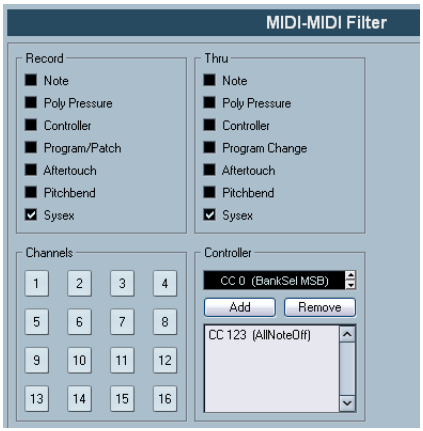
If this is activated and you open a part for editing in a MIDI editor, its track is automatically record-enabled. Furthermore, Record Enable is deactivated for all other MIDI tracks until you close the editor again.
This makes it easier to record MIDI data when you're editing a part – you will always be sure the recorded data ends up in the edited part and not on any other track.

- MIDI Record Catch Range in ms

When you record starting at the left locator, this setting helps you make sure the very start of the recording is included. A very annoying scenario is when you have recorded a perfect MIDI take, only to find out that the very first note wasn't included – because you started playing a little bit too early! If you raise the Record Catch Range, Nuendo will catch the events played just before the recording start point, eliminating this problem.

For a description of the other options, click the Help button in the Preferences.

Filtering MIDI



The MIDI–MIDI Filter page in the Preferences allows you to prevent certain MIDI messages from being recorded and/or "thruput" (echoed by the MIDI Thru function).

The dialog is divided into four sections:

Section	Description
Record	Activating any of these options prevents that type of MIDI message from being recorded. It will, however, be thruput, and if already recorded, it will play back normally.
Thru	Activating any of these options prevents that type of MIDI message from being thruput. It will, however, be recorded and played back normally.
Channels	If you activate a channel button, no MIDI messages on that MIDI channel will be recorded or thruput. Already recorded messages will, however, be played back normally.
Controller	Allows you to prevent certain MIDI controller types from being recorded or thruput. To filter out a controller type, select it from the list at the top of the Controller section and click "Add". It will appear on the list below. To remove a controller type from the list (allow it to be recorded and thruput), select it in the lower list and click "Remove".

Options and Settings

Recording-related Transport Preferences

A couple of settings in the Preferences (Transport page) are relevant for recording. Set these according to your preferred method of work:

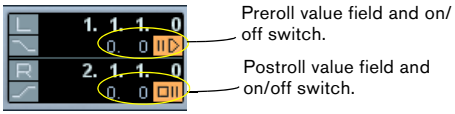
Deactivate Punch In on Stop

If this is activated, punch in on the Transport panel is automatically deactivated whenever you enter Stop mode.

Stop after Automatic Punch Out

If this is activated, playback will automatically stop after automatic punch out (when the project cursor reaches the right locator and punch out is activated on the Transport panel). If the postroll value on the Transport panel is set to a value other than zero, playback will continue for the set time before stopping (see below).

About Preroll and Postroll



The preroll and postroll value fields (below the left/right locator fields) on the Transport panel have the following functionality:

- By setting a preroll value, you instruct Nuendo to “roll back” a short section whenever playback is activated.
  This applies whenever you start playback, but is perhaps most relevant when recording from the left locator (punch in activated on the Transport panel) as described below.

- By setting a postroll value, you instruct Nuendo to play back a short section after automatic punch out before stopping.
  This is only relevant when punch out is activated on the Transport panel and “Stop after Automatic Punch Out” is activated in the Preferences (Transport page).

- To turn preroll or postroll on or off, click the corresponding button on the Transport panel (next to the pre/postroll value) or use the “Use Preroll” and “Use Postroll” options on the Transport menu.

An example:

1. Set the locators to where you want to start and end recording.

2. Activate Punch in and Punch out on the Transport panel.

3. Activate the option “Stop after Automatic Punch Out” in the Preferences (Transport page).

4. Set suitable preroll and postroll times by clicking in the corresponding fields on the Transport panel and typing in time values.

5. Activate preroll and postroll by clicking the buttons next to the preroll and postroll times so that they light up.

6. Activate recording.
The project cursor “rolls back” by the time specified in the preroll field and playback starts. When the cursor reaches the left locator, recording is automatically activated. When the cursor reaches the right locator, recording is deactivated, but playback continues for the time set in the postroll field before stopping.

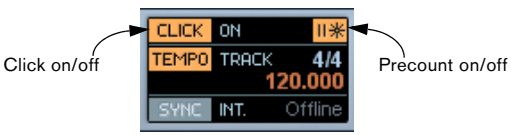
Using the metronome

The metronome can output a click that can be used as a timing reference. The two parameters that govern the timing of the metronome are tempo and time signature, and these are edited in the Tempo Track window (see “Editing the tempo curve” on page 417).

You can use the metronome for a click during recording and/or playback or for a precount (count-in) that will be heard when you start recording from Stop mode. Click and precount are activated separately:

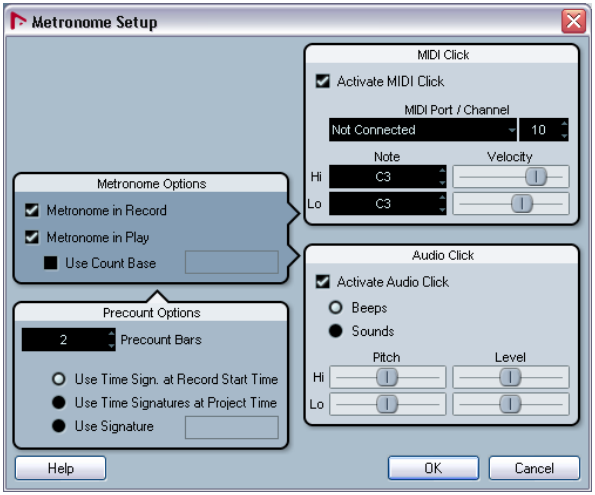
- To activate the metronome, click the Click button on the Transport panel.
  You can also activate the “Metronome On” option on the Transport menu or use the corresponding key command (by default [C]).

- To activate the precount, click the Precount button on the Transport panel.
  You can also activate the “Precount On” option on the Transport menu or set up a key command for this.



Metronome settings

You make settings for the metronome in the Metronome Setup dialog, opened from the Transport menu.



The metronome can use either an audio click played back via the audio hardware, send MIDI data to a connected device which will play back the click or do both.

The following metronome settings can be made in the dialog:

Metronome Options	Description
Metronome in Record / Play	Allows you to specify whether the metronome should be heard during playback, recording or both (when Click is activated on the Transport panel).
Use Count Base	If this option is activated, a field appears to the right where you specify the “rhythm” of the metronome. Normally, the metronome plays one click per beat, but setting this to e.g. “1/8” gives you eighth notes – two clicks per beat. It’s also possible to create unusual metronome rhythms such as triplets etc.

Precount Options	Description
Precount Bars	Sets the number of bars the metronome will count in before it starts recording if precount is activated on the Transport panel.
Use Time Signature at Record Start Time	When this is activated, the precount will automatically use the time signature and tempo set at the position where you start recording.
Use Time Signature at Project Time	When this is activated, the precount will be in the time signature set in the Tempo track. Furthermore, any tempo changes in the Tempo track during the precount will be applied.
Use Signature…	This lets you set a time signature for the precount. In this mode, tempo changes in the Tempo track won’t affect the precount.

MIDI Click	Description
Activate MIDI Click	Selects whether or not the metronome will sound via MIDI.
MIDI Port/ Channel	This is where you select a MIDI output and channel for the metronome click.
Hi Note/ Velocity	Sets the MIDI note number and velocity value for the “high note” (the first beat in a bar).
Lo Note/ Velocity	Sets the MIDI note number and velocity for the “low notes” (the other beats).

Audio Click	Description
Activate Audio Click	Selects whether or not the metronome will sound via the audio hardware.
Beeps	When this is selected, the audio clicks will be beeps generated by the program. Adjust the pitch and level of the beeps for the “Hi” (first) beat and “Lo” (other) beats using the sliders below.
Sounds	When this is selected, you can click in the “Sound” fields below to load any audio files for use as the “Hi” and “Lo” metronome sounds. The sliders set the level of the click.

Recovery of audio recordings after system failure

Normally, when a computer crashes, all changes made to your current project since you last saved it will be lost. Usually, there is no quick and easy way to recover your work.

With Nuendo, when your system crashes while you are recording (because of a power cut or other mishap), you will find that your recording is still available, from the moment when you started recording to the time when your computer crashed.

When you experience a computer crash during a recording, simply relaunch the system and check the project record folder (by default this is the Audio subfolder inside the project folder). It should contain the audio file you were recording at the time of the crash.

⚠ Please note: This feature does not constitute an "overall" guarantee by Steinberg. While the program itself was improved in such a way that audio recordings can be recovered after a system failure, it is always possible that a computer crash, power cut, etc. might have damaged another component of the computer, making it impossible to save or recover any of the data.

⚠ Warning: Please do not try to actively bring about this kind of situation to test this feature. Although the internal program processes have been improved to cope with such situations, Steinberg cannot guarantee that other parts of the computer are not damaged as a consequence.

6

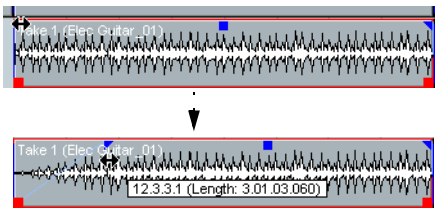
Fades, crossfades and envelopes

Creating fades

There are two main types of fade-ins and fade-outs in audio events in Nuendo: fades created by using the fade handles (see below) and fades created by processing (see "Fades created by processing" on page 89).

Fades created by using the fade handles

Selected audio events have blue handles in the upper left and right corners. These can be dragged to create a fade-in or fade-out respectively.



Creating a fade-in. The fade is automatically reflected in the shape of the event's waveform, giving you a visual feedback of the result when you drag the fade handle.

Fades created with the handles are not applied to the audio clip as such but calculated in real time during playback. This means that several events referring to the same audio clip can have different fade curves. It also means that having a huge number of fades may demand a lot of processor power.

- If you select multiple events and drag the fade handles on one of them, the same fade will be applied to all selected events.

- A fade can be edited in the Fade dialog, as described on the following pages.

  You open the dialog by double-clicking in the area above the fade curve, or by selecting the event and selecting "Open Fade Editor(s)" from the Audio menu (note that this will open two dialogs if the event has both fade-in and fade-out curves).

  If you adjust the shape of the fade curve in the Fade dialog, this shape will be maintained when you later adjust the length of a fade.

- You can make the fade longer or shorter at any time, by dragging the handle.

  You can actually do this even without selecting the event first, i.e. without visible handles. Just move the mouse pointer along the fade curve until the cursor turns into a bidirectional arrow, then click and drag.

- If the option "Show Event Volume Curves Always" is activated in the Preferences dialog (Event Display–Audio page), the fade curves will be shown in all events, regardless of whether they are selected or not.

  If the option is deactivated, the fade curves are shown in selected events only.

- If the option "Fade Handles always on Top" is activated in the Preferences dialog (Event Display-Audio page), the fade handles stay at the top of the event, and vertical help lines indicate the exact end or start points of fades.

  This is useful in situations where you want the event volume to be very low, as this option allows you to still see the fade handles.

- If the option "Thick Fade Lines" is activated in the Preferences dialog (Event Display-Audio page), the fade lines and volume curve are thicker, increasing their visibility.

Fade handles on top of the event and thicker fade and volume lines allow you to edit and view fades even in situations where event volume is very low.

- When the option "Use Mouse Wheel for Event volume and Fades" is activated in the Preferences dialog (Editing–Audio page), you can use the mouse wheel to move the volume curve up or down. When you hold down [Shift] while moving the mouse wheel, this will change the fade curves. This is useful in situations where the fade handles are not visible (e.g. because of a very high zoom factor).

  When you position the mouse pointer somewhere in the left half of the event, the fade in end point is moved. When the mouse pointer is in the right half of the event, the fade out start point will move.

⇨ You can set up key commands for changing the event volume curve and any fade curves, if you don't want to use the mouse for this.

You will find these commands in the Key Commands dialog, in the Audio category. See "Key commands" on page 517.

⇨ As an alternative to dragging the fade handles, you can use the items "Fade In to Cursor" and "Fade Out to Cursor" on the Audio menu to create fades.

Position the project cursor on an audio event where you want a fade in to end or a fade out to begin, and select the appropriate option from the Audio menu. A fade will then be created, ranging from the event's start or end to the position of the cursor.

Creating and adjusting fades with the Range Selection tool

“Handle-type” fades can also be created and adjusted with the Range Selection tool, in the following way:

1. Select a section of the audio event with the Range Selection tool.

The result depends on your selection, in the following way:

- If you select a range from the beginning of the event, a fade-in will be created within the range.
- If you select a range that reaches the end of an event, a fade-out will be created in the range.
- If you select a range encompassing a middle section of the event, but not reaching neither the start nor the end, both a fade-in and a fade-out will be created outside of the selected range. In other words, the fade-in will cover the area from the beginning of the event to the beginning of the selected range, and the fade-out will cover the area from the end of the selected range to the end of the event.

2. Pull down the Audio menu and select “Adjust Fades to Range”.

The fade areas are adjusted according to the selection range.

⚠ You can select multiple audio events on separate tracks with the Range Selection tool, and apply the fade to all of them simultaneously.

Applying Default Fades

You can also create fades by using the commands “Apply Standard Fade In” and “Apply Standard Fade Out” from the Audio menu.

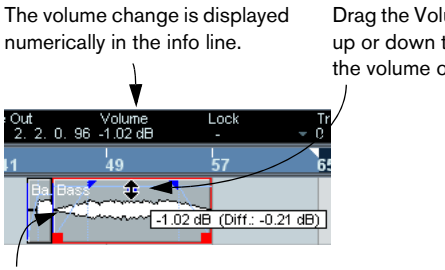
1. Select one or more audio events in the project window.

2. From the Audio menu, choose either “Apply Standard Fade In” or “Apply Standard Fade Out”.

A fade will be created that is the same length and shape as the Default fade (see “As Default button” on page 90 for more information on how to define Default fades).

About the volume handle

A selected audio event also has a blue handle in the top middle. This is the volume handle, and it provides a quick way of changing the volume of an event, directly in the Project window. It is linked directly with the volume setting on the info line, that is, dragging the volume handle also changes the value on the info line.



Removing fades

To remove the fades for an event, select the event and select “Remove Fades” from the Audio menu.

You can also use the Range Selection tool to remove fades and crossfades within the selected range:

1. Drag the Range Selection tool in the Project window, so that the selection encloses all of the fades and crossfades you wish to remove.

2. Select “Remove Fades” from the Audio menu.

Fades created by processing

If you have selected an audio event or a section of an audio event (using the Range Selection tool), you can apply a fade-in or fade-out to the selection by using the “Fade In” or “Fade Out” functions on the Process submenu on the Audio menu. These functions open the corresponding Fade dialog, allowing you to specify a fade curve.

⚠ Note that the length of the fade area is determined by your selection. In other words, you specify the length of the fade before you enter the Fade dialog.

⚠ Also note that you can select multiple events and apply the same processing to all of them simultaneously.

Fades created this way are applied to the audio clip rather than to the event. Please note the following:

- If you later create new events that refer to the same clip, these will have the same fades.
- You can remove or modify the fades at any time using the Offline Process History (see “The Offline Process History dialog” on page 251).

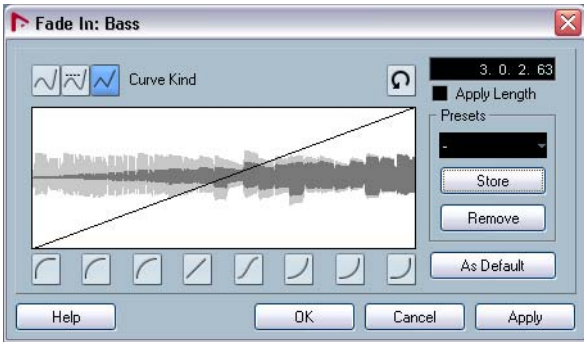
If other events refer to the same audio clip, you will be asked whether you want the processing to be applied to these events or not.

- Continue will apply the processing to all events that refer to the audio clip.
- New Version will create a separate, new version of the audio clip for the selected event.
- You can also activate “Do not show this message again”. Regardless of whether you then choose “Continue” or “New Version”, any further processing will conform to the option you select.

⚠ You can change this setting at any time in the Preferences dialog (Editing–Audio page), under “On Processing Shared Clips”.

The Fade dialogs

The Fade dialogs appear when you edit an existing fade or use the “Fade In”/”Fade Out” functions on the Process submenu on the Audio menu. The picture below shows the Fade In dialog; the Fade Out dialog has identical settings and features.



- If you open the Fade dialog(s) with several events selected, you can adjust the fade curves for all these events at the same time.
This is useful if you want to apply the same type of fade-in to more than one event, etc.

Curve Kind

These determine whether the fade curve should consist of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).

Fade display

Shows the shape of the fade curve. The resulting waveform shape is shown in dark gray, with the current waveform shape in light gray.

You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Curve shape buttons

These buttons give you quick access to some common curve shapes.

Restore button

The Restore button (to the right above the fade display) is only available when editing fades made by dragging the fade handles. Click this to cancel any changes you have made since opening the dialog.

Fade Length Value

The Fade Length Value can be used to enter fade lengths numerically. The format of values displayed here are determined by the Primary Time Display in the Transport Panel.

When you activate the “Apply Length” option, the value entered in the Fade Length value field will be used when clicking “Apply” or “OK”. This setting is deactivated by default.

⚠ When you set the current Fade as the Default fade, the length value is included as part of the default settings.

Presets

If you have set up a fade-in or fade-out curve that you may want to apply to other events or clips, you can store it as a preset by clicking the Store button.

- To apply a stored preset, select it from the pop-up menu.
- To rename the selected preset, double-click on the name and type a new one.
- To remove a stored preset, select it from the pop-up menu and click Remove.

⚠ Stored fade-in presets will only appear in the Fade In dialog, and fade-out presets will only appear in the Fade Out dialog.

As Default button

The “As Default…” button is only available when editing fades made by dragging the fade handles. Click this to store the current settings as default fade. This shape will be used whenever you create new fades by dragging event handles. Both the shape and length will be used when you create fades using the “Apply Standard Fade…” commands from the Audio menu.

Preview, Apply and Process

The buttons in the bottom row are different depending on whether you are editing a fade made with the fade handles or applying a fade using processing:

The Edit Fade dialog.

The Process Fade dialog.

The Edit Fade dialogs have the following buttons:

Button	Function
OK	Applies the set fade curve to the event, and closes the dialog.
Cancel	Closes the dialog.
Apply	Applies the set fade curve to the event, without closing the dialog.

The Process Fade dialogs have the following buttons:

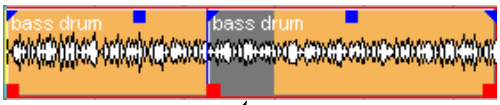
Button	Function
Preview	Plays back the fade area. Playback will repeat until you click the button again (the button is labeled “Stop” during playback).
Process	Applies the set fade curve to the clip, and closes the dialog.
Cancel	Closes the dialog without applying any fade.

Creating crossfades

Overlapping audio material on the same track can be crossfaded, for smooth transitions or special effects. You create a crossfade by selecting two consecutive audio events and selecting the Crossfade command on the Audio menu (or by using the corresponding key command, by default [X]). The result depends on whether the two events overlap or not:

- If the events overlap, a crossfade is created in the overlapping area.

The crossfade will be of the default shape – initially a linear, symmetric crossfade, but you can change this as described below.

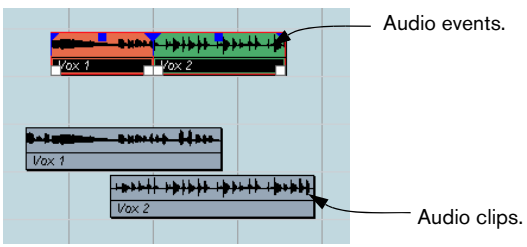


Overlapping section.

- If the events don't overlap but are directly consecutive (lined up end-to-start, with no gap) it's still possible to crossfade them – provided that their respective audio clips overlap! In this case, the two events are resized so that they overlap, and a crossfade of the default length and shape is applied.

The default crossfade length and shape are set in the Crossfade dialog (see "As Default button" on page 90).

An example:



The events in themselves do not overlap, but their clips do. Therefore, the events can be resized so that they overlap, which is required for a crossfade to be created.

When you select the Crossfade function, the two events are resized so that they overlap, and a default crossfade is created in the overlapping section.

- If the events don't overlap, and cannot be resized enough to overlap, a crossfade cannot be created.

- You can specify the length of the crossfade using the Range Selection tool: make a selection range covering the desired crossfade area and use the Crossfade command.

The crossfade is applied in the selected range (provided that the events or their clips overlap, as above). You can also make a selection range after creating the crossfade and use the function Adjust fades to Range on the Audio menu.

- Once you have created a crossfade, you can edit it by selecting one or both crossfaded events, and selecting "Crossfade" from the Audio menu again (or by double-clicking in the crossfade zone).

This opens the Crossfade dialog, see below.

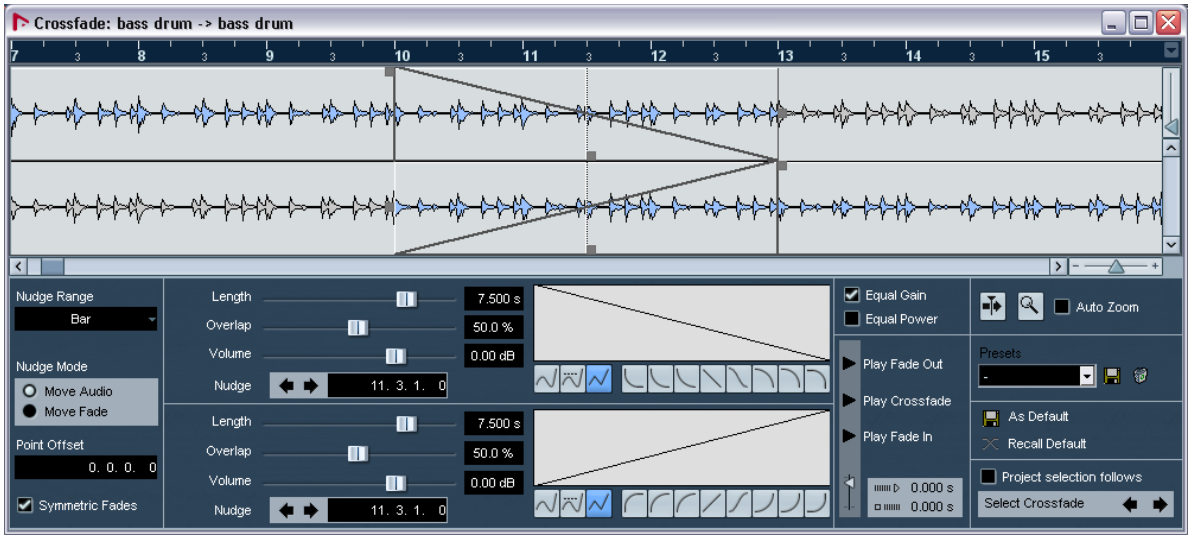
Removing crossfades

To remove a crossfade, select the events and select "Remove Fades" from the Audio menu, or use the Range Selection tool:

1. Drag the Range Selection tool in the Project window, so that the selection encloses all of the fades and crossfades you wish to remove.
2. Select "Remove Fades" from the Audio menu.

- You can also remove a crossfade by clicking and dragging it outside the track.

The Crossfade dialog

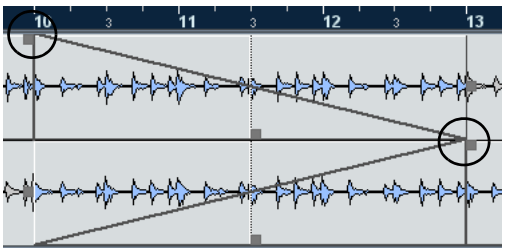


⇨ This section describes the default Crossfade dialog. However, if you activate the option Simple Crossfade Editor in the Preferences dialog (Editing-Audio page), a simplified dialog will be used instead (similar to the regular fade dialogs).

The Crossfade display

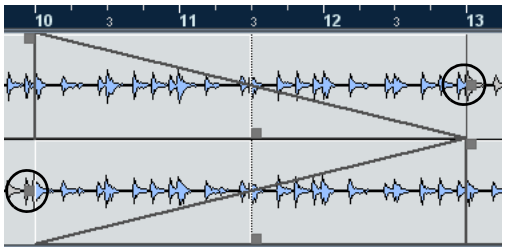
The upper part of the Crossfade dialog shows the shape of the whole crossfade curve and the resulting waveform. You can perform a number of click and drag operations in this display.

- Click and drag these points to change the length of the fade-out curve (upper) or the fade-in curve (lower), respectively:



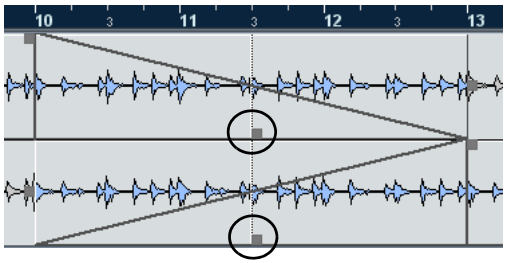
If “Symmetric Fades” is activated, these change the length of both the fade out and the fade in curve instead. The length change will be applied equally to both sides, without moving the “Offset Point” (see “Changing the Offset Point” on page 96).

- Click and drag these points to move the fade-out curve (upper) or the fade-in curve (lower), respectively:



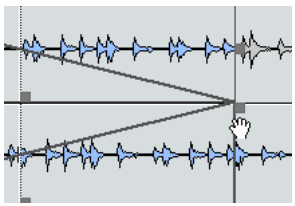
If “Symmetric Fades” is activated, these change the length of both the fade out curve and the fade in curve instead – by moving only the end or the start of the curves as well as the “Offset Point”.

- Click and drag these points to move the Offset Point (the dotted line) for the fade-out curve (upper) or the fade-in curve (lower), respectively:



Moving the Offset Point will also move the fade curve. If "Symmetric Fades" is activated, the Offset Point for both curves will be moved.

- You can also click and drag to move audio clips (along with the fade curve) in the display. The pointer takes on the shape of a hand to indicate that it's possible to move a clip.



- You can right-click (Win) or [Ctrl]-click (Mac) in the ruler and use the pop-up menu to select a time format (see "The ruler" on page 31).

- You can scroll and zoom the display with the horizontal and vertical scroll bars and zoom controls.

Options and settings

The lower part of the Crossfade dialog contains a number of common settings and controls, as well as separate (but identical) settings for the fade-in (top) and the fade-out curve (bottom) of the crossfade.

Nudge Range

This pop-up menu lets you specify the range that is moved when using the nudge buttons, see "Using the Nudge controls" on page 95.

Nudge Mode

Here, you can specify whether you want the fade or the audio to move when you use the Nudge buttons, see "Using the Nudge controls" on page 95.

Point Offset

The Offset Point is the "center" of the fade area, i.e. the point where the volume of the event is precisely halfway between full level and zero level. For further information, see "Changing the Offset Point" on page 96.

Symmetric Fades

If this is activated, you cannot edit the fade in and fade out curves of the crossfade separately, i.e. the editing controls will be "linked", so that both fade curves are affected by the same amount regardless of whether you use the fade-out or fade-in controls. The actual result however, depends on which control is used.

Length, Overlap and Volume

- Use the Length field to specify the length of the crossfade, see "Resizing the crossfade area" on page 95.

- Use the Overlap field to move the fade area without adjusting the Offset point, see "Using the Overlap controls" on page 96.

- You can use the Volume controls to change the volume of the crossfaded events. Either use the Volume sliders or click in the Volume fields, change the values numerically and press [Return].
This is the same as using the volume handles in the Event display, see "About the volume handle" on page 88.

The Nudge buttons

Use the nudge buttons to nudge the fade area or the audio in the desired direction, see "The Nudge buttons" on page 93.

The Fade Displays

The fade displays show the shape of the fade-out and fade-in curve, respectively. You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Curve buttons

- The curve kind buttons determine whether the corresponding fade curve should consist of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).

- The curve shape buttons give you quick access to some common curve shapes.

Equal Gain and Power

- If you activate the “Equal Gain” checkbox, the fade curves are adjusted so that the summed fade-in and fade-out amplitudes will be the same all along the crossfade region.
This is often suitable for short crossfades.

- If you activate the “Equal Power” checkbox, the fade curves are adjusted, so that the energy (power) of the crossfade will be constant all along the crossfade region.

⚠ Equal Power curves have only one editable curve point. You cannot use the Curve kind buttons or the presets when this mode is selected.

Play buttons

- The “Play Fade Out” and “Play Fade In” buttons allow you to audition the fade-out or fade-in part only, without the crossfade.

- The “Play Crossfade” button plays back the whole crossfade.

You can also use the Transport play controls to play back the crossfaded audio events. However, that method will play back all unmuted audio events on other tracks as well.

Pre-roll and Post-roll

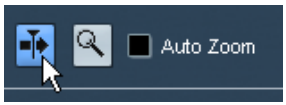
When auditioning with the Play buttons, you can activate pre-roll and/or post-roll. Pre-roll lets you start playback before the fade area, and post-roll lets you stop playback after the fade area. This can be useful for auditioning the fade in a context.

- To specify how long the pre- and post-roll should be, click in the time fields and enter the desired time (in seconds and milliseconds).

- To activate pre-/post-roll, click the respective button.
To deactivate, click the button again.

1 second pre-roll activated.

Autoscroll



If this option is activated, the crossfade display will be scrolled during playback, so that the play position cursor is always visible. This works just like Autoscroll in the Project window (see “Autoscroll” on page 57).

⇨ Note that this only applies if you use the Transport play controls – not if you use the Play controls in the Crossfade dialog.

Zoom and Auto Zoom

If you have scrolled or zoomed the crossfade display horizontally (see “The Crossfade display” on page 92), you can click the “Zoom to Fade” button (the magnifying glass icon) to quickly revert to the standard zoom factor and center the display on the currently selected crossfade area.

If Auto Zoom is activated (checked), the crossfade display will automatically be zoomed and centered on the current crossfade if you resize it (see “Resizing the crossfade area” on page 95).

Presets

If you have set up a crossfade that you may want to apply to other events, you can store it as a preset by clicking the store button (the disk icon).

- To apply a stored preset, select it from the pop-up menu.
- To rename the selected preset, double-click on the name and type in a new one.
- To remove a stored preset, select it from the pop-up menu and click the remove button (the trash icon).

Default buttons

Clicking the “As Default” button stores all of the current settings as the default crossfade. These settings will then be used whenever you create new crossfades.

Clicking the “Recall Default” button copies the curves and settings in the Default crossfade to the Crossfade dialog.

Select Crossfade buttons

These allow you to select the previous/next crossfade area on the current track, if it contains more than one crossfade.

- If “Project selection follows” is activated, selecting another crossfade will automatically change the event selection in the Project window.

Resizing the crossfade area

You can adjust the length of the crossfade area either in the crossfade display (see “The Crossfade display” on page 92), by using the Length controls or by clicking in the “Length” fields, changing the value numerically and pressing [Return].

- If “Symmetric Fades” is activated, both the fade out and the fade in length will be changed by the same amount. Otherwise, the upper Length controls change the length of the fade-out curve, and the lower controls change the length of the fade-in curve.
- If possible, the length change will be applied equally to “both sides” of the crossfade (i.e. Nuendo tries to “center” the crossfade).

⚠ To be able to resize a crossfade this way, it must be possible to resize the corresponding event. For example, if the left crossfaded event already plays its audio clip to the end, its endpoint cannot be moved any further to the right.

Moving the crossfade area

You can move the crossfade area in the crossfade display (see “The Crossfade display” on page 92), with the Nudge buttons, with the Overlap controls (either the slider or numerically) or by changing the Offset Point.

Using the Nudge controls

- When you use the Nudge controls, you can decide whether they should move the fade area or the audio clip, by clicking the corresponding radio button under “Nudge Mode”.
- Each time you click a Nudge button, the fade area or the audio event will be moved in the corresponding direction by the amount specified on the “Nudge Range” pop-up menu.

  The Nudge buttons in the upper region affect the fade-out curve, and the Nudge buttons in the lower region affect the fade-in curve. Note that it is only possible to move the audio of the second event – i.e. the event that is faded in.
- You can also click in the Nudge value field, enter a numerical value and press [Return] to move a fade area or an audio event.
- If “Symmetric Fades” is activated, and the Nudge Mode is set to “Move Fade”, both the fade-out area and the fade-in area will be moved by the same amount.
- If “Symmetric Fades” is activated, and the Nudge Mode is set to “Move Audio”, the Nudge buttons in the lower region will move the audio event with the fade in.

  In this mode, the Nudge buttons in the upper region will move both the entire fade area and the audio event with the fade in.

Using the Overlap controls

The Overlap controls let you move the fade area without moving the Offset Point – the “center” of the fade area (see below). This means that the “center” of the fade will be offset in relation to the fade area.

- You can either use the Overlap sliders or you can click in the Overlap fields, change the values numerically and press [Return].
- If “Symmetric Fades” is activated, both the upper and the lower Overlap controls will move both the fade-out and the fade-in area.

Changing the Offset Point

You can also move a fade area by changing its Offset Point. The Offset Point is the “center” of the fade area, i.e. the point where the volume of the event is precisely halfway between full level and zero level.

- Click in the value field, enter the desired value, in accordance with the selected display format (see “The Crossfade display” on page 92) and press [Return].
  This will move the Offset Point along with the fade area by the specified amount. Note however that this only applies to the fade-in area!
- The Offset Point is indicated by a dotted vertical line in the crossfade display.

Auto Fades and Crossfades

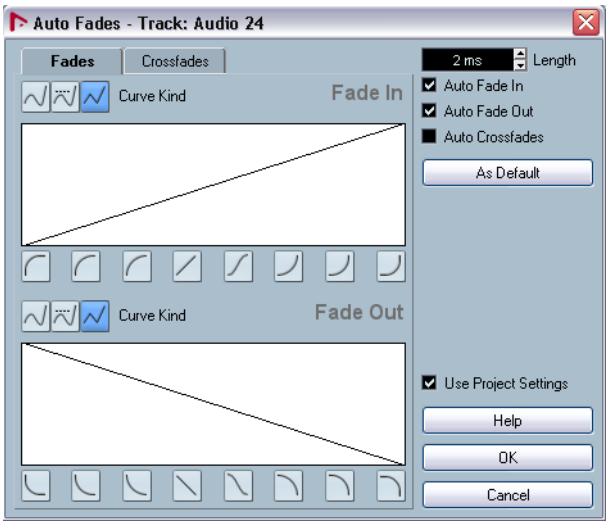
Nuendo features an Auto Fade function that can be set both globally, i.e. for the entire project, and separately for each audio track. The idea behind the Auto Fade function is to create smoother transitions between events by applying short (1 - 500 ms) fade-ins and fade-outs.

⚠ As mentioned earlier, fades are calculated in real time during playback. This means that the larger the number of audio tracks with Auto Fades activated in a project, the higher the demands on the processor.

⚠ Note that auto fades are not indicated by the fade lines!

Making global Auto Fade settings

1. To make Auto Fades settings globally for the project, select “Auto Fades Settings...” from the Project menu.
This opens the Auto Fades dialog for the project.



2. Use the checkboxes in the upper right corner to activate or deactivate Auto Fade In, Auto Fade Out and Auto Crossfades, respectively.

3. Use the Length value field to specify the length of the Auto Fade or Crossfade (1-500 ms).

4. To adjust the shapes of Auto Fade In and Auto Fade Out, select the “Fades” tab and make settings as in the regular Fade dialogs.

5. To adjust the shape of the Auto Crossfade, select the “Crossfades” tab and make settings as in the regular Crossfade dialog.

6. If you want to use the settings you have made in future projects, click the “As Default” button.
The next time you create a new project, it will use these settings by default.

7. Click OK to close the dialog.

Making Auto Fade settings for a separate track

By default, all audio tracks will use the settings you have made in the project’s Auto Fades dialog. However, since Auto Fades use computing power, a better approach may be to turn Auto Fades off globally and activate them for individual tracks, as needed:

1. Right-click the track in the Track list and select “Auto Fades Settings...” from the context menu (or select the track and click the “Auto Fades Settings” button in the Inspector).
The Auto Fades dialog for the track opens. This is identical to the project’s Auto Fades dialog, with the addition of a “Use Project Settings” option.

2. Deactivate the “Use Project Settings” option.
Now, any settings you make will be applied to the track only.

3. Set up the Auto Fades as desired and close the dialog.

Reverting to project settings

If you want a track to use the global Auto Fade settings, open the Auto Fades dialog for the track and activate the “Use Project Settings” checkbox.

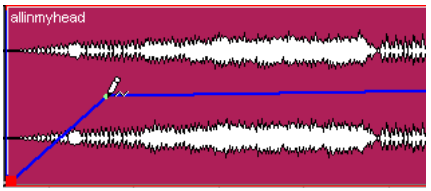
Event Envelopes

An envelope is a volume curve for an audio event. It is similar to the real-time fades, but allows you to create volume changes within the event, not only at the start or end. To create an envelope for an audio event, proceed as follows:

1. Zoom in on the event so that you can view its waveform properly.

2. Select the Pencil tool.
When you move the Pencil tool over an audio event, a small volume curve symbol is shown next to the tool.

3. To add an envelope point, click in the event with the Pencil tool.
A blue envelope curve and a curve point appear.



4. Drag the curve point to adjust the envelope shape.
The waveform image reflects the volume curve.

- You can add as many curve points as you like.
- To remove a curve point from the envelope, click on it and drag it outside the event.
- The envelope curve is a part of the audio event - it will follow when you move or copy the event.
After copying an event with an envelope, you can make independent adjustments to the envelopes in the original event and the copy.

⇨ It is also possible to apply an envelope to the audio *clip* using the Envelope function on the Process submenu on the Audio menu.
See “Envelope” on page 242.

- To remove an event envelope curve from a selected event, open the Audio menu and select the Remove Volume Curve option.

7

The Arranger track

Introduction

The Arranger track allows you to work with sections of your project in a non-linear fashion, to simplify arranging to the maximum extent. Instead of moving, copying and pasting events in the Project window event display to create a linear project, you can define how different sections are to be played back, like a playlist.

For this, you can define arranger events, order them in a list, and add repeats as desired. This offers a different and more pattern-oriented way of working, which complements the usual linear editing methods in the Project window.

You can create several Arranger chains, making it possible to store different versions of a song within the project without sacrificing the original version. When you have created an Arranger chain that you like, you have the option of "flattening" the list, which creates a normal linear project based on the Arranger chain. You can chose to keep the Arranger track or to remove it.

You can also use the Arranger track for live performances on the stage, in clubs or at parties.

Setting up the Arranger track

Let's say you have prepared a number of audio files that form the base of a typical pop song, with introduction, verse, chorus and bridge. Now you want to arrange these files.

The first step is to create an Arranger track. On the Arranger track, you define specific sections of the project by creating arranger events. These can be of any length, may overlap and are not bound to the start or end of existing events and parts. Proceed as follows:

1. Open the project for which you want to create arranger events.

2. Open the Project menu and select "Arranger" from the Add Track submenu (or right-click in the Track list and select Add Arranger track).

An Arranger track is added. There can be only one Arranger track in a project, but you can set up more than one Arranger chain for this track, see "Managing Arranger chains" on page 102.

3. On the Project window toolbar, make sure that Snap is activated, and that the Grid resolution is set to a mode that allows your arranger events to snap to appropriate positions in the project.

Snap to events is activated, i.e. when drawing in the Project window, new events will snap to existing events.

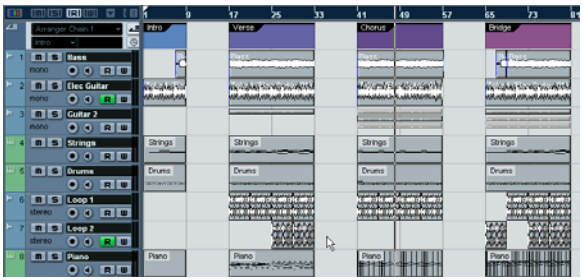
4. On the Arranger track, use the Pencil tool to draw an event of the desired length.

An Arranger event is added, called "A" by default. Any following events will be named in alphabetical order.

- You can rename an Arranger event by selecting it and changing its name in the Project window info line or by holding down [Alt]/[Option], double-clicking on the name in the Arranger chain (see below) and entering a new name.

  You may want to name your arranger events according to the structure of your project, e.g. Verse, Chorus etc.

5. Create as many events as you need for your project.



In this example, arranger events have been created that correspond to a classic pop song structure. Note how there is no real time line in the project: the music sequence is determined by the arranger events.

Events can be moved, resized and deleted using the standard techniques. Please note:

- If you want to change the length of a event, select the Arrow tool and click and drag the bottom corners of the event in the desired direction.

- If you copy an Arranger event (by [Alt]/[Option]-dragging or by using copy/paste), a new event will be created with the same name as the original.

  However, this new event will be totally independent from the original event.

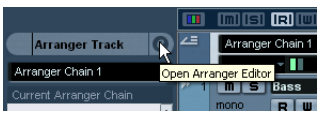
- Double-clicking on an arranger event adds it to the current Arranger chain.

Working with arranger events

You now have a number of arranger events that form the basic building blocks for your arrangement. The next step is to arrange these events using the functions of the Arranger Editor.

Creating an Arranger chain

You can set up an Arranger chain in the Arranger Editor or in the Inspector for the Arranger track. The Arranger Editor is opened by clicking the “e” button in the Inspector or in the Arranger track.



Click in the Inspector…

…or the Track list…

…to open the Arranger Editor.

To the right in the Arranger Editor, the available arranger events are listed, in the order they appear on the time line. To the left you find the actual Arranger chain, which shows in which order the events will be played back, from top to bottom, and how many times they should be repeated.

Initially the Arranger chain will be empty – you set up the Arranger chain by adding events from the right list to the Arranger chain. There are several ways to add events to the Arranger chain.

- Double-clicking on the name of an event in the window section on the right (or in the project window).

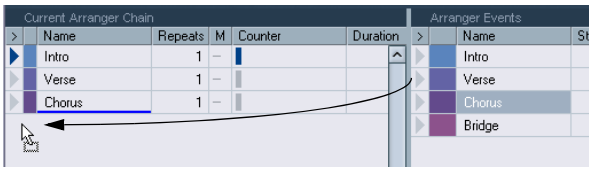
When an event is selected in the Arranger chain on the left will add the event above the selected event. When no events are selected in the Arranger chain on the left will add the event to the end of the list.

- By selecting one or more events in the right list, right-clicking and selecting “Append Selected In Arranger Chain”.

This will add the selected events at the end of the list.

- By dragging and dropping arranger events from the right list to the left list.

A blue insertion line shows you where the dragged event will end up in the list.



Here, the Verse event is dragged into the Arranger chain and placed after the first chorus.

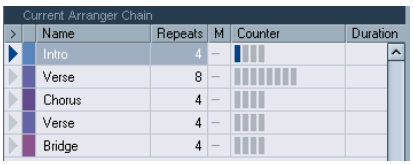
- By dragging arranger events from the Project window and dropping them in the Arranger chain.

If you followed our example, you should now have arranger events arranged in a very basic pop song pattern. However, we have used audio files that are only a few bars long – to turn our pattern into a “song” (or at least into a basic sketch of the song structure), these files must be looped. This is where the Repeats function comes in.

If you want an event to repeat several times, proceed as follows:

- Click in the Repeats field for an event, type in the desired number of repeats and press [Enter].

When playing back the Arranger chain, the Counter column indicates which repeat of this event is currently playing.



▪ Click in the Mode field for an event and select the desired repeat mode.

Option	Button	Description
Normal		In this mode, your Arranger chain will be played back normally, just as you set it up.
Repeat forever		In this mode, the current Arranger event will be repeated in a loop until you either click on another event in the Arranger Editor or press play once again.
Pause after Repeats		In this mode, the playback of the Arranger chain will be stopped after having played back all repeats of the current Arranger event.

When you now play back the Arranger chain, you will hear the complete arrangement. Proceed as follows:

1. Make sure that Arranger mode is activated.
When Arranger mode is activated, the project will be played back using the Arranger settings.

The Arranger mode button must be activated.

2. Position the Arranger Editor window so that you can see the Arranger track in the Project window, and click in the arrow column for the event at the top of the list so that the arrow becomes blue.
You should see the project cursor jump to the beginning of the first event specified in the Arranger chain.

3. Activate playback, either from the Arranger Editor or on the Transport panel.
The events are played back in the specified order.

Editing the Arranger chain

In the Arranger chain to the left, you can do the following:

▪ Select events by clicking or [Shift]-clicking.
The selected events do not have to be a continuous selection.

▪ Drag events to move them in the list.

▪ Drag events while holding [Alt]/[Option] to create copies of the selected items.
The insert location for both move and copy operations is indicated by a blue or red line in the list. A blue line indicates that the move or copy is possible; a red line indicates that if the current position were to be used, a move or copy is not allowed.

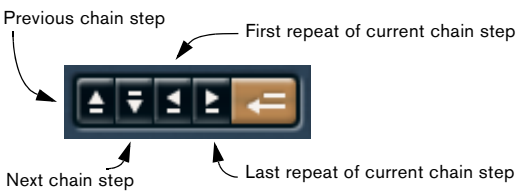
▪ Use the Repeats column to specify how many times each event should be repeated.

▪ Click the arrow to the left of an event in the Arranger chain to move the playback position to the start of that event.

▪ To remove an event from the list, right-click on it and select “Remove Touched” from the pop-up menu that appears. To remove several events, select them, right-click and select “Remove Selected”.

Navigating

To navigate between arranger events, you use the Arranger transport buttons:



These controls are available in the Arranger Editor, the Project window toolbar, and the Transport panel.

In the Arranger Editor, the event that is currently played back is indicated by an arrow in the leftmost column, and the indicators in the Counter column. You can switch between Arranger chains during playback using the pop-up menu in the Editor, Inspector or Track list.

Managing Arranger chains

You can create several Arranger chains. This way, you can create alternative versions for playback. In the Arranger Editor, the toolbar buttons on the right are used for this:

Button	Description
	Click this to rename the current Arranger chain.
	Creates a new, empty Arranger chain.
	Creates a duplicate of the current Arranger chain, containing the same events.
	Removes the currently selected Arranger chain. Only available if you have created more than one Arranger chain.

The Arranger chains you create will be listed on the Name pop-up menu, found in the Arranger Editor to the left of the buttons, at the top of the Arranger track Inspector, and in the Track list. Please note that to be able to select another Arranger chain from the pop-up menu, Arranger mode must be activated.

- In the Inspector, these functions are accessed from the Arranger pop-up menu (opened by clicking on the Arranger name field).

Flattening the Arranger chain

When you have found an Arranger chain that suits your purposes, you can “flatten” it, i.e. convert the list into a linear project. Proceed as follows:

1. Click the Flatten button (or select Flatten Chain from the pop-up menu in the Inspector for the Arranger track).

The events and parts in the project are reordered, repeated, resized, moved and/or deleted (if these are not within the boundaries of any used Arranger event), so that they correspond exactly to the Arranger chain.

The Flatten button

2. Activate Playback.

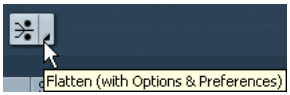
The project will now play back exactly as in Arranger mode, but you can view it and work with it as usual.

⚠ Flattening the Arranger chain may remove events and parts from the project. Only use the Flatten function when you know you don’t want to edit the Arranger track/chain any more. If in doubt, save a copy of the project before flattening the Arranger chain.

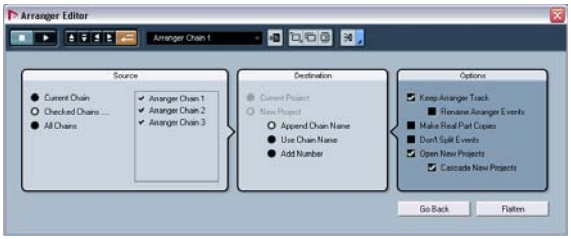
Flattening options

Sometimes it might be useful to keep the original Arranger events even after flattening the Arranger track. By using flattening options you can define which chain should be flattened (Source section), where it should be stored and how it should be named (Destination section) together with other options (Options section).

1. Click the Flattening options button.



2. In the window that appears, select the desired options.



In the Source section you can specify, which Arranger chain should be flattened. The available options are:

Option	Description
Current Chain	If you activate this option, only the current chain will be flattened.
Checked Chain	If you activate this option, you can select the arranger chains you want to flatten in the list to the left.
All Chains	If you activate this option, all arranger chains of the current project will be flattened.

The Destination section allows you to choose where the result of the flattening should be saved. The available options are:

Option	Description
Current Project	This option is only available, if you have selected “Current Chain” as Source. If you activate this option, the result of the flattening of the current chain will be saved in the current project.
New Project	If you activate this option, you can flatten one or several chains in a new project. In this case it might be useful to use naming options. If you activate “Append Chain Name”, the Chain Name(s) will be appended in brackets to the project name. If you activate “Use Chain Name”, the new project(s) will have the name of the current Arranger chain(s). If you activate “Add Number”, the new project(s) will be named like the old ones and a number will be appended in brackets.

In the Options section you can make further settings. The available options are:

Option	Description
Keep Arranger Track	If you activate this option, the Arranger Track will be kept when flattening the Arranger chain. If you activate the option “Rename Arranger Events” a number will be appended to the events according to their use. If e.g. you use Arranger event “A” two times, the first occurrence will be renamed “A 1” and the second “A 2”.
Make Real Event Copies	Normally, you will get shared copies when flattening the Arranger track. If you activate this option, real copies will be created instead.
Don’t Split Events	If the option is activated, MIDI notes that start before or are longer than the Arranger event will not be included. Only MIDI notes that begin and end inside the Arranger event boundaries will be taken into account.
Open New Projects	If you activate this option, a new project will be created for every flattened Arranger chain. If you activate the option “Cascade New Projects” the opened projects will be cascaded.

3. You can now flatten the Arranger track by clicking the Flatten button.

If you realize that you want to do further arrangements, you can also click the “Go Back” button and make your adjustments. Your Flattening settings will be kept.

4. Click the “Go Back” button to go back to the Arranger Editor or close the window by clicking its Close button.

Live Mode

If you have set up an Arranger track and play it back, you have also the possibility to influence the playback order “live”. Note that the Arranger mode has to be activated to be able to use the Live mode.

1. Add an Arranger track by selecting “Arranger” from the Add Track submenu of the Project menu.

2. Create the desired Arranger events by drawing with the Pencil tool on Arranger track.

3. Set up an Arranger chain in the Inspector for the Arranger track or in the Arranger Editor, activate the Arranger mode and play back your project.

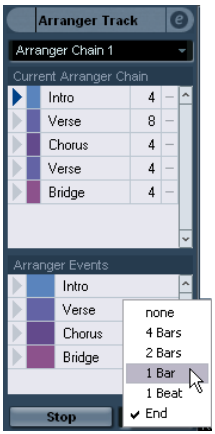
Now you can use your Arranger events listed in the lower section of the Arranger track Inspector to play back your project in Live Mode:

4. Switch into Live mode by clicking on the little arrow in the lower list of the Arranger track Inspector to the left of the Arranger event you want to trigger.

The Arranger event will be looped endlessly, until you click on another Arranger event. This might be useful, if you want to loop e.g. a guitar solo with a flexible length.

- You can stop Live mode by clicking the Stop button or go back to “normal” playback in Arranger mode by clicking on any arranger event in the upper list.

In the latter case, playback will be continued from the arranger event where you clicked. The “Select grid” pop-up menu will always be taken into account. When the grid is set to “1 Bar” and you click the STOP button e.g., playback will be stopped after the next bar.



The active Arranger event will be played back as long as defined before jumping to the next.

Option	Description
Now	Jumps to the next section immediately.
4 bars, 2 bars	When one of these modes is selected, a grid of 4 or 2 bars (depending on the setting) will be placed on the active Arranger event. Whenever the respective grid line is reached, playback will jump to the next Arranger event. An example: Let's say you have an Arranger event which is 8 bars long and the grid is set to 4 bars. When the cursor is anywhere within the first 4 bars of the Arranger event when you hit the next Arranger event, playback will jump to the next event when the end of the fourth bar of the Arranger event is reached. When the cursor is anywhere within the last 4 bars of the Arranger event, playback will jump to the next event at the end of the event. When an event is shorter than 4 (or 2) bars when this mode is selected, playback will jump to the next section at the event end.
1 bar	Jumps to the next section at the next bar line.
1 beat	Jumps to the next section at the next beat.
End	Plays the current section to the end, then jumps to the next section.

Arranging your music to video

The relative time of your Arranger track can be taken as a reference instead of the project time. This is useful, if you want to use the Arranger track to compose music for video and fill e.g. a specific video section with music, by repeating the corresponding number of Arranger events.

If you position your external sync master device to a position that does not match the Project Start time, Nuendo will jump automatically to the right position in the Arranger track and will start playback from there, i.e. the correct relative position and not the absolute project time will be found. The reference for the external timecode can be MIDI or any other Timecode that can be interpreted/read by Nuendo.

⇨ If the Arranger mode is not activated or no Arranger track exists, Nuendo will work as usual.

Below follows an example, that will help you understand this functionality:

1. Set up a project with a MIDI track and three MIDI parts. The first should start at position 00:00:00:00 and end at position 00:01:00:00, the second should start at position 00:01:00:00 and end at position 00:02:00:00 and the third should start at position 00:02:00:00 and end at position 00:03:00:00.

2. Activate the Sync button on the transport panel.

3. Add an Arranger track and create Arranger events that match the MIDI parts.

4. Set up the Arranger chain “A-A-B-B-C-C”, activate the Arranger mode and play back your project.

5. Start external Timecode at position 00:00:10:00 (within the range of "A").

In your project, the position 00:00:10:00 will be located and you will hear "A" playing. Nothing special!

Now, let's see what happens if your external sync master device starts at a position that does not match the Project Start time:

6. Start at 00:01:10:00 (within the range of what originally was "B").

In your project, the position 00:01:10:00 will be located and you will hear "A" playing, because it plays twice in the Arranger track.

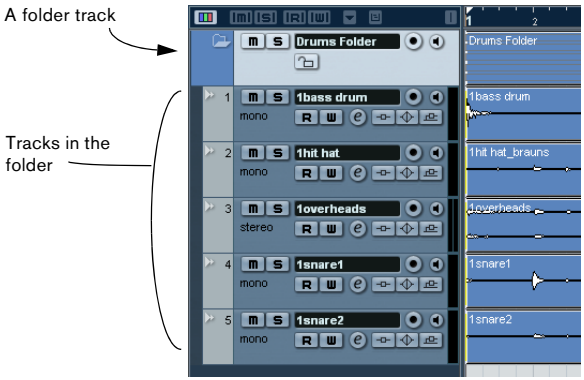
7. Start external Timecode at position 00:02:10:00 (within the range of what originally was "C").

In your project, the position 00:02:10:00 will be located and you will hear "B" playing, because it plays "later" in the Arranger track.

8

Folder tracks

About folder tracks



Just as the name implies, a folder track is a folder that contains other tracks. Moving tracks into a folder is a way to structure and organize tracks in the Project window. For example, grouping several tracks in a folder track makes it possible for you to “hide” tracks (thus giving you more working space on the screen). You can solo and mute several tracks in a quicker and easier way and perform editing on several tracks as one entity. Folder tracks can contain any type of track including other folder tracks.

Handling folder tracks

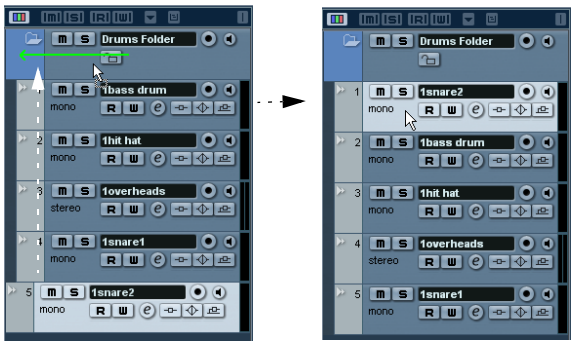
Creating a folder track

Folder tracks are created just like any other track: Select “Add Track” from the Project menu and select “Folder” from the submenu that appears, or right-click in the Track list and select “Add Folder Track” from the context menu.

Moving tracks into a folder

You can move any type of track into a folder by using drag and drop:

1. In the Track list, click on a track that you want to move into a folder and drag it onto a folder track.
A green arrow pointing to a folder appears when you drag the track onto the folder track in the list.
2. Release the mouse button.
The track is now placed in the folder track, and all parts and events on the track will be represented by a corresponding folder part (see “Working with folder parts” on page 107), which is a graphical representation of all parts and events in the folder.



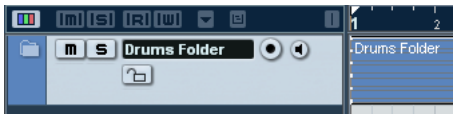
Since you can move any type of track into a folder track, it is possible to create sub-folders by moving one folder track into another. This is called “nesting”. For example, you could have a folder containing all the vocals in a project, and each vocal part could have a nested folder containing all the takes for easier handling etc.

Removing tracks from a folder

To remove a track from a folder, simply drag it out of the folder and release it in the Track list.

Hiding/showing tracks in a folder

You can hide or show the tracks located in a folder by clicking on the “Expand/Collapse Folder” button (the folder icon). Hidden tracks are still played back as usual.



When a folder is “closed” this way, the folder part(s) still give you a graphic representation of the parts and events within the folder.

- In the Track Folding submenu of the Project menu, there are several options for hiding/showing elements inside folders. These are described in detail in the section “Track folding” on page 39.

Muting and soloing folder tracks

One of the main advantages of using folder tracks is that they provide you with a way to mute and solo several tracks as one unit. Muting and soloing a folder track affects all tracks in the folder. You can also solo or mute individual tracks in the folder.

Muting a folder track

You can mute a folder track (and thereby mute all tracks within it) the same way you mute other tracks by clicking in the Mute (“M”) button in the Track list.

Soloing a folder track

You can solo a folder track (and thereby mute all tracks outside the folder, except those already set to Solo) the same way you solo other tracks, by selecting it and clicking the Solo button.

Soloing or muting tracks within a folder

This can be done by showing the tracks in the folder and using the Mute and Solo buttons in the Track list as usual for any tracks inside the folder.

Working with folder parts

A folder part is a graphic representation of events and parts on the tracks in the folder. Folder parts indicate the position and length of the events and parts, as well as on which track they are (their vertical position). If part colors are used, these are also shown in the folder part.

Folder parts are created automatically when there are parts or events on the tracks within the folder. The following rules apply:

- If there is a gap between parts/events on the tracks, there will be two separate folder parts.
- Parts or events that overlap within the folder may be represented by the same folder part or by two different folder parts – depending on how much they overlap.
  If a part/event overlaps by half its length or less, it will be placed in a new folder part.

The “snare1” event overlaps the “snare2” event by more than half its length, which means it is included in the same folder part.

The “bass drum” event does not overlap with any of the other events. This means a new folder part is created.

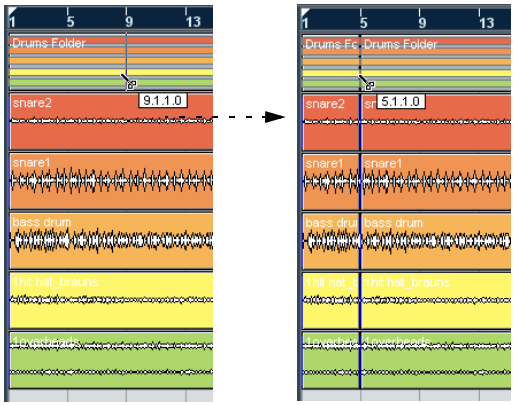
Handling and editing folder parts

Most of the editing you can do in the Project window applies to folder parts as well.

Any Project window editing you perform to a folder part affects all the events and parts it contains (those elements on the track within the folder that are represented by the folder part). You can select several folder parts if you like – this allows you to handle and edit them together. The editing you can perform includes:

- Moving a folder part. This will move its contained events and parts (possibly resulting in other folder parts, depending on how the parts overlap).
- Using cut, copy and paste.
- Deleting a folder part. This will delete its contained events and parts.
- Splitting a folder part with the Scissors tool (see the example below).
- Gluing folder parts together with the Glue tube tool. This will only work if the adjacent folder parts contain events or parts on the same track.
- Resizing a folder part resizes the contained events and parts according to the selected resizing method. This is set by clicking the Arrow tool icon on the toolbar and selecting “Normal Sizing”, “Sizing Moves Contents” or “Sizing Applies Time Stretch” from the pop-up menu – see “Resizing events” on page 48. Note that if you select “Sizing Applies Time Stretch”, any automation data is not taken into account.
- Muting a folder part. This will mute its contained events and parts.

An example



Splitting the folder part with the Scissors tool…

…will split all contained parts or events present at that position.

Editing tracks within folder parts

Tracks inside a folder can be edited as one entity by performing the editing directly on the folder part containing the tracks as explained above. You can also edit individual tracks within the folder by showing the contained tracks, selecting parts and opening editors as usual.

Double-clicking a folder part opens the editors for the corresponding track classes present in the folder. The following applies:

- All MIDI parts located on the tracks within the folder are displayed as if they were on the same track, just like when opening the Key Editor with several MIDI parts selected. To be able to easily discern the different tracks in the editor, give each track a different color in the Project window and use the “Part Colors” option in the editor (see “Coloring notes and events” on page 370).

- If the folder contains tracks with audio events and/or audio parts, the Sample and/or Audio Part Editors are opened with each audio event and audio part in a separate window.

9

Using markers

About markers

Markers are used to locate certain positions quickly. If you often find yourself jumping to a specific position within a project, you should insert a marker at this position. There are two types of markers:

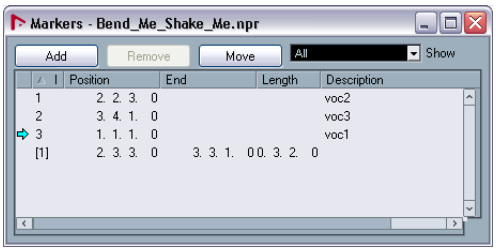
- Cycle markers allow you to store the start and end positions of a range.
- Standard markers store a specific position.

Markers can be created and edited in several ways:

- By using the Marker window (see below).
- By using the Marker track (see "Using the Marker track" on page 111).
- By using key commands (see "Marker key commands" on page 113).
- By using the Project Browser (see "Editing markers in the Project Browser" on page 113).

⇨ The left and right locators are handled separately – see "The left and right locators" on page 61.

The Marker window



In the Marker window, you can perform most editing operations concerning markers. The markers are listed in the Marker window in the order in which they occur in the project. Most functions in the Marker window are also available in the Inspector when the Marker track is selected.

To open the Marker window, you can:

- Select "Markers" from the Project menu
- Click the "Show" button in the Marker section on the Transport panel
- Use the key command (by default [Ctrl]/[Command]-[M]).

The Marker window columns

The Marker window is divided into six columns which are used for performing the following operations:

- The leftmost column is the Locate column.

Clicking in this column will move the project cursor to the corresponding marker position. A blue arrow indicates the marker at the project cursor position (or the closest marker before the project cursor).

- The ID column is used to edit marker ID numbers.

See "About marker ID numbers" on page 111.

- The Position column displays the markers' time positions (or start positions for cycle markers).

The marker positions can be edited directly in this column.

- The End and Length columns display the end positions and length of cycle markers – see "About cycle markers" on page 111.

These values can also be edited directly in the respective column.

- The Description column lets you enter names or descriptions for markers.

Click on a column heading to sort the marker list by that column. The Marker columns can also be reordered by dragging and dropping the column headers.

Adding and removing markers in the Marker window

- You add position markers (in Stop mode, during playback or during recording) by clicking the Add button or by pressing [Insert] (Windows only) on the computer keyboard. Markers are always added at the current project cursor position.

- To add a cycle marker, select "Cycle Markers" from the Show pop-up menu and click the Add button.

This adds a cycle marker between the left and right locator. You can also draw cycle markers on the Marker track (see "Editing markers on the Marker track" on page 112).

- To remove a marker, select it and click the Remove button.

⇨ Note that you can assign key commands to various marker commands in the Key Commands dialog (see "Marker key commands" on page 113).

Moving marker positions in the Marker window

The Move button in the Marker window can be used to "reprogram" marker positions. Proceed as follows:

1. Set the project cursor to the position to which you want to move (or re-program) a marker.

2. Select the marker that you want to change in the Marker window.
Do not select the marker by clicking in the leftmost column, as this will move the project cursor to this marker.

- If a cycle marker is selected, the Move operation affects the cycle marker start position.
The length of the range is not affected.

3. Click the Move button.

You can also move markers by editing their position numerically in the Position column.

About marker ID numbers

Each time you add a marker, it is automatically and sequentially assigned an ID number, starting from ID 1. ID numbers can be changed at any time – this allows you to assign specific markers to key commands (see below).

IDs for cycle markers are shown in brackets and start from [1]. These may also be changed.

Assigning markers to key commands

As explained above, marker ID numbers are assigned automatically and sequentially each time you add a marker. The nine first markers (1 to 9) can be recalled by using key commands – by default these are [Shift]-[1] to [9] on the typewriter part of the keyboard.

⇨ If you have more than nine markers, you cannot use key commands to navigate to markers numbered 10 or higher.

If you want to keep all current markers, but want to specify which markers should be accessed via key commands, the solution is to reassign the marker ID numbers. Proceed as follows:

1. First decide which of the current markers with an ID between 1 and 9 you want to reassign to a new ID number, and thus remove its key command assignment.
Memorize the ID number.

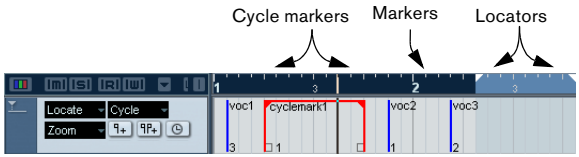
2. Enter this ID number in the ID column of the marker you want to access with a key command and press [Enter].
The two marker ID numbers are switched, and the key command now locates to the marker selected in this step.

3. Repeat as necessary for other markers.

- You can also simply remove a marker with an ID number between 1 to 9 to free up a key – see "Adding and removing markers in the Marker window" on page 110.

- For more about marker key commands, see "Marker key commands" on page 113.

Using the Marker track



The Marker track is used for viewing and editing markers. Markers shown on the Marker track are exactly the same as shown in the Marker window, and any changes made on the Marker track are reflected in the Marker window and vice versa. Standard position markers in the Marker track are shown as marker events: vertical lines with the marker name (if assigned) and number beside it. If you select the Marker track, all markers are shown in the Inspector, much like in the Marker window.

About cycle markers

Cycle markers are shown on the Marker track as two markers bridged by a horizontal line. Cycle markers are ideal for storing sections of a project. By setting cycle markers for sections of a song, for example "Intro", "Verse", "Chorus" etc., this enables you to quickly navigate to the song sections, and also to optionally repeat the section (by activating Cycle on the Transport panel).

In addition, Cycle markers appear on the horizontal Zoom pop-up menu in the Project window (see below).

Adding the Marker track

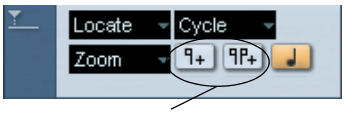
To add the Marker track to the Project, select "Marker" from the Add Track submenu of the Project menu (or right-click in the Track list and select "Add Marker Track"). You can only have one Marker track in a project.

Editing markers on the Marker track

The following editing functions can be performed directly on the Marker track:

- Adding position markers “on the fly”.

Use the [Insert] key (Win) or the “Add Marker” button in the Track list for the Marker track to add position markers at the current cursor position during playback.



Add Marker/Add Cycle Marker buttons

- Adding a cycle marker at the left and right locator positions.

Clicking the “Add Cycle Marker” button in the Track list for the Marker track adds a cycle marker spanning the area between the left and right locator.

- Selecting markers.

You can use standard selection techniques like dragging to make a selection rectangle, or use [Shift] to select separate markers.

- Drawing position markers.

By using the Pencil tool (or pressing [Alt]/[Option] and using the Arrow tool), you can create or “draw” position marker events at any position on the track. If snap is activated on the toolbar, this determines at which positions you can draw markers.

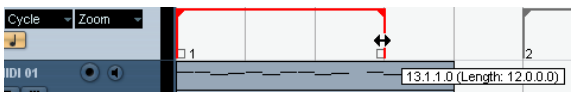
- Drawing cycle markers.

To draw a cycle marker range, press [Ctrl]/[Command] and use the Pencil tool or the Arrow tool. Snap settings are applied if activated.

⇨ Cycle markers can freely overlap.

- Resizing a cycle marker.

Select a cycle marker by clicking on it. Two handles appear at the bottom of the start and end events. If you click and hold one of the handles you can drag the event left or right to resize the cycle marker. This can also be done numerically on the info line.



- Moving markers.

Click and drag to move the selected markers or edit marker positions on the info line. As usual, snap is taken into account if activated.

- Removing markers.

This is done exactly the same way as for other events, i.e. by selecting them and pressing [Delete], using the Erase tool etc.

- Naming markers.

A selected marker’s name can be edited on the info line.

Navigating using cycle markers

Cycle markers represent ranges rather than single positions. Therefore you don’t use them for moving the project cursor, but for moving the left and right locators:

- If you double-click on a cycle marker or select it from the Cycle pop-up menu in the Track list, the left and right locators are moved to encompass the cycle marker.

To move the project cursor position to the start or the end of the cycle marker, move it to the corresponding locator (e.g. by using the numeric pad keys [1] and [2]).

- You can also use key commands for this – see “Marker key commands” on page 113.

Zooming to cycle markers

- By selecting a cycle marker on the Zoom pop-up menu, the event display is zoomed in to encompass the selected range only (see the section “Zoom presets and Cycle markers” on page 36).

You can also do this by pressing [Alt]/[Option] and double-clicking on the cycle marker in the event display.

Editing cycle markers using tools

Cycle markers can be edited on the Marker track using the following tools (Snap applies as usual):

Tool	Use
Pencil	Press [Ctrl]/[Command] and use the Pencil tool to create new cycle markers (as described above).
Eraser	Click with the Eraser tool to delete a cycle marker. If you hold down [Alt]/[Option] when you click, all consecutive markers will also be deleted.
Selection Range	This is described in the following section.

The other tools cannot be used with cycle markers.

Using markers to make range selections in the Project window

Besides enabling you to quickly move the project cursor and the locators, markers can be used in conjunction with the Range Selection tool to make range selections in the Project window. This is useful if you quickly want to make a selection that spans all tracks in the project.

- Double-click with the Range Selection tool between any two markers – this creates a selection range between the markers, spanning all tracks in the project (just as if you had used the Range Selection tool to draw a rectangle).
Any functions or processing you perform now will affect the selection only.

Moving and copying sections

This is a quick way to move or copy complete sections of the project (on all tracks):

1. Set markers at the start and end of the section you want to move or copy.

2. Select the Range Selection tool and double-click on the Marker track between the markers.
Everything in the project within the cycle marker boundaries is selected.

3. Click on the Marker track in the selected range and drag the range to a new position.
The selection in the Project window is moved to the same position.

- If you hold down [Alt]/[Option] while you drag the range, the selection in the Project window is copied instead.

Marker key commands

You can use key commands for the following marker operations:

Operation	Description	Default key
Insert Marker	Creates a new marker at the current project cursor position.	[Insert] (Windows only)
Locate Next Marker	Moves the project cursor to the right to the next marker position (if any).	[Shift]+[N]
Locate Previous Marker	Moves the project cursor to the left to the previous marker position (if any).	[Shift]+[B]
To Marker 1-9	Moves the project cursor to the specified marker (number 1 to 9).	[Shift]+[1] to [9]
Set Marker 1-9	Moves the specified marker (number 1 to 9) to the current project cursor position.	[Ctrl]+[1] to [9]
Recall Cycle Marker 1-9	Moves the left and right locators to encompass the specified cycle marker (1 to 9).	[Shift]+[Pad1] to [Pad9]

If you need to check or change any key command assignments, the marker commands can be found in the Transport category in the Key Commands dialog.

⇨ For the [Shift]+[Pad1] to [Pad9] commands to work, Num Lock must be deactivated on the computer keyboard!

Editing markers in the Project Browser

⚠ To view and edit markers in the Project Browser, the Marker track must be added to the Project window.

If you have a Marker track in the Project window, you can create and edit all marker parameters, including marker IDs, in the Project Browser. Proceed as follows:

1. Open the Project Browser by selecting it from the Project menu.

2. Select “Marker” in the Project Structure window.
A list of the markers is shown in the main Browser window.

3. Now you can edit marker names, positions and ID numbers by selecting an item and typing in values as usual in the main editor window.
For details about editing in the Project Browser see “Editing the Marker track” on page 433.

- You can use the Add pop-up menu in combination with the Add button to insert new markers or cycle markers when the Marker track is selected in the Project Browser.
This works just like the Add button in the Marker window (see “Adding and removing markers in the Marker window” on page 110).

The Transpose functions

Introduction

Nuendo offers transpose functions for audio, MIDI and instrument parts and for audio events. These allow you to create variations of your music or change the harmonics of an entire project or separate sections.

Transpose can be applied on three levels:

- On the entire project

By changing the project Root Key in the Project window toolbar, the whole project will be transposed (see "Transposing an entire project with the Root Key" on page 115).

- On sections of the project

By creating Transpose events on the Transpose track you can set transpose values for separate sections of your project (see "Transposing separate sections of a project using Transpose events" on page 118).

- On individual parts or events

By selecting individual parts or events and changing their transpose value in the info line, you can transpose individual parts or events (see "Transposing individual parts or events using the info line" on page 118).

⚠ The transpose functions do not change the actual MIDI notes or the audio, but only affect the playback.

Apart from the transpose features described in this chapter, you can also transpose all MIDI notes on the selected track using the MIDI modifiers (see "Transpose" on page 346), selected notes using the Transpose dialog (see "Transpose" on page 357), and MIDI tracks using MIDI effects (see the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4").

Transposing your music

In the following sections we will describe the different possibilities of transposing your music. Note that these can also be combined. However, we recommend you to set the root key first, before recording or changing transpose values on the transpose track.

⚠ As a general rule, you should always set the root key first when you work with content with a defined root key.

Transposing an entire project with the Root Key

The root key you specify for a project will be the reference that audio or MIDI events in your project will follow. You can of course exclude separate parts or events from being transposed, e.g. drums or percussion (see "The Global Transpose setting" on page 119).

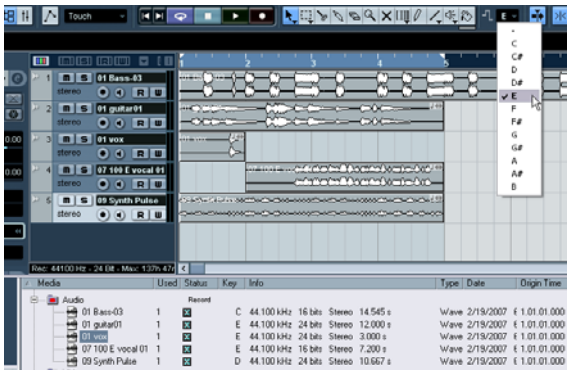
Depending on whether you are using events which already contain root key information or not, the procedures differ slightly:

If the events already contain root key information

Let's say you want to create a project based on loops. Proceed as follows:

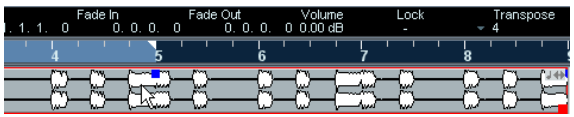
1. Open the Mediabay and drag some loops into an empty project, see "Browsing for media files" on page 316.
For this example, import audio loops with different root keys.

2. Now, open the Root Key pop-up menu in the Project window toolbar and set the project root key.
The entire project will be played back with this root key. Note that by default, the project root key is not specified ("-").



A loop-based project with different event root keys

The separate loops will be transposed in order to match the project root key. If you e.g. have imported a bass loop in C and the project root key is set to E, the bass loop will be transposed up by 4 semitones.



3. Now (with the root key set), record audio or MIDI.
The recorded events will get the project root key.

4. When you are done and satisfied with the result, you can change the project root key and your events will follow.

⚠ If you work with drums or percussion, you should exclude these from being transposed by setting the "Global Transpose" setting on the info line to "Independent" (see "The Global Transpose setting" on page 119).

If the events do not contain root key information

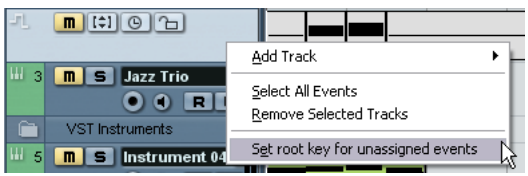
Let's say you have created a project by recording audio and importing some MIDI loops, and you want to match the root key of the whole project to the register of a certain singer.

Proceed as follows:

1. In your project, open the Project menu and select "Transpose" from the Add Track submenu (or right-click in the Track list and select "Add Transpose Track") to add the Transpose track.
You can only have one Transpose track in a project.

2. Set the project to the desired root key by selecting the corresponding option from the Root Key pop-up in the Project window toolbar.

3. Right-click in the Track list for the Transpose track and select "Set root key for unassigned events" from the context menu.
This sets the project root key for all unassigned parts or events. You can undo this command by selecting Undo from the Edit menu. The "Set root key for unassigned events" option is only available, if a project root key has been set.



⚠ If you work with drums or percussion, you should exclude these from being transposed by setting the "Global Transpose" setting on the info line to "Independent" (see "The Global Transpose setting" on page 119).

Recording with a project root key

Let's say that you want to record a guitar line for a project that is in D# minor, but your guitar player prefers to play A minor and G major. In this case, you can change the project root key to A, so that you can record your guitar. Proceed as follows:

1. Open your project and set the project root key to A.
All parts and events will be transposed in order to match the root key.

2. Listen to your project and verify that no drums and percussions have been transposed.
If drums have been transposed, select them and set their Global Transpose setting to "Independent".

3. Record your guitar line as desired.

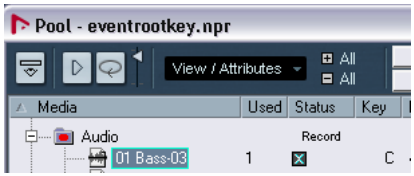
4. When you are done and you are satisfied with the result, you can change the project root key back to D# minor and your events will follow.

⚠ For recorded audio events and MIDI parts, the "Global Transpose" setting on the info line ist automatically set to "Follow", i.e. the events or parts will get the project root key.

Changing the Root key of single events or parts

If you want to check if an audio event or part has root key information or if you want to change it, proceed as follows:

1. Open the Pool and display the Key column by selecting "Root Key" from the "View/Attributes" pop-up menu in the Pool.



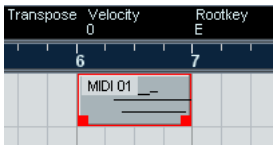
An audio event with a root key set to "C"

2. Click in the Root Key column for the desired audio event and set the key according to your needs.
You can also check and assign Root Keys in the MediaBay.

⇨ If you change the root key of an audio part or event, the corresponding audio file will not change. To save the Root Key setting in the audio file, you have to use the "Bounce Selection" function from the Audio menu.

To check the root key setting of a MIDI part, proceed as follows:

1. Select your MIDI part in the Project window and check the Project window info line.



A MIDI part with a root key set to "E"

2. Click on the root key value in the info line to open the Root key pop-up menu in the Project window info line and select the desired root key.

⚠ If you change the project root key after setting the event root key, the events will keep their own root key settings, and will be transposed to match the project root key. If you record an audio or a MIDI part and the project root key is specified, this root key is automatically set.

Transposing separate sections of a project using Transpose events

Sometimes you may want to transpose only certain sections of your project, e.g. to create harmonic variations. This can be done by creating transpose events. Transpose events allow you to add a relative transpose offset by specifying transpose values in semitones. You can e.g. brighten up your loops in C major by transposing them by 5 semitones, so that the subdominant on F major is played back, or you can turn your hit more interesting by transposing the last chorus one semitone upwards.

1. In your project, open the Project menu and select "Transpose" from the Add Track submenu (or right-click in the Track list and select "Add Transpose Track") to add the Transpose track.

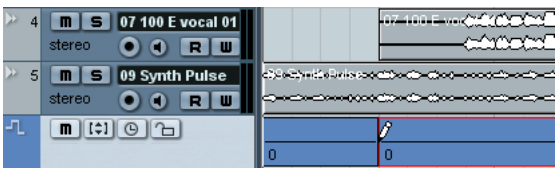
You can only have one Transpose track in a project.

2. Select the Pencil tool from the toolbar and click in the Transpose track to create a transpose event.

A transpose event will be created from the point where you clicked until the end of the project.

3. To create another transpose event, click with the pencil tool on the first transpose event.

By default, the transpose value of new transpose events is set to 0.



You can add more transpose events by clicking with the pencil tool.

4. Click in the transpose value field and enter the transpose value for the transpose event.

You can enter the desired value with the computer keyboard, use the mouse wheel or [Alt]/[Option]-click on the transpose value to open a value fader. You can specify values between -24 and 24 semitones.

If you move the mouse over the transpose event, the cursor turns into a hand symbol. This indicates that you can use the mouse wheel to change the value.

5. Play back your project.

The parts of your project on the same position as the transpose events will be transposed according to the specified transpose values.

⇨ You can also transpose the whole project by means of the transpose track. This is useful e.g. if your singer does not reach a certain pitch. In this case you can transpose your whole project by e.g. -2 semitones. Always remember to verify that the "Global Transpose" setting for drums and percussion is set to "Independent" on the info line (see "The Global Transpose setting" on page 119).

You can erase and move transpose events, but you can not mute, cut or glue them. The option "Locators to Selection" does not apply on transpose events.

Transposing individual parts or events using the info line

You can also transpose individual audio and MIDI parts and events via the Info line (or the Inspector). This transposition will be added to the global transposition (i.e. the root key or the transpose events). Proceed as follows:

1. Select the event that you want to transpose.

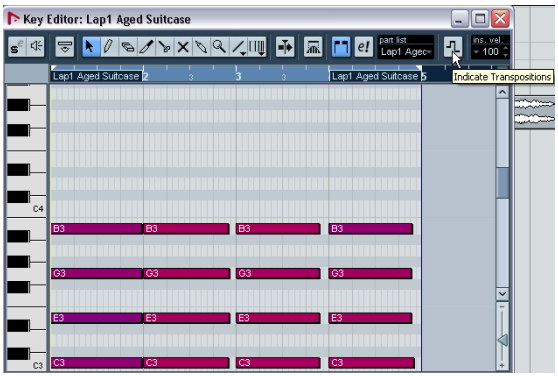
2. In the Project window info line, adjust the Transpose value as desired.

⇨ A global transpose change will not overwrite individual part or event transpose, but will be added to the transpose value for the part or event. In this case, it might be useful to keep the transposition within the octave range (see "Keep Transpose in Octave Range" on page 120).

Other functions

Indicate Transpositions

When you transpose your music, you may sometimes want to visually compare the original sounds and the transposed music. For MIDI parts, you can check this by opening the Key Editor and clicking the “Indicate Transpositions” button. This will help you see how your MIDI notes will be transposed. If the button is activated, the Key Editor will show the note pitch you will hear, if it is deactivated, the Key Editor shows the original pitch of the notes in your MIDI part. By default, the “Indicate Transpositions” button is deactivated.



A MIDI part as originally recorded.

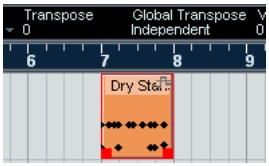
When you activate “Indicate Transpositions” you will see how your MIDI part will be transposed.

The Global Transpose setting

If you are working with drum and percussion loops or with special effects (FX) loops, you normally want to exclude these events from being transposed. This can be achieved by locking them using the Global Transpose setting. Proceed as follows:

1. Open your project.

2. Select the desired event or part and set the “Global Transpose” setting on the info line to “Independent”.
A symbol will be displayed in the upper right corner of the selected part or event. This indicates that the part or event will not be transposed neither by changing the root key nor by specifying transpose events.



If Global Transpose is set to Independent, the selected part will not be transposed.

3. You can now change the project root key.
The “Independent” parts or events will not be affected by the root key changes.

⇨ If you import ready-made parts or events that are tagged drums or FX, Global Transpose will be automatically set to Independent.

If you record audio or MIDI, Global Transpose will be set to “Independent”, if the transpose track exists and you have specified at least one transpose event (even when the transpose value is not defined). In this case, your recording will sound exactly the way you played it. The transpose events will not be taken into account during recording and the recorded event will not get the project root key. Have a look at the following example:

1. Set up a project with the root key in C.

2. Add a transpose track and enter transpose events with the values 0, 5, 7 and 0.

3. Record some chords with your MIDI keyboard. For our example, record C, F, G and C.
The transpose events are not taken into account and the result of your recording will be C, F, G and C. The root key will be not set.

⇨ You will get exactly what you have recorded, i.e. when your record C, F, G and C this will be played back exactly as you recorded it. This is because the recorded event is “Independent” from Global Transpose.

If no transpose track exists or if no transpose event has been added, Global Transpose will be set to Follow.

If Global Transpose is set to Follow, the selected part will follow all global transpositions.

The Edit Lock on the Transpose track

If you want to prevent your transpose events from being changed by mistake, you can activate the Lock button on the transpose track. This way, you will not be able to move your transpose events or change their transpose values.

Mute transpose events

Sometimes it might be useful to disable the transpose track, e.g. to hear the original sound of individual tracks. If you activate the mute button on the transpose track, your transpose events will not be taken into account during playback.

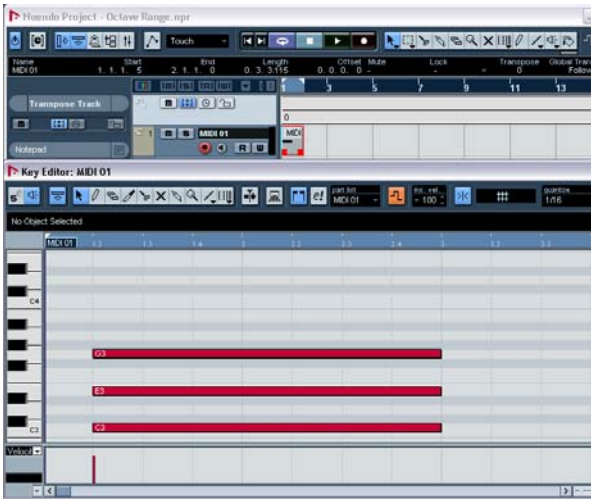
Keep Transpose in Octave Range

The “Keep Transpose in Octave Range” button on the transpose track (the button with an up and down arrow in brackets) keeps the transposition in the octave range. This option is activated by default. This way, nothing will be transposed by more than seven semitones. This ensures that your music never sounds unnatural because the pitch was raised too high or too low.

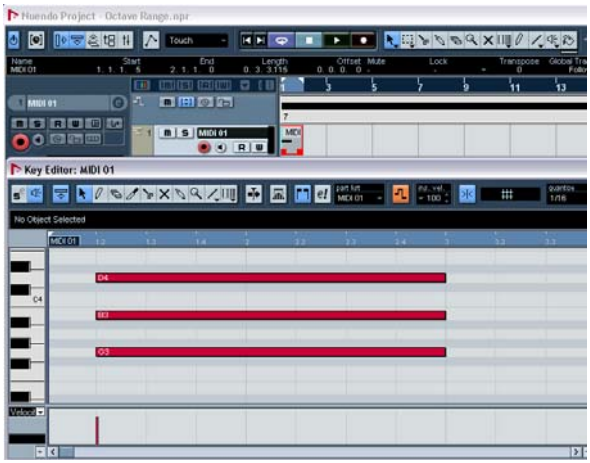
To understand the principle behind this, follow the example below:

1. Create a MIDI part, enter a C major chord, open the key editor and activate “Indicate Transpositions”.
This way you can observe and understand what happens, when you change the tranposition.

2. Add a transpose track and create a transpose event.
By default, the transpose value is set to 0.



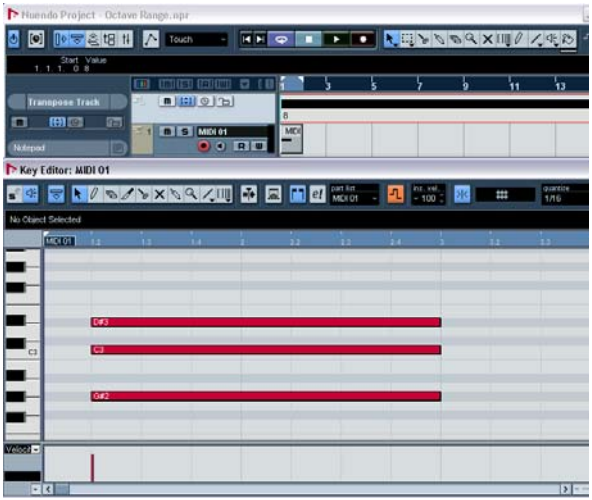
3. Make sure that the “Keep Transpose in Octave Range” button is activated on the transpose track and change the transpose value of the transpose event.
Your chord will be transposed upwards or downwards according to the entered values.



If you enter a transpose value of 7, your chord will be transposed by seven semitones upwards. In this example, this would be G3/B3/D4.

4. Set the transpose value to 8 semitones.

As “Keep Transpose in Octave Range” is activated, your chord will now be transposed to the nearest interval or pitch.



Your chord has been transposed to the nearest pitch, this results in G#2/C3/D#3.

⚠ If you mainly work with audio loops, we recommend to activate “Keep Transpose in Octave Range”.

11

The mixer

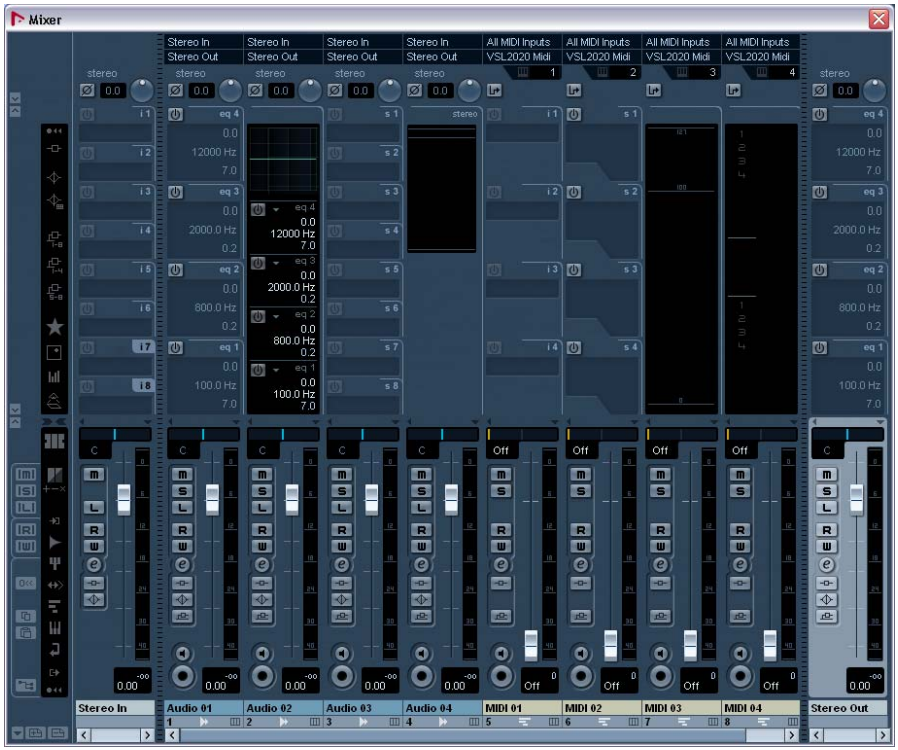
About this chapter

This chapter contains detailed information about the elements used when mixing audio and MIDI, and the various ways you can configure the mixer.

Some mixer-related features are not described in this chapter. These are the following:

- Setting up and using audio effects.
See the chapter “Audio effects” on page 168.
- Setting up and using MIDI effects.
See the chapter “MIDI realtime parameters and effects” on page 342.
- Surround Sound.
See the chapter “Surround sound” on page 202.
- Automation of all mixer parameters.
See the chapter “Automation” on page 213.
- How to mix down several audio tracks (complete with automation and effects if you wish) to a single audio file.
See the chapter “Export Audio Mixdown” on page 437.

Overview



The picture shows an extended mixer (see "Normal vs. Extended channel strips" on page 126).

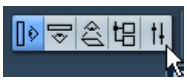
The mixer offers a common environment for controlling levels, pan, solo/mute status etc. for both audio and MIDI channels.

Opening the mixer

The mixer can be opened in several ways:

- By selecting Mixer from the Devices menu.
- By clicking the Mixer icon on the toolbar

This always opens the first Mixer window (see below).



- By using a key command (by default [F3]).
- By clicking the Mixer button in the Devices panel.

You open the Devices panel by selecting Show Panel from the Devices menu.

About the multiple mixer windows

You may have noticed that there are in fact several separate mixer items selectable from the Devices menu. These are not separate mixers, but rather separate views of the same mixer.

- Each of the mixer windows can be configured to show any combination of channels, channel types, narrow and wide channel strips, etc. (how to do this is described later in this chapter).

You can for example configure one mixer window to show MIDI channel strips, another to show input and output channels or another to show all audio-related channels.

- You can also save channel configurations as View sets (see “Channel view sets” on page 129), which are then accessible from all mixer windows.

These features are very convenient when working with large projects. Considering the number of different channel types that can be shown in the mixer, they could even be described as necessary!

The use of multiple mixer windows combined with the ability to recall different mixer configurations enables you to focus on the task at hand and keep window scrolling down to a minimum.

⇨ All options for configuring the mixer described in this chapter are identical for all mixer windows.

What channel types can be shown in the mixer?

The following track-based channel types are shown in the mixer:

- Audio
- MIDI
- Effect return channels (referred to as FX channels in the Project window)
- Instrument channels (VSTi Return)
- Group channels
- Instrument tracks
- ReWire channels

The order of audio, MIDI, instrument, group and effect return channel strips (from left to right) in the mixer corresponds to the Project window Track list (from the top down). If you reorder tracks of these types in the Track list, this will be mirrored in the mixer.

In addition to the above, the following channel types are also shown in the mixer:

- Activated ReWire channels (see the chapter “ReWire” on page 482).
- VST Instrument channels (see the chapter “VST Instruments and Instrument tracks” on page 189).

ReWire channels cannot be reordered and always appear to the right of other channels in the main mixer pane (see below). VST instrument (VSTi) channels can be reordered in the Track list which will in turn be mirrored in the mixer.

Folder, Marker, Video and Automation tracks are not shown in the mixer.

Input and output busses in the mixer

Input and output busses are represented by input and output channels in the mixer. They appear in separate “panes” separated by movable dividers and with their own horizontal scrollbars, see “The input and output channels” on page 132.

About multichannel audio

Nuendo has full support for surround sound. Each audio channel and bus in the mixer can carry up to 12 speaker channels. This means that if you have an audio track configured for 5.1 surround sound, for example, it will have a single channel strip in the mixer, just like mono or stereo tracks, but its level meter will have six meter bars, one for each speaker channel.

Another thing to note is that the look of a channel strip differs slightly depending on how it is routed – mono or stereo tracks routed to a surround output bus will have a surround panner control instead of a regular pan control, for example. For further information on multichannel audio, see the chapter “Surround sound” on page 202.

Configuring the mixer

As mentioned earlier, the mixer windows can be configured in various ways to suit your needs and to save screen space. Here follows a run through of the various view options (the following descriptions assume that you have an active project containing some tracks):

Normal vs. Extended channel strips

You have the option of selecting normal or extended channel strips and whether to show the input and output settings at the top of the channel strips. Proceed as follows:

1. Open any of the mixer windows.

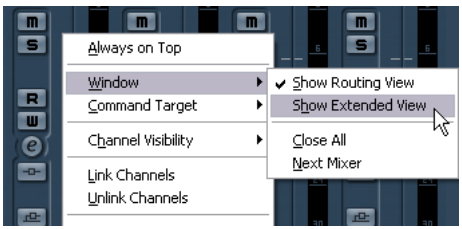
The leftmost strip is called the common panel and is always shown in the mixer. It contains various global settings and options relating to the mixer. For further information, see "The common panel" on page 131.

2. Click on the arrow button on the common panel ("Show Extended Mixer") or right-click in the Mixer to open the Mixer context menu and select "Show Extended View" from the Window submenu.

You can also use a key command for this. See the chapter "Key commands" on page 517.

Opening the Extended Mixer via the Mixer Common panel…

…and via the Mixer context menu.



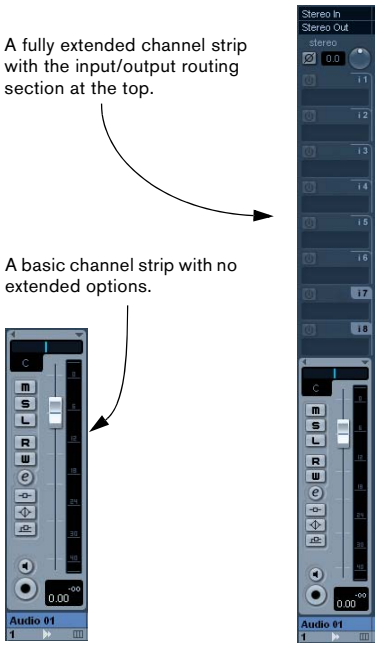
3. You can show or hide the Routing panel of the channel strips by clicking on the respective arrow button ("Show Routing") or by selecting "Show Routing View" from the Window submenu on the Mixer context menu.

The fader panel is always shown.

The fader panel shows the basic controls – faders, pan controls and an associated vertical row of buttons. The extended panel can be set to show EQ, effect sends, insert effects, etc. The input/output settings panel contains input and output routing pop-up menus (where applicable), along with input phase switches and input gain controls.

A fully extended channel strip with the input/output routing section at the top.

A basic channel strip with no extended options.



Selecting what to display in the extended channel strips

You can select what to display in the extended channel strip either globally from the common panel or individually from each channel strip.

The available options vary depending on the type of channel.

- For a description of the options for audio channels, see "Options for the extended audio channel strip" on page 136.
- For a description of the options for MIDI channel, see "Selecting what to show in the extended MIDI channel strip" on page 144 .

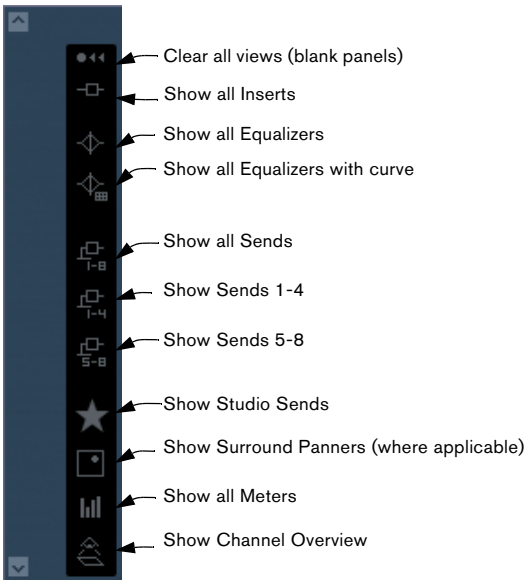
Selecting globally from the common panel

1. Open any of the mixer windows.

The leftmost strip is called the common panel and is always shown in the mixer. It contains various global settings and options relating to the mixer. For more information, see "The common panel" on page 131.

2. Make sure that the extended panel of the mixer is visible.

In the extended area of the common panel, you can see a vertical row of icons. These act as buttons and determine globally what is displayed in the extended panel for all channel strips in the mixer.



If you place the pointer on an icon, a tooltip appears.

3. Click on the "Show all Inserts" button (second icon from the top).

Now all channel strips in the mixer will show Insert effect slots in the extended panel.

- As mentioned above, what can be set globally depends on the type of channel.

Channel types that do not support a selected global option will be unaffected.

- If you press [Alt]/[Option] and click one of the global view buttons, input and output channels will be affected as well.

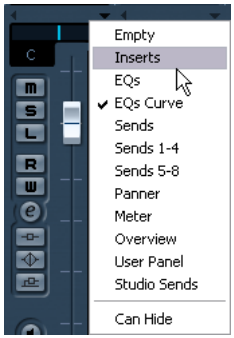
Selecting for individual channels

Each channel strip in the mixer features a View options pop-up menu, which is used for two things:

- To determine what is shown in the extended panel for individual channels in the mixer.
- To set the "Can Hide" status for individual channels in the mixer.

This is described in the section "Showing/hiding individual channels (the "Can Hide" setting)" on page 128.

The View options pop-up is opened by clicking the down arrow located just above the fader panel of the channel strip.



- To select what to display in the extended panel from the View options pop-up menu, you must first open the extended mixer.

You can then use the pop-up to select which parameters to show in the extended panel for each individual channel in the mixer.

Setting the width of channel strips

⚠ Each channel strip can be set to either “Wide” or “Narrow” mode by using the Channel Narrow/Wide button on the left above the fader strip.

The Channel Narrow/Wide button

- Narrow channel strips contain a narrow fader, miniature buttons, and the View options pop-up.

If you have selected to show parameters in the extended section, only the channel overview or the Meter can be shown in narrow mode. (The parameters will be shown again when you return to wide mode.)

Wide and narrow channel strips

- When selecting “All targets narrow” or “All targets wide” on the common panel, all channel strips selected as command targets (see “About the Command Target” on page 129) are affected.

Selecting what channel types to show/hide

You can specify what channel types to show or hide in the mixer. In the lower part of the common panel you find a vertical strip with different indicator buttons. Each indicator represents a channel type to show or hide in the mixer:

“Command Target” options – see “About the Command Target” on page 129.

“Can Hide” options – see below.

Input Channels

Audio Channels

Group Channels

ReWire Channels

MIDI Channels

VST Instrument Channels

Effect Return Channels

Output Channels

Reveals all channel strips

- To hide or show a channel type, click the corresponding indicator.

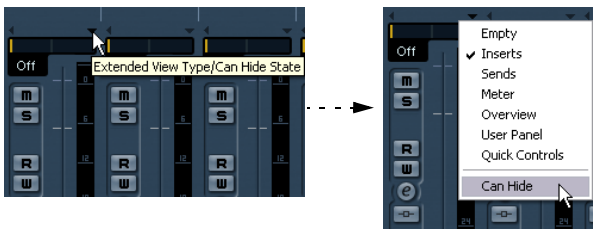
If an indicator is dark, the corresponding channel type will be shown in the mixer. If it is orange, the corresponding channel type will be hidden.

Showing/hiding individual channels (the “Can Hide” setting)

You can also show/hide individual channels of any type in the mixer. For this, you can assign channels a “Can Hide” status, which allows you to hide these channels collectively. Proceed as follows:

1. Pull down the View options pop-up menu for the channel you want to hide and activate the “Can Hide” option.

If “Can Hide” is activated for a channel strip, the corresponding icon (/) will be visible in the top middle section of the channel strip.



2. Repeat this for all channels you want to hide.

3. Click the top “hide button” (Hide Channels set to “Can Hide”) on the common panel.
This hides all channels set to “Can Hide”. To show them again, click the Hide button again or click the button at the bottom on the common panel (“Reveal All Channels”).

Below the top hide button, there are three additional “Can Hide” buttons.

Option	Description
Set Target Channels to 'Can Hide'	This activates “Can Hide” for all Channels you specified as “Command Targets”. For more information, see below.
Remove 'Can Hide' from Target Channels	This deactivates “Can Hide” for all Channels you specified as “Command Targets”. For more information, see below.
Remove 'Can Hide' from All Channels	This deactivates “Can Hide” for all Channels in the Mixer.

Channel view sets

Channel view sets are saved configurations of the mixer windows, allowing you to quickly switch between different layouts for the mixer. Proceed as follows:

1. Set up the mixer the way you wish to store it as a view set.
The following settings will be stored:

- Settings for individual channel strips (e.g. narrow or wide mode and whether the channel strip is (or can be) hidden or not).
- The hide/show status for channel types.
- The mixer’s display status (fader panel, extended panel, input/output panel).
- Settings for what is shown in the extended view of the mixer.

2. Click the “Store View Set” button (the plus sign) at the bottom of the (non-extended) common panel.

3. A dialog appears, allowing you to enter a name for the view set.

4. Click OK to store the current mixer view set.

- You can now return to this stored configuration at any time, by clicking the “Select Channel View Set” button (the down arrow to the left of the “Store View Set” button) and selecting it from the pop-up menu.

- To remove a stored channel view set, select it and click the “Remove View Set” button (the minus sign).

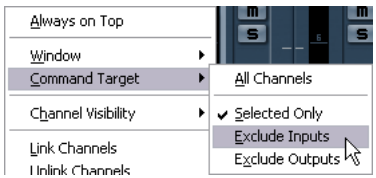
⚠ Some remote control devices (such as Steinberg’s Houston) feature this function, which means that you can use the remote device to switch between the channel view sets.

About the Command Target

Command targets let you specify which channels should be affected by the “commands” (basically all the functions that can be assigned key commands) when working with the Mixer, e.g. what to display in the extended mixer, the width setting of the channel strips, etc. You can set command targets using the Mixer common panel or the context menu.

The Command Target Controls on the common panel

The Command Target submenu in the Mixer context menu



The following options are available:

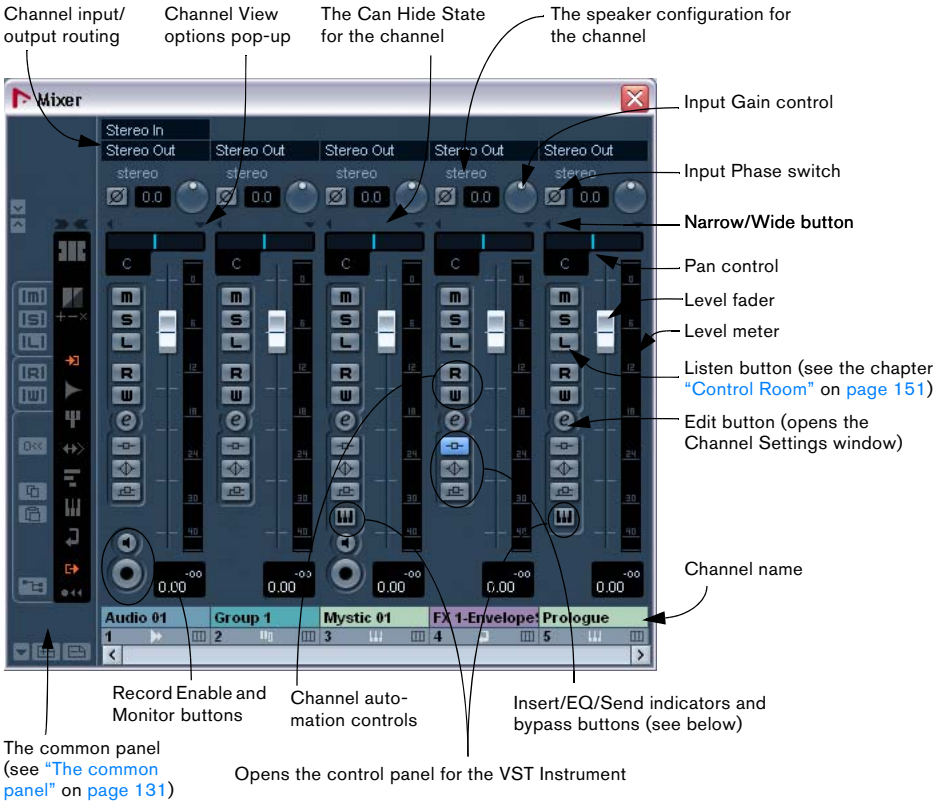
- All Channels
Select this if you want your commands to affect all channels.

- Selected Only
Select this if you want your commands to affect the selected channels only.

- Exclude Inputs
Select this if you don’t want your commands to affect the input channels.

- Exclude Outputs
Select this if you don’t want your commands to affect the output channels.

The audio-related channel strips



The mixer in normal mode (faders and Routing View visible), showing (from left to right): the common panel, a stereo audio channel, a group channel, an instrument channel, an effect return channel and a VST Instrument channel strip.

All audio-related channel types (audio, instrument track, input/output channels, group, effect return, VST Instrument and ReWire) basically have the same channel strip layout, with the following differences:

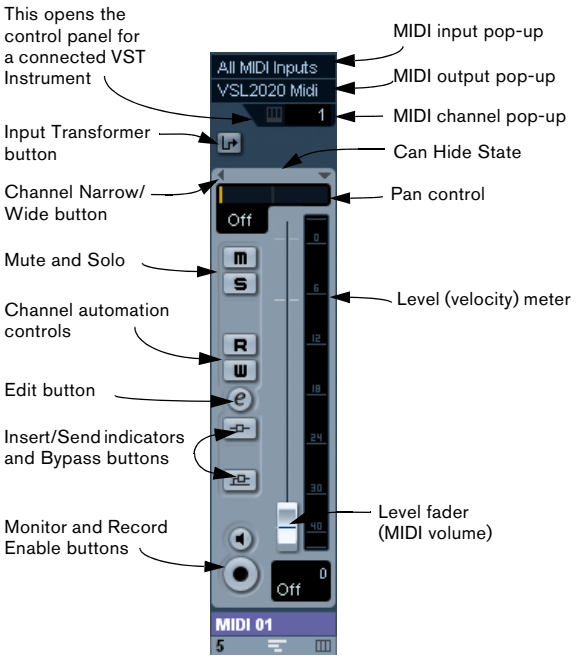
- Only audio track channels have an Input Routing pop-up menu.
- Only audio and instrument track channels have a Monitor and Record Enable button.
- Input/output channels do not have sends.
- Instrument track and VST Instrument channels have an additional button for opening the instrument's control panel.
- Input channels and output channels have clip indicators.

About the Insert/EQ/Send indicators and bypass buttons

The three indicator buttons in each audio channel strip have the following functionality:

- If an Insert or Send effect or an EQ module is activated for a channel, the corresponding button is lit.
  The effect indicators will be blue, the EQ indicator will be green.
- If you click these buttons when lit, the corresponding EQ or effects section will be bypassed.
  Bypass is indicated by yellow buttons. Clicking the button again deactivates bypass.

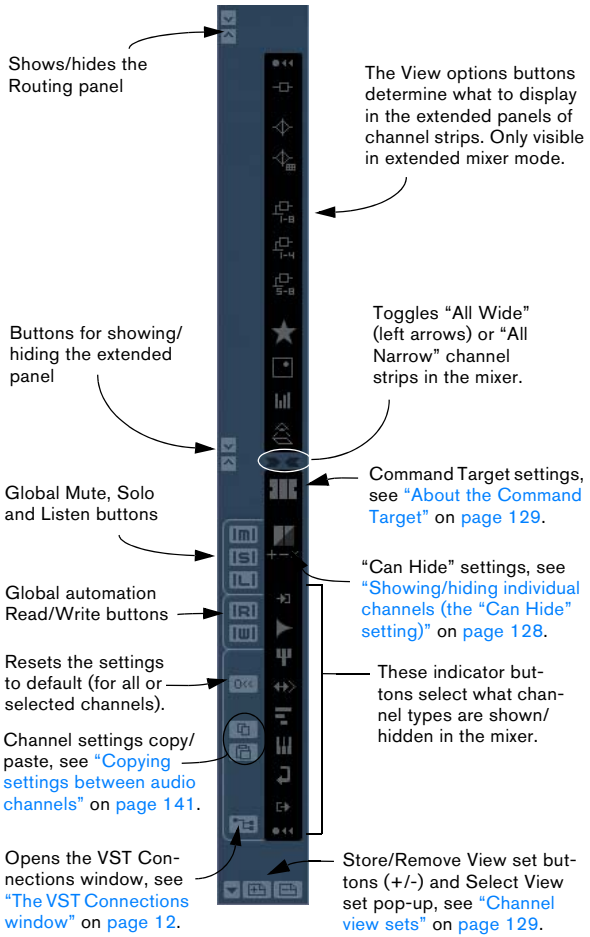
The MIDI channel strips



The MIDI channel strips allow you to control volume and pan in your MIDI instrument (provided that they are set up to receive the corresponding MIDI messages). The settings here are also available in the Inspector for MIDI tracks.

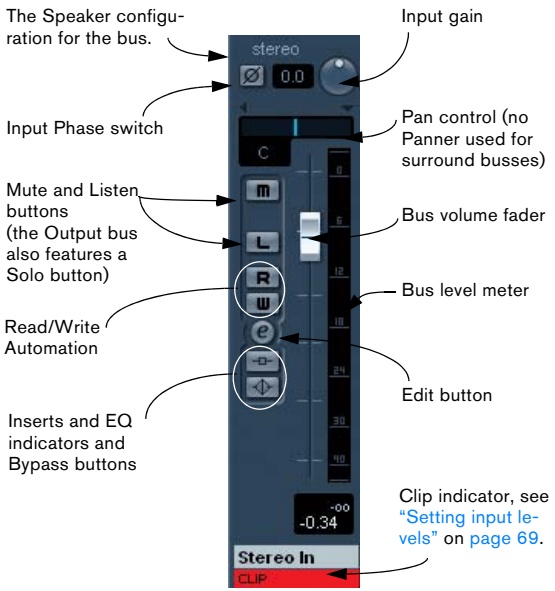
The common panel

The common panel appears to the left in the mixer windows and contains settings for changing the look and behavior of the mixer, as well as global settings for all channels.



The input and output channels

The busses you have set up in the VST Connections window are represented by input and output channels in the mixer. These are shown in separate “panes” (to the left and right of the regular channel strips, respectively), with their own dividers and horizontal scrollbars. The i/o channel strips are very similar to other audio channels and are identical for input and output channels (except that input channels don’t have Solo buttons or Sends).



- For information on how to set up input and output busses, see “VST Connections: Setting up input and output busses” on page 10.
- How to route audio channels to busses is described on “Routing audio channels to busses” on page 143.
- If the Control Room is disabled (see the chapter “Control Room” on page 151), the Main Mix (the default output) bus is used for monitoring. For information about Monitoring, see “About monitoring” on page 17.

Basic mixing procedures

Setting volume in the mixer

In the mixer, each channel strip has a fader for volume control.

- For audio channels, the faders control the volume of the channels before they are routed directly or via a group channel to an output bus.
  Each channel can in turn handle up to 12 speaker channels – see “Surround sound in Nuendo” on page 203.
- An output channel fader determines the master output level of all audio channels routed to that output bus.
- MIDI channels handle fader volume changes in the mixer by sending out MIDI volume messages to the connected instrument(s).
  Connected instruments must be set to respond to MIDI messages (such as MIDI volume in this case) for this to function properly.
- The fader settings are displayed numerically below the faders, in dB for audio channels and in the MIDI volume 0 to 127 value range for MIDI channels.
  You can click in the fader value fields and enter a volume setting by typing.
- To make fine volume adjustments, hold down [Shift] when you move the faders.
- If you hold down [Ctrl]/[Command] and click on a fader, it will be reset to its default value, i.e. 0.0 dB for audio channels, or MIDI volume 100 for MIDI channels.
  This reset to default values works for most mixer parameters.

You can use the faders to set up a volume balance between the audio and MIDI channels and perform a manual mix by moving the faders and other controls while playing back. By using the Write function (see “Enabling and disabling the writing of automation data” on page 214), you can automate the levels and most mixer actions.

⚠ It is also possible to create volume envelopes for separate events in the Project window or Audio Part Editor (see “Event Envelopes” on page 97) or to make static volume settings for an event on the info line or with the volume handle (see “About the volume handle” on page 88).

About the level meters for audio channels

When playing back audio in Nuendo, the level meters in the mixer show the level of each audio channel.

- Directly below the level meter is a small level readout – this shows the highest registered peak level in the signal. Click this to reset the peak levels.

- Peak levels can also be shown as static horizontal lines in the meter, see "Changing the meter characteristics" on page 141.

If the peak level of the audio goes above 0dB, the numerical level indicator will show a positive value (i.e. a value above 0dB).

Nuendo uses 32 bit floating point processing internally, so there is virtually limitless headroom – signals can go way beyond 0dB without clipping. Therefore:

⇨ Having higher levels than 0dB for individual audio channels is not a problem in itself. The audio quality will not be degraded by this.
However, when many high level signals are mixed in an output bus, this may require that you lower the output channel level a lot (see below). Therefore it's good practice to keep the max levels for individual audio channels roughly around 0dB.

⚠ When Direct Monitoring is used and the option "Map input bus metering to Audio track (in Direct Monitoring)" is activated in the Preferences (VST–Metering page), the level meters in the mixer will show the level of the input bus instead.

About the level meters for input and output channels

For the input and output channels, things are different. I/O channels have clip indicators.

- When you are recording, clipping can occur when the analog signal is converted to digital in the audio hardware. It's also possible to get clipping in the signal being recorded to disk (when 16 or 24 bit record format is used and you have adjusted the mixer settings for the input channel). For more about checking and setting input levels, see "Setting input levels" on page 69.

- In the output busses, the floating point audio is converted to the resolution of the audio hardware. In the integer audio domain, the maximum level is 0dB – higher levels will cause the clip indicator for each bus to light up.
If the clip indicators light up for a bus, this indicates actual clipping – digital distortion which should always be avoided.

⚠ If the clip indicator lights up for an output channel, reset the clip indicator by clicking on it, and lower the level until the indicator doesn't light up.

Adjusting Input Gain

Each audio channel and input/output channel features an Input Gain control. This controls the gain for the incoming signal, before EQ and effects.

The Input Gain is not meant to be used as a volume control in the mixer, as it is not suited for continuous level adjustments during playback. It can, however, be used to cut or boost the gain in various circumstances:

- To change the level of a signal before the effects section.
The level going into certain effects can change the way the signal is affected. A compressor, for example, can be "driven" harder by raising the Input Gain.

- To boost the level of poorly recorded signals.

To change the Input Gain, you need to press [Shift] and adjust the control (to avoid accidental gain changes). If you press [Alt]/[Option], you can adjust the Input Gain with a fader. Alternatively, you can also enter the desired number in the value field.

Input Phase switch

Each audio channel and input/output channel has an Input Phase switch, to the left of the Input Gain control dial. When activated, the phase polarity is inverted for the signal. Use this to correct for balanced lines and mics that are wired backwards, or mics that are "out of phase" due to their positioning.

- Phase polarity is important when mixing together two similar signals.

If the signals are “out of phase” with respect to one another, there will be some cancellation in the resulting audio, producing a hollow sound with less low frequency content.

About level meters for MIDI channels

The level meters for MIDI channels do not show actual volume levels. Instead, they indicate the velocity values of the notes played back on MIDI tracks.

About MIDI tracks set to the same MIDI channel and output

If you have several MIDI tracks set to the same MIDI channel (and routed to the same MIDI output), making volume and pan settings for one of these MIDI tracks/mixer channels will also affect all other mixer channels set to the same MIDI channel/output combination.

Using Solo and Mute

The Mute (top) and Solo buttons.

You can use the Mute and Solo buttons to silence one or several channels. The following applies:

- The Mute button silences the selected channel.

Clicking the Mute button again un-mutes the channel. Several channels can be muted simultaneously. Muting Group channels can have two different results depending on how the Preferences are set (see “Settings for group channels” on page 142). A muted channel is indicated by a lit Mute button and also by the lit Global Mute indicator on the common panel.

A muted channel in the mixer.

A lit Global Mute indicator on the common panel shows that one or more channels are muted.

- Clicking the Solo button for a channel mutes all other channels.

A soloed channel is indicated by a lit Solo button, and also by the lit Global Solo indicator on the common panel. Click the Solo button again to turn off Solo.

- Several channels can be soloed at the same time.

However, if you press [Ctrl]/[Command] and click the Solo button for a channel, any other soloed channels will automatically be un-soloed (i.e. this Solo mode is exclusive).

- [Alt]/[Option]-clicking a Solo button activates “Solo Defeat” for that channel.

In this mode the channel will not be muted if you solo another channel. To turn off Solo Defeat, [Alt]/[Option]-click the Solo button again.

[Alt]/[Option]-click a Solo button…

…to activate Solo Defeat for that channel.

- You can un-mute or un-solo all channels by clicking the Mute or Solo indicator on the common panel.

Listen Mode

The Listen button for a channel strip and the global Listen button on the Common panel

Clicking the Listen button for a channel routes that channel to the Control Room without interrupting the normal signal flow. The following applies:

- When the channel is set to after-fader (also referred to as post-fader), the signal being routed to the Control Room channel will come after the fader and pan controls of the Listen-enabled channel.
- When the Control Room channel is set to pre-fader, the signal will be routed from just before the fader.

Control Room channel set to after-fader (AFL)…

…and to pre-fader (PFL).

A Listen-enabled channel is indicated by a lit Listen button, and also by the lit Global Listen button on the common panel. Click the Listen button again to turn off Listen mode. You may also turn off Listen mode for every Listen-enabled track at once by clicking the Listen button on the common panel.

For more information about the Listen functionality, see the chapter “Control Room” on page 151.

Setting pan in the mixer

The pan control.

The pan controls in the mixer are used to position a channel between the left and right side of the stereo spectrum. By default for stereo audio channels, pan controls the balance between the left and right channels. You can change this in the Preferences. By selecting one of the other pan modes (see below), you can set pan independently for the left and right channel.

- To make fine pan adjustments, hold down [Shift] when you move the pan control.
- To select the (default) center pan position, hold down [Ctrl]/[Command] and click on the pan control.
- For MIDI channels, the pan control sends out MIDI pan messages.
  The result depends on how your MIDI instrument is set to respond to pan – check your documentation for details.

⇨ The Surround Panner is described in the section "Using the Surround Panner" on page 208.

Panning Bypass

You can bypass the panning for all track types except MIDI tracks. To do this, keep [Shift] and [Alt]/[Option] pressed and click on the pan setting for the respective channel in the mixer (on the fader panel or in the extended mixer view). The Panning Bypass state is reflected in all the different pan setting sections, e.g. if you bypass a channel in the mixer, this is automatically reflected in the Inspector for the respective track.

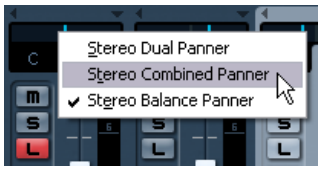
When panning is bypassed for a channel, the following happens:

- Mono channels will be panned center.
- Stereo channels will be panned left and right.
- Surround channels will be panned center.

⇨ To deactivate Panning Bypass, simply press [Shift]+[Alt]/[Option] and click again.

About the three pan modes

If you right-click in the pan control field for a (stereo) audio channel, you can select one of three pan modes:



- Stereo Balance Panner controls the balance between the left and right channels.
  This is the default mode.
- If Stereo Dual Panner is selected, there will be two pan controls with the upper controlling pan for the left channel, and the lower controlling pan for the right channel.
  This allows you set pan independently for the left and right channels. Note that it is possible to reverse the left and right channels, i.e. the left channel can be panned to the right and vice versa. You can also "sum" two channels by setting them to the same pan position (i.e. mono) – note that this will increase the volume of the signal.

- If Stereo Combined Panner is selected, the left and right pan positions are shown as two lines with a blue/gray area between them.
  If you reverse the left and right channels, the area between the pan controls will be red instead of blue/gray.

In this mode, the left and right pan controls are linked, and can be moved left and right like a single pan control (keeping their relative distance).

- Stereo Combined mode also allows you set pan independently for the left and right channels. This is done by holding down [Alt]/[Option] and dragging the corresponding pan control.

When moving combined pan controls so that the left or right pan control reaches its maximum pan value, it naturally cannot go any further. If you continue to move further in the same direction, only the other pan control will move, thus altering the set relative pan range until both channels are panned fully to one side. If you move the pan controls in the opposite direction without releasing the mouse, the previously set pan range will be restored.

⇨ The pan settings made with the Dual Panner are reflected in the Combined Panner and vice versa.

⇨ You can specify the default pan mode for inserted audio tracks in the Preferences (VST page).

About the "Stereo Pan Law" Preference (audio channels only)

In the Project Setup dialog there is a pop-up menu named "Stereo Pan Law", on which you can select one of several pan modes. This is related to the fact that without power compensation, the power of the sum of the left and right side will be higher (louder) if a channel is panned center than if it is panned left or right.

To remedy this, the Stereo Pan Law setting allows you to attenuate signals panned center, by -6, -4.5 or -3 dB (default). Selecting the 0 dB option effectively turns off constant-power panning. Experiment with the modes to see which fits best in a given situation. You can also select "Equal Power" on this pop-up menu, which means that the power of the signal will remain the same regardless of the pan setting.

Audio specific procedures

This section describes the options and basic procedures regarding audio channels in the mixer.

Options for the extended audio channel strip

When using the extended channel strip view options, the upper panel can be set to show different views for each audio channel strip. You can select what to display in the extended panel individually for each channel or globally for all channels (see "Selecting what to display in the extended channel strips" on page 126).

The following views are possible:

- The 8 insert effect slots.

The inserts can also be found in the Inspector and the Channel Settings window, see "Using Channel Settings" on page 137.

- The 8 effect sends, with pop-ups and send level value sliders.

The sends can also be found in the Inspector and the Channel Settings window, see "Using Channel Settings" on page 137.

- You also have the option of displaying four sends at a time (the Sends 1-4 and 5-8 menu items).

These modes offer the additional benefit of displaying send levels as dB values.

⇨ There are no sends for Input channels.

- The EQ section, either with value sliders ("EQs") or as numerical settings with a curve display ("EQs curve").

These two views have exactly the same controls but different graphic layouts. The EQ section is also available in the Channel Settings window. For EQ parameter descriptions, see "Making EQ settings" on page 138.

- The Surround Panner section (where applicable).

If the channel is routed to a surround bus you can view a compact version of the Surround Panner in the extended panel – double-click to open the full Surround Panner panel. Also in this section, three parameters of the Mixconvert plug-in will be shown (provided that this plug-in is inserted and active). They are SRD (surround), CTR (center) and LFE levels. You can edit these values by clicking on them and typing in new values.

- The "Meter" option shows large level meters in the extended panel.

These operate exactly like the regular meters.

- The User Panel option displays Device panels for the audio track, including panels for inserted VST effects, see "Audio tracks" on page 28. You can access User panels by clicking on the tab at the top of the User Panel display in the extended mixer.

For information on Device Panels, see the separate PDF document "MIDI Devices".

- Selecting the "Empty" option will display a blank panel in the extended strip.

- You can also select the "Overview" option – this shows a graphic overview of which insert effect slots, EQ modules and effects sends are activated for the channel.

You can click the indicators to turn the corresponding slot/EQ module/send on or off.

⇨ If you have selected a parameter for the extended channel strip and then switch to “narrow” mode, only the channel overview and the Meter can be shown in the extended channel strip. When you switch back to “wide” mode, the parameter settings are displayed again.

Using Channel Settings

For each audio channel strip in the mixer and in the Inspector and Track list for each audio track, there is an Edit button (“e”).

Clicking this opens the VST Audio Channel Settings window. By default, this window contains:

- A section with eight insert effect slots (see “Audio effects” on page 168).
- Four EQ modules and an associated EQ curve display (see “Making EQ settings” on page 138).
- A section with eight effect sends (see “Audio effects” on page 168).
- A duplicate of the mixer channel strip (without the extended panel but with the input and output settings panel).

You can customize the Channel Settings window, by showing/hiding the different panels and/or by changing their order:

- To specify which panels should be shown/hidden, right-click in the Channel settings window, and activate/deactivate the respective options on the Customize View submenu on the context menu.
- To change the order of the panels, select “Setup” on the Customize View pop-up menu and use the “Move up” and “Move Down” buttons.

For further information, see the chapter “Customizing” on page 503.

Every channel has its own channel settings (although you can view each in the same window if you like – see below).

Click the Edit button to open the Channel Settings window.

The Channel Settings window is used for the following operations:

- Apply equalization, see “Making EQ settings” on page 138.
- Apply send effects, see “Audio effects” on page 168.
- Apply insert effects, see “Audio effects” on page 168.
- Copy channel settings and apply them to another channel, see “Copying settings between audio channels” on page 141.

⚠ All channel settings are applied to both sides of a stereo channel.

Changing channels in the Channel Settings window

You can view any channel’s settings from a single window.

If the option “Sync Project and Mixer Selection” is activated in the Preferences (Editing–Project & Mixer page), this can be done “automatically”:

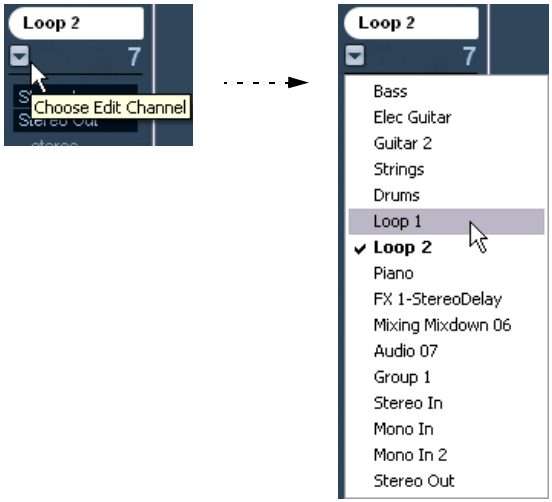
- Open the Channel Settings window for a track and position it so that you can see both the Project window and the Channel Settings window.

Selecting a track in the Project window automatically selects the corresponding channel in the mixer (and vice versa). If a Channel Settings window is open, this will immediately switch to show the settings for the selected channel. This allows you to have a single Channel Settings window open in a convenient position on the screen, and use it for all your EQ and channel effect settings.

You can also select a channel manually (thereby changing what is shown in the open Channel Settings window). Proceed as follows:

1. Open the Channel Settings window for any channel.

2. Open the Choose Edit Channel pop-up menu by clicking the arrow button to the left of the channel number at the top of the Fader view.



3. Select a channel from the pop-up to show the settings for that channel in the open Channel Settings window.

- Alternatively, you can select a channel in the mixer by clicking its channel strip (make sure not to click on a control as this will change the respective parameter setting instead).

This selects the channel, and the Channel Settings window is updated.

- To open several Channel Settings windows at the same time, press [Alt]/[Option] and click the Edit buttons for the respective channels.

Making EQ settings

Each audio channel in Nuendo has a built-in parametric equalizer with up to four bands. There are several ways to view and adjust the EQs:

- By selecting one of the EQ display modes (“EQs” or “EQs Curve”) for the extended channel strip in the mixer.

These modes contain the same settings but present them in different ways:

In “EQs” mode, the top value slider controls the gain, the middle controls frequency and the lower sets the filter type and the Q parameter for each EQ band.

In “EQs Curve” mode, EQ settings are shown as a curve. Parameters are set by clicking on the value and adjusting with the fader that appears.

- By selecting the “Equalizers” or “Equalizer Curve” tab in the Inspector.

The “Equalizers” section is similar to the “EQs” mode in the extended mixer, while the “Equalizer Curve” section shows a display in which you can “draw” an EQ curve. Setting EQ in the Inspector is only possible for track-based audio channels.

⇨ Note that by default, only the Equalizers tab is shown. To display the Equalizer Curve tab, right-click on an Inspector tab (not in the empty area below the Inspector) and activate the “Equalizer Curve” option.

- By using the Channel Settings window.

This offers both parameter sliders and a clickable curve display (the Equalizer + Curve pane) and also lets you store and recall EQ presets.

⚠ Below we describe how to set up EQ in the Channel Settings window, but the parameters are the same in the mixer and Inspector (apart from the presets and reset function, which are not available in the mixer).

The Equalizers + Curve pane in the Channel Settings window consists of four EQ modules with parameter sliders, an EQ curve display and some additional functions at the top.

Using the parameter controls

1. Activate an EQ module by clicking its power button.
Although the modules have different default frequency values and different Q names, they all have the same frequency range (20Hz to 20kHz). The only difference between the modules is that you can specify different filter types for each individual module (see below).

2. Set the amount of cut or boost with the gain control – the upper slider.
The range is ± 24 dB.

3. Set the desired frequency with the frequency slider.
This is the center frequency of the frequency range (20Hz to 20kHz) to be cut or boosted.

4. Click on the lower slider (to the left) to open the filter type pop-up menu and select the desired filter type.
The “eq1” and “eq4” bands can act as parametric, shelving or high/low-pass filters, while “eq2” and “eq3” will always be parametric filters.

5. Set the Q value with the lower slider (to the right).
This determines the width of the affected frequency range. Higher values give narrower frequency ranges.

6. If needed, you can activate and make settings for up to four modules.

- Note that you can edit the values numerically as well, by clicking in a value field and entering the desired gain, frequency or Q value.

Using the curve display

When you activate EQ modules and make settings, you will see that your settings are automatically reflected in the curve display above. You can also make settings directly in the curve (or combine the two methods any way you like):

1. To activate an EQ module, click in the curve display.
This adds a curve point and one of the modules below are activated.

2. Make EQ settings by dragging the curve point in the display.
This allows you to adjust gain (drag up or down) and frequency (drag left or right).

3. To set the Q parameter, press [Shift] and drag the curve point up or down.
You will see the EQ curve become wider or narrower as you drag.

- You can also restrict the editing by pressing [Ctrl]/[Command] (sets gain only) or [Alt]/[Option] (sets frequency only) while you drag the curve point.

4. To activate another EQ module, click somewhere else in the display and proceed as above.

5. To turn off an EQ module, double-click its curve point or drag it outside the display.

6. To mirror the eq curve on the x axis, click the button to the left of the curve display.

EQ bypass

Whenever one or several EQ modules are activated for a channel, the EQ button will light up in green in the mixer channel strip, Inspector (Equalizer and Channel sections), Track list and Channel Settings window (top right corner of the EQ section).

You can also bypass all EQ modules. This is useful, as it allows you to compare the sound with and without EQ. Proceed as follows:

- In the mixer, the Track list and in the Channel section in the Inspector, click the EQs state button so that it turns yellow.
To deactivate EQ Bypass, click the button again, so that it turns green again.

- In the Inspector (Equalizers tab) and in the Channel Settings window, click the Bypass button (next to the EQ button) so that it turns yellow.
Click again to deactivate EQ Bypass mode.

EQ bypass in the mixer, the Channel Settings window and in the Inspector.

EQ reset

On the preset pop-up menu in the Channel Settings window and in the Inspector, you will find the Reset command. Holding down [Alt]/[Option] and clicking this will turn off all EQ modules and reset all EQ parameters to their default values.

Using EQ presets

Some useful basic presets are included with the program. You can use them as they are, or as a starting point for further "tweaking".

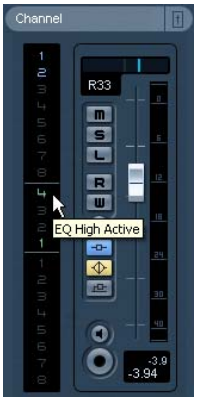
- To call up a preset, pull down the presets pop-up menu in the Channel Settings window or in the Inspector and select one of the available presets.
- To store the current EQ settings as a preset, select "Store Preset" on the presets pop-up menu and enter the desired name for the preset in the dialog that appears.
- To rename the selected preset, select "Rename Preset" on the pop-up menu and enter a new name.
- To delete the selected preset, select "Remove Preset" on the pop-up menu.

⇨ You can also apply EQ (and Inserts) settings from Track presets, see "Inserts and EQ settings from track presets" on page 337.

EQ in the channel overview

If the "Channel" section is selected in the Inspector or the "Overview" view mode is selected in the extended mixer, you will get an overview of which EQ modules, insert effects and effect sends are activated for the channel.

By clicking the respective indicator (1 to 4), you can turn the corresponding EQ module on or off.



The channel overview in the Inspector.

The option "Use Nuendo 3 EQ settings as default"

In the Preferences (VST page) you will find the option "Use Nuendo 3 EQ settings as default". When you activate this option, the EQ settings from the previous program version will be used by default. This means that when you create a new track, the four EQ modules will be set to the EQ band types they had in Nuendo 3:

This EQ module…	…will be set to
EQ1	Low Shelf 1
EQ2	Parametric 1
EQ3	Parametric 1
EQ4	High Pass 1

Copying settings between audio channels

It is possible to copy all channel settings for an audio channel and paste them to one or several other channels. This applies to all audio-based channel types. For example, you can copy EQ settings from an audio track and apply these to a group or VST Instrument channel, if you want them to have the same sound.

Proceed as follows:

1. In the mixer, select the channel you want to copy settings from.

You can also select channels with the Channel Select pop-up menu – see "Changing channels in the Channel Settings window" on page 137.

2. Click the "Copy Selected Channel Settings" button on the common panel.

3. Select the channel(s) you want to copy the settings to and click the "Paste Settings to Selected Channels" button (below the "Copy First Selected Channel Settings" button).

The settings are applied to the selected channel(s).

- You can copy channel settings between different types of channels, but only those channels will be used for which corresponding settings are available in the target channel:
  - For example, as input/output channels don't have send effects, copying from them will leave the Sends settings in the target channel unaffected.
  - Also, in case of Surround Sound, for example, any Insert effects routed to surround speaker channels will be muted, when the settings are pasted to a mono or stereo channel.

Initialize Channel and Reset Mixer

The Initialize Channel button can be found at the bottom in the Control Strip section of the Channel Settings window (if this section is not shown in the Channel Settings window, open the context menu and select "Control Strip" on the Customize View submenu). Initialize Channel resets the selected channel to the default settings.

Similarly, the mixer common panel holds a Reset Mixer/Reset Channels button – when you click this, you will be asked whether you want to reset all channels or just the selected channels.

The default settings are:

- All EQ, Insert and Send effect settings are deactivated and reset.
- Solo/Mute is deactivated.
- The fader is set to 0dB.
- Pan is set to center position.

Changing the meter characteristics

In the Mixer context menu, opened by right-clicking anywhere on the mixer panel, there is a submenu named "Global Meter Settings". Here you can make settings for the preferred meter characteristics, with the following options:

- If "Hold Peaks" is activated, the highest registered peak levels are "held" and are shown as static horizontal lines in the meter.

Note that you can turn this on or off by clicking in any audio level meter in the mixer.

Hold is activated. The highest registered peak is displayed in the meter.

- If “Hold Forever” is activated, the peak levels will remain until meters are reset (by clicking the numerical peak display below the meter).
If “Hold Forever” is off, you can specify for how long the peak levels will be held with the parameter “Meters’ Peak Hold Time” in the Preferences (VST–Metering page). The peak hold time can be between 500 and 30000ms.

- If “Meter Input” is activated, meters will show input levels for all audio channels and input/output channels.
Note that the input meters are post input gain.

- If “Meter Post-Fader” is activated, meters will show post-fader levels.
This is the default setting for channels in the mixer.

- There is also a “Meter Post-Panner” mode.
This is similar to “Meter Post-Fader”, but the meters will reflect pan settings as well.

- If “Fast Release” is activated, the meters respond very quickly to level peaks. If “Fast Release” is deactivated, the meters respond more like standard meters.
You can set the time it takes for the meters to “fall back” in the Preferences (VST–Metering page).

Using group channels

You can route the outputs from multiple audio channels to a group. This enables you to control the channel levels using one fader, apply the same effects and equalization to all of them etc. To create a group channel, proceed as follows:

1. Select Add Track from the Project menu and select “Group Channel” from the submenu that appears.

2. Select the desired channel configuration and click OK.
A group channel track is added to the Track list and a corresponding group channel strip is added to the mixer. By default the first group channel strip is labeled “Group 1”, but you can rename it just like any channel in the mixer.

3. Pull down the Output routing pop-up for a channel you want to route to the group channel, and select the group channel.
The output of the audio channel is now redirected to the selected group.

4. Do the same for the other channels you wish to route to the group.

⚠ You can select a group channel as an Input for an audio track, e.g. to record a downmix of separate track outputs routed to a group (see “Recording from busses” on page 69).

Settings for group channels

The group channel strips are (almost) identical to audio channel strips in the mixer. The descriptions of the mixer features earlier in this chapter apply to group channels as well. Some things to note:

- You can route the output of a group to an audio channel (see “Recording from busses” on page 69), to an output bus or to another group with a higher number.
You cannot route a group to itself. Routing is done with the Output Routing pop-up menu in the Inspector (select the subtrack for the Group in the Track list) or in the Routing section at the top of each channel strip.

- There are no Input Routing pop-ups, Monitor buttons or Record Enable buttons for group channels.
This is because inputs are never connected directly to a group.

- Solo functionality is automatically linked for channels routed to a group and the group channel itself.
This means that if you solo a group channel, all channels routed to the group are automatically soloed as well. Similarly, soloing a channel routed to a group will automatically solo the group channel.

- Mute functionality depends on the setting “Group Channels: Mute Sources as well” in the Preferences (VST page).
By default, when you mute a group channel no audio will pass through the group. However, other channels that are routed directly to that group channel will remain unmuted. If any of those channels have aux sends routed to other group channels, FX channels or output busses, those will still be heard.
If the option “Group Channels: Mute Sources as well” is activated in the Preferences (VST page), muting a group channel will cause all other channels directly routed to it to be muted as well. Pressing mute again

will unmute the group channel and all other channels directly routed to it. Channels that were muted prior to the group channel being muted will not remember their mute status and will be unmuted when the group channel is unmuted.

⚠ The option “Group Channels: Mute Sources as well” does not affect how mute automation is written. Writing mute automation on a group channel only affects the group channel and not channels routed to it. When writing the automation, you will see the other channels being muted when this option is activated. However, upon playback, only the group channel will respond to the automation.

One application of group channels is to use them as “effect racks” – see the chapter “Audio effects” on page 168.

About output busses

Nuendo uses a system of input and output busses which are set up using the VST Connections dialog. This is described in the chapter “VST Connections: Setting up input and output busses” on page 10.

Output busses let you route audio from the program to the outputs on your audio hardware.

Routing audio channels to busses

To route the output of an audio channel to one of the active busses, proceed as follows:

1. Open the mixer.
2. Make sure the input/output settings panel is visible – see “Normal vs. Extended channel strips” on page 126.
3. Pull down the Output Routing pop-up menu at the top of the channel strip and select one of the busses.
This pop-up menu contains the output busses configured in the VST Connections window, as well as available group channels (provided that the busses and groups are compatible with the speaker configuration for the channel – see “Routing” on page 14).

You can also make routing settings in the Inspector.

For details on routing surround channels, see “Surround in the mixer” on page 205.

Viewing the output busses in the mixer

Output busses are shown as output channels in a separate pane to the right in the mixer. You show or hide this pane by clicking the Hide Output Channels button in the mixer’s common panel to the left:

Each output channel resembles a regular audio channel strip. Here you can do the following:

- Adjust master levels for all configured output busses using the level faders.
- Adjust input gain and input phase of the output busses.
- Add effects or EQ to the output channels (see the chapter “Audio effects” on page 168).
- Create Sends that can be routed to other Output channels as long as they are to the right of the selected Output channel in the mixer. This can be useful when creating quick headphone mixes from the current monitor mix. This is done by creating a send from the current monitor Output bus to another Output bus that is routed to a headphone amplifier.

MIDI specific procedures

This section describes basic procedures for MIDI channels in the mixer.

Selecting what to show in the extended MIDI channel strip

When using the extended channel strip view options (see “Normal vs. Extended channel strips” on page 126), the upper panel can be set to show different views for each MIDI channel strip. You select what to display for each channel by using the View options pop-up menu at the top of each channel strip. The following views are possible:

- The MIDI insert effects.

MIDI inserts can also be found in the Inspector and the Channel Settings window for MIDI channels. How to use MIDI insert effects is described in the chapter “MIDI realtime parameters and effects” on page 342.

- The MIDI send effects.

The sends can also be found in the Inspector and the Channel Settings window for MIDI channels. How to use MIDI send effects is described in the chapter “MIDI realtime parameters and effects” on page 342.

- The “Meter” option shows large level (velocity) meters in the extended panel.

- You can also select the “Overview” option – this shows a graphic overview of which insert effect slots and effect sends are activated for the channel.

You can click the indicators to turn the corresponding slot/send on or off.

- The “User Panel” option allows you to import MIDI device panels – this is described in the separate PDF document “MIDI Devices”.

- Selecting “Empty” will display a blank panel in the extended strip.

- By selecting from the View options pop-up on the common panel, you can set the view for all channels in the mixer.

Selecting EQ or Surround Panners (which apply to audio channels only) will not change the view for MIDI channels. Selecting inserts or send effects from the common panel will change the view for all channel types.

Using Channel Settings

For each MIDI channel strip in the mixer (and MIDI track in the Track list or the Inspector), there is an Edit (“e”) button.

Clicking this opens the MIDI Channel Settings window. By default, this window contains a duplicate of the mixer channel strip, a section with four MIDI inserts and a section with four MIDI send effects.

You can customize the Channel Settings window, by showing/hiding the different panels and/or by changing their order:

- To specify, which panels should be shown/hidden, right-click in the Channel settings window, and activate/deactivate the respective options on the Customize View submenu on the context menu.
- To change the order of the panels, select “Setup” on the Customize View pop-up menu and use the “Move up” and “Move Down” buttons in the dialog that opens.

Every MIDI channel has its own channel settings.

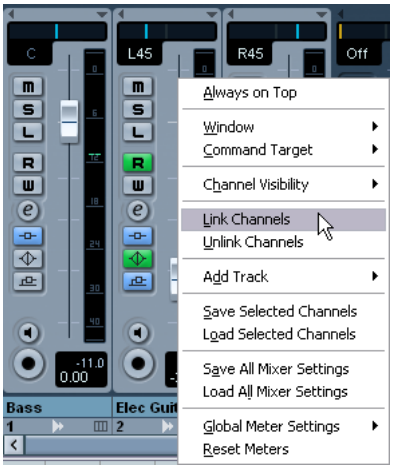
The MIDI Channel Settings window.

Utilities

Link/Unlink channels

This function is used to “link” selected channels in the mixer so that any change applied to one channel will be mirrored by all channels in that group. You can link as many channels as you like, and you can also create as many groups of linked channels as you like. To link channels in the mixer, proceed as follows:

1. Press [Ctrl]/[Command] and click on all the channels you want to link.
[Shift]-clicking allows you to select a continuous range of channels.



2. Right-click somewhere on the gray mixer panel.
The Mixer context menu appears.

3. Select “Link Channels” from the context menu.

- To unlink channels, select one of the linked channels and select “Unlink Channels” from the Mixer context menu.
The channels are unlinked. Note that you do not need to select all the channels that are linked, only one of them.

⇨ It is not possible to remove individual channels from Link status.
To make individual settings to a linked channel, press [Alt]/[Option] when changing the setting.

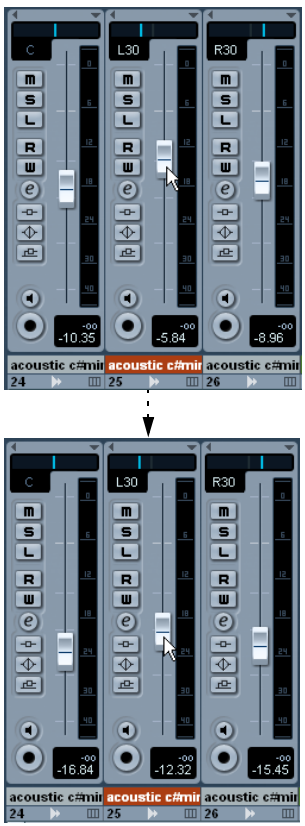
What will be linked?

The following rules apply for linked channels:

- Only level, mute, solo, select, monitor and record enable will be linked between channels.
Effect/EQ/pan/input and output routing settings are not linked.

- Any individual channel settings you have made before linking will remain until you alter the same setting for any of the linked channels.
For example, if you link three channels, and one of them was muted at the time you applied the Link Channel function, this channel will remain muted after linking. However, if you mute another channel all linked channels will be muted. Thus, the individual setting for one channel is lost as soon as you change the same parameter setting for any of the linked channels.

- Fader levels will be “ganged”.
The relative level offset between channels will be kept if you move a linked channel fader.



The three channels shown are linked. Pulling down one fader changes the levels for all three channels, but keeps the relative level mix.

▪ By pressing [Alt]/[Option], you can make individual settings and changes for channels that are linked.

⇨ Linked channels have individual automation subtracks. These are completely independent, and are not affected by the Link function.

The Window submenu

The Mixer context menu, opened by right-clicking anywhere on the Mixer window background, provides the Window submenu. Its options are handy for quickly switching to another open mixer window, showing/hiding the different mixer panes etc. It contains the following options:

▪ Show Routing View

Allows you to show/hide the topmost section of the mixer which contains the input/output routing settings.

▪ Show Extended View

Allows you to show/hide the middle section of the mixer, where you can display different settings for the channels (EQs, Send effects, etc.).

▪ Next Mixer

This displays the next mixer window (if you have several mixer windows open).

Saving mixer settings

⚠ Saving/Loading mixer settings does not apply to MIDI channels in the mixer – only audio-related channels (group, audio, instrument, effect return, VSTi and ReWire) are saved with this function!

It is possible to save complete mixer settings for selected or all audio channels in the mixer. These can later be loaded into any project. Channel settings are saved as mixer settings files. These have the Windows file extension ".vmx".

Right-clicking somewhere in the mixer panel or in the Channel Settings window brings up the Mixer context menu where the following Save options can be found:

▪ "Save Selected Channels" will save all channel settings for the selected channels.

Input/output routings are not saved.

▪ "Save All Mixer Settings" saves all channel settings for all channels.

When you select any of the above options, a standard file dialog opens where you can select a name and storage location on your disk for the file.

Loading mixer settings

Load Selected Channels

To load mixer settings saved for selected channels, proceed as follows:

1. Select the same number of channels in the new project to match the number of channels you saved settings for in the previous project.

For example, if you saved settings for six channels, select six channels in the mixer.

▪ Mixer settings will be applied in the same order as they were in the mixer.

Thus, if you save settings from channels 4, 6 and 8 and apply these settings to channels 1, 2 and 3, the settings saved for channel 4 would be applied to channel 1, the settings saved for channel 6 to channel 2 and so on.

2. Right-click the mixer panel to open the context menu, and select "Load Selected Channels".

A standard file dialog appears, where you can locate the saved file.

3. Select the file and click "Open".

The channel settings are applied to the selected channels.

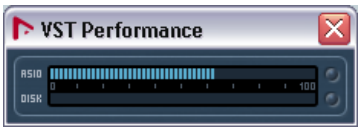
⚠ If you choose to apply mixer settings to fewer channels than you saved, the order of the saved channels in the mixer applies – i.e. the saved channels that are "left over" and not applied will be the channels with the highest channel numbers (or furthest to the right in the mixer).

Load All Mixer Settings

Selecting “Load All Mixer Settings” from the context menu allows you to open a saved mixer settings file, and have the stored settings applied to all channels for which there is information included in the file. All channels, master settings, VST Instruments, sends and master effects will be affected.

⇨ Please note that if the saved mixer settings were for 24 channels, for example, and the mixer you apply it to currently contains 16 channels, only the settings for channels 1 to 16 will be applied – this function will not automatically add channels.

About the VST Performance window



The VST Performance window is opened from the Devices menu. It indicates the current load on the CPU and the hard disk transfer rate. It is recommended that you check this from time to time, or keep it always open. Even though you have been able to activate a number of audio channels in the project without getting any warning, you may run into performance problems when adding EQ or effects.

- The upper bar graph shows the CPU (processor) load.

If the red Overload indicator lights up, you need to decrease the number of EQ modules, active effects and/or audio channels playing back simultaneously.

- The lower bar graph shows the hard disk transfer load.

If the red overload indicator lights up, the hard disk is not supplying data fast enough to the computer. You may need to reduce the number of tracks playing back by using the Disable Track function (see “About track disable/enable” on page 62). If this doesn’t help, you need a faster hard disk. Note that the overload indicator may occasionally blink, e.g. when you locate during playback. This does not indicate a problem, but happens because the program needs a moment for all channels to load data for the new playback position.

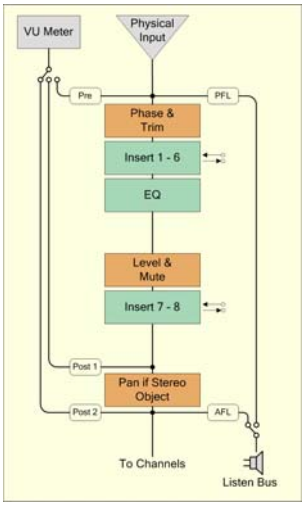
⇨ The CPU and Disk load meters can also be shown on the Transport panel (as “Performance”) and on the Project window toolbar (as “Performance Meter”).

There they are shown as two miniature vertical meters (by default at the left side of the panel/toolbar).

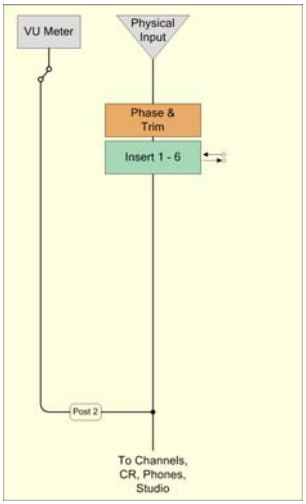
VST Mixer Diagrams

Input Objects

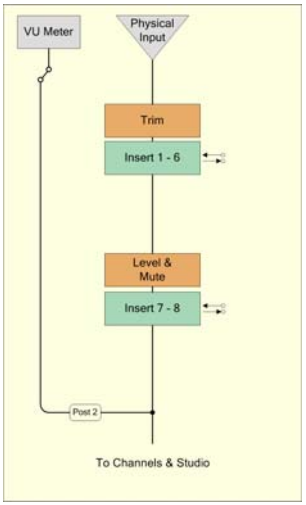
Input Channel



External Input Channel

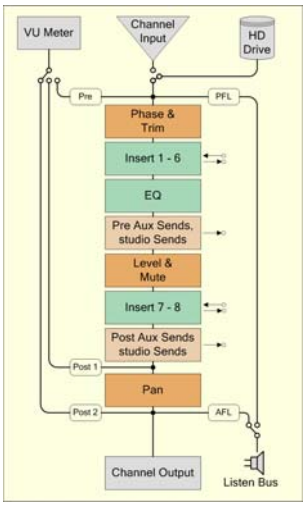


Talkback Channel

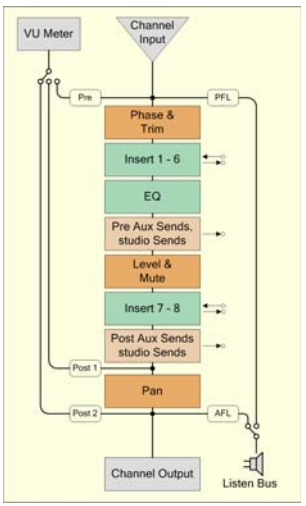


Channel Objects

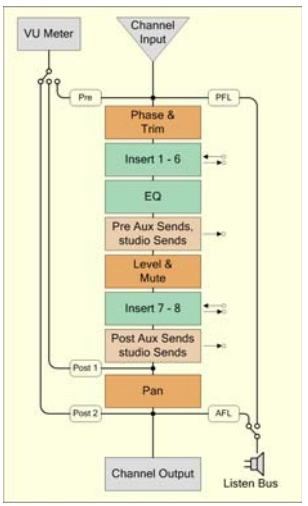
Audio Channel



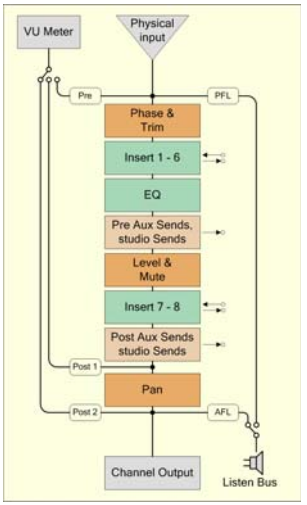
ReWire Channel



VSTi Channel

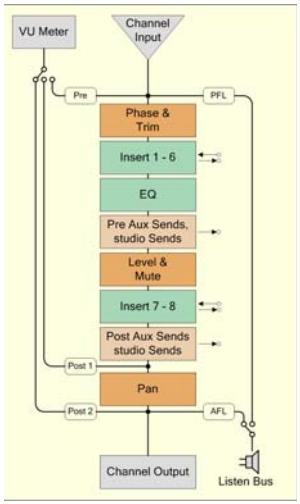


External Instrument

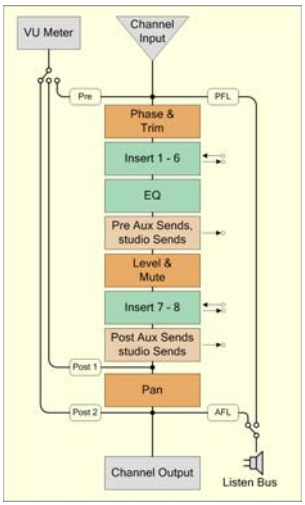


Summing Objects

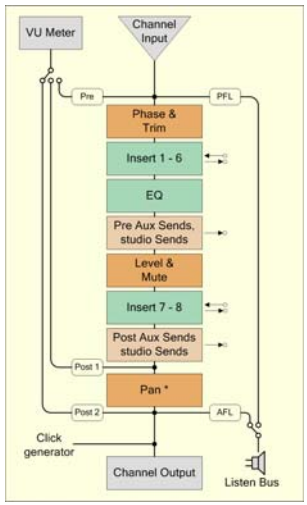
Group Channel



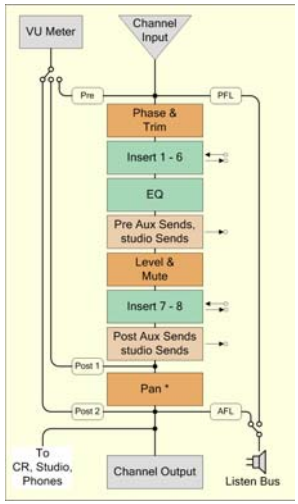
FX Channel



Output Bus

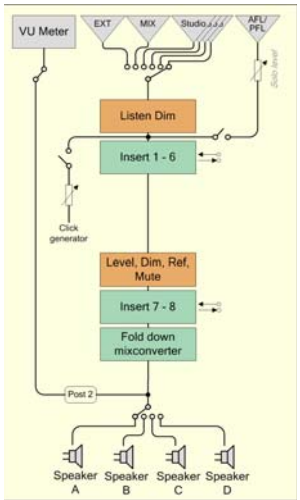


Main Mix Bus

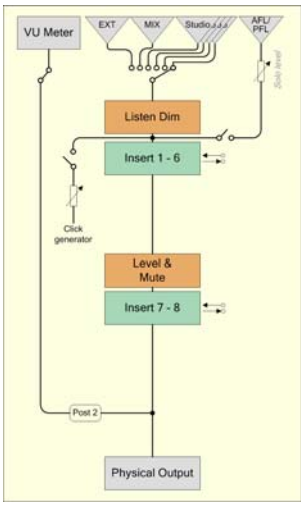


Control Room Objects

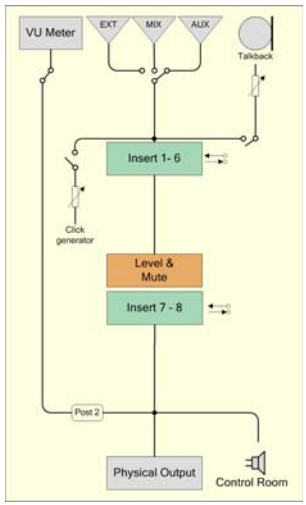
Control Room Channel



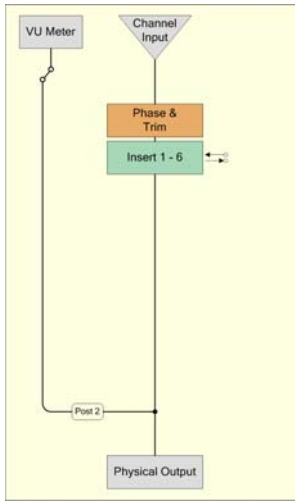
Phones Channel



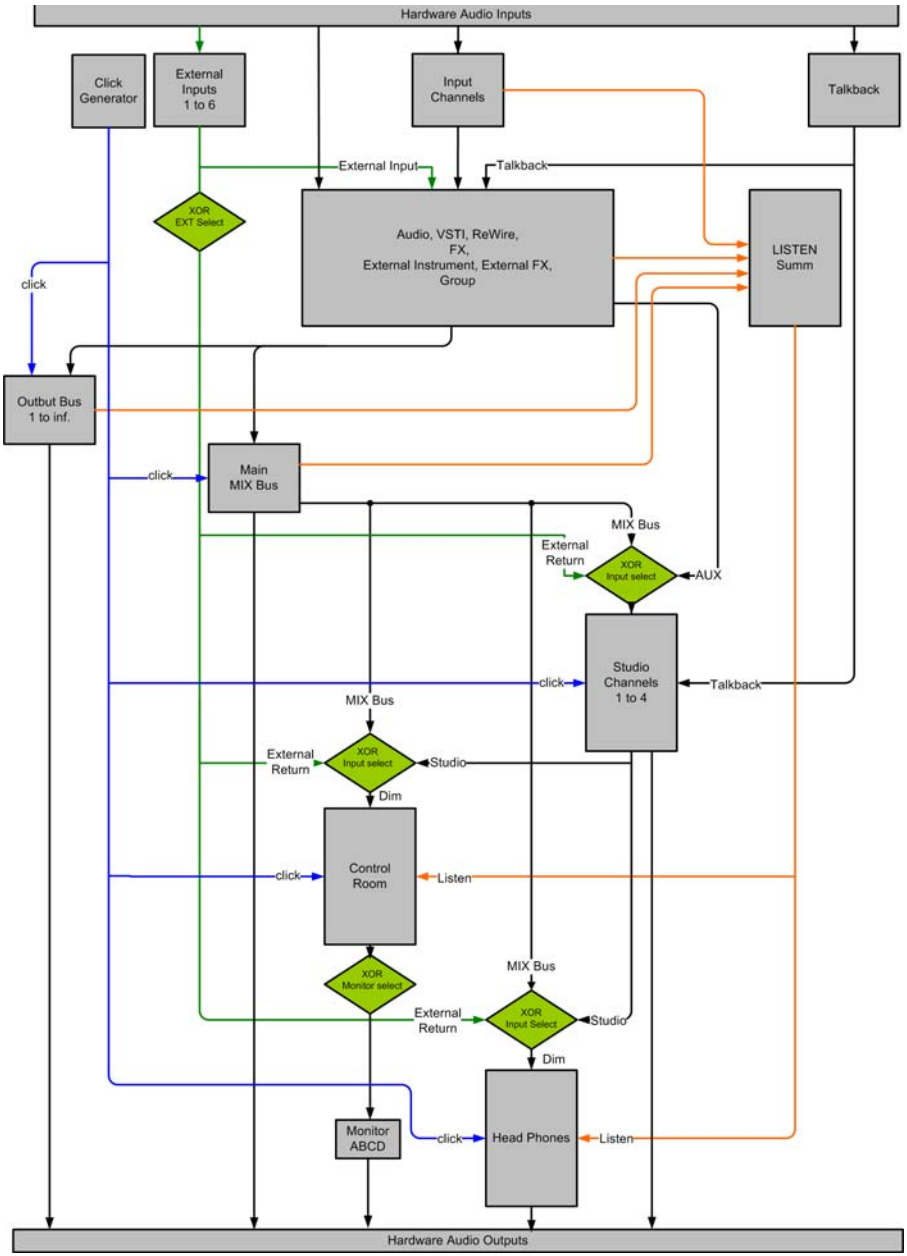
Studio Channel



Monitor



Overall


Hardware Audio Inputs
Click Generator
External Inputs 1 to 6
Input Channels
Talkback
External Input
Talkback
XOR EXT Select
Audio, VSTI, ReWire, FX, External Instrument, External FX, Group
LISTEN Summ
click
Outbut Bus 1 to inf.
click
Main MIX Bus
MIX Bus
External Return
XOR Input select
AUX
Studio Channels 1 to 4
click
Talkback
MIX Bus
External Return
XOR Input select
Studio
Dim
Control Room
click
Listen
XOR Monitor select
MIX Bus
External Return
XOR Input Select
Studio
Dim
Monitor ABCD
click
Head Phones
Listen
Hardware Audio Outputs

12

Control Room

Background

Large console Monitoring sections

In traditional analog studios, the audio console maintained control over every audio signal in the studio, including the control room monitors, headphone systems, external 2-track tape machines and communications such as the talk-back system.

The console itself provided a means of creating multiple cue mixes for performers in the studio. Using available aux sends, the engineer could create multiple cue mixes for the various performers, each one having a unique mix tailored for that person or group of performers.

With the advent of the DAW, many of the functions of the console started being performed inside the audio software, allowing for more flexibility and instant recall of any setting. In many studios, the console sat idle except for adjusting the playback level of the speakers, switching to monitor external devices and routing signals to headphones and other cue mix playback systems.

Smaller hardware units have been made to replace the monitoring section using a simple volume knob with speaker and input switches. Some even include a talkback system and headphone amplifiers.

Surround sound

With more and more surround recording and mixing being performed in the DAW environment, the needs of the monitoring section have become magnified. Surround speaker setups must be able to work with smaller, stereo speakers and even mono speaker systems. Switching back and forth between them can become quite complicated. Also, the ability to perform downmixes of multi-channel audio is now needed on a regular basis for many audio professionals.

Virtual Control Room solution

Nuendo has now added the functionality of the control room monitoring section of large format analog consoles to the virtual audio environment of VST with the creation of the Control Room Mixer and Control Room Overview windows.

The concept

The concept behind creating the Control Room features was to divide the studio environment into the performing area (studio) and the engineer/producer area (control room) common to traditional studios. Previously, an analog console or some method of speaker control and monitor routing was necessary to provide this functionality to the DAW environment.

Nuendo now provides all the functionality of the analog console's monitoring section, along with many more features, in the virtual world where flexibility and instant recall are expected.

⚠ Please note that when we speak of "the Mixer" in this chapter we refer to the Control Room Mixer window. The normal Nuendo Mixer is referred to as the "Project Mixer". For information about the Project mixer, see the chapter "The mixer" on page 122.

Control Room features

The following features are available for the Control Room Mixer:

- Support for up to four sets of monitors with various speaker configurations from mono up to 10.2 cinema speaker systems.
- Dedicated Headphone output.
- Support for up to four discrete cue mix outputs called "Studios".
- Dedicated Talkback channel with flexible routing and automatic record defeat.
- Support for up to six external inputs with configurations up to 10.2 surround.
- Click track routing and level control to all Control Room outputs.
- Flexible Listen Bus options with the Listen Dim setting that allows Listen-enabled tracks to be heard in context with the whole mix.
- Listen Bus Enabling on both Control Room and Headphone outputs.
- User-definable downmix settings using the MixConvert plug-in for all speaker configurations.
- Individual speaker soloing for all speaker configurations.
- Multiple inserts on each Control Room channel for metering and surround de-coding among other possibilities.
- Monitor Dim function with adjustable level.
- User-defined Calibrated Monitor level for post-production mixing in a calibrated environment.

- Adjustable Input Gain and Input Phase on all external inputs and Speaker outputs.
- Full-sized meters on every Control Room channel.
- Support for up to four aux sends (Studio Sends) for creation of discrete cue mixes for performers. Each Studio output has its own cue mix.
- The ability to disable the Control Room Section when working with an external monitoring solution or console.
- Full support for the monitoring section functionality of the ID control surface.

Configuring the Control Room

The Control Room features are configured in several locations within Nuendo.

- The VST Connections window has a tab labelled “Studio” in which the hardware inputs and output are defined for the Control Room channels.
- In the Devices menu you will find the Control Room Overview that displays a visual overview of the Control Room channels and signal flow.
- In the Devices menu you will find the Control Room Mixer which allows operation of the Control Room features.
- In the Preferences (VST–Control Room page) you will find some settings for altering the Control Room preferences.

VST Connections Studio tab

The Studio tab of the VST Connections window is where you configure the inputs and outputs for the Control Room Mixer. For more information, see the chapter “VST Connections: Setting up input and output busses” on page 10.

Control Room channels

There are five types of channels that you can create, each defining either an input or output of the Control Room Mixer. As more channels are created, the Control Room Mixer expands to display controls for each channel.

- Monitors

Each Monitor channel is a set of outputs that are connected to monitor speakers in the Control Room. Each Monitor can be configured for a mono, stereo or up to a 10.2 surround speaker configuration. Up to four Monitors can be created, each with a different speaker configuration.

- Phones

The Phones channel is used by the engineer in the control room for checking cue mixes and as another option for listening to the mix or external inputs on a pair of headphones. It is not intended for cue mixes that performers use while recording. Only one stereo Headphone channel is available.

- Studios

Studio channels are intended for sending cue mixes to performers in the studio during recording. They have talkback and click functions and can monitor the main mix, external inputs or a dedicated cue mix. Up to four Studios can be created allowing four discrete cue mixes for performers.

- External inputs

External inputs are for monitoring external devices such as CD players, multi-channel recorders or any other audio source. Up to six external inputs can be created with various configurations from mono up to 10.2 surround.

- Talkback

The Talkback is a mono input used for a communications system between the control room and performers in the studio. Only one mono Talkback channel is available.

Control Room channels cannot share hardware inputs or outputs with external FX or external instruments, as defined in the VST Connections window (see “Connecting the external effect/instrument” on page 18). As you create connections for each channel, only those device ports that have not been used for external FX or instruments will be available. However, Control Room channels and inputs and outputs can share the same device ports.

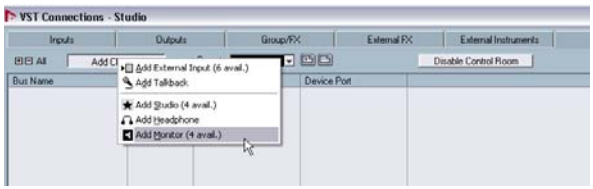
A great deal of confusion can result if outputs and Control Room Monitor channels share the same device ports. As a starting point, set all the outputs to “Not Assigned” while the Control Room is set up. By default, one stereo Monitor channel is created after installing Nuendo.

⚠ The Control Room Mixer is designed to display information and controls only for the channels you have defined in the VST Connections dialog. For example, if you have not defined any Studio channels, they will not appear in the Control Room Mixer. The Control Room Overview displays all the possible channels but only highlights the ones that have been defined. To see all the available controls in the Control Room Mixer, start by creating the maximum amount of channels in the VST Connections Studio tab.

Creating a Control Room channel

To create a new channel, click on the Add Channel button in the Studio tab of the VST Connections window. A pop-up menu lists all available channels along with how many of each type are available. Select the type of channel you wish to create and a dialog will appear allowing you to choose the configuration of the channel (stereo, 5.1, etc.).

⚠ If you are adding the Talkback or Phones channels, there are no channel configuration choices since Talkback is mono only and Phones are stereo only. Also, Studio channels can either be mono or stereo only.



The Studio tab of the VST Connections window with several Control Room Channels created

After clicking OK, the new channel will appear in the VST Connections window. You can now connect it to any available device port using the "+" buttons and the context menu in the Device Port column. An audio device must be selected and then a device port must be chosen for each audio path. You assign device ports to channels in the same fashion as assigning any VST connection.

⚠ Control Room channels can share device ports with each other. This can be helpful if you use the same speakers as a stereo pair and also as the left and right channels of a surround speaker configuration. Switching between monitors that share device ports will be seamless, providing any downmix of multi-channel audio to stereo if needed. Only one monitor set can be active at a time.

Monitors

Create a Monitor channel for every set of speakers in your studio. A typical post-production studio could have one set of 5.1 surround speakers, another stereo set of speakers and even a single, mono speaker for checking balances for mono broadcast. The Control Room Mixer will allow you to switch speakers easily. Each set of Monitors can have its own custom downmix settings, input gain and input phase adjustments.

Phones

Create a Phones channel if you intend to listen to headphones in the control room. The Phones channel is not intended for use by performers in the studio. It is designed for the engineer to quickly listen to any source in the studio, including the four cue mixes, as a reference.

⚠ The Phones channel is stereo only.

Studios

Create a Studio channel for each cue mix you wish to create for performers in the studio. For example, if you have two available headphone amplifiers for performers to use, create two Studio channels, one for each headphone mix. There are four available Studio channels.

⚠ Studio channels can either be mono or stereo.

External inputs

Create external input channels for every playback device you wish to be able to monitor in the Control Room. There are six available external inputs with channel configurations from mono up to 10.2 surround. Use external inputs to quickly listen to CD players, master recorders, or other workstations.

⚠ If you select external inputs as input source of an audio channel, you can record them. In this case, you will not need to assign the device ports to the input channel (see "Routing" on page 14).

Talkback

Create a Talkback channel if you have a microphone in the control room available for communication with performers in the studio. The Talkback channel can be routed to each Studio channel with variable levels in order to optimize communications between the control room and performers.

Additionally, the Talkback is available as a possible input source for audio tracks. You can record from the Talkback just like any other input.

⚠ Inserts are available on the Talkback and all other Control Room channels. A compressor/limiter can be inserted on the Talkback channel to ensure that erratic levels do not bother performers and clear communication with everyone is possible.

Disabling the Control Room

Once you have created all the channels for your studio configuration, the Control Room functions are available for use. If you need to use Nuendo without the Control Room functions, you can simply press the Disable Control Room button on the Studio tab of the VST Connections window. Any channels you have created will be saved and when you enable the Control Room again, that configuration will be reloaded.

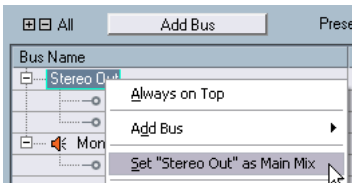
You can also create presets for the Control Room configuration in the same manner as for inputs and outputs, see “Other bus operations” on page 14.

⚠ If you disable the Control Room, make sure that there are device ports assigned to the default output bus “Main Mix” on the outputs tab. Otherwise, you will not hear any sound from the Main Mix.

Outputs – Main Mix

For the Control Room to function correctly, the Main Mix in the Outputs tab must be assigned to the set of outputs that actually contains your final mix signal. If you only have one output bus, it will be the Main Mix by default.

If you have more than one output bus defined, you can change which one is the Main Mix by right-clicking on the name of the output and selecting “Set “Out” as Main Mix”. The Main Mix is marked by a small speaker icon to the left of its name.

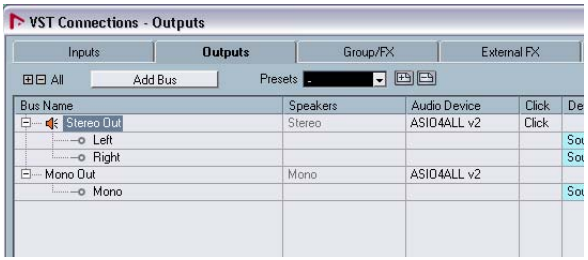


The VST Connections Output tab showing one bus as the Main Mix marked by the small speaker icon.

outputs other than the Main Mix are not routed through the Control Room Mixer. They can, however, share the device ports of Studio and Monitor channels in the Control Room.

Output click enabling

There may be a situation when you want the click to be routed always to a specific output bus, regardless of the actual Control Room settings, or indeed when the Control Room is disabled. In these cases, enable the click on specific outputs using the Click column on the Outputs tab in the VST Connections window.



The Output tab showing two stereo outputs, the Main Mix and a second output that is click enabled.

⚠ The click will only be heard in outputs that are assigned to device ports. Be aware that the click can also be routed to device ports using the Control Room features.

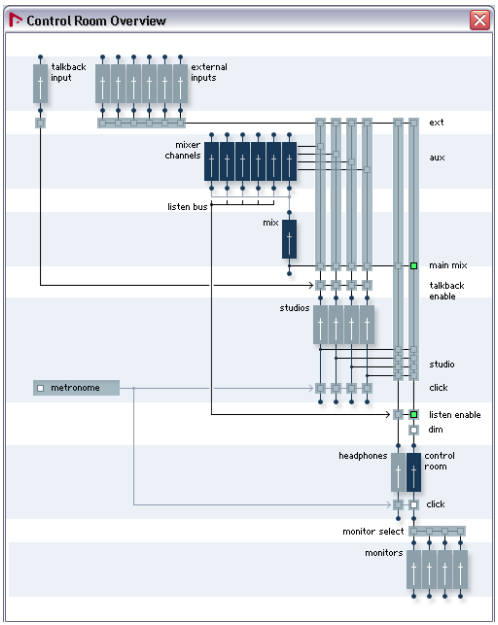
⚠ Sharing audio device ports between outputs and Control Room channels can cause confusing behavior and possible overload of those ports without any indication from Nuendo. It is advisable to disconnect all outputs from all device ports when first configuring the Control Room.

⚠ Be aware that some audio interfaces allow very flexible routing within the hardware itself. Certain routing configurations could cause overloads and possible damage to speaker equipment. Consult the hardware documentation for further information.

The Control Room Overview

You can access the Control Room Overview from the Devices menu. The Control Room Overview is designed to display the current configuration of the Control Room. The window shows all possible channels, with active channels highlighted once they have been created in the VST Connections window. Channels that are grayed out have not been defined in the VST Connections window.

The Control Room Overview allows you to see the signal flow through the Control Room Mixer. All the routing functions of the Control Room Mixer are duplicated in the Overview.



The Control Room Overview

Open the Control Room Mixer and the Control Room Overview windows side by side. As you operate the controls in the Mixer you will see the various pale green squares light up in the Overview, indicating changes in signal flow. You can also click the squares in the Overview and watch the controls in the Mixer reflect the changes in signal flow.

The Control Room Mixer

The Control Room Mixer is where you access all the features of the Control Room. The Control Room Mixer can be resized to accommodate more channels and to display more controls. When you open the window for the first time, it will show none of the extendable panels.

The Control Room Mixer

Configuring the Control Room Mixer

In order to display more controls in the Control Room Mixer, the small arrows at the lower left and right corners can be clicked to open or close the extended speaker controls on the right (“Right Strip”) and the External Input and Talkback controls on the left (“Left Strip”).

The arrow at the upper right corner of the Control Room Mixer extends the Mixer vertically to display meters and inserts (“Extended view”). A second arrow appears above the inserts and meter display. Extending the Mixer using this arrow exposes the Input Gain and Input Phase switch, channel configuration and name for each channel (“Routing view”).

The different Control Room Mixer panels are handled in the same way as the Project Mixer panels, see "Configuring the mixer" on page 126.

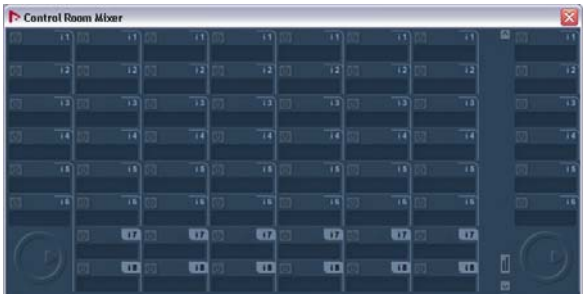
⚠ You can also use the Window submenu on the Control Room Mixer context menu to show/hide the different panels, just as in the Project Mixer.

Control Room inserts and meters

When the Control Room Mixer displays the Extended View, the meters become visible. These meters look and function the same way as the ones in the Project Mixer.

Pressing the small meter icon at the center right side of the mixer will change the view to display inserts. Alternatively, these can also be displayed by deactivating the Show Meters option on the Window submenu of the Control Room Mixer context menu.

Each Control Room channel has a set of inserts configured as six pre-fader and two post-fader inserts. External inputs and Monitor channels only have the six pre-fader inserts.



The Control Room Mixer's Extended View displaying channel inserts

If you do not wish to see full sized meters but still want some indication of signal activity, activate the option "Signal Presence Indicators" in the Preferences (VST–Control Room page). They will be displayed next to the input selection buttons and will indicate signal presence for all inputs.

The Control Room Mixer with all Signal Presence indicators lit up.

Inserts for external inputs

Each external input has its own set of six inserts. Selecting each external input by clicking the button next to its name at the left of the Mixer window will display the inserts associated with that channel in the extended view.

Inserts for the Talkback channel

The Talkback channel has a separate set of eight inserts. In order to view and adjust them, the Talkback must be enabled via the TALK button located to the lower right of the Control Room Mixer. Click once on the Talkback to latch it on. The inserts for external inputs will now display the Talkback inserts. Once the Talkback is disabled, the view will revert back to external input inserts.

⚠ You can easily identify the inserts for the Talkback since they have six pre-fader and two post-fader inserts while the external inputs only have six pre-fader inserts. If the Control Room Mixer is fully expanded, the name displayed at the very top of the Mixer will reflect which channel is currently in the Extended View.

Monitor Inserts

Each Monitor channel has a set of six inserts. These inserts are all post Control Room fader level and are most useful for surround decoding or brickwall limiting to protect sensitive monitor speakers.

Each set of monitors has its own Input Phase and Input Gain settings available in the top section of the extended Control Room Mixer. In addition, there are speaker solo icons along with various soloing modes and speaker routing options in the Speaker Solo panel.

The Speaker Solo panel

⇨ Use the speaker solos to test your multichannel speaker system and ensure that the proper channels are routed to each speaker.

Just below the configuration display, all settings for automatic downmixing of multichannel sources are shown. There are four down-mix presets. Some will automatically configure themselves for the sets of monitors you have defined. Each preset is adjustable by accessing the MixConvert plug-in by clicking the small arrow icon above the downmix presets section.

Click here to open the MixConvert control panel.

The Down-Mix Presets section.

⚠ Automatic configuration of the downmix settings follows a logical path. For example, if you have defined one set of 5.1 monitors and another set of stereo monitors, Nuendo will create a 5.1 to stereo downmix preset and another downmix to mono. You can modify all the settings for each downmix preset using the MixConvert plug-in.

Control Room operations

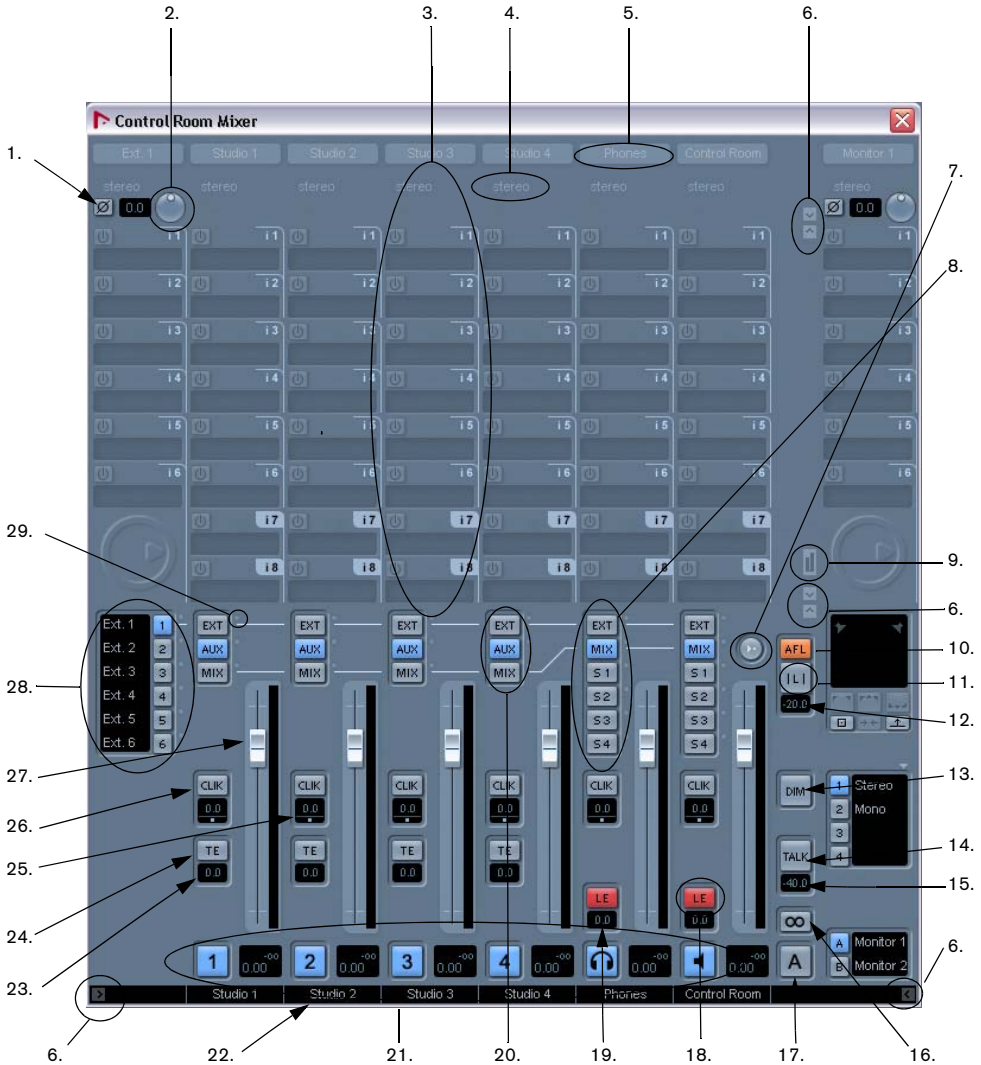
In traditional analog studios, the control room section of the console contained the most used set of controls in the whole studio. Often, the studio monitor level had all the markings rubbed off from so much use.

The need to constantly be able to switch monitoring sources, adjust the volume of monitors and route various cue mixes and other sources to headphone systems is the norm in most sessions. Meeting the needs of several performers in the studio plus a producer and the engineer becomes a constant task that requires flexibility and ease of operation. Communication between everyone must be flawlessly clear without intruding on the creativity of performers.

With all this in mind, the Nuendo Control Room Mixer is designed to fill those needs with a simple yet highly flexible solution. The virtual mixing environment of VST is the ideal solution to the varied needs of a control room matrix. With a virtual mixer, a high degree of customization and precise settings are possible with the ability to completely recall these settings at any time.

Control Room Mixer layout

The Control Room Mixer has a variety of controls, some that are similar to the Project Mixer and some that are unique to Control Room operations. The following diagrams show every control, followed by a brief description of what each control does.



1. Input Phase
Each external input and Monitor speaker output has an Input Phase reversal switch. When lit, all audio paths within the channel will have their phase reversed.

2. Input Gain
Each external input, Monitor speaker output and the Talkback input has an Input Gain control. When an external input or Monitor becomes active, the Gain settings will be recalled.

3. Channel Inserts
Each channel in the Control Room Mixer has inserts available. While most channels have six pre-fader and two post-fader inserts, the external inputs and Monitors only have six pre-fader inserts.

4. Channel Configuration
This displays the current configuration of audio paths in the channel, e.g. Stereo, 5.1, etc.

5. Channel Labels
This displays the name of the channel as defined in the VST Connections.

6. Expansion controls
There are several arrow buttons that open and close various panels of the Control Room Mixer. By default, all expandable panels are hidden.

7. Use Reference Level
When you click this button, the Control Room Level is set to the reference level set in the Preferences, e.g. a level for calibrated mixing environments such as film dubbing stages. Press [Alt]/[Option] and click on this button to set the Preferences reference level setting to the current Control Room level.

8. Control Room and Headphone Input Selectors
These buttons allow the selection of various input sources for the Control Room and Headphone channels. The choices are for External Input, Main Mix, or any one of the four Studio channels.

9. Show Meters/Inserts button
This allows you to switch between the display of Meters and Inserts for the extended Mixer view.

10. Listen Bus AFL/PFL
This button determines whether the source signals sent to the Listen bus are pre-fader (PFL) or post-fader (AFL).

11. Global Listen Defeat
When lit, this indicates that one or more channels in the Project Mixer are Listen enabled. Clicking on this button defeats Listen mode for all channels.

12. Listen DIM
This gain control adjusts the volume of the Main Mix when channels have been put in Listen mode. This allows you to keep Listen enabled channels in context with the Main Mix. If the Listen DIM is set to minus infinity, Listen enabled channels will be heard by themselves. Any other setting leaves the Main Mix on at a lower level.

13. DIM Enable
This turns the Control Room Level down by a preset amount (the default setting is -30 dB). This allows a quick reduction in monitor volume without disturbing the current monitor level. Clicking on the DIM button again returns the monitor level to the previous setting.

14. Talkback Enable
Click the Talk button to turn on the Talkback system, allowing communication between the control room and performers in the studio. There are two modes of operation: momentary mode used by clicking and holding the Talk button, and latch mode where clicking once turns the Talkback on until you click it again to turn it off.

15. Talkback DIM Level
When the Talkback is enabled, this control allows you to determine how much the output of all the channels in the Control Room Mixer is reduced. This prevents unwanted feedback. If the Talkback DIM level is set to 0dB, no change will occur in the Control Room channels.

16. Cycle Down-Mix Preset Selection
The Control Room allows four different Speaker down-mix settings for auditioning with various speaker configurations. Clicking this button cycles through the four down-mix presets. Various icons appear to show which preset is active.

17. Cycle Monitor Selection
Pressing this button changes the Monitor selection to the next available set. As Monitors are changed, so are the down-mix presets, Monitor inserts, Input Gain and Input Phase controls associated with that Monitor set.

18. Listen Bus Enable
This turns on Listen bus functions for either the Control Room or Headphone outputs. If this is not enabled, the Listen bus will not be routed to that channel.

19. Listen Bus Gain
This level adjustment determines how loud Listen bus signals are when routed to the Control Room or Headphone outputs. Clicking on the number pops up a fader control for adjustment.

20. Studio Input Selectors
For Studio Channels, the input choices are External Input, Aux (from Studio Sends) or Main Mix.

21. Activate Channel Buttons
These buttons turn each channel's output on or off. When lit, the channel is on.

22. Channel Labels
These labels reflect the names created in the VST Connections window.

23. Talkback Level
This pop-up fader controls the amount of Talkback signal fed to the output of each Studio.

24. Talkback Enable
In order for Talkback signals to be routed to a Studio, this button must be lit. Clicking on it turns it on or off. When Talkback Enable is deactivated, the Talkback DIM setting has no effect on this output.

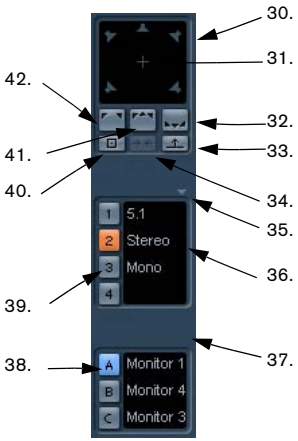
25. Metronome Mix
These level and pan controls determine how the Metronome will be heard in each channel. These controls are independent for each channel.

26. Metronome Enable
This determines whether click signals are sent to each channel. When lit, click signals will be heard in that output.

27. Channel Level Control
This is the main volume for each Control Room output. These faders do not affect recording input levels or the Main Mix level for exporting mixdowns.

28. External input switching
There are six available external inputs. These buttons determine which external input is currently being used. The names for each external input are displayed here as they were created in the VST Connections.

29. Signal Presence Indicators
In the Preferences dialog, there is the option to display these Signal Presence Indicators as a substitute for the full size meters.



The Monitor controls in the Control Room Mixer

30. Individual Speaker Solos
Each speaker icon is a solo button for that channel. [Shift]-clicking a speaker will solo all the speakers in that row (front or rear). [Ctrl]/[Command]-clicking on a speaker that is already soloed will mute that speaker and solo all other channels.

31. LFE Solo
The plus icon solos the LFE channel.

32. Solo Rear Channels
This solos all rear channels.

33. Listen to Rear Channels on Front Monitors
This button solos the rear channels and routes them to the front speakers.

34. Listen to Solo Channels on Center Monitor
When this button is enabled, all speakers that are soloed will be heard in the center channel if there is one in the configuration. If not (as with stereo) the soloed channel will be heard equally in both left and right speakers.

35. Edit Down-Mix
Clicking on this tab opens the MixConvert plug-in used to down-mix multichannel signals for monitoring.

36. Down-Mix Labels
This area displays the names of the four down-mix presets. You may click on a name to change it. A “?” appears when there is no preset defined for that down-mix.

37. Monitor Labels
This area displays the names of the four possible Monitors. The names are created in the VST Connections when you define a Monitor channel.

38. Monitor Selection
These buttons select the current Monitor set. Each Monitor has its own settings including down-mix preset, solo enables, inserts, Input Gain and Input Phase. These settings are automatically recalled when a Monitor is selected.

39. Down-Mix Preset Selection
These buttons select the down-mix preset for the current Monitor.

40. Speaker Solo Defeat
This button defeats all speaker solos, resetting them for normal playback.

41. Solo Front Channels
This button solos all front speakers.

42. Solo Left and Right Channels
This button solos the left and right channels.

The Main Mix and the Control Room channel

The channel configuration of the “Main Mix” (the default output) determines what the channel configuration of the Control Room channel will be. Switching between a project that has a stereo Main Mix to a project that has a 5.1 Main Mix will cause the Control Room channel in the Control Room Mixer to change from a stereo to a 5.1 configuration.

The Main Mix configuration also determines the layout of the Speaker Solo panel. If the Main Mix is stereo, there will only be a left and right speaker in the solo panel.

Any external input that has more channels than the Main Mix will not be heard correctly when routed to the Control Room channel. Only the channels available will be heard.

⇨ If a 5.1 external input is routed to a stereo Control Room channel, only the left and right channels will be heard even if a 5.1 Monitor is selected. Only two channels can be routed through a stereo Control Room channel. You could use an instance of MixConvert on the external input’s inserts to down-mix the material to stereo in order to hear it.

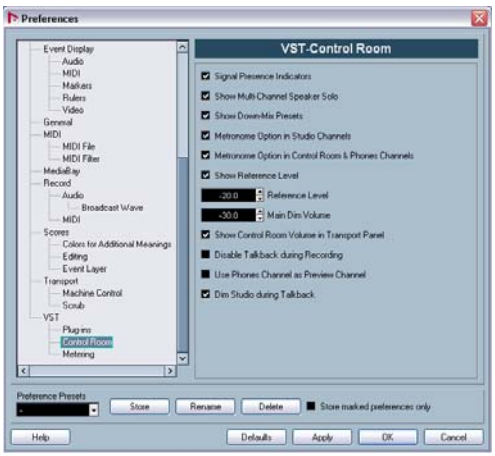
Suggested settings

With all the versatility that the Control Room provides there are also opportunities for confusion when first setting up the Control Room. The following list contains suggestions that could help to quickly set up the Control Room to get started for recording and mixing.

- If you do not have a master recording device and only use the Export Mixdown function to create finished mix files, set your Main Mix output to “Not Assigned”. This eliminates many confusing errors and unpredictable behavior since outputs and Control Room Monitors can share hardware outputs. The Main Mix is automatically routed to the Control Room channel and will not be affected.
- Create one stereo Monitor to familiarize yourself with the Control Room level controls, DIM settings, the Listen Bus and other monitoring features. Once you have become acquainted to some of these functions, create additional Monitors for every set of speakers you intend to use.
- Use the inserts on Monitor channels for surround decoding and bass management plug-ins among other things.
- Use the inserts on the Control Room channel for metering and spectral analysis plug-ins. All solos including the Listen Bus will come through the Control Room channel allowing analysis of individual sounds.
- A brickwall limiter in the last insert of the Control Room channel can prevent accidental overloads and damage to speaker systems.
- Use the inserts for the Talkback channel to control the dynamics of the talkback microphone. This will help protect performers’ hearing and ensure that everyone can be heard over the talkback microphone.
- Use the Gain settings on the external inputs to level balance CD players and other sources to the Main Mix level for A/B comparisons.
- Use the Gain settings on each Monitor to level balance all your monitor systems. Switching between sets of speakers will result in the same playback volume.
- Use the calibrated Control Room level for film or DVD mixing. Set this level to the proper speaker volume as determined by the mixing standard you choose to follow.

Control Room preferences

There are several preferences for the Control Room Mixer. These are found in the Preferences (VST–Control Room page).



The Control Room Preferences

Most of these preferences deal with what options are visible in the Control Room Mixer. This allows you to customize the layout of the Mixer and only have the controls visible that you use the most without added clutter.

The other preferences have the following functionality:

- Reference Level

This setting determines the Control Room level used when the Reference Level button is activated.

- Main Dim Volume

This is the amount of gain reduction applied to the Control Room channel when the DIM button is activated.

- Show Control Room Volume in Transport Panel

This option makes the small fader at the right hand side of the Transport Panel control the Control Room level. When this option is not activated (or the Control Room is disabled), that fader controls the level of the Main Mix bus.

- Disable Talkback during Recording

When activated, this option will turn off the Talkback channel when the transport enters Record. It is advisable to set the Talkback DIM to 0dB when using this feature so as not to radically change the mix level when punching in and out of Record.

- Use Phones Channel as Preview Channel

When activated, the Headphone output will be used for Preview options such as Import preview, scrubbing, offline process preview and certain Sample Editor operations. Note that when using the Headphones output for preview, the Control Room channel will no longer output preview audio.

- Dim Studio during Talkback

When this option is enabled, the cue mix heard in a Studio will be dimmed (by the amount set in the Talkback dim level field (below the TALK button) for as long as the Talkback channel is used. When disabled, the cue mix level remains the same during Talkback.

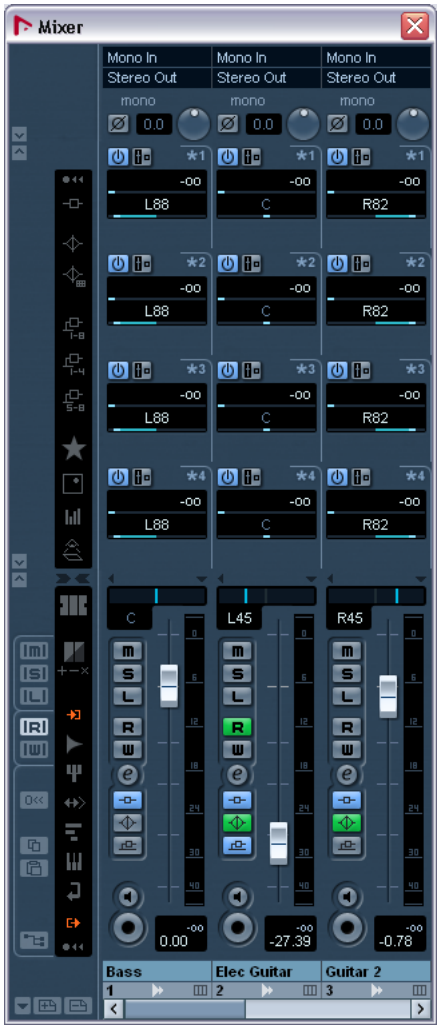
Studios and Studio Sends

Studio Sends are displayed in the Nuendo Project Mixer and the Inspector. Each Studio Send is intended for the creation of a discrete cue mix for performers to listen to during recording. Studio Sends are essentially stereo aux sends that are routed to Studio outputs in the Control Room Mixer. There are up to four Studios and Studio Sends available.

Configuring Studio Sends

Studio Sends only become active when a Studio channel has been created in the VST Connections window. Otherwise they remain grayed out. For every Studio defined in the VST Connections, every channel in the Project Mixer has an additional aux send with level, pan and pre/post-fader selection. This aux send is used to create a mix for a performer to listen to while recording.

- In the Project Mixer, the Studio Sends are accessed by choosing the Studio Sends option from the View options pop-up menu in each channel or by clicking the star icon ("Show Studio Sends") on the common panel of the extended Project Mixer.



The Studio Sends view in the Project Mixer

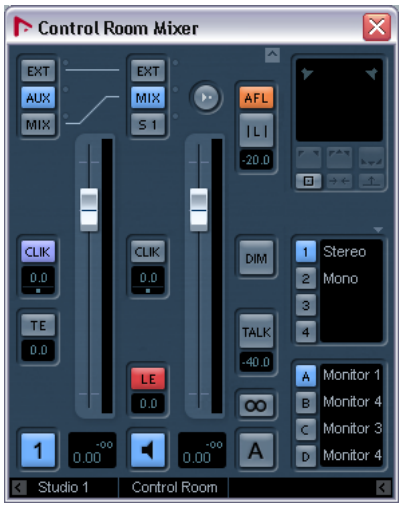
- In the Inspector, a Studio Sends tab can be found. This will display all Studio Sends for the selected track.
Please note that not all Inspector sections are available by default. To show/hide a section, right-click on an Inspector section and activate/deactivate the desired option on the context menu.

The Studio Sends tab in the Inspector

Each Studio can have a unique name in order to help identify what it is being used for. For example, the four Studios could be named:

- Vocalist Mix
- Guitarist Mix
- Bassist Mix
- Drummer's Mix

The name of each Studio is displayed in the Control Room Mixer. To hear the Studio Sends mix in the Studio output, the input selector for each Studio must be set to “Aux”.



A Studio channel in the Control Room Mixer with its input set to Aux.

Setting up a Studio cue mix

The Studio Sends are very flexible. There are several ways to create a cue mix for each Studio in a very fast and efficient manner. Simple “more me” mixes and more complex discrete mixes are easily accommodated by the Studio Sends.

Using fader and pan settings from the Project Mixer

You can create a cue mix from the fader and pan levels already used in the Project Mixer and then alter them to meet the needs of an individual performer. You can do this with any single channel or group of channels at any time. To copy fader and pan information from the main mix, proceed as follows:

1. In the Project Mixer, select all the channels that you wish to copy settings from.
The following operations affect only selected channels.

2. In the Control Room Mixer, right-click anywhere in a Studio Channel's mixer strip and a context menu will appear that has the Studio's name as a submenu.
This submenu contains all the Studio Send functions for that Studio. If you open the context menu outside of a Studio mixer strip, the submenu will be for All Studios.

The Control Room Mixer's context menu

3. Choose the "Use Current Mix Levels" option to copy the fader levels on the selected tracks to the Studio Sends.
This option sets all Studio Send levels for the selected tracks to the same level as the main channel fader. It also changes the Studio Send status to pre-fader so that changes in the main mix do not affect the Studio Sends.

4. Choose the "Use Current Pan Settings" option to copy pan information from the main mix to the Studio Sends on selected tracks.
Studio Sends are either mono or stereo. If the Send is mono, the pan setting will still be copied. However, the output of the Studio Send will sum the left and right channels together.

5. Choose the "Enable Studio Sends" option to activate the Sends on selected channels.
By default, Studio Sends are not enabled even when level and pan information is copied to them. You must enable them in order to hear the Studio cue mix.

By copying the level and pan information from the main mix to the Studio Sends, a rough balance can be created in a matter of moments. Next, you may alter the level and pan settings on any channel's Studio Sends to change the mix to meet the performer's needs. This may require increasing the volume of the performer herself. This is often referred to as a "more me" mix.

Adjusting the overall Studio Send level

Levels in the main mix are often optimized for the loudest signal level possible without clipping. However, when you are creating a "more me" mix, you may find that there is not enough headroom available in the Studio Send to turn up channels without clipping becoming a possibility.

Fortunately, the Studio Sends have an option to adjust multiple send levels at the same time, allowing you to keep the blend intact while lowering the overall volume to make room for "more me" signals.

Once you have created a Studio Send mix, proceed as follows to adjust their relative levels.

1. Select all the channels you wish to modify.
Only selected channels are affected by the context menu commands.

2. Right-click anywhere in the Studio mixer strip on the Control Room Mixer to open the context menu for that Studio.
You may also use the context menu outside of the Studio strip to adjust all four Studio Sends on the selected channels at the same time.

3. Choose the "Change Studio Sends Level" option from the Studio submenu.
This will bring up a gain window with a checkbox that reads "Relative Mode". Make sure this is activated if you want to adjust already existing levels.

4. Either use the up and down buttons or click on the numeric readout to open a pop-up fader and adjust the gain as necessary.
The level of all selected Studio Sends will be adjusted by the amount shown here. For example, if the amount reads -3dB, then each Studio Send level is reduced by 3dB.

5. Click OK and the level change will be performed.
It is possible to view these changes as they occur if you have the Project Mixer open and the extended view set to show the Studio Sends.

⚠ If you deactivate the “Relative Mode” option, all Studio Sends will be set to the same absolute level. While the dialog window is still open, you may check the “Relative Mode” box again and reload the previous relative levels. Only when you click OK, will the level settings be made permanent. Choosing Cancel returns all Send levels to their previous settings.

Using Studio Sends from outputs

Each output also has Studio Sends. Studio Sends from the Main Mix output can be used to route the main mix instantly to the Studio output.

Any level changes made to the main mix will be reflected in the signal sent by the Studio Send. Setting the level lower than 0dB can leave headroom for “more me” signals in the Studio channel output.

Post-Fader Studio Sends

It is also possible to use the Studio Sends as post-fader aux sends. This is another way for the cue mix to follow changes made to the Main Mix. The Reset function is very helpful in this regard.

To reset the Studio Sends to the post-fader default level of -6dB, proceed as follows:

1. Select all the channels you wish to reset.
Studio Send commands only work on selected channels.

2. In the Studio Channel mixer strip right-click to open the context menu. In the Studio submenu, select the “Reset Studio Sends” command.
If you open the context menu in other areas of the Control Room Mixer besides the Studio mixer strips, the context menu commands will affect all Studios at the same time.

3. Selecting the “Reset Studio Sends” option changes the Send level of all selected channels to -6dB and sets the signal source to post-fader.
The -6dB level is designed to allow for headroom for “more me” signals in the Studio outputs.

Once all Studio Sends have been set to -6dB, post-fader, any changes to the main mix will also change the Studio mix. For “more me” channels, simply turn up the level on that channel or even set the signal to pre-fader for absolute control.

Studio Send cue mix summary

Using various combinations of the above techniques should allow you to create complex discrete cue mixes for performers in very little time. Modifications to these mixes can occur in the Project Mixer or the Inspector, giving you the most accessibility for quick changes.

To familiarize yourself with how the Studio Sends work, open the extended Project Mixer and set the view to the Studio Sends. Follow the above examples and watch how the Studio Sends react to various commands. This should help you get a feel for how they function and increase the workflow productivity of recording sessions.

Direct Monitoring and latency

The Control Room and Studio Sends functions use the internal processing power of the host computer system for all routing and processing, which means they are subject to the computer’s latency.

When recording with several performers at once, a system capable of running at very low ASIO buffer settings will be necessary to take full advantage of all the Studio Send features.

Studio Sends are not capable of controlling the Direct Monitoring features of various audio hardware interfaces. This means that unless the internal latency of the system is very low (128 samples or less), monitoring of record-enabled tracks through the Studio Sends will have some delay that could affect performers during recording.

In the situation where internal latency is too much for record monitoring, it is advisable to use the Studio Sends for monitoring of tracks that have already been recorded and use normal Direct Monitoring for tracks currently being recorded.

WK-Audio's ID Controller

With the implementation of the Control Room Features, functionality for the Monitoring Section of the ID control surface has been enabled. The ID has controls for most of the Control Room features including:

- Control Room Level
- Studios 1-3 Level
- Control Room Level Meter
- DIM
- Talkback (with built in mic preamp)
- Talkback DIM
- Listen Bus AFL/PFL
- Listen Bus DIM
- Monitor Selection
- Speaker Solos
- External Input Switching
- Headphones (with built-in headphone amp)
- Speaker Down-Mix Control
- Input Selection for Control Room and Headphones

⚠ Complete documentation on the ID features is available from WK-Audio.

13

Audio effects

About this chapter

Nuendo comes with a number of effect plug-ins included. This chapter contains general details about how to assign, use and organize effect plug-ins. The effects and their parameters are described in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

⚠ This chapter describes audio effects, i.e. effects that are used to process audio, group, VST Instrument and ReWire channels.

Overview

There are three ways to use audio effects in Nuendo:

- As insert effects.

An insert effect is inserted into the signal chain of an audio channel, which means that the whole channel signal passes through the effect. This makes inserts suitable for effects for which you don’t need to mix dry and wet sound, e.g. distortion, filters or other effects that change the tonal or dynamic characteristics of the sound. You can have up to eight different insert effects per channel (and the same is true for input and output busses – for recording with effects and “master effects”, respectively).

- As send effects.

Each audio channel has eight effect sends, each of which can be freely routed to an effect (or to a chain of effects). Send effects are practical for two reasons: you can control the balance between the dry (direct) and wet (processed) sound individually for each channel using the sends, and several different audio channels can use the same send effect. In Nuendo, send effects are handled by means of FX channel tracks.

- By using offline processing.

You can apply effects directly to individual audio events – this is described in the chapter “Audio processing and functions” on page 238.

About VST 3

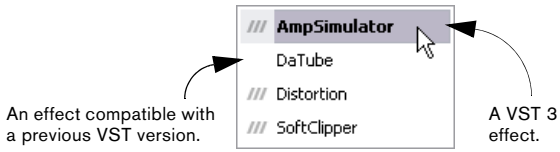
The new VST 3 plug-in standard offers many improvements over the previous VST 2 standard, yet retains full backwards compatibility, i.e. you will still be able to use your previous VST effects and presets.

Nuendo is able to run plug-ins originally developed for different platforms: you can use a 32-bit plug-in under Windows Vista 64 bit, and you can use plug-ins developed for Mac PPC on MacIntel systems.

As the use of 32-bit plug-ins on 64-bit computers affects the computer performance, these will be marked by an icon in the plug-in menus.

⇨ Please note that this functionality is provided to allow you to load older projects including their original plug-ins on current computers. However, the plug-ins will require higher CPU performance when compared to their native platform. Therefore, it is recommended to use 64 bit versions or Intel Mac (Universal Binary) versions of such plug-ins or instruments once available.

In the program, effects compatible with previous VST versions will be easily recognized:



VST Preset management

From a user perspective, the main difference between VST 2 and VST 3 is in the effect preset management. The “.fxp/.fxb” files used in VST 2 have been replaced by VST 3 Presets (extension “.vstpreset”). Using the preset management features, you can assign various attributes to your effect presets to help you quickly find the right patch. You can also preview effect presets before you load them. A large number of presets for effects are included with the program. If you have any previous VST plug-ins installed on your computer, you can still use them, and you can also convert their programs to VST 3 presets. See “Effect presets” on page 183 for details.

Smart plug-in processing

Another feature of the VST3 standard is “smart” plug-in processing. Previously, any loaded plug-in was processing continuously, regardless of whether a signal was present or not. In VST3, processing by a plug-in can be disengaged if there is no signal present. This can greatly reduce the CPU load, thus allowing for more effects to be used.

This is achieved by activating the option “Deactivate VST3 Plug-in when silence is detected” in the Preferences dialog (VST – Plug-ins page).

When this is activated, VST 3 plug-ins will not consume CPU power on silent passages, i.e. when no audio data runs through them.

Be aware, however, that this can lead to a situation where you added more plug-ins on "transport stop" than the system can handle on playback. Therefore, you should always find the passage with the largest number of events playing simultaneously to make sure that your system offers the required performance.

⇨ Activating this option can increase your system performance a lot in certain projects, but it also makes it more unpredictable whether the project can play back fine on any timecode position of the project.

About side-chain inputs

Several VST3 effects feature side-chain inputs. This means that the operation of the effect can be controlled via external signals routed to the side-chain input. The effect processing is still applied to the main audio signal. See "Setting up side-chain" on page 180.

About plug-in delay compensation

A plug-in effect may have some inherent delay or latency. This means that it takes a brief time for the plug-in to process the audio fed into it – as a result, the output audio will be slightly delayed. This especially applies to dynamics processors featuring "look-ahead" functionality.

However, Nuendo provides full plug-in delay compensation throughout the entire audio path. All plug-in delays are compensated for, maintaining the sync and timing of all audio channels.

Normally, you don't have to make any settings for this. However, VST3 dynamics plug-ins with look-ahead functionality have a "Live" button, allowing you to disengage the look-ahead to minimize latency, if they are to be used during real-time recording (see the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4").

You can also constrain the delay compensation, which is useful to avoid latency when recording audio or playing a VST Instrument in real time. See "VST Instruments and Instrument tracks" on page 189.

About tempo sync

Plug-ins can receive timing and tempo information from the host application (in this case, Nuendo). Typically, this is used to synchronize certain plug-in parameters (such as modulation rates or delay times) to the project tempo.

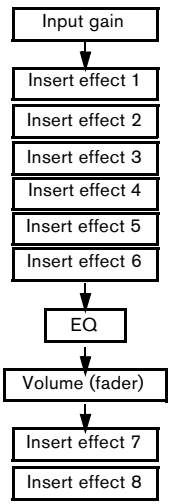
- This information is automatically provided to any VST (2.0 or later) plug-in that "requests it".
  You don't need to make any special settings for this.
- You set up tempo sync by specifying a base note value.
  You can use straight, triplet or dotted note values (1/1 - 1/32).

Please refer to the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4" for details about the included effects.

Insert effects

Background

As the name implies, insert effects are inserted into the audio signal path – this means that the audio channel data will be routed through the effect. You can add up to eight different insert effects independently for each audio channel (audio track, group channel track, FX channel track, VST Instrument channel or ReWire channel) or bus. The signal passes through the effects in series from the top downwards, with the signal path shown below:



As you can see, the last two insert slots (for any channel) are post-EQ and post-fader. Post-fader slots are best suited for insert effects where you don't want the level to be changed after the effect, such as dithering (see "Dithering" on page 173) and maximizers – both typically used as insert effects for output busses.

⇨ Applying several effects on several channels may be too much for your CPU to handle!

If you want to use the same effect with the same settings on several channels, it may be more efficient to set up a group channel and to apply your effect only once, as a single insert for this group. You can use the VST Performance window to keep an eye on the CPU load.

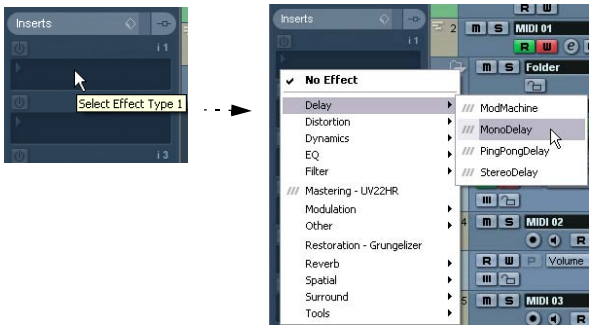
Routing an audio channel or bus through insert effects

Insert effect settings are available in the mixer (in extended mode), the Channel Settings window and the Inspector. The examples below show the Channel Settings window, but the procedures are the same for all three inserts sections:

1. Bring up the Channel Settings window, the Inserts pane in the extended mixer, or open the Inspector's Inserts section.

In the Channel Settings window, the inserts are located to the far left by default.

2. Pull down the effect type pop-up for one of the insert slots, and select an effect.



The effect is loaded and automatically activated and its control panel opens. You can open or close the control panel for an effect by clicking the "e" button for the insert slot.

- If the effect has a dry/wet Mix parameter you can use this to adjust the balance between the dry signal and the effect signal.

See "Making settings for the effects" on page 182 for details about editing effects.

- To remove an effect, pull down the effect type pop-up menu and select "No Effect".

You should do this for all effects that you don't intend to use, to reduce the CPU load.

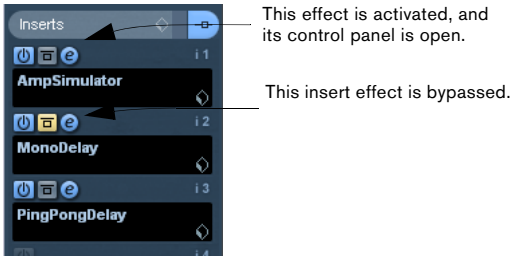
- You can add up to 8 insert effects per channel this way.
- You can reorder the effects by clicking in the area above the name field and dragging the effect onto another slot.
- You can copy an effect into another effect slot (for the same channel or between channels) by holding down [Ctrl]/[Command] and dragging it onto another effect slot.

Deactivating vs. bypassing

If you want to listen to the track without having it processed by a particular effect, but don't want to remove this effect completely from the insert slot, you can either deactivate or bypass it:

- To deactivate an effect, click the blue button on the left above the insert slot.
- To bypass an effect, click its Bypass button (the middle button above the insert slot).

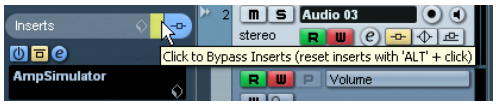
When an effect is bypassed, this button is yellow.



Deactivating means to terminate all processing, whereas bypassing means to play back only the unprocessed original signal – a bypassed effect is still processing in the background. Bypassing allows for crackle-free comparison of the original ("dry") and the processed ("wet") signal.

- To bypass all inserts for a track, click the global bypass button.

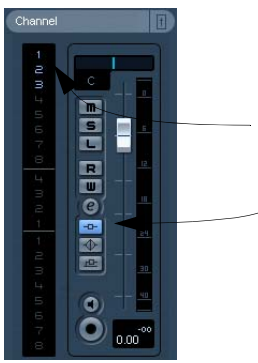
This button can be found at the top of the Inserts section in the Inspector or the Channel Settings window. It lights up in yellow to indicate that the inserts of this track are bypassed. In the track list and the channel strip in the mixer, the Inserts State button will also light up in yellow.



Insert effects in the channel overview

If the “Channel” section is selected in the Inspector or the “Channel Overview” view mode is selected in the extended mixer, you will get an overview of which insert effects, EQ modules and effect sends are activated for the channel.

You can activate or deactivate individual insert effect slots by clicking the corresponding number (in the top part of the overview).



The blue color of inserts 1 and 2 and the blue Inserts State button in the channel strip indicate that this track has active inserts.

The channel overview in the Inspector.

Using mono or stereo effects with a surround channel

Whether your effect supports mono, stereo or multi-channel processing, depends entirely on the effect plug-in.

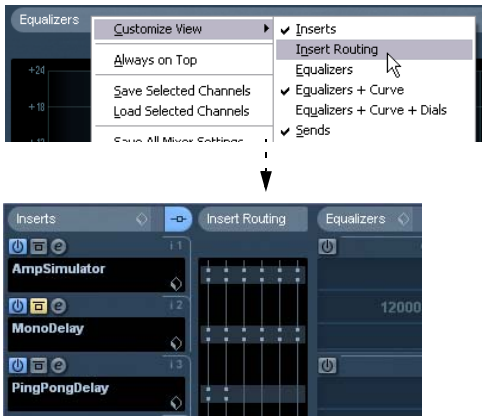
Normally, when you apply a mono or stereo insert effect to a surround (multi-channel) track, the first speaker channels of the track (often L and/or R) are routed through the effect’s available channels, and the other channels of the track are left unprocessed.

However, you may want to apply the effect to other speaker channels. This is done in the Channel Settings window:

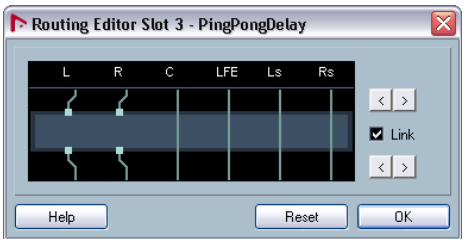
1. Right-click somewhere in the Channel Settings window (except the EQ display) to open the Channel Settings context menu.

2. Select “Customize View” from the menu, and select “Insert Routing” from the submenu.

The Insert Routing section appears to the left of the EQ display. It contains a row of small signal diagrams.



3. Double-click on the small signal diagram for the effect to open the Routing Editor window.

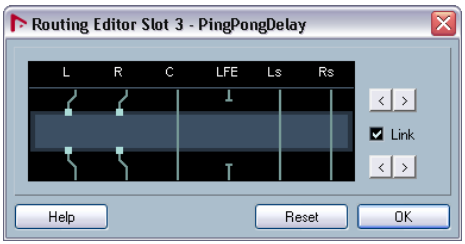


The Routing Editor window.

The columns in the diagram represent the channels in the current configuration, with signals passing from top to bottom. The gray field in the middle represents the actual effect plug-in.

- The squares above the effect represent inputs to the effect plug-in.
- The squares below the effect represent outputs from the effect plug-in.

- A line that passes through the effect (with no square input/output indicators) represent a bypass connection – the audio on that speaker channel passes the effect without being processed.
- A “broken” line indicates a broken connection – the audio on that speaker channel will not pass on to the output at all.



Here, the effect will process the L and R channels. The Ls, Rs and C channels are not processed, while the Lfe connection is broken.

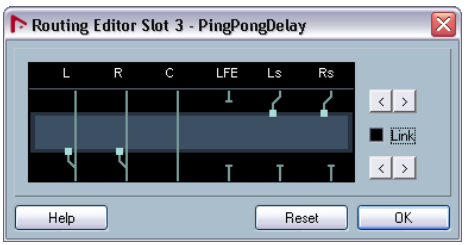
Operations

You can move connections to the effect inputs and outputs sideways to route the audio to/from inputs/outputs other than the standard configuration. To do this, click the arrow buttons to the right.

- The upper two arrows move the input connections, and the lower two arrows move the output connections.

If the “Link” checkbox is activated, the input and output connections will be moved at the same time. This is the mode to use when you simply want to process other channels than the default, without any cross-connections.

- If you move inputs or outputs independently of each other, this means you create a “cross-connection”.



The audio on the Ls-Rs channels is processed in the plug-in and output on the L-R channels. Since the L-R channels are bypassed, this means the final L-R output will contain both the original L-R signals and the processed Ls-Rs signals.

- If a channel is bypassed (a straight line is shown through the plug-in) you can click the line to break the connection.

Click again to replace the broken connection with a bypass.

- Clicking Reset takes you back to the original standard connection.

⇨ Changes you make in this window are audible immediately.

Adding insert effects to busses

All input and output busses have eight insert slots, just like regular audio channels. The procedures for adding insert effects are the same.

- Adding insert effects to an input bus allows you to record with effects.

The effects will become a permanent part of the recorded audio file (see the chapter “Recording” on page 64).

- Insert effects added to an output bus will affect all audio routed to that bus, like a “master insert effect”.

Typically you would add compressors, limiters, EQ or other plug-ins to tailor the dynamics and sound of the final mix. Dithering is a special case, as described below.

⇨ Please note that the input/output busses only appear as tracks in the Track list, when their automation W(rite) buttons have been activated once. I.e. you can only use the Inspector section to make Inserts settings for the busses if you have activated Write automation for the respective bus beforehand.

However, you can always make Inserts settings in the Channel Settings window and the extended mixer.

Dithering

Dithering is a method for controlling the noise produced by quantization errors in digital recordings. The theory behind this is that during low level passages, only a few bits are used to represent the signal, which leads to quantization errors and hence distortion.

For example, when “truncating bits”, as a result of moving from 24 to 16 bit resolution, quantization errors are added to an otherwise immaculate recording. By adding a special kind of noise at an extremely low level, the effect of these errors is minimized. The added noise could be perceived as a very low-level hiss under exacting listening conditions. However, this is hardly noticeable and much preferred to the distortion that otherwise occurs.

When should I use dithering?

- Consider dithering when you mix down to a lower resolution, either in real-time (playback) or with the Export Audio Mixdown function.
A typical example is when you mix down a project to a 16-bit stereo audio file for audio CD burning.

What is a “lower resolution” then? Well, Nuendo uses 32-bit float resolution internally, which means that all integer resolutions (16 bit, 24 bit, etc.) are lower. The negative effects of truncation (no dithering) are most noticeable when mixing down to 8 bit, 16 bit and 20 bit format; whether to dither when mixing down to 24 bits is a matter of taste.

Applying dithering

1. Open the VST Output Channel Settings window by clicking the “e” button for the Output channel in the mixer.
You can also display the Inserts section in the extended mixer pane.

2. Open the Inserts pop-up menu for slot 7 or 8.
The two last Insert effect slots (for all channels) are post-fader, which is crucial for a dithering plug-in. The reason is that any master gain change applied after dithering would bring the signal back to the internal 32 bit float domain, rendering the dithering settings useless.

3. Select the included UV22HR dithering plug-in from the pop-up menu.

The included dithering plug-ins and their parameters are described in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”. If you have installed another dithering plug-in that you prefer, you can of course select this instead.

4. Make sure the dithering plug-in is set to dither to the correct resolution.
This would be the resolution of your audio hardware (on playback) or the desired resolution for the mixdown file you want to create (as set in the Export Audio Mixdown dialog, see the chapter “Export Audio Mixdown” on page 437).

5. Use the other parameters in the control panel to set up the dithering to your liking.

Using group channels for insert effects

Like all other channels, group channels can have up to eight insert effects. This is useful if you have several audio tracks that you want to process through the same effect (e.g. different vocal tracks that all should be processed by the same compressor).

Another special use for group channels and effects is the following:

If you have a mono audio track and want to process this through a stereo insert effect (e.g. a stereo chorus or an auto panner device), you cannot just insert the effect as usual. This is because the audio track is in mono – the output of the insert effect will be in mono as well, and the stereo information from the effect will be lost.

One solution would be to route a send from the mono track to a stereo FX channel track, set the send to pre-fader mode and lower the fader completely for the mono audio track. However, this makes mixing the track cumbersome, since you cannot use the fader.

Here’s another solution:

1. Create a group channel track in stereo and route it to the desired output bus.

2. Add the desired effect to the group channel as an insert effect.

3. Route the mono audio track to the group channel.

Now the signal from the mono audio track is sent directly to the group, where it passes through the insert effect, in stereo.

Freezing (rendering) insert effects for a track

Effect plug-ins can sometimes require a lot of processor power. If you are using a large number of insert effects for a track, you may eventually reach a point where the computer cannot play back the track properly (the CPU overload indicator in the VST Performance window lights up, you get crackling sounds, etc.).

To remedy this, you can freeze the track, by clicking the Freeze button in the Inspector.

- The Freeze Channel Options dialog is opened, allowing you to set a “Tail” time in seconds.
  This adds time at the end of the rendered file to allow reverb and delay tails to fully fade out.

- The program now renders the output of the track, including all pre-fader insert effects, to an audio file.
  This file is placed in the “Freeze” folder within the Project folder (Windows). On the Mac, the Freeze folder is stored under “User/Documents”.

- The frozen audio track is locked for editing in the Project window.
  The frozen insert effects cannot be edited or removed and you cannot add new insert effects for the track (except post-fader effects).

- On playback, the rendered audio file is played back. You can still adjust the level and panning in the Mixer, make EQ settings and adjust the effect sends.
  In the Mixer, the channel strip for a frozen track is indicated by a “snow flake” symbol on the volume fader handle.

After freezing the Inserts for a track, you hear the track play back as before but the insert effects don’t have to be calculated in real time, easing the load on the computer processor. Typically, you would freeze a track when it’s finished and you don’t need to edit it anymore.

- You can only freeze audio tracks this way, not group channel tracks or FX channel tracks.

- The last two insert effects will not be frozen. This is because these are post-fader insert slots.

- You can also freeze VST instruments and their insert effects – see “VST Instruments and Instrument tracks” on page 189.

Unfreezing

If you need to edit the events on a frozen track or make settings for the insert effects, you can unfreeze the track:

1. Click the Freeze button in the Inspector for the track.
   You will be asked whether you really want to unfreeze the channel and if you wish to keep or delete the freeze files.

2. Click “Unfreeze” or “Keep Freeze files”.
   This reactivates the frozen insert effects. Clicking “Keep Freeze Files” will unfreeze the channel but not delete the freeze files. After editing you can freeze the track again.

Send effects

Background

As their name implies, send effects are outside of an audio channel’s signal path, i.e. the audio data to be processed must be sent to the effect (as opposed to insert effects, which are inserted into the channel’s signal path).

To this end, Nuendo provides FX channel tracks. When you have created such a track, it is added to the track list and can be selected as a routing target in the Send slots of audio channels.

- When selecting an FX channel track in one of the send slots of an audio channel, the audio is sent to the FX channel and through any insert effects set up for it.
  Each audio channel has eight sends, which can be routed to different FX channels, and thus different FX channel insert effect configurations. You control the amount of signal sent to the FX channel by adjusting the effect send level.

- If you have added several effects to the FX channel, the signal passes through the effects in series, from the top (the first slot) downward.
  This allows for “custom” send effect configurations – e.g. a chorus followed by a reverb followed by an EQ and so on.

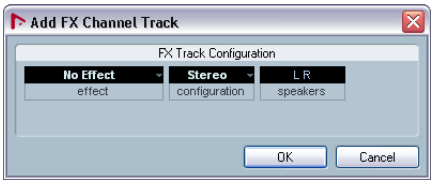
- The FX channel track has its own channel strip in the mixer, the effect return channel.
  Here you can adjust the effect return level and balance, add EQ and route the effect return to any output bus.

- Each FX channel track can have any number of automation tracks, for automating various effect parameters.
  See the chapter “Automation” on page 213 for more information.

Setting up send effects

Adding an FX channel track

1. Pull down the Project menu and select “FX Channel” from the “Add Track” submenu.
A dialog appears.



2. Select a channel configuration for the FX channel track.
Normally, stereo is a good choice since most effect plug-ins have stereo outputs.

3. Select an effect for the FX channel track.
This is not strictly necessary at this point – you can leave the plug-in pop-up menu set to “No Effect” and add effects to the FX channel later if you like.

4. Click OK.
An FX channel track is added to the track list, and the selected effect, if any, is loaded into the first insert effect slot for the FX channel (in that case, the lit Inserts tab for the FX channel track in the Inspector indicates that an effect has been assigned and automatically activated).

- All FX channel tracks you create will appear in a dedicated “folder” track in the Track list.
This makes it easy to manage and keep track of all your FX channel tracks, and also allows you to save screen space by folding in the FX Channel folder.

FX channel tracks are automatically named “FX 1”, “FX 2” etc., but you can rename them if you wish. Just double-click the name of an FX channel track in either the Track list or the Inspector and type in a new name.

Adding and setting up effects

As mentioned above, you can add a single insert effect when you create the FX channel track. To add and set up effects after the FX channel track is created, you can either use the Inspector for the track (click the Inserts tab) or the VST FX Channel Settings window:

1. Click the Edit (“e”) button for the FX channel track (in the Track list, mixer or Inspector).
The FX Channel Settings window appears, similar to a regular Channel Settings window.

To the left in the window is the Inserts section with eight effect slots.

2. Make sure the FX channel is routed to the correct output bus.
This is done with the output routing pop-up menu at the top of the fader section (also available in the mixer and Inspector).

3. To add an insert effect in an empty slot (or to replace the current effect in a slot), click in the slot and select an effect from the pop-up menu.
This works just like when selecting insert effects for a regular audio channel.

4. When you add an effect, its control panel will automatically appear. When you set up send effects, you would normally set the wet/dry Mix control to all “wet”.
This is because you control the balance between the wet and the dry signal with the effect sends. For more information, see “Making settings for the effects” on page 182.

- You can add up to eight effects for an FX channel.
The signal will pass through all the effects in series. It is not possible to adjust the effect send and return levels separately for the effects – this is done for the FX channel as a whole. If what you want is several separate send effects (where you can control the send and return levels independently), you should instead add more FX channel tracks – one for each effect.

- You can reorder the effects by clicking in the area above the name field and dragging the effect onto another slot.
- You can copy an effect into another effect slot (for the same channel or between channels) by holding down [Ctrl]/[Command] and dragging it onto another effect slot.
- To remove an insert effect from a slot, click in the slot and select “No Effect” from the pop-up menu.
  You should do this for all effects that you don’t intend to use, to reduce the CPU load.
- You can bypass individual effects (or all effects) by clicking the corresponding Bypass button(s) for the FX channel track.
  See “Routing an audio channel or bus through insert effects” on page 171.
- You can also adjust level, pan and EQ for the effect return in the FX Channel Settings window.
  This can also be done in the mixer or in the Inspector.

⇨ Remember that the more effect units you use, the higher the CPU load.

Setting up the sends

The next step is to set up a send for an audio channel and route it to the FX channel. This can be done in the mixer (in the extended panel), in the Channel Settings window or in the Inspector for the audio track. The example below shows the Channel Settings window, but the procedure is similar for all three sections:

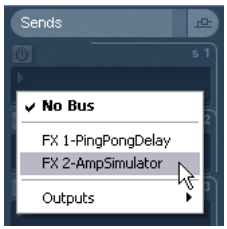
1. Click the “e” button for an audio channel to bring up its Channel Settings window.
   In the mixer you would select one of the Sends modes for the extended mixer panel; in the Inspector you would click the Sends tab.

In the Channel Settings window, the send section is located to the left of the channel strip by default. Each of the eight sends has the following controls:

- An On/Off button for activating/deactivating the effect
- A send level slider
- A pre/post-fader switch
- An “e” (edit) button

Note that the last three items are not shown until the send is activated and an effect has been loaded.

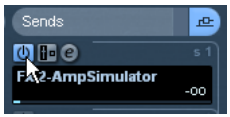
2. Pull down the routing pop-up menu for a send by clicking in the empty slot, and select the desired routing destination.



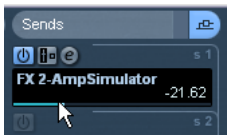
- If the first item on this menu (“No Bus”) is selected, the send isn’t routed anywhere.
- Items called “FX 1”, “FX 2” etc. correspond to existing FX tracks. If you renamed an FX track (see “Adding an FX channel track” on page 176) that name will appear on this menu instead of the default.
- The menu also allows for routing a send directly to output busses, separate output bus channels or Group channels.

3. Select an FX channel track from the pop-up menu.
   Now the send is routed to the FX channel.

4. Click the power button for the effect send so that it lights up in blue.
   This activates the send.



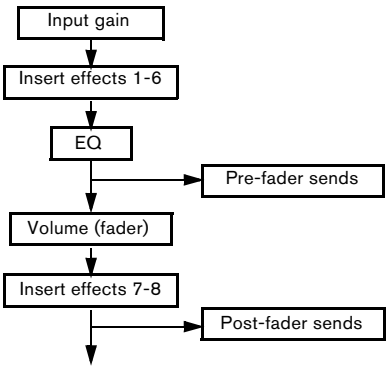
5. Click and drag the send level slider to a moderate value.
   The send level determines how much of the signal from the audio channel is routed to the FX channel via the send.

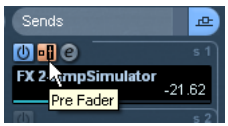


Setting the Send level.

6. If you want the signal to be sent to the FX channel before the audio channel's volume fader in the mixer, click on the Pre-Fader button for the send so that it lights up.

Normally you want the effect send to be proportional to the channel volume (post-fader send). The picture below shows where the sends are "tapped" from the signal in pre and post-fader mode.





A send set to pre-fader mode.

⇨ You can choose whether a send in pre-fader mode should be affected by the channel's Mute button or not.

This is done with the option "Mute Pre-Send when Mute" in the Preferences dialog (VST page).

- When one or several sends are activated for a channel, the Send Effects buttons light up in blue in the mixer and the Track list. Click the button for a channel to bypass (disable) all its effect sends.

When the sends are bypassed, the button is yellow. Click the button again to enable the sends. Note that this button is also available in the Inspector and the Channel settings window.

Click this button to bypass the sends.

- You can also bypass individual sends in the channel overview.

See "Insert effects in the channel overview" on page 172.

- You can also bypass the send effects by clicking the "Bypass Inserts" button for the FX channel.

This bypasses the actual send effects which may be used by several different channels. Bypassing a send affects that send and that channel only. If you bypass the insert effect the original sound will be passed through. This may lead to unwanted side effects (higher volume). To deactivate all effects, use the mute button in the FX channel.

Setting pan for the sends

By default, the sends for an audio channel follow any pan settings – stereo or surround – you make for the channel itself. This means that if an audio channel is panned to the right, the signal from its effect sends will be panned the same way, making the stereo imaging as clear and true as possible.

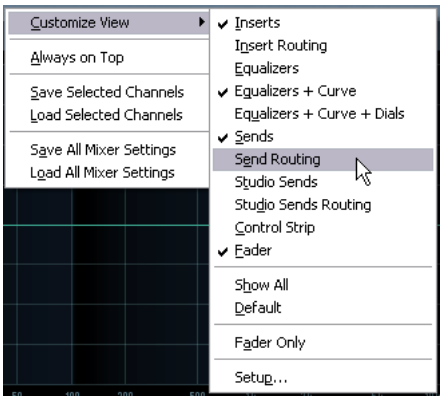
However, you may want to have different pan settings for the sends. There are several uses for this:

- If you route a send from a mono channel to a stereo FX channel track, you can position the send signal at center pan in the stereo FX channel (or anywhere you like).
- If you route a send from a stereo channel to a mono FX channel track, the pan control works as a crossfader, determining the balance between the stereo sides when the stereo send signal is mixed to mono.
- If you route a send from a mono or stereo channel to a FX channel track in surround format, you can use the surround panner to position the send signal in the surround image.
- If you route a send from a surround channel to an FX channel in a format with less channels, you can set the panning with the Mixconvert plug-in.

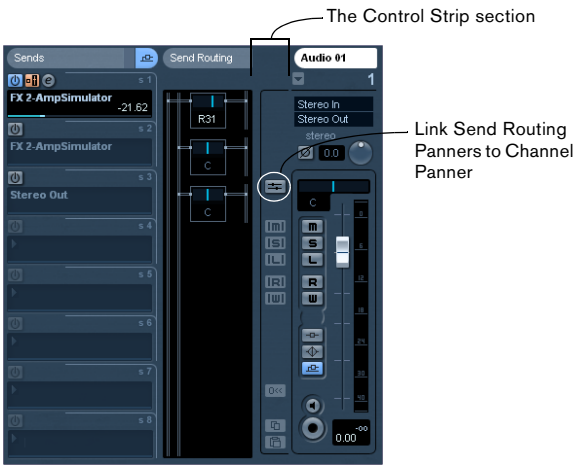
You set up send panning in the following way:

1. Open the Channel Settings window for the audio channel.

2. Right-click somewhere in the Channel settings window (not the EQ display), to open the context menu and open the “Customize View” submenu.

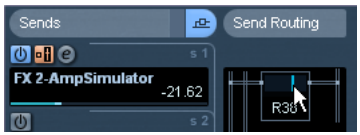


3. From the submenu, select “Send Routing” and “Control Strip”.
In the Send Routing section of the Channel Settings window, each send is shown as a small routing diagram showing a pre/post selector to the right and a pan fader (where applicable). In the Control Strip section, you can activate the option “Link Send Routing Panners to Channel Panner as Default”. When this is activated, the send panners follow the pan for the channel. This item is also available in the Preferences dialog (VST page).



The Sends, Send Routing and Control Strip sections in the Channel Settings window.

4. Click and drag the pan control for the desired send(s) in the display.
You can reset the pan control to the center position by [Ctrl]/[Command]-clicking on the pan control.



- If the FX channel is configured in a surround format, the pan control will be a miniature surround panner, similar to the one found in the mixer.
You can click and drag the “ball” in the miniature panner display to position the send in the surround field, or double-click in the display to bring up the surround panner. See the chapter “Surround sound” on page 202.

⇨ If both the send (the audio channel) and the FX channel are in mono, the pan control is not available.

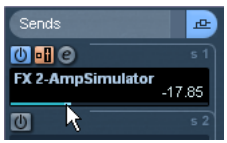
About sends for FX channels

The FX channels themselves have sends, too. However, these can only be routed to output busses, not to effects.

Setting effect levels

When you have set up the sends as described in the previous sections, you can do the following:

- You can use the send level slider in the Channel Settings window, the Inspector or the extended mixer panel to set the send level.
By adjusting the send level, you control the amount of signal sent from the audio channel to the FX channel.



Setting the effect send level.

- In the mixer, you can use the level fader for the FX channel to set the effect return level.

By adjusting the return level, you control the amount of the signal sent from the FX channel to the output bus.

Setting the effect return level.

FX channels and the Solo Defeat function

When mixing, you might sometimes want to solo specific audio channels, and listen only to these while other channels are muted. However, this will mute all FX channels as well. If the soloed audio channels have sends routed to FX channels, this means you won't hear the send effects for the channels.

To remedy this, you can use the Solo Defeat function for the FX channel:

1. [Alt]/[Option]-click the Solo button for the FX channel.

This activates the Solo Defeat function for the FX channel. In this mode, the FX channel will not be muted if you solo another channel in the mixer.

2. You can now solo any of the audio channels without having the effect return (the FX channel) muted.

- To turn off the Solo Defeat function for the FX channel, [Alt]/[Option]-click the Solo button for the FX channel again.

Using the Side-Chain input

Many VST 3.0 effects feature a side-chain input. Side-chaining allows you e.g. to lower the music volume when someone is speaking ("ducking") or to use compression on e.g. a bass sound when the drums are hit, thereby "harmonizing" the intensity of the two instruments. Another possibility is to use the side chain signal as a source for modulation.

The following types of effects feature side-chain inputs:

- Delay plug-ins

The included delay plug-ins with side-chain functionality are MonoDelay, PingPongDelay and StereoDelay.

- Dynamics plug-ins

The included dynamics plug-ins with side-chain functionality are Compressor, Expander, Gate and VintageCompressor.

- Modulation plug-ins

The included modulation plug-ins with side-chain functionality are AutoPan, Flanger, Phaser, StudioChorus, Tremolo and Vibrato.

- Filter plug-ins

The included filter plug-in with side-chain functionality is the WahWah effect.

Setting up side-chain

⇨ Certain combinations of tracks and side-chain inputs may lead to feedback loops and added latency. If this is the case, the side-chain options will not be available.

⚠ For detailed descriptions of the plug-ins that feature side-chaining, see the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4".

Delay plug-ins

The delay repeats can be silenced by side-chain signals exceeding a certain threshold.

You can use this feature to create a so-called "ducking delay" for your vocals. Let's say you want to add a delay effect that is audible only when no signal is present on the vocal track. For this, you need to set up a delay effect which is deactivated every time the vocals start again.

Proceed as follows:

1. Select the vocal track.

2. On the Project menu, select “Duplicate Tracks”.
Now you can use the vocal events on the second track to silence the delay effect.

3. Open the Insert tab for the first Vocal track in the Inspector and select “PingPongDelay” from the Effects pop-up menu.
The control panel for the effect opens.

4. On the control panel for the effect, make the desired effect settings and activate the Side Chain button.
Try out the effect settings to find out which settings will work best with your project. For detailed descriptions of the parameters, see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

5. In the Track list, select the second vocal track.

6. Pull down the Output Routing pop-up menu and on the Side-Chain submenu, select the PingPongDelay effect you set up for the vocal track.
This way, the signals from the second (duplicate) track are routed to the effect (and do not end up in the mix).

Now every time the signals on the vocal track exceed the threshold, the delay will be deactivated. Since the threshold for the delay effect is fixed, you may have to adjust the volume of track 2, in this example, to ensure that vocal parts of low or middle volume will also silence the delay effect.

Dynamics plug-ins

Compression, expansion or gating can be triggered by side-chain signals exceeding a specified threshold.

You may run into a situation where you want to lower the volume of one instrument every time another instrument is played. You could e.g. want to lower the volume of the bass guitar during the bass drum hits. This can be achieved by applying compression to the bass guitar signal every time the drum signals are present on the respective track.

Proceed as follows:

1. Select the bass guitar track.

2. Open the Inserts tab in the Inspector, click in an insert slot to open the effect selection pop-up menu and, on the Dynamics submenu, select “Compressor”.
The effect is loaded into the effect slot and the effect control panel opens.

3. Make the desired effect settings (you will most likely have to adjust them later to get the right compression level) and activate the Side-Chain button.

4. Select the bass drum track.

5. Open the Sends Inspector section, click in a send slot and from the Side-Chain submenu, select the Compressor effect you created for the bass guitar track. Adjust the Send level.
This way, the bass drum signal triggers the compressor on the bass guitar track.

When you now play back the project, the bass guitar will be compressed whenever the signals on the bass drum track exceed the threshold.

Modulation plug-ins

Side-chain signals bypass the built-in LFO modulation and instead apply modulation according to the envelope of the side-chain signal. Since each channel will be analyzed and modulated separately, this allows for creating astonishing spatial stereo or surround modulation effects. Feel free to experiment with the functions to see what they have to offer!

About drag&drop and Side chain connections

When you drag effects from one insert slot to another (on the same channel or between different channels), the following applies:

- When you move an effect within a channel (e.g. from slot 4 to slot 6), the side chain connections will be kept.
- When you drag and drop an effect between two channels, the side chain connections will not be kept.
- When copying an effect into another effect slot (for the same or a different channel), the side chain connections will not be copied, i. e. they will be lost.

Using external effects

Although this program comes with a top selection of VST effect plug-ins, and although there's a huge range of additional plug-ins available on the market, you may still have some hardware effect units that you want to use – valve compressors, reverb units, vintage tape echo machines, etc. By setting up external FX busses you can make your outboard equipment part of the Nuendo virtual studio!

An external FX bus is a combination of outputs (sends) and inputs (returns) on your audio hardware, along with a few additional settings. All external FX busses you have created will appear on the effect pop-up menus and can be selected like the internal effect plug-ins. The difference is that if you select an external effect as an insert effect for an audio track, the audio will be sent to the corresponding audio output, processed in your hardware effect (provided that you have connected it properly) and returned via the specified audio input.

⇨ Creating and handling of external effects is described in detail in the chapter "VST Connections: Setting up input and output busses" on page 10.

Making settings for the effects

Editing effects

All inserts and sends have an Edit ("e") button. Clicking this opens the control panel for the effect, in which you can make parameter settings.

The contents, design and layout of the control panel depends on the selected effect. However, all effect control panels have an On/Off button, a Bypass button, Read/Write automation buttons (for automating effect parameter changes, see the chapter "Automation" on page 213), a preset pop-up menu and a Preset Management pop-up menu for saving and loading effect presets. Some plug-ins also feature a side-chain button, see "Using the Side-Chain input" on page 180.

The Rotary effect control panel.

- Please note that all effects can be edited using a simplified control panel (horizontal sliders only, no graphics). This panel is opened by pressing [Ctrl]/[Command]+[Alt]/[Option]+[Shift] and clicking on the Edit button for the effect send or slot.

Effect control panels may have any combination of knobs, sliders, buttons and graphic curves.

⇨ The included effects and their parameters are described in detail in the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4".

If you edit the parameters for an effect, these settings are saved automatically with the project.

You can also save the current settings as a preset, see below.

- Effects parameters can be automated – see the chapter "Automation" on page 213.

Effect presets

Effect preset management in Nuendo is very versatile. In the MediaBay – or with certain limits in the Save Preset dialog – you can assign attributes to presets which allow you to organize and browse them according to various criteria. Nuendo comes with a huge array of categorized track and VST presets that you can use straight out of the box. You can also preview effect presets before loading them which considerably speeds up the process of finding the right effect preset.

Effect presets can be divided into the following main categories:

- VST presets for a plug-in.
These are stored parameter settings for a specific effect.

- Inserts presets that contain insert effect combinations.
These can contain the whole insert effects rack, complete with settings for each effect, see "Saving insert effect combinations" on page 185.

Selecting effect presets

Most VST effect plug-ins come with a number of useful presets for instant selection.

The preset browser

To select an effect preset in the preset browser, proceed as follows:

1. Load an effect, either as a channel insert or into an FX channel.
The control panel for the effect is displayed.

2. Click in the preset field at the top of the control panel.
This opens the preset browser.

- You can also open the Preset browser from the Inspector (Inserts tab) or the Channel Settings window.

3. Select the desired preset in the list.

4. Activate playback to audition the selected preset.
Simply step through the presets until you found the right sound. It may be helpful to set up cycle playback of a section to make comparisons between different preset settings easier.

5. Double-click on the desired preset (or click outside the Preset browser) to apply the preset.

- To return to the preset that was selected when you opened the Preset browser, click the Reset button.

- You can also open the Preset browser by clicking the SoundFrame button to the right of the preset field an selecting "Load Preset" from the Preset Management pop-up menu.

- The preset handling for VST 2 plug-ins is slightly different, see "About earlier VST effect presets" on page 184.

The Browser sections

The Preset browser contains the following sections:

- The "Search & Viewer" section (displayed by default) lists the available presets for the selected effect.

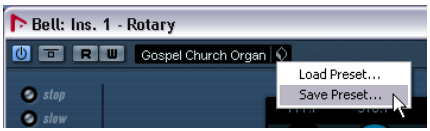
- The Filter section (displayed when you click the Categories button) shows the available preset attributes for the selected effect.
If no attributes have been specified for the effect presets, the columns will be empty. If attributes have been assigned to a preset for this effect, you can click on the attribute in the respective column (Category, Style etc.), to filter out all presets that do not match the selected attribute(s).

- If you also activate the "Show Location" button, the Browser & Filter section is displayed, allowing you to specify the Presets folder that should be searched for preset files.

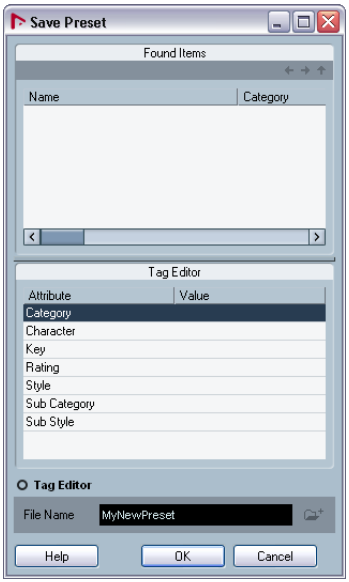
Saving effect presets

You can save your edited effect settings as presets for further use (e.g. in other projects):

1. Click the SoundFrame button to open the Preset Management pop-up menu.



2. Select “Save Preset…” from the pop-up menu.
This opens a dialog where you can save the current settings as a preset.



3. In the File name field in the lower part of the Save Preset dialog, enter a name for the new preset.

- If you wish to assign attributes to the preset, click the Tag Editor button.
Click in the Value column to select an appropriate “tag” for one or several of the available categories in the Attributes column. For further information on preset handling and the Tag Editor, see the chapter “The MediaBay” on page 314.

4. Click OK to store the preset and exit the dialog.

User-defined presets are saved in the following location:

- Win: Documents and Settings/User name/Application data/VST3 presets\<company>\ <plug-in name>
- Mac: Users/<user name>/Library/Audio/Presets/<company>/<plug-in name>

You cannot change the default folder, but you can add further subfolders inside the individual effect preset folders.

About earlier VST effect presets

As stated previously, you can use any VST 2.x plug-ins in Nuendo. For a description of how to add VST plug-ins see “Installing and managing effect plug-ins” on page 186.

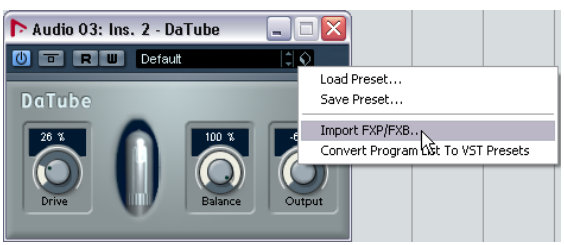
When you add a VST 2 plug-in, any previously stored presets for it will be in the old FX program/bank format (.fxp/.fxb). You can import such files, but the preset handling will be slightly different. You will not be able to use the new features like the Tag editor until you have converted the old “.fxp/.fxb” presets to VST 3 presets. If you save new presets for the included VST 2 plug-ins, these will automatically be saved in the new “.vstpreset” format.

⚠ All VST 2 presets can be converted to VST 3 presets.

Importing and converting FXB/FXP files

To import .fxp/.fxb files, proceed as follows:

1. Load any VST 2 effect you may have installed, and click on the SoundFrame button to open the Preset Management pop-up menu.



2. Select “Import FXB/FXP…” from the pop-up.
This menu item is only available for VST 2 plug-ins.

3. In the file dialog that opens, locate the .fxp file and click Open.
If you load a bank (.fxb), it will replace the current set of all effect programs. If you load a single program, it will replace the currently selected effect program only. Note that such files exist only if you created your own .fxp/.fxb presets with a previous version of Nuendo (or any other VST 2 application).

4. After importing, you can convert the current program list to VST presets by selecting “Convert Program List to VST Presets” from the Preset Management pop-up.
After converting, the presets will be available in the Preset Browser, and you can use the Tag Editor to add attributes and audition the presets. The new converted presets will be stored in the VST3 Preset folder.

Saving insert effect combinations

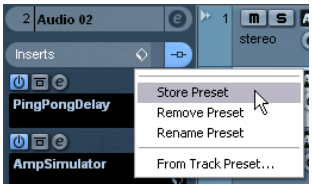
You can save the complete insert effect rack for a channel together with all parameter settings as an inserts preset. Inserts presets can be applied to audio, instruments, FX channel or group tracks.

This works as follows:

1. Select the desired track in the Track list and open the Inserts Inspector section.

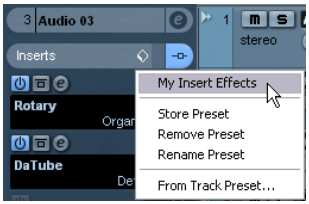
2. Load a combination of insert effects and adjust the parameters (or select effect presets) for each effect.

3. At the top of the Inserts tab, click the SoundFrame button to open the Preset Management pop-up menu for the inserts and select “Store Preset”.
This can also be done from the Channel Settings window using the SoundFrame button at the top of the Inserts section.



4. Type in a name for the preset in the dialog that appears.

5. Select the track (audio/group/instrument/fx channel) you wish to apply the new preset to, and click its SoundFrame button.
As you can see, the new preset is available at the top of the pop-up menu.



6. Select the preset you created from the pop-up menu.
The effects are loaded into the Insert slots of the new track, and the control panels for all effects are opened.

- Note that when loading insert combination presets, any plug-ins that were previously loaded for the track will be removed, regardless of whether these slots are used in the preset.
In other words, saving an inserts preset means saving the states of all insert slots.

- You can use the Preset Management pop-up to save your settings as preset, or to rename or remove the current preset.

Extracting insert effect settings from track presets

You can extract the effects used in a track preset and load them into your inserts “rack”:

- Select “From Track Preset…” on the Preset Management pop-up menu to open a dialog where all track presets are shown.

- Select an item in the list to load the effects used in the track preset.

Track presets are described in their own chapter in the Operation Manual.

Installing and managing effect plug-ins

Nuendo supports two plug-in formats; the VST 2 format (with the file name extensions ".dll" on the PC and ".VST" on the Mac) and the VST 3 format (extension ".vst3" on both platforms). The formats are handled differently when it comes to installation and organizing.

Installing additional VST plug-ins

Installing VST 3 plug-ins under Mac OS X

To install a VST 3.x plug-in under Mac OS X, quit Nuendo and drag the plug-in file into one of the following folders:

- /Library/Audio/Plug-Ins/VST3/

This is only possible if you are the system administrator. Plug-ins installed in this folder will be available to all users, for all programs that support them.

- Users/Username/Library/Audio/Plug-Ins/VST3/

"Username" is the name you use to log on to the computer (the easiest way to open this folder is to go to your "Home" folder and use the path /Library/Audio/Plug-Ins/VST/ from there). Plug-ins installed in this folder are only available to you.

When you launch Nuendo again, the new effects will appear on the effect pop-up menus. In the VST 3 protocol, the effect category, sub-folder structure etc. are built-in and cannot be changed. The effect(s) will simply show up in the assigned category folder(s) on the Effect pop-up menu.

Installing VST 2.x plug-ins under Mac OS X

⚠ Plug-ins in Mac OS 9.X format cannot be used.

To install a VST 2.x plug-in under Mac OS X, quit Nuendo and drag the plug-in file to one of the following folders:

- /Library/Audio/Plug-Ins/VST/

This is only possible if you are the system administrator. Plug-ins installed in this folder will be available to all users, for all programs that support them.

- Username/Library/Audio/Plug-Ins/VST/

"Username" is the name you use to log on to the computer (the easiest way to open this folder is to go to your "Home" folder and use the path /Library/Audio/Plug-Ins/VST/ from there). Plug-ins installed in this folder are only available to you.

When you launch Nuendo again, the new effects will appear on the effect pop-up menus.

⇨ If an effect plug-in comes with its own installation application, you should use this.

As a general rule, always read the documentation or readme files before installing new plug-ins.

Installing VST 3 plug-ins under Windows

Under Windows, VST 3 plug-ins are installed by dragging the files (with the extension ".vst3") into the vst3 folder in the Nuendo application folder. When you launch Nuendo again, the new effects will appear on the Effect pop-up menus. In the VST 3 protocol, the effect category, sub-folder structure etc. are built-in and cannot be changed. The installed new effect(s) will simply show up in the assigned category folder(s) on the effect pop-up menu.

Installing VST 2 plug-ins under Windows

Under Windows, VST 2.x plug-ins are installed by dragging the files (with the extension ".dll") into the Vstplugins folder in the Nuendo application folder, or into the Shared VST Plug-in folder – see below. When you launch Nuendo again, the new effects will appear on the effect pop-up menus.

⇨ If an effect plug-in comes with its own installation application, you should use this.

As a general rule, always read the documentation before installing new plug-ins.

Organizing VST 2 plug-ins

If you have a large number of VST 2 plug-ins, having them all on a single pop-up menu in the program may become unmanageable. For this reason, the VST 2 plug-ins installed with Nuendo are placed in appropriate subfolders according to the effect type.

- Under Windows, you can organize VST plug-ins by moving, adding or renaming subfolders within the Vstplugins folder.

When you launch the program and pull down an effects pop-up menu, the subfolders will be represented by hierarchical submenus, each listing the plug-ins in the corresponding subfolder.

- Under Mac OS X, you cannot change the hierarchic arrangement of the "built-in" VST plug-ins.

However, you can arrange any additional plug-ins you have installed (in the /Library/Audio/Plug-Ins/VST/ folders, see above) by placing them in subfolders. In the program, the subfolders will be represented by hierarchical submenus, each listing the plug-ins in the corresponding subfolder.

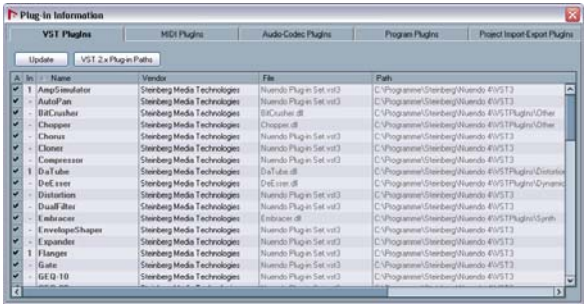
About the effects from previous Nuendo versions

The Legacy folder on the program DVD contains effects from previous versions of Nuendo.

The main reason for installing these earlier plug-ins is backwards compatibility, allowing you to import old Nuendo projects and get the correct effect settings.

The Plug-in Information window

On the Devices menu, you will find an item called “Plug-in Information”. Selecting this opens a dialog listing all the available VST compatible plug-ins in your system (including VST Instruments), along with all MIDI plug-ins.



Managing and selecting VST plug-ins

To display all available VST plug-ins, open the “VST PlugIns” tab.

- To enable a plug-in (make it available for selection), put a check mark in the left column.
  Only the enabled plug-ins will appear on the effect menus.

- The Instances column indicates how many instances of the plug-in are currently used in Nuendo.
  Clicking in this column for a plug-in which is already in use produces a pop-up showing exactly where each use occurs.

⇨ A plug-in may be in use even if it isn’t enabled in the left column.
You might for example have opened a project containing effects that are currently disabled on the menu. The left column only determines whether or not the plug-in will be visible on the effect menus.

- All columns can be resized by dragging the divider in the column header.

The other columns show the following information about each plug-in:

Column	Description
Name	The name of the plug-in.
Vendor	The manufacturer of the plug-in.
File	This shows the complete name of the plug-in (with extension).
Category	This indicates the category of each plug-in (such as VST Instruments, Surround Effects, etc.).
Version	Shows the version of the plug-in.
SDK	Shows with which version of the VST protocol a plug-in is compatible.
Latency	This shows the delay (in samples) that will be introduced if the effect is used as an Insert. This is automatically compensated for by Nuendo.
Side Chain Inputs	Shows the number of side-chain inputs for a plug-in.
I/O	This column shows the number of inputs and outputs for each plug-in.
Path	The path and name of the folder in which the plug-in file is located.

Update button

Clicking this button will make Nuendo re-scan the designated VST folders for updated information about the plug-ins.

VST 2.x Plug-in Paths button

This opens a dialog where you can see the current paths to where VST 2.x plug-ins are located. You can freely Add/Remove folder locations by using the corresponding buttons. If you click “Add”, a file dialog is opened, where you can select a folder location.

About the “shared” plug-ins folder (Windows and VST 2.x only)

You can designate a “shared” VST 2.x plugins folder. This will allow VST 2.x plug-ins to be used by other programs that support this standard.

You designate a shared folder by selecting a folder in the list and clicking the “Set As Shared Folder” button in the VST 2.x Plug-in Paths dialog.

Exporting plug-in information files

You can also save plug-in information as an .xml file, e.g. for archiving purposes or troubleshooting. The Export function is available for VST, MIDI and Audio Codec plug-ins. Proceed as follows:

1. Right-click on the desired tab in the Plug-in Information window (for VST, MIDI or Audio Codec plug-ins), to open the context menu and select “Export”.
A file dialog opens.

2. In the dialog, specify a name and location for the Plug-in Information export file and click OK to export the file.

- The Plug-in Information file contains information on the currently installed/available plug-ins, their version, vendor, etc.

- The .xml file can then be opened in any editor application supporting the xml format.

14

VST Instruments and Instrument tracks

Introduction

VST Instruments are software synthesizers (or other sound sources) that are contained within Nuendo. They are played internally via MIDI. You can add effects or EQ to VST Instruments, just as with audio tracks.

⇨ This chapter describes the general procedures for setting up and using VST Instruments.

⇨ Depending on the VST version the instrument is compatible with, an icon may be displayed in front of the instrument name, see “About VST 3” on page 169.

⇨ Note that VST instruments are only supplied as part of the Nuendo Expansion Kit. You can, however, use your own VST instruments in Nuendo. The VST instrument included in the Nuendo Expansion Kit are described in detail in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

VST Instrument channels vs. instrument tracks

Nuendo allows you to make use of VST Instruments in two different ways:

- By activating instruments in the VST Instruments window.
  This creates a VST Instrument channel, which can be played by one (or several) MIDI track(s) routed to it.
- By creating instrument tracks.
  Instrument tracks are a combination of a VST Instrument, an instrument channel and a MIDI track. You play and record MIDI note data directly for this track.

Both methods have their advantages, and should be selected according to what best suits your needs. The following sections describe the two approaches.

VST Instrument channels

You can access a VST Instrument from within Nuendo by creating a VST Instrument channel and associating this channel with a MIDI track. Proceed as follows:

1. On the Devices menu, select “VST Instruments”.
   The VST Instruments window opens.

2. Click in one of the empty slots to open the instrument pop-up menu and select the desired instrument.

3. You will be asked if you want to create an associated MIDI track connected to the VST Instrument. Do so.
   The instrument is loaded and activated, and its control panel is opened. A MIDI track with the name of the instrument is added to the Track list. The output of this track is routed to the instrument.

In the Preferences dialog (VST–Plug-ins page), you can specify what should happen when loading a VST instrument in an instrument slot. Open the pop-up menu “Create MIDI track when loading VSTi” and select one of the available options:

- When you select “Always”, a corresponding MIDI track will always be created.
- When you select “Do not”, no track will be created and only the instrument will be loaded.
- Select “Always ask to” if you want to decide whether a MIDI track should be created whenever you load an instrument.

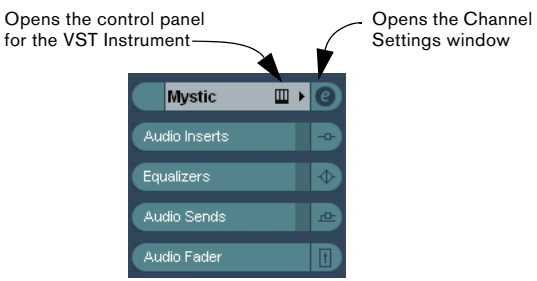
You can also use modifiers to specify what should happen when you load a VST instrument (overriding the Preference setting):

- When you hold down [Ctrl]/[Command] while selecting a VST Instrument for an instrument slot, a corresponding MIDI track with the name of the instrument is automatically created.
- When you hold down [Alt]/[Option] while selecting a VST Instrument for an instrument slot, no MIDI track will be created for the instrument.

- If you don't want the plug-in control panels to open every time you load a plug-in, open the Preferences dialog (VST–Plug-ins page) and deactivate "Open Effect Editor After Loading it".
You can open a plug-in panel at any time by clicking the "e" button of the corresponding plug-in slot.

4. If you now look in the Project window track list, you will find that a dedicated folder for the chosen instrument has been added, within a "VST Instruments" folder (where all your VST Instrument channels will be listed).
The separate folder for the added VST Instrument contains two or more automation tracks: one for automating the plug-in parameters and one for each mixer channel used by the VST Instrument. For example, if you add a VST Instrument with four separate outputs (four separate mixer channels), the folder will contain five automation tracks. To keep the screen less cluttered, you may want to close the folder for the VST Instrument until you need to view or edit any of the automation tracks. For more about automation, see the chapter "Automation" on page 213.

- When you select the MIDI track routed to the VST instrument, you will see that the Inspector contains a separate section for the instrument.
This section contains the audio channel settings for the VST Instrument (inserts, EQs, Sends and fader settings). The tab has two buttons for opening the Channel Settings window (for the VST Instrument channel) and the Edit Instrument button which opens the control panel for the VST Instrument.



5. Depending on the selected VST Instrument, you may also need to select a MIDI channel for the track.
For example, a multitimbral VST Instrument can play back different sounds on different MIDI channels – check the documentation for the VST Instrument for MIDI implementation details.

6. Make sure the option "MIDI Thru Active" is activated in the Preferences dialog (MIDI page).

7. Activate the Monitor button for the MIDI track (in the Track list, Inspector or mixer).
When this is activated (or when the track is record enabled), incoming MIDI is passed on to the selected MIDI output (in this case the VST Instrument), see the chapter "Recording" on page 64.

8. Open the mixer.
You will find one or more channel strips for the audio outputs of the VST Instrument. VST Instrument channel strips have the same features and functionality as group channel strips, with the addition of an Edit button at the bottom of the strip for opening the VST Instrument control panel. You will also find output routing pop-up menus at the top of the channel strips, for routing the VST Instrument channels e.g. to output channels or groups. Routing is described in detail in the chapter "VST Connections: Setting up input and output busses" on page 10.

9. Play the VST Instrument from your MIDI keyboard.
You can use the mixer settings to adjust the sound, add EQ or effects, etc., just as with regular audio channels. Of course, you can also record or manually create MIDI parts that play back sounds from the VST Instrument.

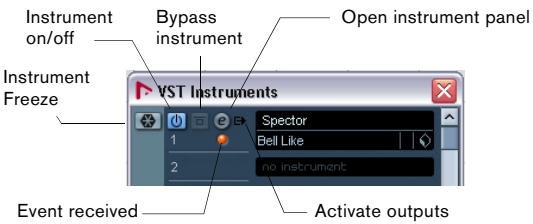
⚠ You can have up to 64 VST Instruments activated at the same time, either different instruments or several instances of the same instrument. However, software instruments can consume a lot of CPU power – keep an eye on the VST Performance window to avoid running out of processor power. See also "Instrument Freeze" on page 195.

- VST Instrument channels give you full access to multitimbral instruments.
You can have several MIDI tracks routed to the VST Instrument, each playing a different part.

- Similarly, you can route channels to any available output provided by the VST Instrument.

The VST Instruments window

When a VST Instrument is loaded, six controls are displayed for this slot in the VST Instruments window.



- The button on the far left is used for the Freeze function, see "Instrument Freeze" on page 195.

- The second button is used to activate or deactivate the VST Instrument.
When an instrument is selected from the instrument pop-up menu, it is activated automatically, i.e. the on/off control lights up in blue.
For some instruments you may also bypass the instrument by clicking the Bypass button to the right of the on/off button.

- Click the Edit (“e”) button to open the control panel for the VST Instrument.

- Below the Edit button is a small LED that will light up when MIDI data is received by the instrument.

- The rightmost button allows you to activate the desired output for the instrument.
This is useful when you are using VST Instruments that have a large number of audio busses, which may be confusing. Click entries in the pop-up list to activate/deactivate output busses for this effect.

Instrument tracks

An instrument track is a combination of a VST Instrument, a MIDI track, and a VST Instrument channel, in other words: it is a track coupled with a sound – it allows you to think in terms of sounds rather than in terms of track and instrument settings.

Adding Instrument tracks

To open and use an Instrument track, proceed as follows:

1. Open the Project menu and select Instrument from the Add Track submenu.
You can also right-click in the track list and select “Add Instrument Track” on the context menu.

2. The Add Instrument Track dialog is opened.
You can select an instrument for the track from the pop-up (but you can also leave this until later if you wish). Specify the number of instrument tracks you wish to create in the “count” field. If you click the “Browse Presets” button, the dialog expands to show the preset browser, where you can browse for sounds.

3. Click OK to add the Instrument track.
When you selected an Instrument in the Add Track dialog, the new track will get the name of the instrument. When no instrument was selected, the track will be named “Instrument track”.

An instrument track in the Track list.

Properties

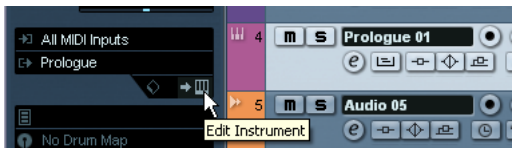
- Each Instrument track has a corresponding channel strip in the mixer.

- In the Inspector, you can select a VST Instrument from the Instrument pop-up menu.
When you select an instrument from this pop-up, its control panel will open automatically.

- You can also exchange the “sound” of an instrument track (i.e. the VST Instrument and its settings) by extracting these data from another instrument track or a VST preset, see “Extracting sound from an instrument track or VST preset” on page 335.

- On the Input Routing pop-up menu, you can select a MIDI input.
Instrument tracks have only one MIDI input.

- To open the control panel for the VST Instrument, click the “Edit Instrument” button in the Inspector.



- As with MIDI tracks, you can perform the usual MIDI editing procedures on the instrument track, like duplicate, split repeat or lock the track, use the In-Place Editor, drag and drop the MIDI parts of an instrument track etc. For more information, see the chapter “MIDI realtime parameters and effects” on page 342.

- As with MIDI track inspector and track controls, you can adjust track delay, choose MIDI input, work with VST Instrument panels, etc. For more information, see the chapter “MIDI realtime parameters and effects” on page 342.

- Instrument tracks have all options that VST Instrument channels have, i.e. Inserts, Sends, EQ, etc.

⇨ VST Instruments used in Instrument tracks do not appear in the VST Instruments window.
For an overview over all used VST Instruments, open the Plug-in Information window via the Devices menu. For further information, see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

Restrictions

- Instrument tracks have no MIDI Sends.
- MIDI volume and pan cannot be controlled (there is no "MIDI fader" tab in the Inspector); instead, the VST Instrument volume and pan are used (via the "Channel" tab in the Inspector). This applies also to the respective automation parameters.

⇨ Due to there being only one volume and pan control for the instrument track, the Mute button will mute the complete track including the VST Instrument. (As opposed to a MIDI track with an assigned VST Instrument, for which muting the MIDI track still allows you to monitor and record the VST Instrument.)

- Instrument tracks always have one stereo output channel only. This means that VST Instruments that do not provide a stereo output as their first output channel cannot be used with instrument tracks, and must be loaded via the VST Instruments window.
- Due to the limitation to one output channel, instrument tracks play only the first voice of a multi-timbral VST Instrument. If you want to use all voices, you have to load the instrument via the VST Instruments window and set up a MIDI channel to play it.

Import and export options

Importing MIDI loops

You can import "MIDI loops" (file extension "*.midiloop") in Nuendo. These files contain MIDI Part information (MIDI notes, controllers, etc.) as well as all the settings that are saved in Instrument track presets (see "About track presets and VST presets" on page 197). This way, you can easily reuse instrument patterns you really like in other projects or applications for example.

Proceed as follows:

1. Open the MediaBay window via the Media menu.
2. In the Filter section, activate the "Show MIDI Loops" button.
This is not necessary, but will help you locate your MIDI loops more quickly.
3. In the Viewer section, select the desired MIDI loop and drag it in an empty section in the Project window.
An Instrument track is created and the Instrument part is inserted at the position where you dragged the file. The Inspector will reflect all settings saved in the MIDI loop, e.g. the VST instrument that was used, applied Insert effects, Track parameters, etc.

⇨ You can also drag MIDI loops onto existing Instrument or MIDI tracks. However, this will only import the part information.
This means this part will only contain the MIDI data (notes, controllers) saved in the MIDI loop, but no inspector settings or instrument parameters.

Exporting MIDI loops

Exporting MIDI loops is a great way of saving a MIDI part together with its instrument and e.g. effect settings. This allows you to easily reproduce patterns you once created without having to search for the correct sound, style or effect.

Proceed as follows:

1. Select the desired Instrument part.
2. On the File menu–Export submenu, select "MIDI Loop…".
A file dialog opens.
3. Enter the desired name for the MIDI loop in the Name field in the lower section of the dialog.
- If you want to save attributes for the MIDI loop, click the Tag Editor button.
This lets you specify e.g. a category and a sub category for your MIDI loop.
4. Click OK to close the dialog and save the MIDI loop.

MIDI Loop files are saved in the following folder:

- Windows: /Documents and Settings/<Username>/Application Data/Steinberg/MIDI Loops.
- Mac: /Users/<Username>/Library/Application Support/Steinberg/MIDI Loops/

This default folder cannot be changed, you can however create subfolders within this folder to organize your MIDI loops. Simply click the "Create New Folder" button in the Save MIDI Loop dialog.

Exporting instrument tracks as MIDI file

You can also export instrument tracks as standard MIDI files, see “Exporting MIDI files” on page 498.

Please note:

- As there is no MIDI patch information in an instrument track, this information is missing in the resulting MIDI file.
- If you activate “Export Inspector Volume/Pan”, volume and pan information of the VST Instrument will be converted and written into the MIDI file as controller data.

Comparison

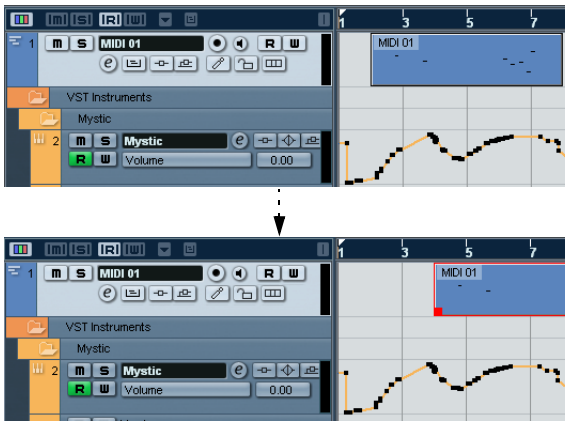
Since instrument tracks are a combination of MIDI and VST features, the instrument track properties and their handling show aspects of both.

On the left, the MIDI Inspector for a MIDI channel with its output routed to a VST Instrument – on the right, the instrument track Inspector for an instrument track using the same VST Instrument.

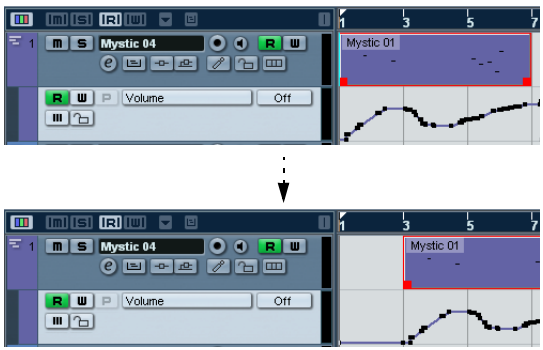
Automation considerations

- Automation of the VST Instrument channel settings or the settings for an instrument track is done in the same way as automating regular channels.
- Automation of the specific parameters for a VST Instrument is done in the same way as automating VST effect parameters.

When you set up a VST Instrument in the VST Instruments window, you also need to create a MIDI channel in which to enter the notes that you want the instrument to play. Although the VST Instrument channel and the MIDI track are connected via the VST Instrument, there is no direct connection between, for example, the volume automation of the VST Instrument channel and the events on the MIDI track. If you move the MIDI part, the automated volume curve of the VST return channel will not move with it.



In the instrument track, however, you have one track that includes the MIDI data, the VST Instrument and the channel you wish to automate. Therefore, the information on the automation track will move with the MIDI part.



For more information on track automation, see the chapter "Automation" on page 213.

What do I need? Instrument channel or Instrument track?

- If you need a particular sound without knowing which VST Instrument to use, create an instrument track and use the preview features to find the sound you want.
- Do likewise if the Instrument track restrictions described above do not matter.
- If you are planning to create an instrument track preset, complete with inserts and EQ settings, you have to use an instrument track.
- If you need to use multitimbral parts and/or multiple outputs, set up a VST Instrument channel.

Instrument Freeze

Like all plug-ins, VST Instruments may require a lot of processor power. If you are using a moderately powerful computer or if you are using a large number of VST Instruments, you may come to a point where your computer cannot handle all VST Instruments playing back in real time (the CPU overload indicator in the VST Performance window lights up, you get crackling sounds, etc.).

Enter the Instrument Freeze function! This is how it works:

- When you freeze a VST Instrument, the program renders an audio file of the instrument output (taking into account all unmuted MIDI parts routed to that VST Instrument). This file is placed in the "Freeze" folder within the Project folder.
- All MIDI tracks routed to the VST Instrument, or the instrument track associated with the VST Instrument, are muted and locked (the controls for these tracks will appear "grayed-out" in the track list and Inspector).
- When you start playback, the rendered audio file is played back from an "invisible" audio track, routed to the VST Instrument's mixer channel. Thus, any effects, EQ or mixing automation will still be applied.
- You can also freeze the mixer channel of the VST Instrument. This freezes any pre-fader insert effects for the channels, just as when freezing audio tracks (see "Freezing (rendering) insert effects for a track" on page 175).

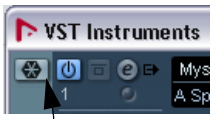
The result of the Freeze is that you get exactly the same sound as before, but the computer processor doesn't have to calculate the sound of the VST Instrument in real time.

Performing the freeze

The instrument freeze function is available in the VST Instruments window, and in the track list and the Inspector for instrument tracks.

1. Set up the project so that the VST Instrument plays back the way you want it to.
   This includes editing the MIDI tracks routed to the VST Instrument, or editing the instrument track, and making parameter settings for the VST Instrument itself. If you have automated parameter changes for the VST Instrument, make sure the Read (R) button is activated.
2. Open the VST Instruments window from the Devices menu, or, if you are using an instrument track, select the track and open the top Inspector tab.

3. Click the Freeze button for the VST Instrument (the button to the left of the VST Instrument slot), or the Freeze button in the Inspector for the instrument track.



The Freeze button in the VST Instruments window…

…and in the Inspector.

The Freeze Instrument Options dialog appears with the following options for the Freeze operation:

- Select “Freeze Instrument Only” if you don’t want to freeze any insert effects for the VST Instrument channels.
If you are using insert effects on the VST Instrument channel(s) and want to be able to edit, replace or remove these after freezing the VST Instrument, you should select this option.

- Select “Freeze Instrument and Channels” if you want to freeze all pre-fader insert effects for the VST Instrument channels.
If your VST Instrument channels are set up with the desired insert effects and you don’t need to edit these, select this option.

- You can set a Tail Size time to let sounds complete their normal release cycle.
Otherwise, the sound might be cut off at the very end of the freeze file.

- When you activate “Unload Instrument when Frozen”, the frozen VST Instrument will be removed.
This is useful if you are freezing an instrument that uses a lot of RAM, e.g. for pre-loading samples. By unloading the instrument, the RAM becomes available for other plug-ins, etc.

4. Click OK.
A progress dialog is shown while the program renders the VST Instrument audio to a file on your hard disk.

The Freeze button lights up. If you check the Project window at this point, you will find that the relevant MIDI/instrument tracks have grayed out controls in the Track list and Inspector. Furthermore, the MIDI parts are locked and cannot be moved.

5. Play back the project.
You will hear exactly the same sound as before freezing the VST Instrument – but the CPU load will be considerably less!

- If you selected “Freeze Instrument and Channels”, any insert effects used by the VST Instrument are also frozen (except for the post-fader inserts). However, you can always adjust level, pan, sends and EQ for frozen VST Instruments.

Unfreezing

If you need to make adjustments (either to the MIDI tracks, to the VST Instrument parameters or to the VST Instrument channels if these were frozen) you need to unfreeze the VST Instrument:

1. Click the Freeze button for the VST Instrument again (either in the VST Instruments window or in the Inspector).
You will be asked to confirm this operation.

2. Click “Unfreeze”.
The tracks and VST Instrument are restored and the rendered “freeze file” is deleted.

VST instruments and processor load

If you are working with VST 3 instruments, another way to relieve processor load is the option “Deactivate Plug-in when silence is detected” in the Preferences dialog (VST–Plug-ins page). This is described in detail in the section “Smart plug-in processing” on page 169.

Using presets for VSTi configuration

About track presets and VST presets

Track presets and VST presets allow you to quickly set up tracks or instruments with all the settings required for the sound you want. Nuendo provides various types of presets for various purposes. Two of these are of relevance for VST Instruments:

- Track presets for instrument tracks store the parameter settings of a VST Instrument together with all track/channel settings (applied audio and MIDI insert effects, etc.).
Instrument track presets can only be applied to instrument tracks, not to instrument channels activated in the VST Instruments window.

- VST presets store all panel settings for a plug-in (VST Instruments and VST effects), but no track/channel settings.
Note that you can create instrument tracks from VST 3 presets, i.e. selecting a VST 3 preset will create an instrument track with all settings stored in the VST preset plus an "empty" track.

As described in the chapter "Audio effects" on page 168, there are two types of VST presets that can be used: the VST 2 standard ".fxb/.fxp" files and the VST 3 preset standard with the extension ".vstpreset". Some of the included VST Instruments use the VST 2 preset standard, and others use the VST 3 standard.

All VST 2 instruments can import ".fxb/.fxp" files and also convert them to the VST 3 standard. Once converted, you can use all VST 3 features. See "About earlier VST Instrument presets" on page 200.

⇨ For further information on Track presets and VST presets, see the chapter "Track Presets" on page 327.

Browsing for sounds

One important and often time-consuming aspect of music creation is the search for the right sounds. You might spend a huge amount of time trying out the presets for a particular instrument only to find out later that the preset for another instrument contains the sound you were looking for.

This is why Nuendo features extensive browsing possibilities, allowing you to preview all available presets without having to load them first!

In addition, you can filter your search by specifying category, style etc.

For example, if you are looking for a bass sound, simply select the Bass category and you can browse and preview all bass sounds for all instruments. If you know you want a synth bass sound, select Synth Bass as sub-category and all synth bass sounds will be shown etc.

You can also browse and preview track presets for instrument tracks, i.e. instrument sounds plus all track settings and all channel insert effect settings for this track.

These features combined speed up the process of finding the right sound immensely.

- When creating your own presets, it is always a good idea to set up attributes for them, as it allows you to fully use the browsing features for your files, too.
This is described in detail in the chapter "The MediaBay" on page 314.

There are two ways of browsing for sounds:

- Using the Presets browser.
This will apply preset settings to an existing track.

- Using the Browse Sounds dialog.
Use this dialog if you haven't set up a track yet.

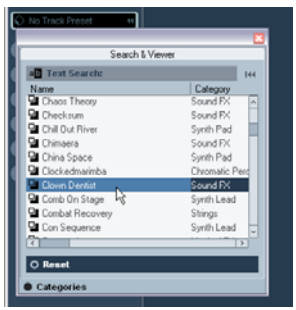
Using the Presets browser

1. Create an instrument track and select it in the track list.
You do not have to assign an instrument to the track, but make sure to specify a MIDI input.

2. Make sure that the track settings are shown in the Inspector.

3. Click in the Track Preset field in the Inspector (the text field currently reads "No Track Preset").

Click here…



…to open the Presets browser.

4. The Presets browser is opened. It contains three sections (Browser, Search & Viewer and Filter). By default, only the Search & Viewer section is shown. Note that it may take a moment before all available sounds appear in the Viewer.

- The Viewer section to the right displays all track presets for instrument tracks and all VST 3 presets.
Track presets for audio tracks, MIDI tracks or "multi" track setups are not displayed. The preset icon to the left of the file name indicates the type of preset.

5. Select a preset in the list.

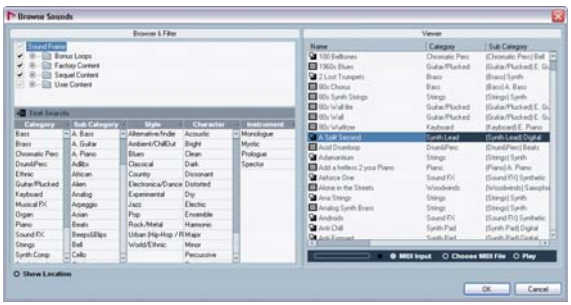
6. Play a few notes on your MIDI keyboard to hear the preset sound. You can switch between presets and hear the sound when you play. You can also play back/loop a MIDI part on a track. Each time you select a preset, all associated track and/or instrument settings are automatically loaded.

7. Use the Filter section to search for specific attributes if you wish.
You can click on the attributes in the respective column (Category, Style etc.), to filter out all presets that do not match the selected attribute(s).

8. When you have found the right sound, click OK to close the dialog.

Using the "Browse Sounds" dialog

1. Open the Project menu–Add Track submenu and select "Browse Sounds".
The Browse Sounds dialog is opened. It contains the same sections as the Apply Track Presets dialog (Browser, Viewer and Filter) and its Browser section also has the root "Presets" item selected – leave it like this.



- The Viewer section of the Browse Sounds dialog displays all preset sounds for all track types and all VST Instruments.

To preview the presets, you have to select a MIDI file or play MIDI notes on your MIDI keyboard because at this stage there is no track connected. This is done as follows:

2. Select a preset in the Viewer section.
A row of buttons appears in the dialog below the Viewer section.

3. Click the "Choose MIDI File" button.
This opens a file dialog where you can navigate to the location of a MIDI file (extension ".mid").

4. Click "MIDI Input" and then the "Play" button.
The sound is played. For each new preset you select you have to click the "Play" button to preview the preset.

5. Use the Filter section to search for specific attributes if you wish.
You can click on the attributes in the respective column (Category, Style etc.), to filter out all presets that do not match the selected attribute(s).

6. When you have found a preset, click OK to close the dialog.
An instrument track is created. It will show all track and/or instrument settings that were saved in the preset.

Selecting VST Instrument presets

The previous sections focussed on selecting presets for the creation of new instrument tracks, or for changing the setup of an existing track. However, you can also use presets to change the settings of a VST Instrument.

⚠ Note that the following refers to the selection of VST 3 presets (.vstpreset). If you want to apply .fxp/.fxb presets to your VST 2 instruments in this way, see "About earlier VST Instrument presets" on page 200.

To select a VST Instrument preset, proceed as follows:

1. Load a VST Instrument (either in the VST Instruments window or via an instrument track).

2. If you use the VST Instruments window, select a MIDI track routed to the instrument. If you use an instrument track, select this.

3. If necessary, click on the track name at the top of the Inspector to open the basic track settings.

4. Click in the Programs field in the Inspector.
The Preset browser is opened.

5. Step through the presets during playback to find the sound you are looking for.

6. Double-click the desired preset to load it and close the preset browser.

- You can also open the preset browser by clicking in the preset name field in the the control panel of a VST Instrument or by clicking the SoundFrame button in the control panel and selecting “Load Preset…” from the pop-up

- Selecting another preset in the preset browser will load it directly, replacing the previous preset.

- When the preset browser is open, you can still use Project window key commands, allowing you to start/stop playback or locate to different positions in the project.

- Clicking the Reset button below the Viewer will reload the last loaded preset.

Saving VST Instrument presets

You can save your settings as presets for further use (e.g. in other projects):

1. In the VST Instrument panel, click the SoundFrame button to the right of the preset name and select “Save Preset” from the pop-up menu.
This opens a dialog where you can save the current settings as a preset.

Presets are saved into a default folder named VST3 Presets. Within this folder, there is a folder called “Steinberg Media Technologies” where the included presets are arranged in sub-folders named after each instrument.

You cannot change the default folder, but you can add further subfolders inside the instrument’s preset folder.

- Under Windows, the default preset folder is in the following location:
Boot drive/Documents and Settings/User name/Application data/VST3 Presets.

- Under Mac OS, the default preset folder is in the following location:
Users/Username/Library/Audio/Presets/<company>/<plug-in name>

2. Enter a name for the new preset in the File name field in the lower part of the dialog.

- If you wish to assign attributes to the preset, click the Tag Editor button.
Click in the Value column to select an appropriate “tag” for one or several of the available categories in the Attributes column. Tagging is described in detail in the chapter “The MediaBay” on page 314.

3. Click OK to store the preset and exit the dialog.

Extracting sound from Track Presets

You can extract a sound from a Track preset (disregarding any track/channel settings) and save it as a VST preset. Proceed as follows:

1. Click the SoundFrame button (“Extract sound from Track Preset”) below the Output Routing pop-up menu in the Inspector.
This opens a dialog where all Track Presets are shown.

2. Select an instrument track preset or VST preset and click OK.
The VST Instrument and the settings (but no inserts, EQs or modifiers) of the existing track are overwritten using the data of the track preset. The previous VST Instrument for this instrument track is removed and the new VST Instrument with its settings is set up for the instrument track.

Track Presets are described in detail in the chapter “Track Presets” on page 327.

About earlier VST Instrument presets

You can use any VST 2.x Instrument plug-ins in Nuendo. Installing VST Instrument plug-ins works the same way as for audio effects – see “Installing additional VST plug-ins” on page 186.

When you install a VST 2 instrument, any previously stored presets for it will be of the old FX program/bank (.fxp/.fxb) standard. You can import such files, but the preset handling will be slightly different. You will not be able to use the new features like the Preview function or the Tag editor until you have converted the old “.fxp/.fxb” presets to VST 3 presets. If you save new presets for a VST 2 plug-in these will automatically be saved in the new “.vstpreset” format in the default location.

Importing and converting FXB/FXP files

To import .fxp/.fxb files, proceed as follows:

1. Load any VST 2 instrument you may have installed, and click on the SoundFrame button to open the Preset Management pop-up menu.

2. Select “Import FXB/FXP” from the pop-up menu.
This menu item is only available for VST 2 instrument plug-ins.

3. In the file dialog that opens, locate the .fxp file and click “Open”.
If you load a bank (.fxb), it will replace the current set of all effect programs. If you load a single program, it will replace the currently selected effect program only. Note that such files exist only if you created your own .fxp/fxb presets with a previous version of Nuendo (or any other VST 2 application).

- After importing, you can convert the current program list to VST presets by selecting “Convert Program List to VST Presets” from the Preset Management pop-up.
When the presets are converted, they will be available in the preset browser, and you can use the Tag Editor to add attributes and audition the presets. The presets will be stored in the VST3 Preset folder.

About latency

Depending on your audio hardware and its ASIO driver, the latency (the time it takes for the instrument to produce a sound when you press a key on your MIDI controller) may simply be too high to allow comfortable real-time VST Instrument playback from a keyboard.

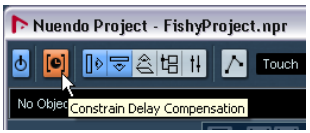
If this is the case, a workaround is to play and record your parts with another MIDI sound source selected, and then switch to the VST Instrument for playback.

⇨ You can check the latency for your audio hardware in the Device Setup dialog (VST Audio System page).
The input and output latency values are shown below the ASIO Driver pop-up menu. For live VST Instrument playing, these values should ideally be a few milliseconds (although the limit for “comfortable” live playing is a matter of personal taste).

Constrain Delay Compensation

Nuendo features full delay compensation throughout the entire audio path. This means that any delay inherent in the VST plug-ins you use will automatically be compensated for during playback, so that all channels are kept in perfect sync (see “About plug-in delay compensation” on page 170).

However, when you play a VST Instrument in real time or record live audio (with monitoring through Nuendo activated), this delay compensation may sometimes result in added latency. To avoid this, you can click the Constrain Delay Compensation button on the Project window toolbar. This function tries to minimize the latency effects of the delay compensation, while maintaining the sound of the mix as far as possible.



- In the Preferences dialog (VST page) you will find a setting called Delay Compensation Threshold. Only plug-ins with a delay higher than this setting will be affected by the Constrain Delay Compensation function.

- VST plug-ins (with higher delay than the threshold value) which are activated for VST Instrument channels, audio track channels that are record enabled, group channels and output channels will be turned off when you activate Constrain Delay Compensation.
- VST plug-ins activated for FX channels are not turned off but their delay is disregarded by the program (delay compensation is turned off).

After recording or using a VST Instrument with Constrain Delay Compensation, you should turn off the function to restore full delay compensation.

External instruments

An external instrument bus is an input (return) to your audio hardware, along with a MIDI connection via Nuendo and few additional settings. External instrument busses are created in the VST Connections window. All external instrument busses you have created will appear on the VST Instrument pop-up menus and can be selected in the same way as any VST Instrument plug-in. If you select an external instrument, you play it via MIDI as usual (you have to create a MIDI device to play it) and the sound (synth audio output) will come in to the VST environment where you can apply processing etc. For more information on external instruments, see “Setting up external instruments” on page 19.

15

Surround sound

Background

What is Surround sound?

Surround is a common name for various techniques for positioning audio in reference to the listener. Whereas regular stereo is limited to left/right positioning, within a relatively narrow field, surround sound opens possibilities of positioning an audio source anywhere around the listener.

Surround sound comes in many flavors, from the ill-fated Quadraphonic format for vinyl discs launched in the 70s, to today's more successful incarnations.

The differences between the formats are in two areas:

- The number and configuration of speakers.
This varies from two speakers up to 12.
- The intended final coding format.
This depends on the media the audio will be "stored" on: film, broadcast video or DVD, for example.

Surround sound is a large topic, there are entire books and regular publications devoted to the subject. This chapter will not provide an in-depth introduction to surround sound as such. Instead it will concentrate on the specific implementation in Nuendo.

Surround sound in Nuendo

Nuendo has integrated surround sound features with support for several formats. This support goes all the way through the audio path – all audio channels and busses can handle multiple speaker channel configurations (up to 12 channels). A channel in the mixer can either carry complete surround mixes, or an individual speaker channel which is part of a surround setup.

- Audio channels can be routed freely to surround channels.
- The Surround Panner function in the mixer allows you to graphically position channels in the surround field.
- The Mixconvert plug-in allows conversion of one surround channel into another with a different speaker configuration. Nuendo places Mixconvert automatically where needed.
- Nuendo is ready for surround specific plug-ins, that is plug-ins with multi-channel support specifically designed for surround sound mixing tasks (the included "Mix8to2" plug-in is an example of this). There are also surround aware plug-ins, which are not designed specifically for Surround but which due to their multi-channel support work well in a Surround configuration. An example is the Surrounddither plug-in.
- You configure Nuendo for surround by defining input and output busses in the desired surround format, and specifying which audio inputs and outputs should be used for the different channels in the busses. This is done in the VST Connections window.

Requirements for using Surround

The following additional equipment is required for taking advantage of the surround sound implementation in Nuendo:

- An audio card with more than two outputs.
The card must have as many outputs as the surround format you plan to select.
- A matching amplifier/speaker configuration.

Encoding

The result of a surround mix in Nuendo is either the multi-channel audio sent from the surround output bus to your surround speaker setup, or (if you use the Export audio feature) audio file(s) on your hard disk. Exported surround mixes can either be split (one mono file per speaker channel) or interleaved (a single file containing all the surround channels).

Getting from this step to the final product (surround sound on DVD disc, DTS, etc.) requires special software and possibly hardware. This equipment will encode the signal into the desired format, possibly compress the audio and store it on the final media.

Exactly what type of software and/or hardware you need depends on what kind of format you are mixing for and is not dependent on Nuendo in any way.

- Steinberg provides Dolby Digital and DTS encoders for purchase, tailored for use with Nuendo.
For details, please go to www.steinberg.net.

About surround plug-ins

Included with the program are some specific surround-plug-ins. These are:

- MatrixEncoder and MatrixDecoder.

These are used for working with LRCS Surround encoded material. In LRCS Surround, four audio channels are converted to two channels, for distribution via regular video and broadcast formats. These plug-ins perform such conversions (in both ways) and are compatible with the LRCS Surround format.

- Mixconvert

Mixconvert gives you an easy way to take surround mixes and convert them to other formats with less channels. For example, Mixconvert can be used to downmix a 5.1 surround mix to a normal stereo mix. This plug-in is unique in that Nuendo will automatically insert it in place of the channel panner or aux send panner in certain situations. Please refer to the manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4” for complete information about Mixconvert.

- Mix6to2

The Mix6to2 effect allows you to control the levels of up to six surround channels, and to mix these down to a stereo output.

- Mix8to2

The Mix6to2 effect allows you to control the levels of up to eight surround channels, and to mix these down to a stereo output.

- Mixer Delay

The Mixer Delay effect is useful for time aligning surround speakers if your room configuration does not allow for proper ITU-R speaker placement. It is also handy for re-routing surround channels to their proper speaker channels in your setup (refer to the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4” for more information about Mixer Delay.

- SurroundDither

This is a dithering plug-in capable of handling six channels at the same time – use this for applying dithering to a surround output bus.

- SurroundPanner

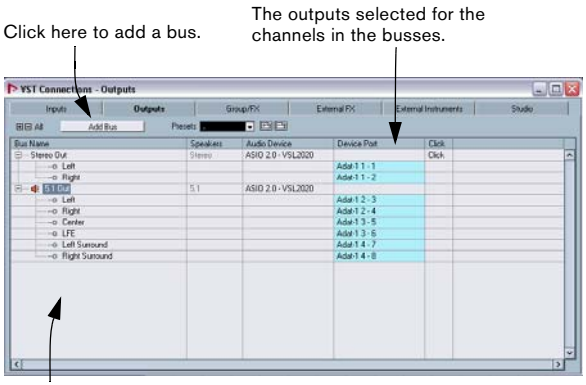
This is described in the section “Using the Surround Panner” on page 208.

⇨ Surround plug-ins (apart from the SurroundPanner) are described in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

The VST Connections window

In this window you can add input and output busses. There is a complete selection of common surround configurations available, as well as standard mono or stereo busses.

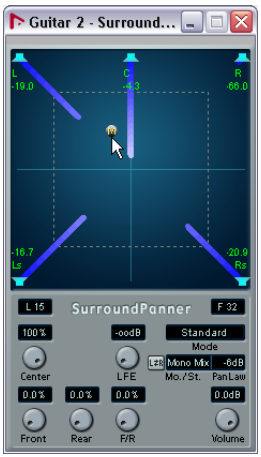
The Bus Name column contains the currently configured busses as they will appear in the input and output routing pop-ups in the mixer.



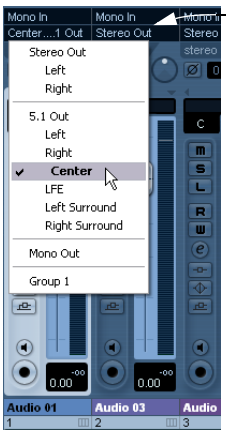
VST Connections showing the Outputs page. The “5.1 Out” bus is unfolded, displaying the individual speaker channels, with their physical output ports displayed in the Device Port column to the right.

Surround in the mixer

Surround sound is supported throughout every stage of the signal path in the Nuendo mixer, from input to output bus. Each bus or audio channel can carry up to 12 surround speaker channels.



Here, the SurroundPanner is used for positioning the sound “dynamically” in the surround field.



Using the Output Routing pop-up, audio channels can be routed directly to surround channels.

In the output channel section of the mixer you can control the master levels for configured busses. The level meter for a bus (or channel in the mixer) that carries multiple surround channels will show multiple level bars, one for each speaker channel in the surround configuration.

Operations

Setting up the surround configuration

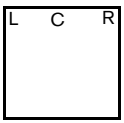
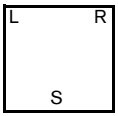
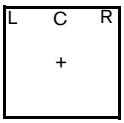
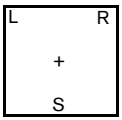
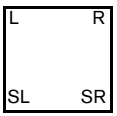
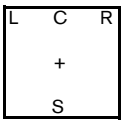
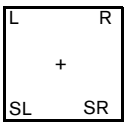
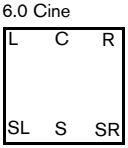
Output bus configuration

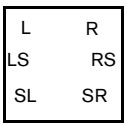
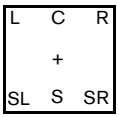
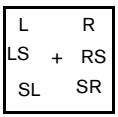
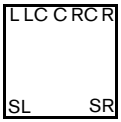
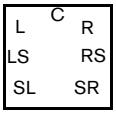
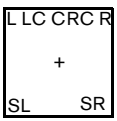
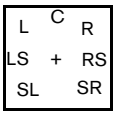
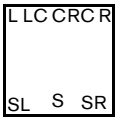
Before you can start working with surround sound, you have to configure a surround output bus, through which all the speaker channels of the chosen surround format are routed. How to add and set up busses is described in detail in the section “Setting up busses” on page 11. Here is a brief run through:

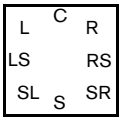
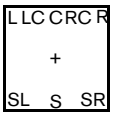
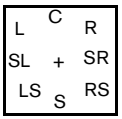
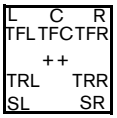
1. Open the VST Connections window from the Devices menu.
2. Click the “Outputs” tab.
3. Click the “Add Bus” button and select one of the preset formats from the Configuration pop-up (see below).
   The new bus appears with the ports visible.
4. By clicking in the Device Port column you can now route the speaker channels to the desired outputs of your audio hardware.
5. If you like, rename the output bus by clicking its name and typing in a new one.
   This name will appear in the mixer and on routing pop-ups.

The following surround configurations are included:

Format	Description
LRCS L C R S	LRCS refers to Left Right Center Surround, where the surround speaker is center-rear positioned. This is the original surround format that first appeared as Dolby Stereo in cinema and later as the home cinema format Dolby ProLogic.
5.0 L C R SL SR	This is the same as 5.1 (see below) but without the LFE channel. The LFE channel is optional in 5.1 and if you don’t plan to use it, you might find this option more convenient.
5.1 L C R + SL SR	This format is one of the most popular in cinema and DVD. In its various cinema and DVD encoding implementations (established by different manufacturers) it is referred to as Dolby Digital, AC-3, DTS and MPEG 2 Multichannel. 5.1 has one center speaker (mainly used for speech), main left and right speakers, and two surround speakers (mostly for sound effects). Additionally a subchannel (LFE – Low Frequency Effects) with lower bandwidth is used for special low frequency effects.

Format	Description
LRC 	Same as LRCS, but without the surround speaker channel.
LRS 	Left-Right-Surround, with the surround speaker positioned at center-rear.
LRC+Lfe 	Same as LRC but with an Lfe sub-channel added.
LRS+Lfe 	Same as LRS but with an Lfe sub-channel added.
Quadro 	The original Quadraphonic format for music, with one speaker in each corner. This format was intended for vinyl record players.
LRCS+Lfe 	Same as LRCS but with an Lfe sub-channel added.
Quadro+Lfe 	Same as Quadro but with an Lfe sub-channel added.
6.0 Cine 	A Left-Right-Center front speaker arrangement with 3 (Left-Right-Center) surround channels.

Format	Description
6.0 Music 	This uses 2 (Left/Right) front channels with Left and Right surround channels and Left and Right Side channels.
6.1 Cine 	Same as 6.0 Cine but with an Lfe sub-channel added.
6.1 Music 	Same as 6.1 Cine but with an Lfe sub-channel added.
7.0 Cine 	A Left, Mid-left, Center, Mid-right, Right front speaker arrangement with Left and Right surround channels.
7.0 Music 	Same as 6.0 Music but with a Center front channel added.
7.1 Cine 	Same as 7.0 Cine but with an Lfe sub-channel added.
7.1 Music 	Same as 7.0 Music but with an Lfe sub-channel added.
8.0 Cine 	Same as 7.0 Cine but with the addition of a Center Surround channel.

Format	Description
8.0 Music 	Same as 7.0 Music but with the addition of a Center Surround channel.
8.1 Cine 	Same as 8.0 Cine but with an Lfe sub-channel added.
8.1 Music 	Same as 8.0 Music but with an Lfe sub-channel added
10.2 	This is an experimental format with ten surrounding speakers and two Lfe channels (a combination of two 5.1, one at the top and one at the bottom of the room).

Child busses

Essentially a child bus is a bus within a (bigger) bus. Typically you may want stereo child busses within your surround bus – this allows you to route stereo tracks directly to a stereo speaker pair within the surround bus. You may also want to add child busses in other surround formats (with fewer channels than the “parent bus”).

Once you have created a surround bus, you can add one or several child busses to it by right-clicking the bus and selecting “Add Child Bus”. This is described in detail in the section “Adding a child bus” on page 13.

Input bus configuration

To work with surround sound in Nuendo, it is often not necessary to configure a surround format input bus. You can record audio files via standard inputs, and easily route the resulting audio channels to surround outputs at any stage. You can also directly import multi-channel files of specific surround format onto audio tracks of the same format.

You should add a surround input bus in the following circumstances:

- You have existing audio material in a specific surround format, and you wish to transfer this material into Nuendo as a single, multi-channel file.
- You wish to record a surround setup “live”.

In both cases, you can add and configure an input bus of the format you wish to use in the VST Connections dialog so that each input on your audio hardware is routed to the corresponding speaker channel.

To add an input bus, use the same general method as described for output busses (see “Output bus configuration” on page 205), but select the “Inputs” tab instead.

Routing channels directly to surround channels

If you want to place an audio source in one separate speaker channel only, you can route it directly to that speaker channel. This is useful for pre-mixed material or multi-channel recordings that don’t require panning.

1. Open the mixer and locate the channel you wish to route.
2. From the output routing pop-up menu, select the corresponding surround speaker channel.

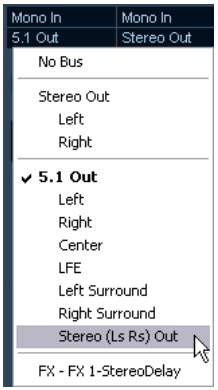
- If a stereo audio channel is routed directly to a speaker channel, the left/right channels will be mixed to mono.
  The pan control for the audio channel governs the balance between the left and right channel in the resulting mono mix. Center pan will produce a mix of equal proportion.

Routing channels using child busses

Child busses provide a way to route stereo (or multi-channel) audio channels to specific speaker channels in a surround configuration.

The most obvious application of a child bus is when you wish to add a stereo channel to two specific left/right surround speaker channels.

If you have added a child bus within a surround bus (see above), it appears as a submenu item within the surround bus on the output routing pop-up menu. Select this to route a stereo audio channel directly to that stereo speaker pair in the surround bus.



Using the Surround Panner

Nuendo has a special feature for graphically positioning a sound source in a surround field. This is actually a special plug-in which distributes the audio from the channel in various proportions to the surround channels.

1. Open the mixer and locate the channel you wish to position.
This could be a mono or stereo channel.

2. From the output routing pop-up menu, select the "whole surround bus" option (not a specific speaker channel).
A miniature graph of the surround plug-in interface appears above the fader in the channel strip.

When the "whole surround bus" is selected, the channel strip shows a miniature surround control.

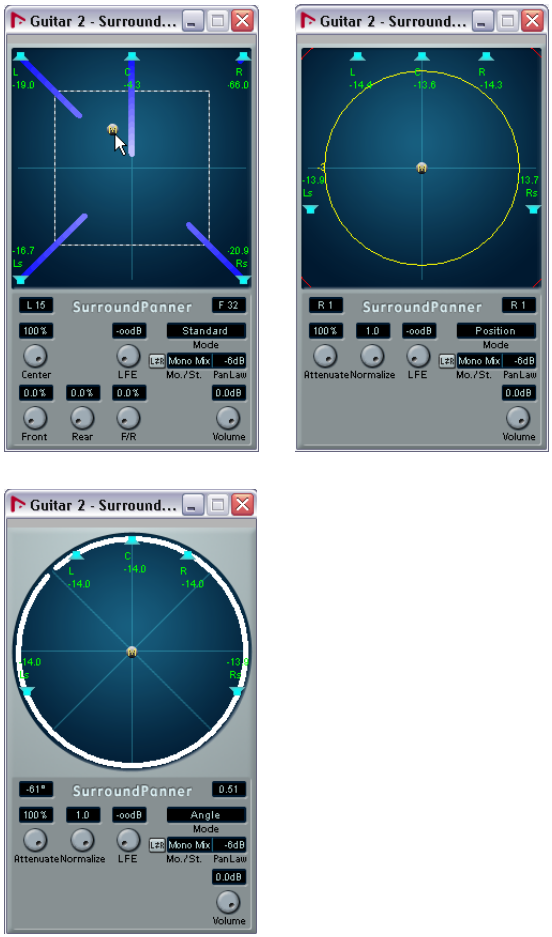
3. You can click and drag directly in the miniature image to move the sound in the surround field.
The horizontal red strip to the right controls the subbass (LFE) level (if available in the selected surround format).

- You can also view a slightly larger version of this control by selecting "Panner" on the View options pop-up menu for the extended mixer panel.
This mode offers click and drag-panning as well as numerical values for left/right balance, front/rear balance and LFE amount – enter the desired number or use the mouse wheel to adjust them.

- The SurroundPan can also be displayed in the Inspector for all audio channel track types. To display the Surround Pan tab in the Inspector, make sure the corresponding option is enabled in the Inspector context menu.

- For total control over surround panning, double-click on the miniature image to open the full Surround Panner interface in a separate window.

The SurroundPan controls



The SurroundPan plug-in interface in Standard, Position and Angle mode, respectively.

The SurroundPan plug-in allows you to position your audio in the surround field. It consists of an image of the speaker arrangement, as defined by the output bus selected on the output routing pop-up menu, with the sound source indicated as a gray ball.

Mode – Standard/Position/Angle

The Standard Mode/Position Mode/Angle Mode switch allows you to work in three modes:

- In both Standard and Position mode, the speakers in the front are aligned, as they would normally be in a cinema-type situation. This means that the front speakers are at a varying distance from the center. Standard mode (default) is the best mode for moving sources between speakers without level attenuation.
- Angle Mode is the traditional surround sound mixing definition. Note that here the speakers are defined as being at equal distance from the center. This is not really a true representation of for example a cinema, but has still proven to work well in many situations.

Speakers

The speakers in the panel represent the chosen surround configuration.

- The speakers in the front are aligned, as they would normally be in a cinema-type situation.
  This means that the front speakers are at a varying distance from the center, allowing you to move sources between speakers without level attenuation.

- You can turn speakers on and off by clicking them with [Alt]/[Option] pressed. When a speaker is turned off, no audio will be routed to that surround channel.

Positioning and levels

⚠ The text below assumes that the Mono/Stereo pop-up is set to “Mono Mix”. For more information on the other modes, see below.

A sound source is positioned either by clicking or by dragging the gray “ball” around in the panel (or by using key commands, see below). By dragging during playback you can record automation, see “Enabling and disabling the writing of automation data” on page 214.

- In Standard Mode, the signal levels from the individual speakers are indicated by colored lines from the speakers to the center of the display.

- In Position Mode, the concentric circles will help you determine the level of the signal at a certain position.
  The yellow circle represents -3dB below nominal level, the red circle is at -6dB and the blue is located at -12dB. These are affected by attenuation, see below.

- In Angle Mode, a red arc helps you determine the perceived “range” of a source. The sound will be at its loudest in the middle of the arc and will have dropped in level towards the ends.

Exactly how levels are handled may require some explanation:

- When you move a source around, a number will indicate the loudness in each speaker.
This is a value in dB (decibel) and is relative to the nominal level of the source. In other words, 0.0 (dB) represents full level.

- If you position the source far enough away from a speaker, its level will drop to zero (indicated by an infinity symbol).

- The signal levels from the individual speakers are indicated by colored lines from the speakers to the center of the display.

- You can use modifier keys to restrict movement in various ways:

In Standard and Position Mode:

Key	Movement restriction
[Shift]	Horizontally only
[Ctrl]/[Command]	Vertically only
[Alt]/[Option]	Diagonally (up left, down right)
[Ctrl]/[Command]+ [Alt]/[Option]	Diagonally (up right, down left)

In Angle Mode:

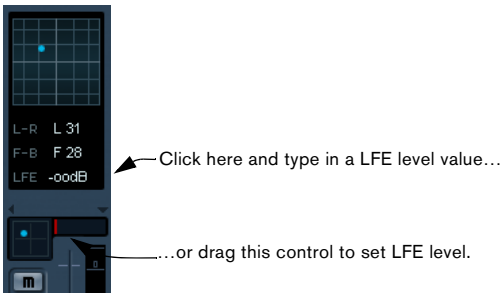
Key	Movement restriction
[Shift]	From center to perimeter only
[Ctrl]/[Command]	Along the perimeter only (at current distance from center)

There is also a special set of key commands for working in the SurroundPan window.

⚠ For a complete list of the available key commands, click on the “SurroundPanner” logo and then click again!

The LFE dial (all modes)

If the selected surround setup includes an LFE (Low Frequency Effects) channel, a separate LFE level dial will be available in the SurroundPan window. Use this to set the signal amount sent to the LFE channel. You can also set this using the small red strip to the right of the Surround Panner in the mixer channel strip, or by typing in a number in the LFE value field in the larger Surround Panner that can be shown in the extended channel strip.



The Surround Panner in the channel strip (bottom) and in the extended panel of the mixer channel strip (“Panner” selected on the View options pop-up menu).

Mono/Stereo pop-up (All Modes)

If you have a mono channel the Mono/Stereo pop-up is by default set to Mono Mix. The panner will then behave as described above.

If you have a stereo channel, you have the option of using one of the three Mirror modes. Two gray balls will then appear, one for each channel (L/R). This will allow you to move the two channels symmetrically, by dragging one of them. The three modes allow you to select which axis should be used for mirroring.

- The default mode for stereo channels is the Y-Mirror mode.
- If you run a stereo signal through the panner in Mono Mix mode, the two channels will be mixed together before entering the plug-in.
- If you run a mono signal through the plug-in in one of the stereo modes, the signal will be split before entering the plug-in.

Additional parameters (Standard mode)

- Center Level.

This determines how center source signals should be reproduced by the front speakers. With a value of 100%, the center speaker will provide the center source. With a value of 0%, the center source will be provided by the ghost image created by the left and right speakers. Other values will produce a mix between these two methods.

- Divergence Controls.

The three divergence controls determine the attenuation curves used when positioning sound sources, for X-axis front, X-axis back and Y-axis (front/rear), respectively. If all three Divergence values are 0% (default), positioning a sound source on a speaker will set all other speakers to zero level (-×) (except for the center speaker which depends on the center level). With higher values, the other speakers will receive a percentage of the sound source.

Additional parameters (Position and Angle mode)

- Attenuate.

Attenuate can be used to amplify or weaken the source. Exactly what effect this has on the level in each speaker can be determined by the level readouts, the concentric circle (Position mode) and the arc (Angle mode).

- Normalize.

Normalize is a function for controlling the overall loudness from all speakers. When this is set to 1.0 (full normalization), the level from all speakers together is always exactly 0dB. The individual levels will then be boosted or attenuated accordingly.

⚠ Please note that this is not a dynamic feature, like compression or limiting. It is instead just a tool for scaling the nominal output levels from the surround channels.

Automation

All parameters in the SurroundPan plug-in can be automated, just as with any other plug-in. See “Enabling and disabling the writing of automation data” on page 214.

Mixconvert

Mixconvert is a special plug-in that converts one multi-channel audio source into another multi-channel destination. It is most frequently used to “downmix” a multi-channel surround mix into another format with less channels (a 5.1 surround mix into a stereo mix for example).

This plug-in can be used as an insert effect in the mixer like other plug-ins but it also has special functions. Nuendo will automatically insert Mixconvert in place of the surround panner in cases where the channel (audio track, group channel etc…) is being routed to a destination that has fewer audio paths. Mixconvert will also be inserted in place of any aux send panner when the destination has a different audio path than the source. The surround panner’s displays and controls will be replaced by Mixconvert’s.

Please refer to the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4” for detailed information on the operation of Mixconvert.

⇨ There is one exception to this behavior. When a stereo channel is routed to a mono destination through the channel routing or an aux send routing, a normal panner will appear. However, this panner will control the balance of the left and right channels as they are blended into the mono destination. The center position blends both channels together equally. With the pan set all the way to the left, only the left channel will be heard. With the pan set all the way to the right, only the right channel will be heard.

Exporting a Surround mix

When you have set up a surround mix you can choose to export it with the Export Audio Mixdown function. This function exports a single selected output bus – this means that all channels that you want to be part of the mix must be routed to the surround output bus.

You have the following export options when doing surround work:

- Export to “split” format, resulting in one mono audio file for each surround channel.

- Export to interleaved format, resulting in a single multi-channel audio file (e.g. a 5.1 file, containing all six surround channels).

- Under Windows you can also export a 5.1 surround mix to a file in Windows Media Audio Pro format.
This is an encoding format tailored for 5.1 surround – see “Windows Media Audio Pro files (Windows only)” on page 442.

- You can also export a surround mix to a Dolby Digital AC3 file or a DTS file, if you have the Steinberg Dolby Digital Encoder or the Steinberg DTS Encoder (both optional, separate plug-ins) installed in your system.
Please go to www.steinberg.net for details.

For more about exporting to files, see the chapter “Export Audio Mixdown” on page 437.

Using effects in surround configurations

Nuendo introduces a special surround format for VST plug-ins, that is plug-ins that can process more than two channels. Mix8to2 is an example of such a plug-in.

Applying a Surround-aware plug-in

This is not different from applying a regular plug-in. The only difference is that the plug-in panel may have controls for more than two channels.

Using a stereo plug-in in a surround configuration

Normally, when you apply a stereo insert effect to a surround configuration, the first two speaker channels (often L and R) are routed through the plug-in and other channels are left unprocessed.

However, you may want to use the plug-in on other speaker channels. This is described in the chapter “Audio effects” on page 168.

16

Automation

Introduction

In essence, automation means finding and recording, for each and every moment of your project, the right values for a particular mixer parameter. When you create your final mix, you won't have to worry about having to adjust this particular parameter control yourself – Nuendo will do it for you.

Automation is a key feature when mixing audio data in complex, multi-track projects. Whether you want to mix a music project or if you are performing a feature-film re-recording – without comprehensive automation features your task would be impossible. Nuendo provides very powerful and yet intuitive automation of virtually every mixer and effect parameter.

The following sections provide detailed descriptions of the Nuendo automation features:

- The section following below describes how to activate automation Write mode and how the automation data is displayed.
- What can and what cannot be automated is briefly explained in "What can be automated?" on page 216.
- "The Automation panel" on page 217 provides a first look at the Automation panel and its features.
- Make sure you read and understand "Virgin territory vs. the initial value" on page 217!
- The various automation punch-out modes are explained in detail in the section "Automation modes" on page 219.
- The Nuendo automation features become truly powerful thanks to the automation performance utilities, as explained in the section "Automation performance utilities" on page 222.
- "The Settings section" on page 229 describes the global options and settings available on the Automation panel.
- "Hints and further options" on page 230 gives you general information on how the automation features interact with other Nuendo features.
- The section "Automation track operations" on page 231 describes how to open and manipulate automation tracks.
- Finally, the section "Working with automation curves" on page 235 explains how to edit automation curves.

Enabling and disabling the writing of automation data

Tracks and mixer channels in Nuendo can be "automation enabled" by activating their automation Write (W) buttons.

All track types except arranger, folder, marker, transpose, video and ruler tracks feature Write (W) and Read (R) buttons in the mixer, in the Track list and in the Channel Settings window. Furthermore, the control panels for all plug-in effects and VST Instruments also feature Write and Read buttons.

The Write and Read buttons for a channel in the mixer and for an automation track in the Track list.

- If you activate Write for a channel, virtually all mixer parameters you adjust during playback for that specific channel will be recorded as automation events.
- If Read is activated for a channel, all your recorded mixer actions for that channel will be performed during playback, just like you performed them in Write mode.
- The W and R buttons for a track in the Track list are mirrors of the W and R buttons in the corresponding channel strip in the mixer.

⇨ Note that the Read button is automatically enabled when you enable the Write button. This allows Nuendo to read existing automation data at any time.
You can separately deactivate Write, if you want to only read existing data. There is no status Write on/Read off.

There are also global Read and Write indicator buttons ("All Automation to Read/Write Status") in the common panel of the mixer and at the top of the Track list:

The "All Automation to Read/Write Status" buttons in the mixer, and in the Track list.

These buttons light up as soon as there is a single enabled Read or Write button on any channel/track within your project.

- When “All Automation to Read/Write Status” is disabled and you click on one of these buttons, all Read/Write buttons on all tracks/channels are enabled.
When “All Automation to Read/Write Status” is enabled, this means that at least one of the Read/Write buttons on one of the channels of your project is enabled.

- When “All Automation to Read/Write Status” is enabled and you click on one of these buttons, any enabled Read/Write buttons on the tracks/channels of your project are disabled.

⇨ You will also find global Read/Write buttons on the Automation panel. See the section “The Read/Write buttons in the Mode section” on page 221.

MIDI Controller Input to Automation Tracks

If you set up a remote device to control parameters and settings in Nuendo, you can record automation with that remote device – just activate Write as usual. However, if you are recording a MIDI track and want to record automation at the same time, the controller data sent by the remote device will be recorded “twice” – as automation and as MIDI controller data on the MIDI track.

To avoid this, activate the “MIDI Controller Input to Automation Tracks” option in the Preferences (MIDI page). When this is activated, the controllers will be recorded as automation only, not as MIDI controller data on the recorded MIDI track.

Creating automation data

Within a Nuendo project, the changes in a parameter value over time are reflected as curves on so-called automation tracks. The curves are drawn in real-time while you write the automation data. Most of the tracks in your project have automation tracks, one for each automated parameter.

⇨ Note that automation tracks are hidden by default. You can display all automated parameters and the corresponding automation tracks at the same time.
See the section “Automation track operations” on page 231 for details on how to show, hide or remove automation tracks. “Working with automation curves” on page 235 explains what you can do with automation curves.

There are two approaches you can use to create automation curves:

- “Offline”, by manually drawing the curves on automation tracks in the Project window.
See “Editing automation events” on page 235.

- “Online”, by enabling the Write/Read buttons and adjusting parameters in the mixer or channel settings window while rolling through the project in real-time. The value settings are recorded and displayed as a curve on the automation track.
In the following sections, this online writing of automation data is also referred to as an “automation pass”. See “Enabling and disabling the writing of automation data” on page 214.

The methods are not different in terms of how the automation data is applied. They only differ in the way the automation events are created – manually drawing them or recording them during automation passes. Any applied automation data will be reflected in both the mixer (a fader will move for example) and in a corresponding automation track curve.

There are no hard and fast rules regarding which method you should use. For example, you can create your automation data online without ever even opening an automation track. Or you can stick to drawing automation curves offline. Every method has its advantages, but of course it is up to you to decide what to use and when.

- Editing curves on automation tracks offers a graphical overview in relation to the track contents and the time position.

This makes it easy to quickly change parameter values at specific points, without having to activate playback. For example, this method gives you a good overview if you have a voice-over or a dialog on one track and a music bed on another track, the level of which needs to be lowered by a specific amount every time the dialog occurs.

- By using write automation in the mixer you don't have to manually select parameters from the Add Parameter list.

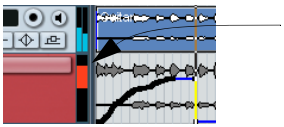
You can work much like you would using a "real" physical mixer. Every action you perform is automatically recorded on automation tracks which you can later open for viewing and editing of the parameters you changed.

The automation tracks themselves indicate the writing of automation data:

- While writing automation data, the color of the automation track in the track list changes to red.

- The delta indicator in the automation track shows the relative amount by which the new parameter setting deviates from any previously automated value.

This is an additional visual aid when writing new automation data.



What can be automated?

You can automate virtually every parameter in the Nuendo mixer.

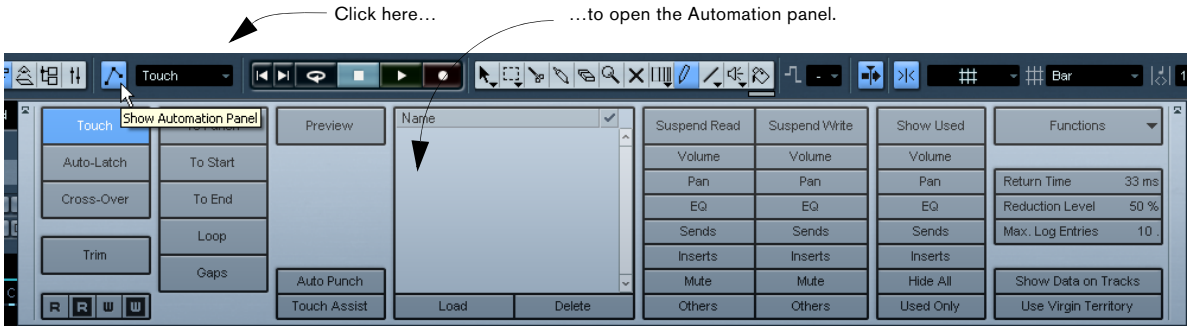
- To find out which parameters can be automated for a particular track, click in the Parameter display of the automation track to open a pop-up menu. Select "More…" to open the Add Parameter dialog.

This dialog lists all automatable parameters for a particular track type. It is described in detail in the section "Assigning a parameter to an automation track" on page 232.

The following actions CANNOT be automated, even though they are features of the Nuendo mixer:

- Changing the input phase
- Changing the input gain
- Changing of routing settings
- Inserting a plug-in
- Moving of plug-ins to different insert slots
- Copying insert settings
- Changing the stereo panner mode
- Changing Control Room settings

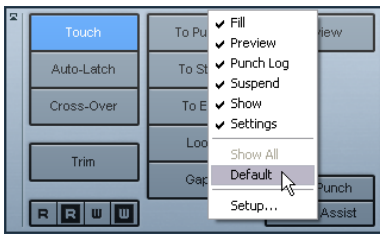
The Automation panel



The Automation panel is a floating window, similar to the Mixer and Transport panel. You can leave it open while you work – the Project window will always have the focus.

To open the Automation panel, open the Project menu and select the Automation Panel option or click the Automation Panel button on the Nuendo toolbar.

The Automation panel gives you access to all automation options in Nuendo. By default, all seven sections are displayed.



You can change the panel configuration using the Setup dialog – see "The Setup dialogs" on page 506. The following sections will explain all options and functions.

Virgin territory vs. the initial value

⚠ When we speak of "touching a control" in the following sections, we mean both clicking a parameter control on the Nuendo program interface and physically touching a fader or other control on a remote control device.

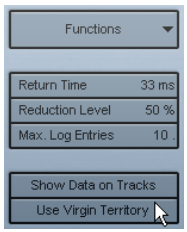
Before we go into detail about the various modes and options available through the Automation panel, we need to explain how Nuendo handles those sections of your project in which you have not yet performed an automation pass.

For parameter automation, Nuendo works either with an initial value (see below) or with "virgin territory" (see "Virgin territory" on page 218).

It is very important that you understand the difference between these two concepts and their individual advantages and disadvantages before continuing.

The initial value

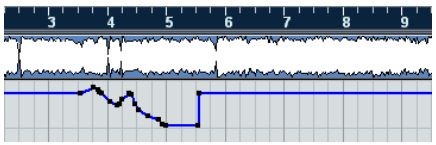
An initial value is always used when "Use Virgin Territory" is disabled on the Automation panel.



Use Virgin Territory is disabled.

When no automation data exists for a particular parameter, and you perform an automation pass for this parameter, its value at the moment when you start the automation pass is saved as the initial value. When you punch-out of the automation pass, it is this initial value to which the parameter will return.

This has one very important consequence: As soon as the initial value is set, the corresponding parameter is fully automated, on this track, at any given timecode position of the project – even if your automation pass lasted only 2 seconds.



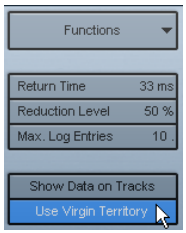
The straight line after the last automation event indicates the initial value.

This is reflected in the curve on the automation track – it is visible right through to the end of the project that the initial value is kept. As long as the track is in Read mode, the parameter control will follow this curve – it will either take values set during an automation pass, or it will return to its initial value.

You may touch the parameter control and force it to a different value manually. But as you let go of the control, it will return to the value defined by the automation curve – even when in Stop mode.

Virgin territory

Think of virgin territory as the “state” of the automation track before performing the first automation pass. When you enable the “Use Virgin Territory” option, no automation curve is displayed on the automation track, and you have full manual control of the parameter.



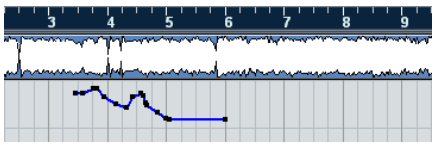
Use Virgin Territory is enabled.

The idea here is that you find automation only where you actually perform an automation pass – there is no initial value to which the parameter can return.

Outside a section with automated values, you always have full manual control of the parameter.

Gaps

After an automation pass you will find virgin territory only to the right of the last automation event. “Empty” sections between two automation curves are referred to as “gaps” in the following sections.

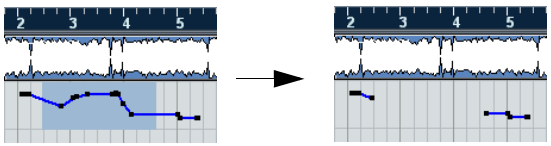


Only the dynamic change in the parameter is automated.

You can create gaps inside a section with automated values. This is useful if you want to have full manual control:

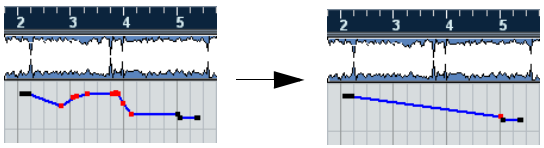
1. Make sure that “Use Virgin Territory” is enabled.
2. Select the Range Selection tool.
3. On an automation track with existing automation data, select a range and press [Delete] or [Backspace].

A gap is created.



A new break-point at the position where the selected range started marks the end point of the automation curve to the left. A second new break-point can now be found at the position where the selected range ended, marking the start of the automation curve to the right of the gap.

▪ When you select one or more break-points of an automation curve with the Arrow tool and press [Delete] or [Backspace], no gap is created.
Instead, the selected break-points are deleted. The curve between the deleted points is replaced by a new line connecting the two points to the left and right of the deleted points.



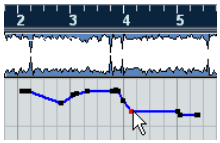
The “Terminator” setting

You can “force” any automation track into using virgin territory, by defining any automation break-point on the automation curve as the “terminator” point of this part of the curve. This will automatically delete the line between this break-point and the next one, creating a gap – a section on the automation track where you find no automation data. The next break-point to the right of the terminator point will automatically become the “start” point of the next automated section.

⇨ Note that this is independent of the setting for “Use Virgin Territory” – you can create gaps at any time.

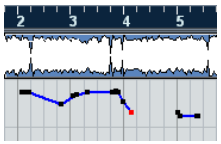
▪ To define a break-point as the last point in an automation curve, select it by clicking on it with the mouse pointer, and in the Event info line above the Project window, set “Terminator” to Yes.

Select a break-point…



…and set “Terminator” to Yes.

A gap is created.



▪ When you set the “Terminator” option for the last (rightmost) automation break-point of an automation curve to “Yes”, any automation data to the right of this point (as defined by an initial value) is deleted.

Automation modes

Nuendo provides three different punch-out modes for automation, available on the Automation Mode pop-up menu on the main toolbar and in the Mode section on the Automation panel.

Selecting the automation mode in the Automation panel and the Nuendo toolbar

The three modes available are Touch, Auto-Latch and Cross-Over. In all three modes, automation data will be written as soon as a parameter control is touched in play mode. They differ in the way the writing of automation data is ended, i.e. in their “punch-out” behavior. Which mode to use depends on what is required in your particular working situation.

⇨ Note that you can change the automation mode at any time, i.e. in play or stop mode or during an automation pass. You can also assign key commands to the automation modes so you can quickly change between them.
See “Automation key commands” on page 230.

General punch-out conditions

The current automation pass will always punch-out as soon as one of the following conditions is met, independent of which automation mode is selected:

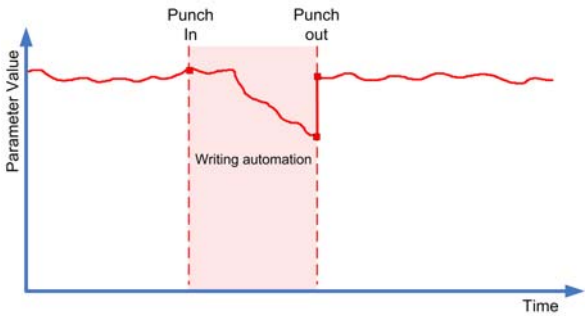
- If you Disable Write
- If you Stop playback
- If you activate Fast Forward/Rewind
- If the project cursor reaches the right locator in Cycle mode.
- If you click in the timeline to move the project cursor.

Touch

Typically, you would use Touch mode in situations where you want to make a change lasting only a few seconds to an already set up parameter.

As the name implies, Touch will write automation data only for as long as you actually touch a parameter control – punch-out occurs as soon as you release the control.

After punch-out, the control will return to the previously set value. The Return Time setting (see “Return Time” on page 229) determines how long it takes for the parameter to reach the previously set value.



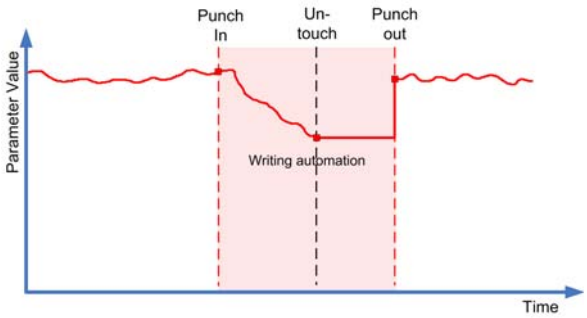
Automation mode: Touch

Auto-Latch

In Auto-Latch mode, there is no specific punch-out condition other than those valid in all modes – see “General punch-out conditions” on page 219.

Auto-Latch is probably the automation mode you will use the most, in all situations where you want to keep a value over a longer period of time – for example when making EQ settings for a particular scene.

Once your pass has started, the writing of automation data continues for as long as playback lasts or Write is enabled – if you wanted an adjustment that lasted for just a few moments, you would use Touch mode. The last value setting will be kept until you stop writing.



Automation mode: Auto-Latch

⇨ The automation mode for ON/OFF switches is always Auto-Latch (even if another mode is selected globally or for the track).

Cross-Over

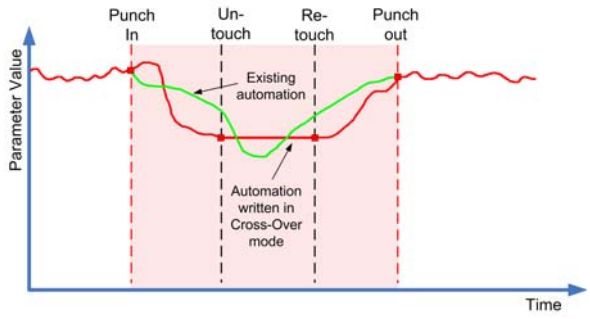
Think of the Cross-Over mode as a kind of “manual return time” option (see also “Return Time” on page 229). The Cross-Over mode can be used in situations where you are not happy with an already existing automation curve or with the automatically applied return settings. Cross-Over mode gives allows you to perform a “manual return” to ensure smooth transitions between new and existing automation settings.

For Cross-Over, the punch-out condition is crossing over an already existing automation curve after touching the parameter for a second time.

Look at the figure below: Like in Auto-Latch mode, once the automation pass begins with the first touching of the parameter control, automation data is written for as long as playback lasts.

When you have found the correct value setting, you can release the fader – the automation pass continues, with the value setting remaining the same.

Now, re-touch the fader and move it towards the original value. As soon as you cross the original curve, punch-out occurs automatically.



Automation mode: Cross-Over

Trim

This is described in the section "Trim" on page 224.

Automation mode: global or different for each track?

The automation mode you set on the Automation panel (or in the Project window toolbar) is used globally, i.e. for all tracks of your project.

However, you may also select a different automation mode for individual tracks:

- Open the topmost Inspector section for a track for which you require a different automation mode, and from the Track Automation Mode pop-up menu, select the desired automation mode.

Selecting an automation mode for an individual track.

- When selecting the Global option from the pop-up menu, the track will again use the automation mode selected from the toolbar or the Automation panel.
Note that you can use the option "All track modes to Global" in the Key Commands dialog–Automation category to set up a key command that will reset all tracks to using the global automation mode.

⚠ When selecting Trim as the automation mode for a track (see "Trim" on page 224), the punch-out behavior will always be as in Auto-Latch.

The Read/Write buttons in the Mode section

At the bottom of the Mode section, you find two Read and two Write buttons. These are used to globally enable or disable the Read and Write buttons on all tracks.

The All Automation to Read/Write buttons in the Mode section.

- Click "All Automation to Write" to enable all Write buttons (and, at the same time, all Read buttons) on all tracks/channels of your project.
Clicking "All Automation Write off" will disable all Write buttons. The Read buttons will remain enabled.

- Click "All Automation to Read" to enable all Read buttons on all tracks/channels of your project.
Clicking "All Automation Read off" will disable all Read buttons.

The various other Read and Write buttons on the Nuendo interface are described in detail in the section "Enabling and disabling the writing of automation data" on page 214.

Automation performance utilities

The automation modes described above become far more effective when used in combination with the Nuendo automation performance utilities. These are a number of options and functions tailored to specific situations, allowing you to write automation data quickly and efficiently. You will find these utilities in the various sections on the Automation panel.

The Fill options

The Fill options define conditions for what is to happen in a specific section of your project when you punch-out of a running automation pass. They can be used in real-time while rolling through your project, in situations that are not too complex. Look at these two examples:

Fill To End

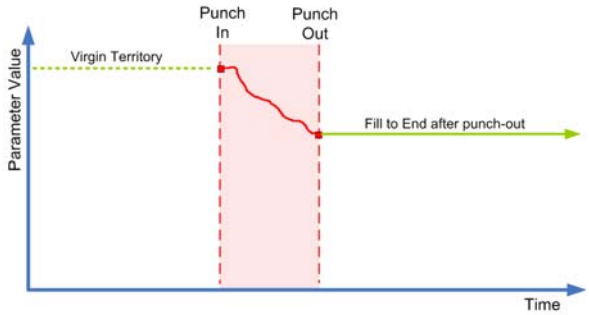
Imagine you are automating volume for the background tracks of a two-minute scene. Rather than to hold on to the fader for two minutes, you can proceed as follows:

1. Open the Automation panel and select Touch as your automation mode.

2. Click the “To End” button once to activate it as Fill option.
The “To End” button is highlighted.

3. Start rolling and touch the parameter control to punch-in the automation pass.

4. Move the fader until you have found the setting you want, and release the fader.
This will punch-out the writing of automation data. As you let go of the fader, the automation curve will take the found value setting, from where you punched out through to the end of the project.



Fill To End

Fill To Punch

Let’s say you are rolling, in real-time, over a scene cut and volume must be softer in the next scene – you don’t yet know how much softer, but the change in volume from the first to the second scene must be abrupt.

1. Select Touch as automation mode and “Fill To Punch” as Fill option.

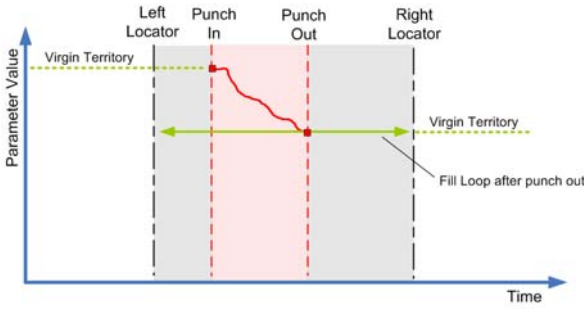
2. Start rolling somewhere during the first scene and touch the fader on the moment of scene change.
The automation pass is punched in.

3. Move the fader until you have found the volume setting you need in the second scene, and release the fader to punch-out.
The volume curve is set from the point of punch-out back to where you punched in. The values written while moving the fader to find the right value are deleted, and volume jumps, at exactly the right moment, from the value set in the first scene to the value found for the second scene.

You will find this works the same for the other Fill options:

- When “To Start” is selected, punching out of automation will fill the automation track from where you punched out to the start of the project.

- To use the Loop option, you must first set up a loop range with the left and right locators. When you then select Loop, punching out of automation will set the found value within the range defined by the left and right locator.
Note that, even when the project cursor is outside the defined loop, the found automation value will be applied only between the locators.



Fill Loop

- The Gaps option is used only in combination with Virgin Territory. This is explained in detail in the section "Virgin territory vs. the initial value" on page 217. When Gaps is selected, punching out of automation will fill any gaps between previously written automation with the last value found during the last automation pass.

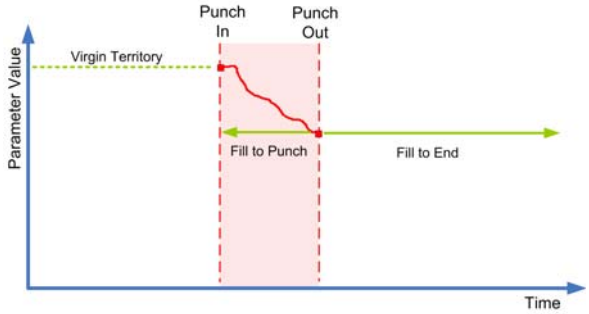
⚠ The Fill options write one particular value across a defined section of your automation track – any previously created data within this section is overwritten. Therefore, use the Fill options with caution, to avoid accidental loss of data.

⚠ Note that when Trim is active, the Fill–Gaps option will have no effect. This is because Trim will only modify already existing data.

Fill combinations

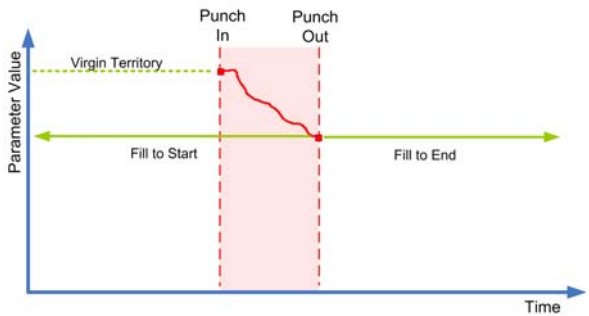
You can also combine the various Fill options.

- Select "To Punch" and "To End" if you want the found value to be used from where you punched in through to the end of your project.



Combining Fill To Punch and Fill To End

- Combining "To Start" and "To End" will fill the automation track from the beginning through to the end of the project.



Combining Fill To Start and Fill To End

- You can also combine the Fill options with the Preview options (see "The Preview options" on page 225), and when working offline with the Pencil tool.
Offline editing is explained in more detail in the section "Editing automation events" on page 235). This is a very fast and efficient way to move through your project.

Feel free to experiment!

One shot vs. continuous fill

The Fill options can be used in two different ways:

- When you click one of the Fill options once, it is highlighted, and will be enabled during the next automation pass.
  Afterwards, the option is disabled again, i.e. the operation can be performed only once.

- If you click a Fill option a second time, a lock symbol is displayed on the highlighted button, indicating that you are permanently in “Fill to X” mode and that the operation can be repeated as many times as you wish.
  Clicking the option for a third time will disable this Fill option.

Trim

Trim is available from the Automation panel only. Trim is a way of manipulating an already written automation curve, other, rather than an automation mode.

⇨ Trim works for channel volume and aux send level adjustments.

When enabling Trim, a channel volume fader is positioned in the exact middle position, and will not move with any existing volume automation curve.

You can use Trim either in Stop mode or in Play mode.

Trim in Stop mode

In Stop mode, selecting one of the Fill options and moving the fader in Trim mode will move the entire existing volume automation curve up or down, so you can still adjust the overall volume of a channel without destroying any automation data that you might have created earlier.

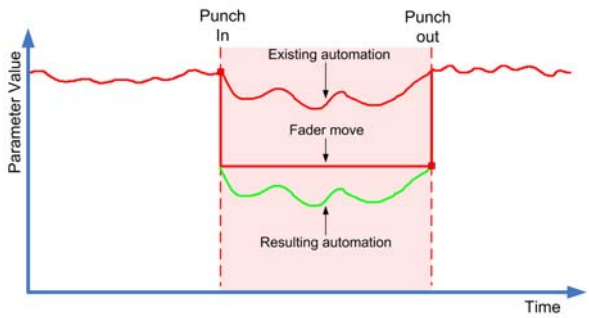
- In Stop mode, Trim is used in combination with some of the Fill options (see “The Fill options” on page 222), to determine within which range the automation curve is adjusted.
  The Fill options available are To Start, To End, Loop and any combination of these.

Trim in Play mode

In Play mode, moving the fader in Trim mode will move the existing break-points by a relative amount as the project cursor passes over them.

- In Play mode, as the project cursor moves along the timeline, your Trim moves will adjust the existing break-points on the automation curve.

⇨ Note that the exact result of your trim moves in Play mode will only be visible after punch-out.



Trim in Play mode, in combination with Fill to Punch. Note that you would arrive at a similar curve when enabling Trim, setting the left and right locators, selecting Fill Loop and moving the fader downwards in Stop mode.

⇨ Note that Trim is not merely a matter of rewriting the automation curve using the fader movements you perform. Instead, the settings from the existing curve and the settings calculated from your fader movements are used to re-calculate the automation curve as soon as you punch-out.

The Preview options

Preview provides an easy way to find new settings without recording the steps needed to locate them:

- Preview allows you to deal with abrupt changes in your audio material, e.g. in music when changing from verse to chorus, or in film when moving into the next scene.
- With Preview, you can do a test run of your automation pass.
- Preview is the mode to use in complex situations where many things happen in a very short period of time, and where it is not possible to set all required parameters in real-time.
- Preview allows you to set up automation for several parameters simultaneously.

Imagine two film scenes where the actors move from a hotel entrance hall into the open air: while some of your parameter settings might still be OK for the second scene, others will have to change abruptly as soon as the second scene starts.

So for the second scene, you must find new settings, but without deleting any existing automation data.

The Preview workflow

The Preview workflow has three different phases: touch-collecting the required parameters, finding the required values, and the actual automation pass. Proceed as follows:

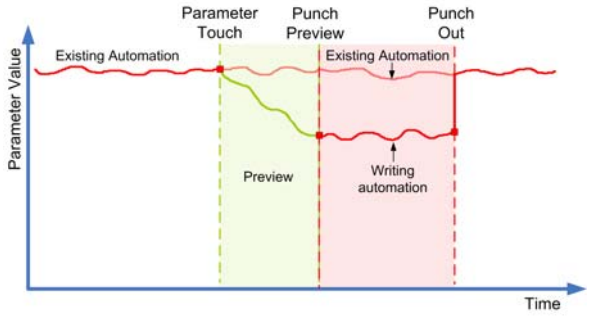
1. On the Automation panel, click the Preview button in the Preview section.
The Preview button is highlighted.

2. Touch a parameter control.
Below the Preview button three other buttons are displayed. You now have full manual control of the touch-collected parameter, suspending (but not deleting!) any previously recorded automation data. You may now touch-collect another parameter, if you want to write data for several parameters during the same automation pass.

- Note that each automation track has its own Preview button.

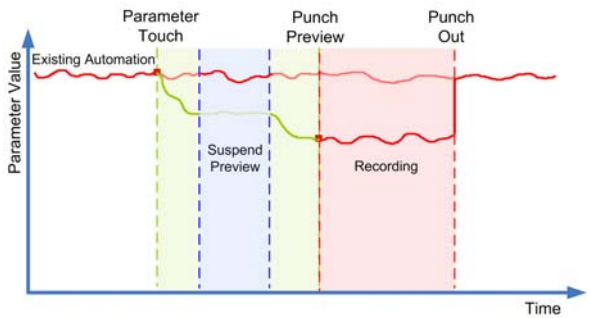
Clicking this button will enable Preview mode for this particular automation track. This is touch-collecting via automation tracks.

3. Play back the scene (you may want to loop it) and find the parameter setting(s) you want.



Touch the required parameter, start rolling, find the desired value and select Punch to start the new automation pass.

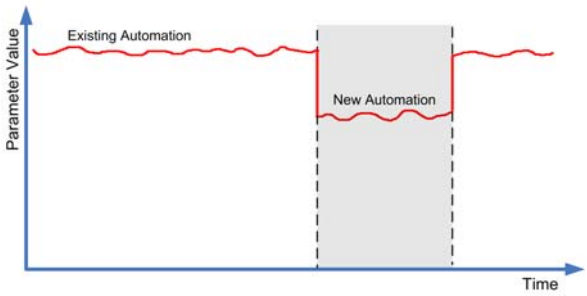
- Use the Suspend option in the Preview section on the Automation panel to compare any previously automated value with the value found during preview.
Suspend will play back your audio material using the parameter values set before activating Preview – in our example above, to hear the settings for the indoor scene, you need to click Suspend, and at the moment of scene change, you need to click Suspend again to return you to Preview mode and the values found for the open-air scene.



Suspend allows you to listen to the existing automation settings.

⇨ Remember: you can use the delta indicator in the automation track as an additional visual aid for comparing the previously found and the currently set parameter values.

4. When you are happy with the values found, start rolling and click Punch to punch-in the automation pass.
The new value setting is recorded, from the point where you punched in to your punch-out position (as defined by the automation mode setting).



The result of the Preview automation pass.

Punch vs. Punch on Play

When using the Punch option as described above, starting playback and punching in are two separate actions. If you want to punch-in when starting playback, activate Punch on Play.

- Punch would be the option to use if you need to listen to the section before your desired punch-in point and if this section has automation data already that you don't want to overwrite – you would roll through this section and then punch-in the automation pass.

- You can also use Punch in Stop mode. To create automation data in this way, Punch must be combined with one of the Fill modes (see "The Fill options" on page 222).

- Use Punch on Play when you cannot punch-in on the fly – i.e. in situations where you need to find the punch-in position in stop mode. Once you have found the exact position, enable Punch on Play and start playback from there.

Auto Punch

As described in the section "General punch-out conditions" on page 219, when setting up a loop with the left and right locators, an automation pass will always punch-out when reaching the right locator.

When in Preview mode, you can also use the left and right locators to automatically punch-in and out at defined positions, using the Auto Punch command.

- Use Auto Punch when you want the automation pass to begin and end at defined positions.

You can also use Auto Punch without enabling Preview mode, to set up a "safe zone" for previously written automation data:

- Place the right locator at the beginning of an area you wish to protect and enable cycle mode.
This will ensure that a running automation pass will always punch-out before reaching this section of your project.

Touch Assist

When you use Preview mode, you may get into a situation where you change some parameters, but not others, although they belong to the same group of parameters (e.g. EQ settings). To prevent you from forgetting some parameters while touch-collecting parameters for Preview (see also "The Preview workflow" on page 225), you can enable the Touch Assist option. You will find this option at the bottom of the Preview section on the Automation Panel.

The Touch Collect Assistant is enabled.

When the Touch Collect Assistant is enabled, the parameters of the following features will be treated as groups:

- Channel EQ module (21 parameters total)
- Aux send on/off and send level
- Stereo panner
- Surround panner (Left-Right, Front-Rear, LFE)
- Insert plug-ins (only available for plug-ins with 32 or less parameters)

- When this option is enabled, it will ensure that touching one parameter in a group will "touch" all other parameters in that group as well.

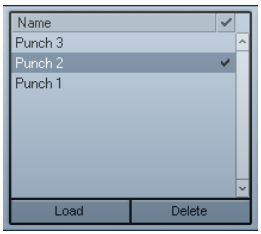
▪ If, however, you want to automate one and only one particular parameter, the Touch Collect Assistant should be disabled to prevent you from inadvertently overwriting any previously created automation data.

⚠ Enabling the Touch Collect Assistant may lead to the creation of a large amount of automation data, causing a higher CPU load. If performance is an issue in your workflow, you should consider not using the Touch Collect Assistant.

Changing plug-in presets in Preview mode

When changing a preset of a VST plug-in while in Preview mode, the change in the parameter settings caused by the preset change is recorded automatically as automation. Note that the plug-in must have 32 or less parameters for this to work.

The Punch Log section



This section of the Automation panel displays a list of recent punch-in operations performed in Preview mode.

By loading one of these log entries for the current track, you recall the corresponding touch-collected parameters and their values at the moment of punch-in.

▪ To recall the settings of a particular entry in the punch log, select it in the list and click Load.
The Preview button on the Automation panel and the “Preview mode” button on the corresponding automation track light up to indicate that this parameter is now in Preview mode.

▪ You can rename any log entry by double-clicking it and entering a new name.

▪ To delete an entry, select it and click Delete.

▪ To specify how many log entries are displayed, click the Max. Log Entries button in the Settings section.
If this value is set to 10 entries, the eleventh punch event will overwrite the entry created for the first event, the twelfth will replace the second entry, etc. The maximum possible number of punch log entries is 100.

▪ You can prevent a particular entry from being overwritten by clicking in the right column for this entry, so that a check mark is displayed.

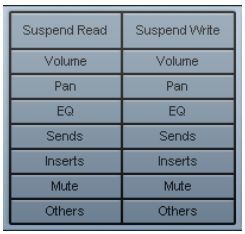
▪ Punch log entries are saved with the current project.
Punch log data is always project-specific. There is no way to export log entries to another project.

Loading behavior

When loading a log entry, you add the corresponding parameter(s) to any other parameters that you have touch-collected during the current Preview session.

However, if you manually touch-collect a parameter, e.g. volume, and then add volume again by loading a punch log entry, the settings for volume from the punch log will be used, replacing any values set manually.

The Suspend options



The parameters or parameter groups selected here are excluded from the reading or writing of automation data – giving you full manual control of these parameters.

⇨ Note that the Others options refer to all parameters not covered by any of the options Volume, Pan, Mute, EQ, Sends or Inserts.

Suspending Write

Imagine the following situation: To help you concentrate while working on a particular track, you mute several other tracks. However, because automation Write is active on these tracks, this mute state is also automated during the next automation pass – a classic situation in mixing.

To avoid inadvertently excluding whole tracks from your mix in this way, you can exclude Mute from all automation writing. Simply click Mute below the Suspend Write button in the Suspend section on the Automation panel.

- Click the Suspend Write button to enable all Suspend Write options, thus suspending the writing of automation data for all parameters/parameter groups.
When any of the options below the Suspend Write button are enabled, clicking Suspend Write will disable these buttons.

- When an automation pass is in progress for a particular parameter and you write-suspend this parameter, it will punch-out of the automation pass.

Suspending Read

Imagine you have already automated several tracks. While working on the current track, you want one of the other tracks to be louder, to better identify a particular position in your audio material. By suspending Read for the volume parameter, you regain full manual control and can set the volume to the required level.

- Click the Suspend Read button to enable all Suspend Read options, thus suspending the reading of automation data for all parameters/parameter groups.
When any of the options below the Suspend Read button are enabled, clicking Suspend Read will disable these buttons.

The Show options

The Show options in the Automation panel

The Show options in the Automation panel always affect all tracks. Clicking on these buttons opens the automation tracks for the corresponding parameters, e.g. volume or pan. This makes it easy to look at, e.g., your EQ settings on several tracks.

- When you click either Volume, Pan, EQ, Sends or Inserts, this will open the corresponding automation track(s) for all tracks.
The automation tracks will be opened even if no automation data was recorded on these tracks.

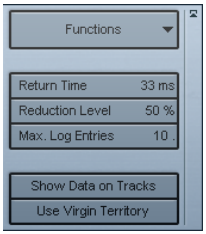
- For parameter groups (i.e. Pan, EQ, Sends and Inserts) you can step through the individual parameter sets by repeatedly clicking the respective button.

- When the Used Only button is enabled, clicking one of the parameter options will show you only the automation tracks for which automation data has already been written.
"Empty" automation tracks will not be displayed.

- When you click Show Used, only those automation tracks that contain automation data will be displayed.
These will be all automation tracks, for any parameter, on all automated tracks.

- Hide All will hide all open automation tracks.

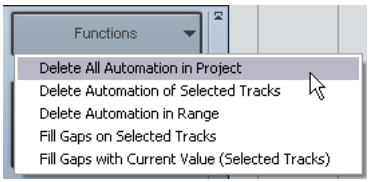
The Settings section



The options in the Settings section of the Automation panel

In the Settings section of the Automation panel you will find a number of global options and commands.

The Functions pop-up menu



At the top of the Settings section you will find the Functions pop-up menu. Here you will find a number of global commands affecting automation.

⇨ You can always undo these actions!

Delete All Automation in Project

This global command will remove all automation data from your project. Use this option with great caution, otherwise you may loose your work.

Delete Automation of Selected Tracks

When you select this command, all automation data for the selected track(s) will be removed. Make sure you have selected the right track(s) before using this option.

Delete Automation in Range

This command will delete, on all tracks, all automation data between the left and right locator. Be sure that this is what you want to do before proceeding!

Fill Gaps on Selected Tracks

When working with virgin territory (see “Virgin territory vs. the initial value” on page 217), selecting this option will, on the selected track(s), fill the gaps between those sections of the project that show automation curves with a continuous value.

The value used is the value of the last break-point (the end point) of a section. This value is written across the gap up to one millisecond before the first break-point of the next automated section. A new break-point is inserted here; the value will be ramped to the next automated section.

Fill Gaps with current Value (Selected Tracks)

When working with virgin territory (see “Virgin territory vs. the initial value” on page 217), selecting this option will, on the selected track(s), fill the gaps between those sections of the project that show automation curves with the value set by the current position of the corresponding control.

Global options

Return Time

The Return Time setting determines how fast the automated parameter returns to any previously automated value when you release the mouse button.

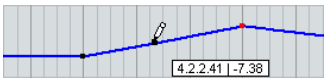
The default setting is 33 ms. Make sure that the return time is set to a value larger than 0, to prevent sudden jumps in your parameter settings (which may lead to crackles).

Reduction Level

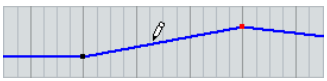
The automation reduction function automatically reduces the number of automation events. During an automation pass (or when drawing automation with the Pencil tool), these are added as a continuous stream of densely packed break-points. This is necessary because the program cannot “guess” what you will be doing next.

However, when punching out, the reduction function will remove all break-points that are not needed. The automation curve will contain only the break-points necessary to reproduce your actions.

For example, all break-points that lie between two other points, but do not deviate from the curve, will be automatically removed by reduction.



If you try to add a break-point that doesn't deviate from the existing curve between two existing points…



…it will be removed when the mouse is released. If you move the selected break-point by any amount so that the resulting curve isn't a straight line, a new event will be added.

- If you are unhappy with the default setting (a reduction of roughly 75%), you can change it, but normally the default setting works well.

⚠ The higher the number of automation events, the higher the CPU load. If performance is an issue in your workflow, you should consider moving the reduction level slider further to the right, to remove more events.

Max. Log Entries

This setting refers to the Punch Log and is described in "The Punch Log section" on page 227.

Show Data on Tracks

When this option is enabled, audio waveforms or MIDI events will be displayed not only on the audio or MIDI tracks, but also on the corresponding automation tracks.

⇨ Note that this depends on two options in the Preferences dialog: The events will be displayed only when the option "Show waveforms" (Event Display–Audio) is enabled and when "Part Data Mode" (Event Display–MIDI) is set to an option other than "No data".

Use Virgin Territory

This option is described in detail in the section "Virgin territory vs. the initial value" on page 217.

Hints and further options

Automation key commands

In the Key Commands dialog (opened from the File menu in Nuendo), in the Commands section on the left, you will find an Automation category which lists all automation commands to which you can assign key commands.

How to assign key commands is described in detail in the chapter "Key commands" on page 517.

About automation undo

Every automation write operation you perform creates its own event in the undo history, so you can undo or redo any of your automation moves at any time.

About linking and automation

Nuendo allows you to link, in the mixer window, various parameters between different channels (see "Link/Unlink channels" on page 145).

Also, in the channel settings window, you can link a send's panorama settings to the panorama settings displayed in the channel strip (by enabling the option "Link Send Routing Panners to Channel Panner as Default" in the Preferences–VST page).

- When automating the settings of a channel that is linked to another channel in the mixer, the parameters of the linked channel will NOT be automated.
- For linked panners of sends and channels, automating one panner will automate the linked panner as well.

Automation track operations

About automation tracks

Audio tracks, group channel tracks and FX channel tracks all have automation tracks. These allow you to view and edit the automation of all mixer settings for the track, including settings for the track's insert effects. There is one automation track for each parameter, and automation tracks can be shown or hidden in any combination.

Similarly, MIDI tracks have automation tracks for mixer settings, track parameters and (if used) for send and insert effect settings.

VST Instruments have special automation tracks that appear in the Project window when you load a VST Instrument via the VST Instruments window. There is one automation track for the plug-in parameters, and one track for each mixer channel used by the instrument. These tracks all have automation tracks, giving you access to all parameters and mixer settings.

Instrument tracks, as a combination of a MIDI track and a VST Instrument, have automation tracks that provide automation parameters for the VST Instrument itself, for the VST Instrument channel and the respective MIDI automation parameters.

Finally, for ReWire channels and input/output channels, automation tracks are automatically added as soon as you activate automation (with the Write button) in the corresponding mixer channel strip or in the Channel Settings window. These tracks have automation tracks for all parameters as well.

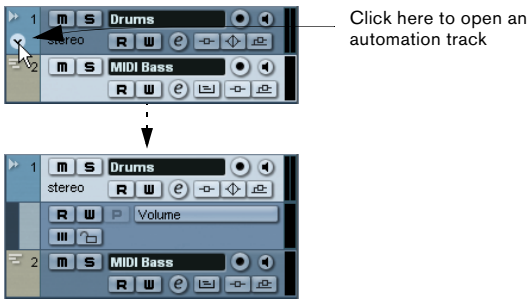
Opening automation tracks

Every track/channel has a number of automation tracks, each showing one automation parameter.

For audio, Instrument, group channel, MIDI and FX channel tracks, there are two ways you can open an automation track for the channel:

- By right-clicking the track in the Track list and selecting "Show Automation" from the context menu.
- By clicking along the left edge of the track in the Track list. (Also, when you position the mouse pointer over the lower left corner of the track, a corresponding arrow icon ("Show/Hide Automation") appears.)

An automation track opens in the Track list. Depending on your Preference settings (see above), the event display shows a straight black horizontal line as well as a grayed out mirror image of the audio events' waveform (or MIDI events for MIDI tracks). By default, the volume parameter is assigned to the first automation track.



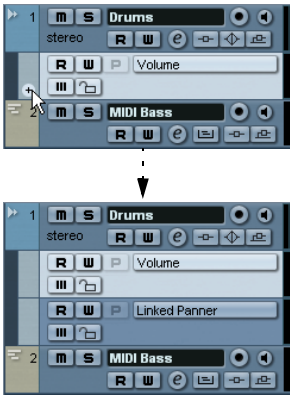
For VST Instruments (not for Instrument tracks, see below), automation tracks appear automatically when you add them in the VST Instruments window.

For ReWire channels and input/output busses, automation tracks are automatically created when the Write automation button (see "Enabling and disabling the writing of automation data" on page 214) is activated in either:

- The corresponding channel strip in the mixer.
- The corresponding Channel Settings window.
- The mixer common panel ("All Automation to Write Status").
- The area above the Track list ("All Automation to Write Status").

Opening additional automation tracks

- If you position the mouse pointer over the lower left corner of an automation track, a "+" sign ("Append Automation Track") will appear. If you click this, another automation track opens, by default showing the next parameter in the Add Parameter list (see below).



Assigning a parameter to an automation track

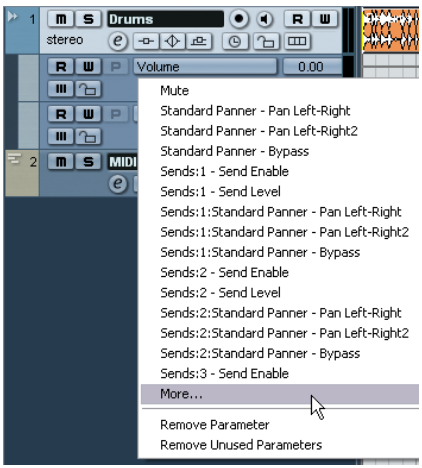
Default parameters are already assigned to automation tracks when you open them, according to their order in the Add Parameter list (see below).

To select which parameter an open automation track should display, proceed as follows:

1. If none exists, open an automation track using one of the methods described above.

2. Click in the parameter display for the automation track.

A pop-up list is shown, containing some of the automation parameters plus the item “More...” at the bottom of the list. The contents of the list depend on the track type (audio, MIDI, VST instrument, etc.).



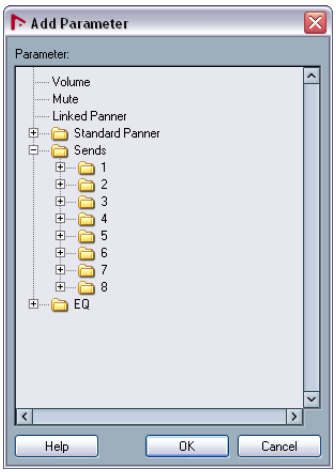
- If the parameter you wish to automate is on the pop-up menu, you can select it directly.

The parameter will then replace the current parameter in the automation track.

- If you wish to add a parameter not available on the pop-up menu or want to view all parameters that can be automated, go on to the next step.

3. Select “More...”.

The Add Parameter dialog appears. This dialog shows a list with all parameters that can be automated for the selected channel (sorted into different categories), including the parameters for any assigned insert effects. To view the parameters in each category, click the “+” sign for the category folder.

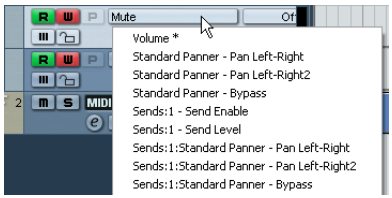


The Add Parameter dialog for an audio track.

4. Select a parameter from the list and click OK.

The parameter will then replace the current parameter in the automation track.

⇨ Note that the “replacing” of the parameter displayed in the automation track is completely non-destructive.
For example, if the automation track contained any automation data for the parameter you just replaced, this data will still be there, although it will not be visible after you replaced the parameter. If you click in the parameter display you can switch back to the replaced parameter. On the pop-up menu, all automated parameters are indicated by an asterisk (*) after the parameter name.



The Volume parameter is automated.

You can click the “Append Automation Track” button (the “+” sign) for the automation track several times to open additional automation tracks. Repeat the above procedure to assign a parameter to each automation track.

Removing automation tracks

To remove automation tracks from the Track list, proceed as follows:

- To remove a single automation track, click the parameter name and select “Remove Parameter” from the pop-up menu.
Note that this will also delete any automation events on the automation track, and the automation track will be closed.

- To remove all currently unused automation tracks from a track in the Track list, select “Remove Unused Parameters” from any of its automation track parameter name pop-ups.
All automation tracks that do not contain automation events will be closed for the selected track.

- On the Automation panel, you will find the Delete options in the Functions pop-up menu (see “The Functions pop-up menu” on page 229).
Using these commands will also lead to the removal of automation tracks.

Showing/hiding automation tracks

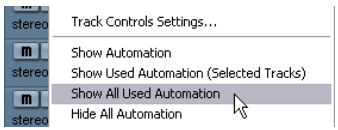
- To hide a single automation track, position the pointer over the top left border of the automation track in the Track list and click the “Hide Automation Track” button (the minus sign).

- To hide all automation tracks for a track, right-click the track for which you wish to hide the automation tracks, and select “Hide Automation” from the context menu.

- To hide all automation tracks for all tracks in the Track list, right-click any track and select “Hide All Automation” from the context menu.
This option is also available in the Track Folding submenu of the Project menu.

- On the Automation panel, you can hide or show automation tracks using the options in the Show section.
See “The Show options” on page 228.

Showing only used automation tracks



If a lot of automation tracks are used, it may be impractical to have them all open in the Track list. If you want to view only the automation tracks that are used (i.e. those that actually contain automation events) and hide all empty automation tracks, do one of the following:

- Right-click any track in the Track list and select the option “Show All Used Automation” from the pop-up menu.
This will close all automation tracks not containing any automation events, while leaving used automation tracks open for all tracks. This option is also available in the Track Folding submenu of the Project menu.

- Right-click a specific track and select the option “Show Used Automation (Selected Track)” from the context menu.
This will close all automation tracks for the selected track not containing any automation events, while leaving used automation tracks open.

Muting automation tracks

You can mute individual automation tracks by clicking their Mute buttons in the Track list. Clicking the Read (R) button (see "Enabling and disabling the writing of automation data" on page 214) for an automation track will activate or deactivate Read mode for all automated parameters of the track. Using the Mute button allows you to turn off automation for a single parameter.

The "Automation follows Events" setting

If you activate "Automation follows Events" on the Edit menu (or in the Preferences–Editing page), automation events will automatically follow when you move an event or part on the track.

This makes it easy to set up automation related to a specific event or part, rather than to a specific position in the project. For example, you can automate the panning of a sound effect event (having the sound pan from left to right, etc.) – if you need to move the event, the automation will automatically follow! The rules are:

- All automation events for the track between the start and end of the event or part will be moved.
  If there are automation events in the new position (to which you move the part or event), these will be overwritten.

- If you copy an event or part (using Copy/Paste, or [Alt]/[Option]-dragging, or using the Duplicate or Repeat functions), the automation events will be duplicated as well.

Recording plug-in automation

Every parameter for every assigned effect or VST Instrument can be automated in much the same manner as described above.

The following example assumes that you have assigned an insert effect to an FX channel track (see the chapter "Audio effects" on page 168), and describes how to record automation for the effect:

1. Select the FX channel track in the Track list and open its Inserts section in the Inspector.
   If the Inspector is hidden, click the "Show Inspector" button in the Project window toolbar.

⇨ Please note that not all Inspector tabs are shown by default. You can show/hide Inspector sections by right-clicking on an Inspector tab and activating/deactivating the desired option(s).
Make sure to click on an Inspector tab and not on the empty area below the Inspector, as this will open the Quick context menu instead.

2. Open the control panel for the effect by clicking the Edit button ("e") above the insert effect slot in the Inspector.

3. Click the Write button in the control panel to enable Write mode.
   The Read button is enabled as well. All effects and VST Instruments have Write/Read buttons on their control panels. These work exactly like the corresponding buttons in the mixer or in the Track list.

4. Start playback and adjust some effect parameters in the control panel.
   When you are finished, stop playback and return to the position where you started playback.

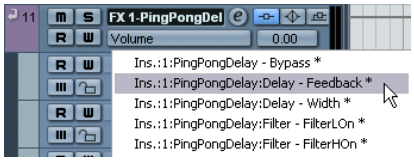
5. Disable Write.
   The Read button remains enabled.

6. Start playback and watch the control panel.
   All actions you performed during the previous playback will be reproduced exactly.

Assigning an automated parameter to an automation track

To select which parameter is currently shown in the automation track for a channel, proceed as follows:

1. Click on the parameter name for the channel's automation track.
   The parameter name pop-up list is shown containing the automation parameters for the plug-in. The parameter(s) you previously automated are indicated by an asterisk after the parameter name in the list.



Automated parameters for the PingPongDelay effect.

2. Select the parameter you wish to view from the parameter display pop-up.
   The automation curve for the parameter you selected is displayed on the automation track.

- To view VST Instrument parameters, you use the same method.

As described earlier, each VST Instrument has two or more automation tracks – one for the plug-in settings and one for each VST Instrument mixer channel.

Dragging and dropping of insert plug-ins

You can drag an insert plug-in from one insert slot to another, either on the same channel or on a different channel.

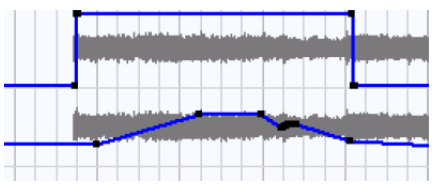
- When dragging a plug-in to a different insert slot on the same channel, any existing automation data will move with the plug-in.
- When dragging a plug-in to a different insert slot on a different channel, any existing automation data will not be transferred to the new channel.

Working with automation curves

About automation curves

There are two kinds of automation curves, “ramp” and “jump”:

- Jump curves are created for any parameter that only has on/off values, like a Mute button, for example.
- Ramp curves are created for any parameter that generates continuous multiple values, such as fader or dial movements etc.



Examples of jump and ramp automation curves shown in the event display.

About the static value line

When you are not using virgin territory (see “Virgin territory vs. the initial value” on page 217) and you open an automation track for a parameter for the first time, it doesn’t contain any automation events (unless you have previously adjusted that parameter with write automation activated), and this is reflected in the event display as a straight horizontal black line, the “static value” line. This line represents the current parameter setting.

- If you have manually added any automation events or used write automation for the corresponding parameter, and then disable the reading of automation data, the automation curve will be grayed-out in the automation track event display and the static value will be used instead.

As soon as Read mode is enabled, the automation curve will become available.

Editing automation events

Drawing automation events

By using write automation in the mixer, you generate automation events by moving parameter dials and faders in the mixer. You can also add them manually by drawing automation curves on an automation track. Proceed as follows:

1. Show the automation track by clicking on the left edge of the track in the Track list.

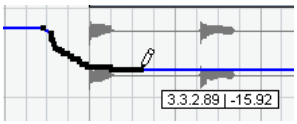
The static value line is shown in the event display for the automation track.

2. Select the Pencil tool.

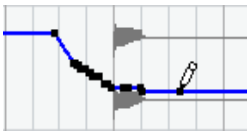
You can also use the various modes of the Line tool for drawing curves, see below.

3. Click on the static value line. An automation event is added, read automation mode is automatically activated, and the static value line changes to a blue automation curve.

4. If you click and hold, you can draw a curve by adding a multitude of single automation events.
Note that the track color in the track list changes to red to indicate that automation data is being written.



5. When you release the mouse button, the number of automation events is reduced to a few events, but the basic shape of the curve still remains the same.
This "thinning out" of events is governed by the Reduction Level setting in the Settings section of the Automation panel, see "Reduction Level" on page 229.



6. If you now activate playback, the volume will change with the automation curve.
In the mixer, the corresponding fader moves accordingly.

7. Simply redo the operation if you are not happy with the result.
If you draw over existing events, a new curve is created.

- If the automation track is in Read mode already, you can also add automation events by clicking with the Arrow tool.
If you are trying to add a break-point between two existing points and the new point doesn't deviate from the existing curve, it will be removed by reduction as soon as you release the mouse button (see "Reduction Level" on page 229).

Drawing curves with Fill enabled

You can use the Fill options on the Automation panel in combination with the Pencil tool. This provides you with an extremely powerful tool for offline work:

1. As in the example above, open an automation track for the desired parameter and select the Pencil tool.
Remember: the Write button does not have to enabled.

2. On the Automation panel, select "To End".

3. Click and draw to create an automation curve.

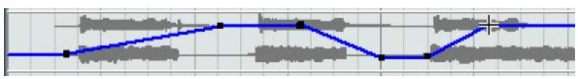
4. Release the mouse button.
At the moment of release, a final automation event is created. The automation curve is written from this last break-point through to the end of the project.

You will find this works the same for all the other Fill options. For more information on what you can do with Fill and the other automation performance utilities, see "Automation performance utilities" on page 222.

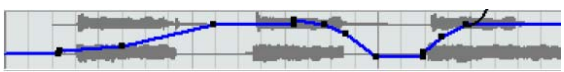
Using the various modes of the Line tool to draw automation curves

The Line tool can be very useful for drawing automation events. The various modes are accessed by selecting the Line tool on the toolbar, clicking on it a second time and selecting from the pop-up menu that appears.

- Clicking and dragging with the Line tool in Line mode shows a line in the automation track and creates automation events aligned with this line.
This is a quick way to create linear fades, etc.



- The Line tool in Parabola mode works in the same way, but aligns the automation events with a parabolic curve instead, resulting in more "natural" curves and fades.
Note that the result depends on the direction from which you draw the parabolic curve.



- The Sine, Triangle and Square Line tool modes create automation events aligned with continuous curves.
If snap is activated and set to Grid, the period of the curve (the length of one curve "cycle") is determined by the grid setting. If you press [Shift] and drag, you can set the period length manually, in multiples of the grid value.

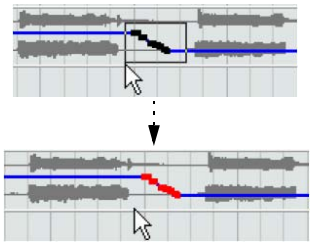
Selecting automation events

- To select a single automation break-point, click on it with the Arrow tool.

The break-point turns red, and you can drag it in any horizontal or vertical direction between two points.

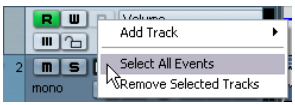
- To select multiple break-points, you can either [Shift]-click or drag a selection rectangle with the Arrow tool.

All break-points inside the selection rectangle will be selected.



Drawing a selection rectangle around break-points to select them.

- To select all automation events on an automation track, right-click the automation track in the Track list and choose “Select All Events” from the context menu.



Removing automation events

There are several ways to remove break-points:

- By selecting points and pressing [Backspace] or [Delete] or selecting Delete from the Edit menu, or by clicking on a break-point with the Eraser tool.

This will remove the break-points. The curve is redrawn to connect the break-points immediately to the left and right of the removed points.

- By selecting a range (with the Range Selection tool), and pressing [Backspace] or [Delete] or selecting Delete from the Edit menu.

When “Use Virgin Territory” is enabled, this will create a gap. When “Use Virgin Territory” is disabled, this will remove the break-points within the range, but the curve will be redrawn to connect new break-points at the start and end of the selected range. See also “Gaps” on page 218.

- By clicking in the parameter display on an automation track and selecting “Remove Parameter” from the pop-up.

This will remove all automation events from the automation track, and the automation track will be closed.

Editing automation events

Automation events can be edited much like other events. You can use cut, copy and paste, you can group and nudge events etc. There are, however, four items on the Edit menu that are not applicable to automation events. These are:

- Split at Cursor
- Split Loop
- Move to Front
- Move to Back

Editing automation events in the Project Browser

You can also edit automation events in the Project Browser. Proceed as follows:

1. Open the Project Browser by selecting it from the Project menu.

The Browser window opens. The window is divided into two sections, the Structure list to the left and the event display to the right.

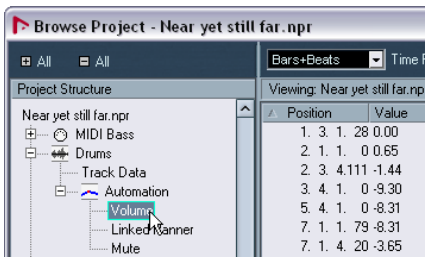
2. Click on the “+” sign for a track in the structure list.

Automated tracks have two subitems: Track Data and Automation. The Automation item corresponds to the automation track in the Project window, and contains the track’s automation events.

3. Click on the “+” sign for the Automation item.

All automated parameters for the track are shown in the structure list.

4. Clicking on a parameter in the structure list brings up the automation events in the event display.



The following parameters are available for all automation tracks:

Parameter	Description
Position	The position of the automation event.
Value	The value of the automation event.

17

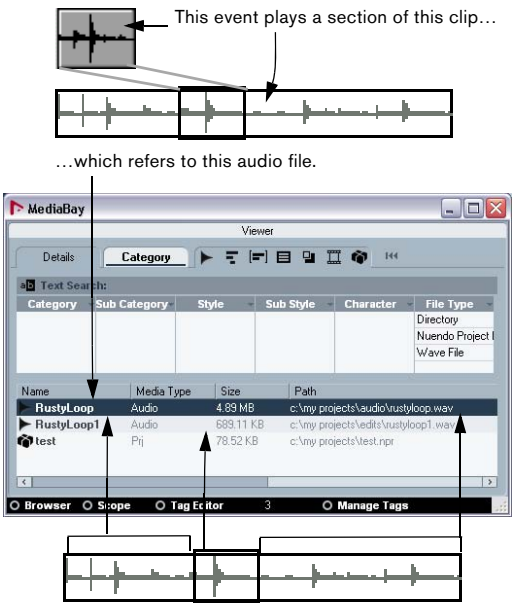
Audio processing and functions

Background

Audio processing in Nuendo can be called “non-destructive”, in the sense that you can always undo changes or revert to the original versions. This is possible because processing affects audio clips rather than the actual audio files, and because audio clips can refer to more than one audio file. This is how it works:

1. If you process an event or a selection range, a new audio file is created in the Edits folder, within your project folder.
This new file contains the processed audio, while the original file is unaffected.

2. The processed section of the audio clip (the section corresponding to the event or selection range) then refers to the new, processed audio file.
The other sections of the clip will still refer to the original file.



After processing the event the clip will refer both to the original file and a new file, containing the processed section only.

- Since all edits are available as separate files, it is possible to undo any processing, at any point and in any order!
This is done in the Offline Process History dialog, see “The Offline Process History dialog” on page 251.

- Furthermore, the original, unprocessed audio file can still be used by other clips in the project, by other projects or by other applications.

Audio processing

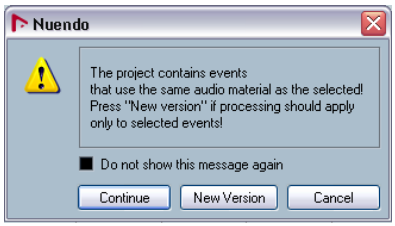
Basically, you apply processing by making a selection and selecting a function from the Process submenu on the Audio menu. Processing is applied according to the following rules:

- Selecting events in the Project window or the Audio Part Editor will apply processing to the selected events only.
Processing will only affect the clip sections that are referenced by the events.

- Selecting an audio clip in the Pool will apply processing to the whole clip.

- Making a selection range will apply processing to the selected range only.
Other sections of the clip are not affected.

If you attempt to process an event that is a shared copy (i.e. the event refers to a clip that is used by other events in the project), you are asked whether you want to create a new version of the clip or not.



Select “New Version” if you want the processing to affect the selected event only. Select “Continue” if you want the processing to affect all shared copies.

⇨ If you activate “Do not show this message again”, any further processing you do will conform to the selected method (“Continue” or ”New Version”).
You can change this setting at any time by using the “On Processing Shared Clips” pop-up in the Preferences (Editing–Audio page).

Common settings and features

If there are any settings for the selected Audio processing function, these will appear when you select the function from the Process submenu. While most settings are specific for the function, some features and settings work in the same way for several functions:

The “More…” button

If the dialog has a lot of settings, some options may be hidden when the dialog appears. To reveal these, click the “More…” button.

To hide the settings, click the button again (now labeled “Less…”).

The Preview, Process and Cancel buttons

These buttons have the following functionality:

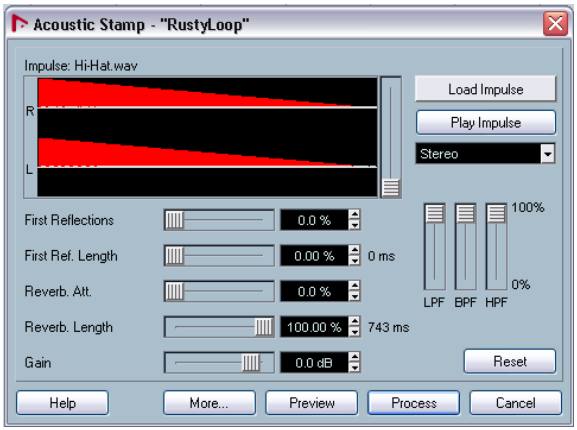
Button	Description
Preview	Allows you to listen to the result of the processing with the current settings. Playback will continue repeatedly until you click the button again (the button is labeled “Stop” during Preview playback). You can make adjustments during Preview playback, but the changes are not applied until the start of the next “lap”. Some changes may automatically restart the Preview playback from the beginning.
Process	Performs the processing and closes the dialog.
Cancel	Closes the dialog without processing.

Pre/Post-CrossFade

Some processing functions allow you to gradually mix the effect in or out. This is done with the Pre/Post-CrossFade parameters. If you activate Pre-CrossFade and specify a value of e.g. 1000 ms, the processing will be applied gradually from the start of selection, reaching full effect 1000 ms after the start. Similarly, if you activate Post-CrossFade, the processing will gradually be removed, starting at the specified interval before the end of the selection.

⚠ The sum of the Pre- and Post-CrossFade times cannot be larger than the length of the selection.

Acoustic Stamp



The Acoustic Stamp function is a convolution tool, which allows you to apply room characteristics (reverb) to the audio. This is done by processing the audio signal according to an impulse response – generally a stereo or mono recording of a very short signal (the impulse) in a room or other location. As a result, the processed audio will sound as if it were played in the same location.

⚠ This function requires a lot of processing power, especially when using the Preview function. If you are working with long impulse response files or stereo files, you may find that Preview playback stutters or stops. In that case, it’s better to process the material, listen to the result and modify it in the Offline Process History (see “The Offline Process History dialog” on page 251) if necessary.

The dialog contains the following settings:

Impulse and Envelope display

This display shows the loaded impulse response (in white) and the Envelope (in red). You can zoom in vertically on the impulse response using the slider to the right of the display (this can be useful since impulse responses typically are very weak). Zooming does not affect the processing in any way.

Load Impulse button

Clicking the “Load Impulse” button allows you to load an impulse response file from disk. These are ordinary wave or aiff audio files, with a maximum duration of 12 seconds. The name of the currently loaded impulse response file is shown above the display.

- A number of demonstration impulse response files are included in the Nuendo program folder.

For proper use of the Acoustic Stamp function, we recommend that you acquire files from a professional impulse response library.

Play Impulse button

Plays back the currently loaded impulse response.

Channel selector

If the currently loaded impulse response is a stereo file, this pop-up menu allows you to select whether the left channel, right channel or both (stereo) should be used for the convolution process.

Envelope controls

The five sliders below the display are used for setting up the “reverb envelope”, that is, a gain curve modifying how the impulse response is applied over time, and thereby the reverb character. These settings are reflected in the red Envelope display above. The sliders have the following functionality:

Parameter	Description
First Reflections	A level control for the first section of the reverb (the length of which is set with the next parameter, see below). Usually, this governs the volume of the first reflection(s) of the reverb.
First Ref. Length	This determines the length of the First Reflections section (the level of which is controlled by the previous parameter). Usually you would want to set this so that it includes the first reflection in the impulse response (normally about 5% of the total length).
Reverb Att.	A level control for the end section of the reverb (the section after the First Reflections, see above).
Reverb Length	Governs the reverb time, in milliseconds.
Gain	Allows you to adjust the gain of the impulse response. This may be necessary for optimal results, since different impulse response files may be recorded at different levels.

Filter controls

The three sliders to the right allow you to tailor the tonal character of the processed sound. In essence, this is a graphic equalizer with three broad bands: the LPF slider governs the low frequency content, the BPF governs the midrange and the HPF governs the high frequency content.

- Setting a slider to 100% means that the corresponding filter is “fully open”.

When all three sliders are set to 100%, the processed audio is not filtered at all.

Reset button

Sets all parameters in the upper section of the dialog to their default values.

Wet/Dry Mix

These two sliders allow you to specify the balance between wet (processed) and dry (original) signal in the resulting clip.

Normally the two sliders are “reverse-ganged”, so that raising the Wet mix slider lowers the Dry mix slider by the same amount. However, if you press [Alt]/[Option] and drag a slider, you can move it independently. This allows you to set e.g. 80% dry and 80% wet signal. Be careful to avoid distortion.

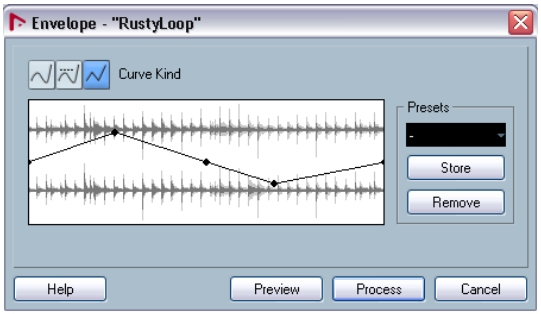
Tail

This parameter allows you to “add space” after the original audio section, to avoid that the reverb tail is cut off. When the checkbox is activated, you can specify a tail length using the slider. The tail time is included when playing back with the Preview function, allowing you to find the appropriate tail length. A good value would be the Reverb Length value, displayed in ms to the right of the Reverb Length parameter.

Pre and Post-CrossFade

See “Pre/Post-CrossFade” on page 240.

Envelope



The Envelope function allows you to apply a volume envelope to the selected audio. The dialog contains the following settings:

Curve Kind buttons

These determine whether the envelope curve should consist of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).

Fade display

Shows the shape of the envelope curve. The resulting waveform shape is shown in dark gray, with the current waveform shape in light gray. You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Presets

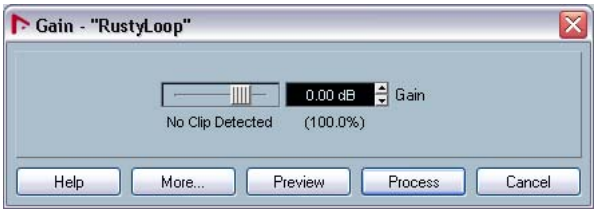
If you have set up an envelope curve that you may want to apply to other events or clips, you can store it as a preset by clicking the Store button.

- To apply a stored preset, select it from the pop-up menu.
- To rename the selected preset, double-click on the name and enter a new one in the dialog that appears.
- To remove a stored preset, select it from the pop-up menu and click Remove.

Fade In and Fade Out

For a description of these functions, see the chapter "Fades, crossfades and envelopes" on page 86.

Gain



Allows you to change the gain (level) of the selected audio. The dialog contains the following settings:

Gain

This is where you set the desired gain, between -50 and +20dB. The setting is also indicated below the Gain display as a percentage.

Clipping detection text

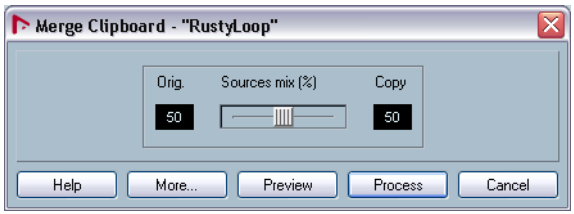
If you use the Preview function before applying the processing, the text below the slider indicates whether the current settings result in clipping (audio levels above 0 dB). If that is the case, lower the Gain value and use the Preview function again.

- If you want to increase the level of the audio as much as possible without causing clipping, you should use the Normalize function instead (see "Normalize" on page 244).

Pre- and Post-CrossFade

See "Pre/Post-CrossFade" on page 240.

Merge Clipboard



This functions mixes the audio from the clipboard into the audio selected for processing, starting at the beginning of the selection.

⚠ For this function to be available, you need to have cut or copied a range of audio in the Sample Editor first.

The dialog contains the following settings:

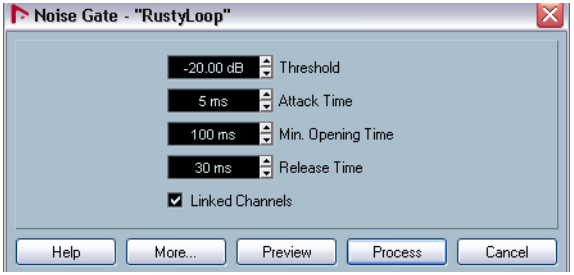
Sources mix

Allows you to specify a mix ratio between the original (the audio selected for processing) and the copy (the audio on the clipboard).

Pre- and Post-CrossFade

See “Pre/Post-CrossFade” on page 240.

Noise Gate



Scans the audio for sections weaker than a specified threshold level and replaces them with silence. The dialog contains the following settings:

Threshold

The level below which you want audio to be silenced. Levels below this value will close the gate.

Attack Time

The time it takes for the gate to open fully after the audio level has exceeded the threshold level.

Min. Opening Time

This is the shortest time the gate will remain open. If you find that the gate opens and closes too often when processing material that varies rapidly in level, you should try raising this value.

Release Time

The time it takes for the gate to close fully after the audio level has dropped below the threshold level.

Linked Channels

This is available for stereo audio only. When it is activated, the Noise Gate is opened for both channels as soon as one or both channels exceed the Threshold level. When Linked Channels is deactivated, the Noise Gate works independently for the left and right channel.

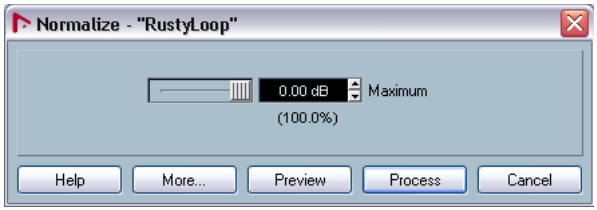
Dry/Wet mix

Allows you to specify a mix ratio between “dry” and processed sound.

Pre- and Post-CrossFade

See “Pre/Post-CrossFade” on page 240.

Normalize



The Normalize function allows you to specify the desired maximum level of the audio. It then analyzes the selected audio and finds the current maximum level. Finally it subtracts the current maximum level from the specified level and raises the gain of the audio by the resulting amount (if the specified maximum level is lower than the current maximum, the gain will be lowered instead). A common use for Normalizing is to raise the level of audio that was recorded at too low an input level. The dialog contains the following settings:

Maximum

The desired maximum level for the audio, between -50 and 0dB. The setting is also indicated below the Gain display as a percentage.

Pre- and Post-CrossFade

See “Pre/Post-CrossFade” on page 240.

Phase Reverse

Reverses the phase of the selected audio, turning the waveform “upside down”. The dialog contains the following settings:

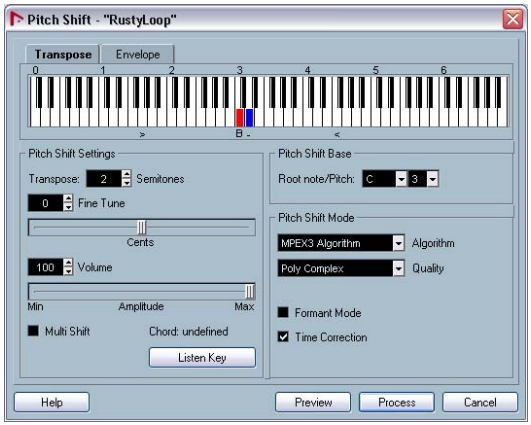
Phase Reverse on

When processing stereo audio, this pop-up menu allows you to specify which channel(s) should be phase-reversed.

Pre- and Post-CrossFade

See “Pre/Post-CrossFade” on page 240.

Pitch Shift



This function allows you to change the pitch of the audio with or without affecting its length. You can also create “harmonies” by specifying several pitches or apply pitch shift based on a user specified envelope curve.

When the “Transpose” tab is selected, the dialog contains the following parameters:

Keyboard display

This offers a way to specify the transpose interval in semitones and gives a graphic overview of the transposition setting.

- The “root note” is indicated in red.

This has nothing to do with the actual key or pitch of the original audio, it just provides a way to display transpose intervals. If you like, you can change the root note by using the settings in the Pitch Shift Base section, or by pressing [Alt]/[Option] and clicking in the keyboard display.

- To specify a transpose interval, click on one of the keys.

The key is indicated in blue, and the program plays test tones in the base pitch and transpose pitch to give you an audible confirmation.

- If “Multi Shift” is activated (see below), you can click on several keys to create “chords”.

Clicking on a blue (activated) key removes it.

Pitch Shift settings

The “Semitones” and “Fine tune” settings allow you to specify the amount of pitch shift. You can transpose the audio ±16 semitones, and fine tune it by ±200 cents (hundredths of semitones).

Volume/Amplitude

Allows you to lower the volume of the pitch-shifted sound.

Multi Shift

When this is activated, you can add more than one transpose value, creating multi-part harmonies. This is done by adding intervals in the keyboard display (see above). Note that you cannot use the Preview function in Multi Shift mode.

- If the intervals you add make up a standard chord, this chord is displayed to the right.

Note however, that to include the base pitch (the original, untransposed sound) in the processed result, you need to click the base key in the keyboard display as well, so that it is displayed in blue.

Listen Key/Chord button

Clicking this button plays a test tone pitched according to the activated interval key on the keyboard display. If “Multi Shift” is activated, this button is called “Listen Chord” and plays all activated intervals as a chord.

Pitch Shift Base

This allows you to set the root note (the red key in the keyboard display). It has nothing to do with the actual pitch, but is an aid for setting up intervals and chords.

Pitch Shift Mode

This is where you can make settings for the MPEX 3 algorithm.

You can choose between 7 quality settings:

Option	Description
Preview	This mode should only be used for preview.
Mix Fast	This mode is a very fast mode for preview. This works best with composite music signals mono or stereo material.
Solo Fast	Use this mode for single instruments (monophonic material) and voice.
Solo Musical	Same as above but higher quality.
Poly Fast	Use this for processing monophonic and polyphonic material. This is the fastest setting that gives still very good results. You can use this for drum loops, mixes, chords.
Poly Musical	Use this for processing monophonic and polyphonic material. This is the recommended MPEX default quality setting. You can use this for drum loops, mixes, chords.
Poly Complex	This high quality setting is quite processor intense and should be used only when processing difficult material or for stretch factors above 1,3.

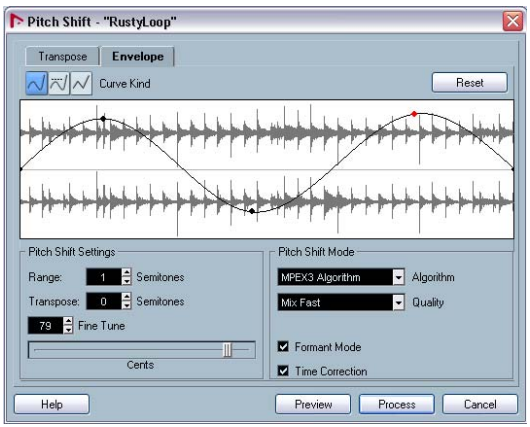
Formant Mode

If you are processing vocal material, you should activate this option in order to preserve the vocal characteristics of the pitch-shifted audio and to avoid a a “chipmunk voice” effect.

Time Correction

When this is activated, the pitch shift process will not affect the length of the audio. When this is deactivated, raising the pitch will shorten the audio section and vice versa, much like changing the playback speed on a tape recorder.

Using envelope based Pitch Shift



When the “Envelope” tab is selected, you can specify an envelope curve on which the pitch shift should be based. This allows you to create pitch bend effects, pitch-shift different sections of the audio by different amounts, etc.

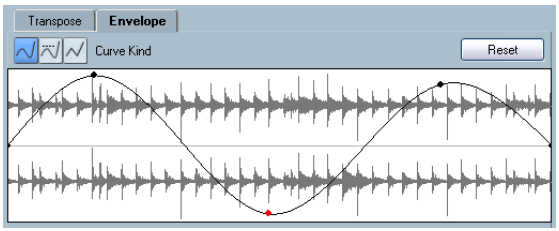
Envelope display

Shows the shape of the envelope curve over the waveform image of the audio selected for processing. Envelope curve points above the center line indicate positive pitch shift, while curve points below the center line indicate negative pitch shift. Initially, the envelope curve will be a horizontal, centered line, indicating zero pitch shift.

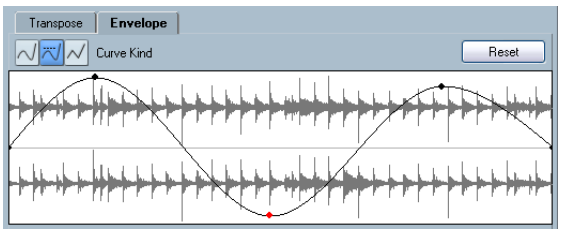
- You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Curve Kind

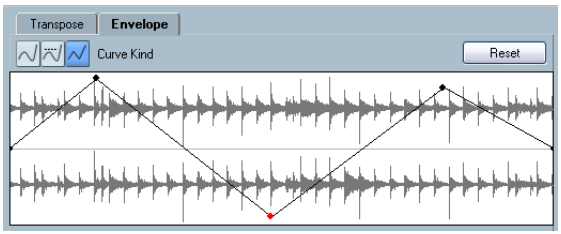
These buttons determine whether the envelope curve should consist of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).



Spline curve segment envelope.



The same envelope with damped spline segments selected.



The same envelope with linear segments selected.

Range

This parameter determines the vertical pitch range of the envelope. If set to “4”, moving a curve point to the top of the display corresponds to pitch shifting by + 4 semitones. The maximum range is +/- 16 semitones.

Transpose and Fine Tune

These parameters allow you to adjust the value of a curve point numerically:

1. Click on a curve point to select it.
The selected point is shown in red.

2. Adjust the Transpose and Fine Tune parameters to change the pitch of the curve point in semitones and cents, respectively.

Pitch Shift Mode

These are the same parameters as on the Transpose tab, see “Pitch Shift Mode” on page 245.

Example

Let’s say that you wish to create a pitch bend effect, so that the pitch is raised linearly by exactly 2 semitones in a specific part of the selected audio.

1. Remove all curve points by clicking the Reset button.

2. Select a linear curve by clicking the Curve Kind button to the right.

3. Make sure the Range parameter is set to 2 semitones or higher.

4. Create a point where you want the pitch bend to start by clicking on the envelope line.
Since this is the starting point for the pitch bend, you want its pitch to be zero (the envelope line should still be straight). If necessary, use the Fine Tune parameter to set the curve point to 0 cents, because this point governs the start point, where you want the pitch transition to begin.

5. Create a new curve point at the horizontal position where you want the pitch bend to reach the full value.
This curve point determines the rise time of the pitch bend effect, i.e. the further away from the starting point the new point is positioned, the longer it will take for the pitch bend to reach the full value, and vice versa.

6. With the second point still selected, use the Transpose and Fine Tune parameters to set the pitch to exactly 2 semitones.

7. Create a new curve point to set the duration of the pitch bend, i.e. the time the pitch should remain transposed by 2 semitones.

8. Finally, create a point where you want the pitch bend to end.
You don't need to create a new point if you are at the end of the audio file, since there is always an end point at the right side of the waveform display.

9. If necessary, make additional settings in the Pitch Shift Mode section, see "Pitch Shift Mode" on page 245.

10. Click Process.
The pitch bend is applied according to the specified settings.

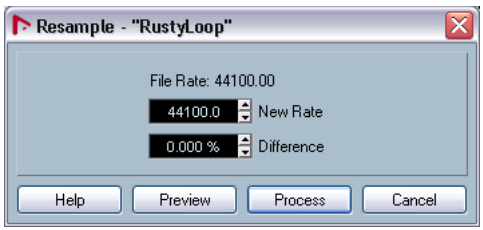
Remove DC Offset

This function will remove any DC offset in the audio selection. A DC offset is when there is too large a DC (direct current) component in the signal, sometimes visible as the signal not being visually centered around the "zero level axis". DC offsets do not affect what you actually hear, but they affect zero crossing detection and certain processing, and it is recommended that you remove them.

⚠ It is recommended that this function is applied to complete audio clips, since the DC offset (if any) is normally present throughout the entire recording.

There are no parameters for this function. Note that you can check for DC Offset in an audio clip using the Statistics function (see "Statistics" on page 256).

Resample



The Resample function can be used for changing the length, tempo and pitch of an event.

The original sample rate of the event is listed in the dialog. Resample the event to a higher or lower sample rate by either specifying a sample rate or by specifying the difference (as a percentage value) between the original sample rate and the desired new one.

- Resampling to a higher sample rate will make the event longer and cause the audio to play back at a slower speed with a lower pitch.
- Resampling to a lower sample rate will make the event shorter and cause the audio to play back at a faster speed with a higher pitch.
- You can audition the result of the resampling by entering the desired value and clicking "Preview".
  The event will then be played back as it will sound after the resampling.
- When you are satisfied with the preview result, click "Process" to close the dialog and apply the processing.

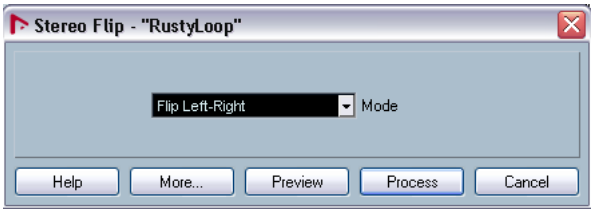
Reverse

Reverses the audio selection, as when playing a tape backwards. There are no parameters for this function.

Silence

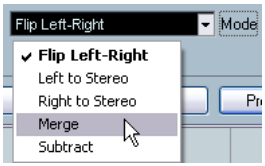
Replaces the selection with silence. There are no parameters for this function.

Stereo Flip



This function works with stereo audio selections only. It allows you to manipulate the left and right channel in various ways. The dialog contains the following parameters:

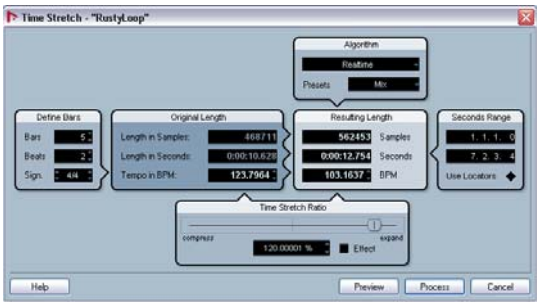
Mode



This pop-up menu determines what the function does:

Option	Description
Flip Left-Right	Swaps the left and right channel.
Left to Stereo	Copies the left channel sound to the right channel.
Right to Stereo	Copies the right channel sound to the left channel.
Merge	Merges both channels on each side for mono sound.
Subtract	Subtracts the left channel information from the right and vice versa. This is typically used as a “Karaoke effect”, for removing centered mono material from a stereo signal.

Time Stretch



This function allows you to change the length and “tempo” of the selected audio without affecting the pitch. The dialog contains the following parameters:

Define Bars section

In this section you set the length of the selected audio and the time signature:

Parameter	Description
Bars	If you use the tempo setting (see below), you can specify the length of the selected audio here, in bars.
Beats	If you use the tempo setting, you can specify the length of the selected audio here, in beats.
Sign.	If you use the tempo setting, you can specify the time signature here.

Original Length section

This section contains information and settings regarding the audio selected for processing:

Parameter	Description
Length in Samples	The length of the selected audio, in samples.
Length in Seconds	The length of the selected audio, in seconds.
Tempo in BPM	If you are processing music, and know the actual tempo of the audio, you can enter it here as beats per minute. This makes it possible to time-stretch the audio to another tempo, without having to compute the actual time stretch amount.

Resulting Length section

These settings are used if you want to stretch the audio to fit within a specific time span or tempo. The values will change automatically if you adjust the Time Stretch Ratio (see below).

Parameter	Description
Samples	The desired length in samples.
Seconds	The desired length in seconds.
BPM	The desired tempo (beats per minute). For this to work, you have to know the actual tempo of the audio, and specify this (along with time signature and length in bars) in the Original Length section to the left.

Seconds Range section

These settings allow you to set the desired range for the time stretch.

Parameter	Description
Range	Allows you to specify the desired length as a range between two time positions.
Use Locators	Clicking the diamond-shaped button below the Range fields sets the Range values to the left and right Locator positions, respectively.

Time Stretch Ratio section

The Time Stretch Ratio determines the amount of time stretch as a percentage of the original length. If you use the settings in the Resulting Length section to specify the amount of time stretch, this value will change automatically. The possible range depends on the "Effect" option:

- If the "Effect" checkbox is deactivated, the range is 75-125%.

This is the preferred mode if you want to preserve the character of the sound.

- If the "Effect" checkbox is activated, you can specify values between 10 and 1000% (Realtime), or 50 and 200% (MPEX 3).

This mode is mainly useful for special effects, etc.

Algorithm section

Allows you to select a time stretch algorithm: MPEX 3 and Realtime mode.

- MPEX 3 mode

This mode is based on Prosoniq's proprietary MPEX (Minimum Perceived Loss Time Compression/Expansion) algorithm. This algorithm (which is also used in Prosoniq's TimeFactory™ application) uses an artificial neural network for time series prediction in the scale space domain to achieve high end time and pitch scaling. This gives the best possible audio quality result. You can choose between 7 quality settings, see "Pitch Shift Mode" on page 245.

- Realtime mode

This is the algorithm used for the realtime time stretching features in Nuendo. Although this algorithm is optimized for time stretching in realtime, you can use it for offline processing as well. The Presets pop-up contains the same presets as found in the Algorithm pop-up in the Sample Editor, see "Determining the audio tempo automatically and time-stretching your audio" on page 272.

Applying plug-ins

You can add plug-in effects in real-time during playback (see the chapter "Audio effects" on page 168). However, sometimes it's useful to "permanently" apply effects to one or several selected events. This is done in the following way:

1. Make a selection in the Project window, the Pool or an editor.

Effects are applied according to the same rules as Processing (see "Common settings and features" on page 240).

2. Select "Plug-ins" from the Audio menu.

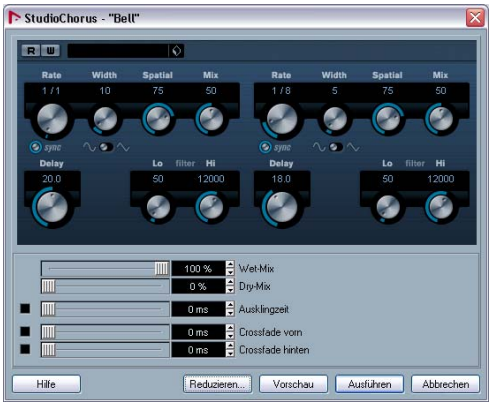
3. Select the desired effect from the submenu that appears.

The Process Plug-in dialog appears.

About stereo and mono

If you are applying an effect to mono audio material, only the left side of the effect's stereo output will be applied.

The process plug-in dialog



The process plug-in dialog for the StudioChorus effect.

The upper section of the process plug-in dialog contains the actual effect parameters of the selected plug-in. For details on the parameters of the included plug-ins, see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

The lower section of the dialog contains settings for the actual processing. These are common to all plug-ins.

- If the lower section is hidden, click the “More…” button to display it.

  Clicking the button again (now labeled “Less…”) will hide the lower section.

The following settings and functions are available in the common, lower section of the dialog:

Wet mix/Dry mix

These two sliders allow you to specify the balance between wet (processed) and dry (original) signal in the resulting clip.

Normally the two sliders are “reverse-ganged”, so that raising the Wet mix slider lowers the Dry mix slider by the same amount. However, if you press [Alt]/[Option] and drag a slider, you can move it independently. This allows you to set e.g. 80% dry and 80% wet signal. Be careful to avoid distortion.

Tail

This parameter is useful if you are applying an effect that adds material after the end of original audio (such as reverb and delay effects). When the checkbox is activated, you can specify a tail length using the slider. The tail time is included when playing back with the Preview function, allowing you to find the appropriate tail length.

Pre/Post-CrossFade

These settings allow you to gradually mix the effect in or out. If you activate Pre-CrossFade and specify a value of e.g. 1000 ms, the effect will be applied gradually from the start of selection, reaching full effect 1000 ms after the start. Similarly, if you activate Post-CrossFade, the processing will gradually be removed starting at the specified interval before the end of the selection.

⚠ The sum of the Pre- and Post-CrossFade times cannot be larger than the length of the selection.

Preview button

Allows you to listen to the result of the processing with the current settings. Playback will continue repeatedly until you click the button again (the button is labeled “Stop” during Preview playback). You can change the effect settings during Preview playback if needed.

Process button

Applies the effect and closes the dialog.

Cancel button

Closes the dialog without applying the effect.

The Offline Process History dialog

Procedures

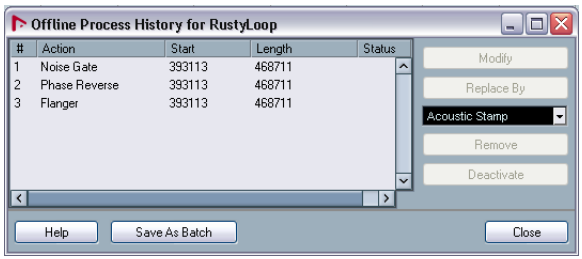
If you want to remove some or all processing from a clip, this can be done in the Offline Process History dialog. Processing that can be modified in the Offline Process History dialog includes the functions on the Process menu, any applied plug-in effects, and Sample Editor operations such as Cut, Paste, Delete and drawing with the Pencil tool.

⇨ Due to the clip-file relationship (see "Background" on page 239), it is even possible to modify or remove some processing "in the middle" of the Process History, while keeping later processing! This feature depends on the type of processing performed (see "Restrictions" on page 251).

Proceed as follows:

1. Select the clip in the Pool or one of its events in the Project window.
You can see which clips have been processed by checking the Status column in the Pool – the waveform symbol indicates that processing or effects have been applied to the clip (see "About the Status column symbols" on page 299).

2. Select "Offline Process History…" from the Audio menu.
The Offline Process History dialog appears.



The left part of the dialog contains a list of all processing you have added to the clip, with the most recent operations at the bottom of the list. The "Start" and "Length" columns indicate which section of the clip was affected by each operation. The "Status" column indicates if the operation can be modified or undone.

3. Locate the operation you want to edit and select it by clicking on it in the list.

- To modify the settings of the selected processing, click the "Modify" button.
This opens the dialog for the processing function or applied effect, allowing you to change the settings. This works just as when you applied the processing or effect the first time.

- To replace the selected operation with another processing function or effect, select the desired function from the pop-up menu and click the "Replace By" button.
If the selected function has settings, a dialog will appear as usual. The original operation will then be removed and the new processing will be inserted in the Offline Process History.

- To remove the selected operation, click the "Remove" button.
The processing is removed from the clip.

- To undo the selected operation and remove the processing from the clip click the "Deactivate" button.
The processing is removed from the clip, but the operation remains in the list. To redo the operation and apply the processing again, click the button, now renamed to "Activate", again.

- To save the list of processing operations as a Batch Process, click the "Save As Batch" button.
See "Batch Processing" on page 252.

4. Click "Close" to close the dialog.

Restrictions

- If there are no settings for the processing function, you cannot modify it.

- If you have applied processing that changes the length of the clip (such as Cut, Insert or Time Stretch), you can only remove this if it is the most recent processing in the Offline Process History (at the bottom of the list in the dialog). If an operation cannot be removed or modified, this is indicated by an icon in the "Status" column. Also, the corresponding buttons will be grayed out.

- The list must contain at least two processing operations in order to be saved as a Batch Process (see "Batch Processing" on page 252.

Batch Processing

Nuendo features a Batch Processing function that lets you apply a chain of audio processing to one or several events in one go – in either the Project window or the Pool. Batch Processing is based on operations in the Offline Process History dialog, described above. That is, the list of applied processes in this dialog is what can be made to constitute a batch process.

Batch Processing is therefore a convenient way to apply the same effects with the same settings to several audio events in a project.

It can also be used to "store" effect settings for future use. You may for example have performed a series of elaborate audio processing with a good result, and want to retain the particular combination and settings of effects you applied, so that you may quickly and easily apply them again to other events in the future.

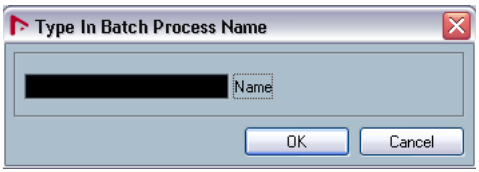
To set up a batch process, proceed as follows:

1. Apply the desired processing to an audio event or selection range in the project.
Note that you must apply at least two audio processes to be able to set up a batch process.

From here, there are two ways to go:

2. Pull down the Audio menu, and from the Batch Processes submenu, select "Create from Process History…".

3. In the dialog that appears, type in a name for the batch process, and click OK.



or…

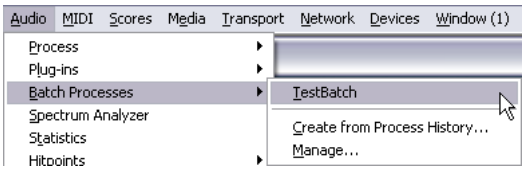
4. Pull down the Audio menu and select "Offline Process History".
The Offline Process History dialog opens. In this dialog you can modify settings or remove operations as desired (see "The Offline Process History dialog" on page 251).

5. In the Process History Dialog, click "Save As Batch", and then type in a name for the batch process in the dialog that appears and click OK.

Regardless of which of the above two methods you use, the batch process is now saved and available for use:

6. In the Project window, select all the audio events you want to process.
You can also make a selection range that spans multiple tracks and batch process the selection for all the audio events.

7. Pull down the Audio menu and open the Batch Processes submenu.
At the top of the menu you can now find the name of the batch process you created. The menu will list the names of any batch processes you create, until you delete them (see below).

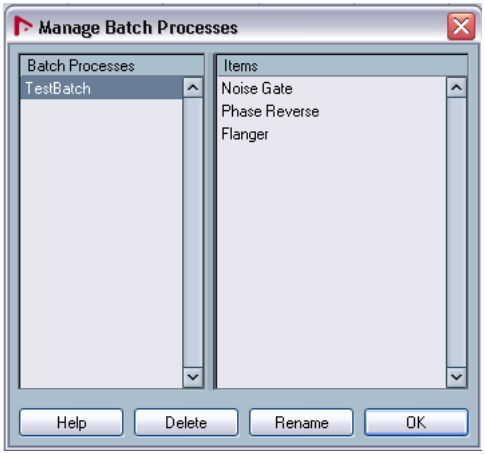


8. Select the batch process you want to apply from the menu.
All the selected events will now be processed accordingly.

⇨ Note that even if you clear the Offline Process History dialog of all the operations that make up a batch process, this will not affect the saved batch process. It will still contain and perform the operations on which it was based when created.

Managing Batch Processes

You can delete and rename created batch processes in the Manage Batch Processes dialog.



- Open the Audio menu and select “Manage…” from the Batch Processes submenu to open the Manage Batch Processes dialog.

The created batch processes are listed in the left column, and the operations each batch process contains are listed in the right column.

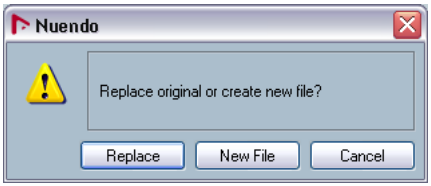
- To remove a batch process, just select it in the list and click “Delete”.
- To change the name of a batch process, select it in the list and click “Rename” and enter the new name.

Freeze Edits

The Freeze Edits function on the Audio menu allows you to make all processing and applied effects permanent for a clip:

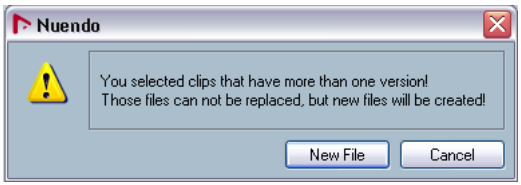
1. Select the clip in the Pool or one of its events in the Project window.
2. Select “Freeze Edits…” from the Audio menu.

- If there is only one edit version of the clip (no other clips refer to the same audio file), the following dialog will appear:



If you select “Replace”, all edits will be applied to the original audio file (the one listed in the clip’s Path column in the Pool). If you select “New File”, the Freeze Edits operation will create a new file in the Audio folder within the project folder (leaving the original audio file unaffected).

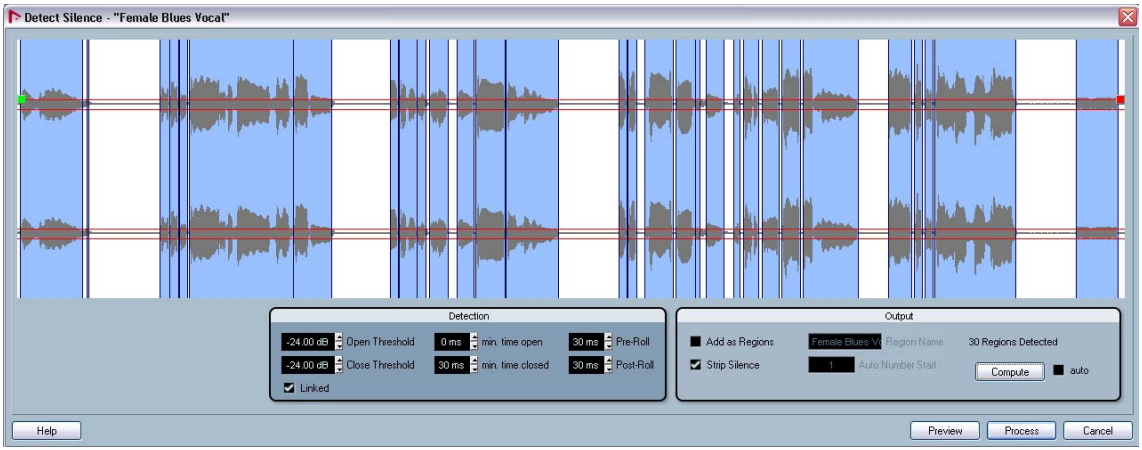
- If the selected clip (or the clip played by the selected event) has several edit versions (i.e. there are other clips referring to the same audio file), the following alert will appear:



As you can see, you don’t have the option to Replace the original audio file in this case. This is because that audio file is used by other clips. Select “New File” to have a new file created in the Audio folder within the project folder.

⚠ After a Freeze Edits, the clip refers to a new, single audio file. If you open the Offline Process History dialog for the clip, the list will be empty.

Detect Silence



The Detect Silence function on the Advanced submenu of the Audio menu searches for silent sections in an event and either splits the event, removing the silent parts from the project, or creates regions corresponding to the non-silent sections. Proceed as follows:

1. Select the event in the Project window or the Audio Part Editor.

You can select several events if you like, in which case you will be allowed to make separate settings for each selected event.

2. Select "Detect Silence" from the Advanced submenu of the Audio menu.

The Detect Silence dialog appears.

3. Adjust the settings in the Detection section to the left.

They have the following functionality:

Setting	Description
Open Threshold	When the audio level exceeds this value, the function will "open", i.e. let the sound through. Set this low enough to open when a sound starts, but high enough to remove unwanted noise during "silent" sections.
Close Threshold	When the audio level drops below this value, the function will "close". This value cannot be higher than the Open Threshold value. Set this high enough to remove unwanted noise during "silent" sections.
Linked	If this checkbox is ticked, Open and Close Threshold will have the same value.
min. time open	Determines the minimum time that the function will remain "open" after the audio level has exceeded the Open Threshold value. If the audio contains repeated short sounds, and you find that this results in too many short "open" sections, try raising this value.
min. time closed	Determines the minimum time that the function will remain "closed" after the audio level has dropped below the Close Threshold value. Usually you would want to set this to a low value, to avoid removing sounds.
Pre-Roll	Allows you to have the function "open" slightly before the audio level exceeds the Open Threshold value. In other words, the start of each "open" section is moved to the left according to the time you set here. This is useful to avoid removing the attack of sounds.
Post-Roll	Allows you to have the function "close" slightly after the audio level drops below the Close Threshold value. This is useful to avoid removing the natural decay of sounds.

4. Click the "Compute" button.

The audio event is analyzed, and the waveform display is redrawn to indicate which sections will be considered "silent", according to your settings. Above the Compute Button the number of detected regions is displayed.

- If you activate the "auto" checkbox next to the Compute button, the audio event will be analyzed (and the display will be updated) automatically every time you change the settings in the Detection section of the dialog.

Please note that you should not activate this option when you are working with very long files, as this process might take some time.

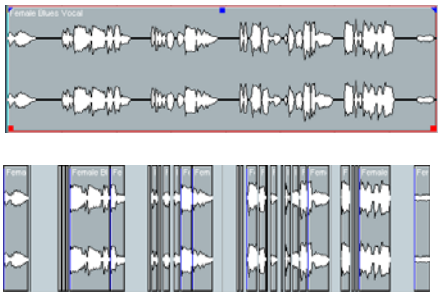
- You can use the Preview function to listen to the result.
The event is played back repeatedly in its entire length, but with the "closed" sections silenced.

5. Repeat steps 3 and 4 until you are satisfied with the result.

6. Select the desired result, by activating either the "Add as Regions" or the "Strip Silence" checkbox, or both.
"Add as Regions" will create regions according to the non-silent sections. "Strip Silence" will split the event at the start and end of each non-silent section, and remove the silent sections in between.

7. If you activate "Add as Regions", you can specify a name for the Regions in the Region Name field.
In addition to the name, the regions will be numbered, starting with the number specified in the Auto Number Start field.

8. Click "Process".
The event is split and/or regions are added.



The result of the "Strip Silence" option.

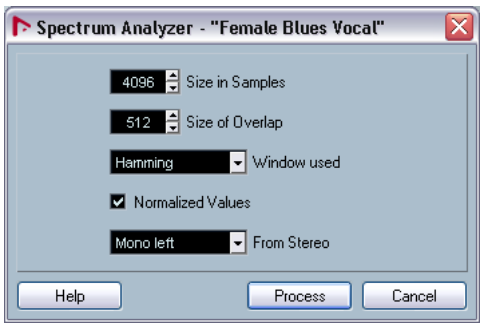
- If you selected more than one event in step 1 above, you can activate the "process all" checkbox to apply the same settings to all selected events. If you don't activate this, the dialog will appear again, allowing you to make separate settings for each event.

The Spectrum Analyzer

This function analyzes the selected audio, computes the average "spectrum" (level distribution over the frequency range) and displays this as a two-dimensional graph, with frequency on the x-axis and level on the y-axis.

1. Make an audio selection (a clip, an event or a range selection).

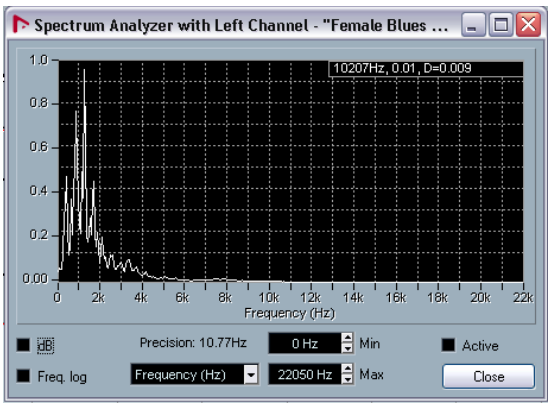
2. Select "Spectrum Analyzer" from the Audio menu.
A dialog with settings for the analysis appears.



The default values give good results in most situations, but you can adjust the settings if you like:

Setting	Description
Size in Samples	The function divides the audio into "analysis blocks", the size of which is set here. The larger this value, the higher the frequency resolution of the resulting spectrum.
Size of Overlap	The overlap between each analysis block.
Window used	Allows you to select which window type should be used for the FFT (Fast Fourier Transform, the mathematical method used for computing the spectrum).
Normalized Values	When this is activated, the resulting level values are scaled, so that the highest level is displayed as "1" (0dB).
From Stereo	When analyzing stereo material, there is a pop-up menu with the following options: Mono mix – the stereo signal is mixed to mono before analyzing. Mono left/right – the left or right channel signal is used for analysis. Stereo – both channels are analyzed (two separate spectrums will be displayed).

3. Click the “Process” button.
The spectrum is computed and displayed as a graph.



4. You can adjust the display with the settings in the display window:

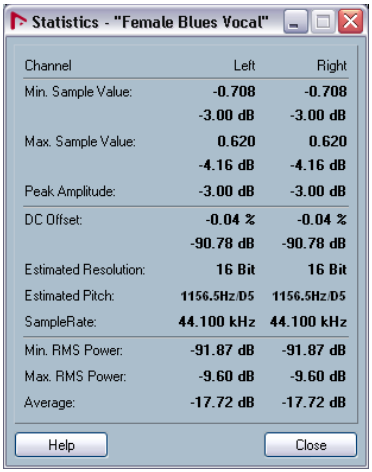
Setting	Description
dB	When this is activated, the vertical axis shows dB values. When it is deactivated, values between 0 and 1 are shown.
Freq. log	When this is activated, frequencies (on the horizontal axis) are displayed on a logarithmic scale. When it is deactivated, the frequency axis is linear.
Precision	Indicates the frequency resolution of the graph. This value cannot be changed here, but is governed by the Size in Samples setting in the previous dialog.
Frequency/ Note	Allows you to select whether you want the frequencies to be displayed in Hertz or with note names.
Min.	Sets the lowest frequency shown in the graph.
Max.	Sets the highest frequency shown in the graph. By adjusting the Min and Max values, you can take a closer look at a smaller frequency range.
Active	When this is activated, the next Spectrum Analysis will appear in the same window. When deactivated, new Spectrum Analysis results will appear in separate windows.

5. If you move the mouse pointer over the graph, a crosshair cursor follows the graph curve and the display in the upper right corner shows the frequency/note and level at the current position.
To compare the level between two frequencies, move the pointer to one of the frequencies, right-click once and move the pointer to the second frequency. The delta value (the difference in level between the current position and the right-click position) is displayed in the upper right corner (labeled “D”).

- If you analyze stereo audio and selected the “Stereo” option in the first dialog, the graphs for the left and right channel are superimposed in the display, with the left channel graph in white and the right channel graph in yellow.
The display in the upper right corner shows the values for the left channel – to see the right channel values, hold down [Shift]. An “L” or “R” is displayed to indicate which channel values are shown.

6. You can leave the window open or close it by clicking the “Close” button.
If you leave it open and the “Active” checkbox is ticked, the result of the next Spectrum Analysis will be displayed in the same window.

Statistics



The Statistics function on the Audio menu analyzes the selected audio (events, clips or range selections) and displays a window with the following information:

Item	Description
Min. Sample Value	The lowest sample value in the selection, as a value between -1 and 1 and in dB.
Max. Sample Value	The highest sample value in the selection, as a value between -1 and 1 and in dB.
Peak Amplitude	The largest sample value (in absolute numbers) in the selection, in dB.
DC Offset	The amount of DC Offset (see “Remove DC Offset” on page 247) in the selection, as a percentage and in dB.
Estimated Resolution	Even though an audio file is in 16 or 24 bits, it may have been converted from a lower resolution. The Estimated Resolution value makes an educated guess about the actual audio resolution, by computing the smallest level difference between two samples.

Item	Description
Estimated Pitch	The estimated pitch of the audio selection.
Sample Rate	The sample rate of the audio selection.
Min. RMS Power	The lowest loudness (RMS) measured in the selection.
Max. RMS Power	The highest loudness (RMS) measured in the selection.
Average	The average loudness over the whole selection.

18

The Sample Editor

Background

The Sample Editor allows you to view and manipulate audio at the audio clip level, by cutting and pasting, removing or drawing audio data, processing or applying effects (see “Audio processing and functions” on page 238). This editing can be called “non-destructive”, in the sense that you can undo changes or revert to the original versions at any time, using the Offline Process History (see “The Offline Process History dialog” on page 251), and because the actual audio file (if created or imported from outside the project) will remain untouched.

The Sample Editor also contains most of the Audio Warp related functions, i.e. the realtime time-stretching and pitch-shifting functions in Nuendo. These are useful to e.g. tempo-match any audio loop to the project tempo (see “Audio Warp realtime processing / Tempo matching audio to the project tempo” on page 272).

Another special feature of the Sample Editor is hitpoint detection. Hitpoints allow you to create “slices”, that are useful, if you want to e.g. change the tempo without affecting the pitch (see “Working with hitpoints and slices” on page 278).

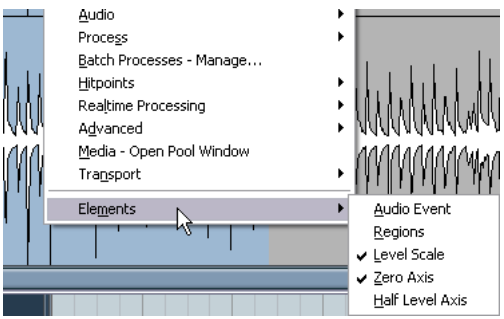
Opening the Sample Editor

You open the Sample Editor by double-clicking an audio event in the Project window or the Audio Part Editor, or by double-clicking an audio clip in the Pool. You can have more than one Sample Editor open at the same time.

- Note that double-clicking an audio part in the Project window will open the Audio Part Editor, even if the part only contains a single audio event.
This is described in a separate chapter, see “The Audio Part Editor” on page 290.

Window overview

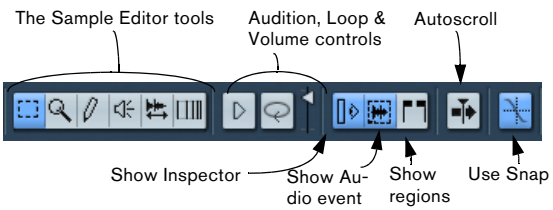
The Elements menu



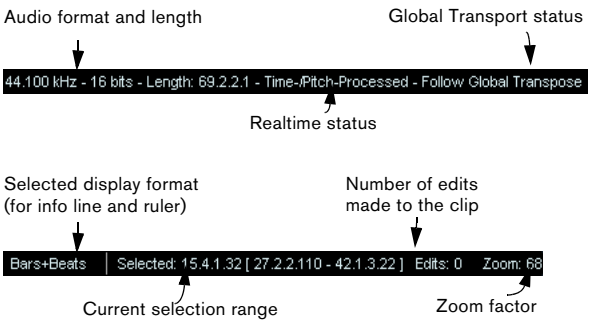
If you right-click in the Sample Editor to bring up the Quick menu, you will find a submenu called “Elements”. By activating or deactivating options on this submenu, you specify what is shown in the editor window. Some of these options are also available as icons on the toolbar.

The toolbar

The toolbar contains the tools…



… and information about the edited audio clip:



Initially, length and position values are displayed in the format specified in the Project Setup dialog. If you click in the middle field, a pop-up menu opens, where you can select another display format. This selection affects the Sample Editor ruler as well.

- You can customize the toolbar by right-clicking it and using the pop-up menu to hide or show items.
- Selecting Setup from the pop-up menu allows you to reorder sections on the toolbar, store presets, etc. See "The Setup dialogs" on page 506.

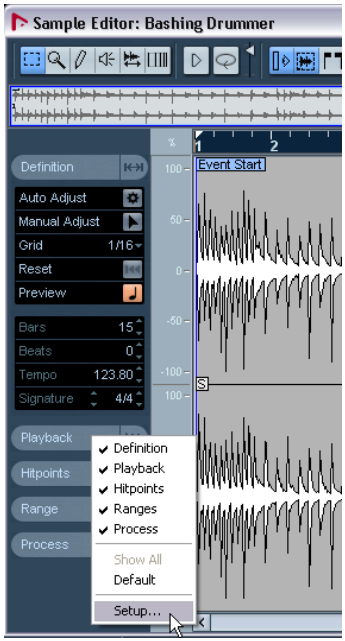
The Sample Editor Inspector

To the left of the Sample Editor, you will find the Sample Editor Inspector. It contains all the tools and functions for working in the Sample Editor.

You open a tab by clicking on it. If you want to open another tab without closing the first, [Ctrl]/[Command]-click on it. To open all tabs in the Inspector [Alt]/[Option]-click on any tab.

⇨ You can show/hide Inspector sections by right-clicking on an Inspector tab and activating/deactivating the desired option(s).

Make sure you right-click on an inspector tab and not on the empty area below the Inspector, as this will open the Quick context menu instead.



The Definition tab

The topmost tab of the Sample Editor Inspector is used to define the musical context of your audio. Here, you can define the grid, i.e. measure the audio tempo and the groove. Open this tab, if you want to use your audio in a musical context, so that you can later activate the Straighten Up mode, create a groove quantize map or slices.

The upper section of the Definition tab will help you to adjust the audio grid. You can select a grid resolution from the pop-up menu and adjust the grid manually by activating the Manual Adjust tool, or automatically by clicking the Auto Adjust button. When you click on the Auto Adjust button, the Manual Adjust tool will be activated, so that you can afterwards verify and change the grid manually, if necessary. The Preview mode should be activated (default setting) to use the grid for playback. Preview is linked to the Straighten Up mode and Quantize menu on the Playback tab. If you only want to create slices or quantize grooves, you can deactivate the Preview mode.

The lower section displays the length of your audio file in bars and beats (PPQ) together with the estimated tempo and the time signature. You should always verify if the length in bars corresponds to the audio file you imported. If necessary, listen to your audio and enter the correct bar length.

⚠ If you work with audio with triplet feeling, set the basic grid resolution to 1/8 or 1/16 and the signature to 12/8. Note that you should afterwards also set the time signature for the project to 12/8 (in the Transport panel).

The Playback tab

In this tab, the audio grid and the tempo of the audio can be adjusted to the project grid by activating the Straighten Up mode.

From the algorithm pop-up, you can select an algorithm for the realtime time-stretching.

If you activate Straighten Up mode, the audio file will snap to the project grid. The Quantize pop-up lets you select a resolution for the audio, allowing you to specify how exact the quantization will be. When you select the “Bars” option, the audio will be synced to tempo without quantizing. The Swing fader lets you offset every second position in the grid creating a swing or shuffle feel.

In Free Warp mode you can manually change the rhythm of the audio. When this button is activated, you can drag beats to time positions in the grid. This is described in the section “Free Warp” on page 285.

When the Transpose track has been added to the project, or when the event root key is defined and the project root key is set, you can follow global transpose by activating the Follow Global mode (see “Realtime pitch-shifting of audio events” on page 288). Note that the Transpose function on the Playback tab is not available if you opened the Sample Editor by double-clicking on an event in the Pool.

If you click the Flatten button, the realtime warp processing will be applied to the clip, making the settings permanent (see “Flattening the realtime processing” on page 288).

⚠ Warp tabs will only be displayed in the waveform, if this tab is open.

The Hitpoints tab

In this tab, the transients, i.e. hitpoints of the audio can be marked.

Adjust the sensitivity slider to determine how many hitpoints should be shown, and edit them with the Edit Hitpoints tool, if necessary. If you want to clear all hitpoints, e.g. to re-detect hitpoints, click the Remove All button.

Click the Slice & Close button, if you want to slice your audio to quantize the rhythm of the different slices separately (see "Creating slices" on page 283).

Click the Make Groove button, if you want to create an audio groove for quantizing other material to the groove of your audio (see "Creating groove quantize maps" on page 283).

Click the Create Markers button, if you want to create markers for the hitpoints (see "Create Markers" on page 284).

Use the Create Regions button, if you want to create regions, e.g. for further use in a sampler (see "Create Regions" on page 284).

Use the Create Events button, if you wish to create separate events according to the hitpoints for a file (see "Create Events" on page 284).

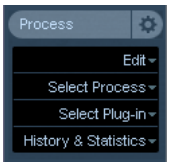
Before you can use the Make Groove and the Slice & Close buttons, the tempo and the time signature of the audio must be defined (the Definition tab will light up in blue to indicate this).

⚠ Hitpoints will only be displayed in the waveform, if this tab is open.

The Range tab

In this tab you will find some utility functions for working with ranges and selections (see "Making selections" on page 267).

The Process tab



This tab regroups the most important audio editing commands from the Audio and the Edit menus. For further information on the Select Process and Select Plug-in pop-up menus, see the chapter "Audio processing and functions" on page 238.

The thumbnail display

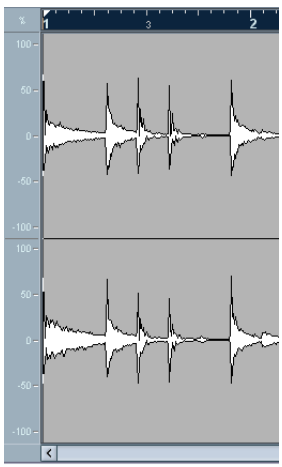
The thumbnail display provides an overview of the whole clip. The section currently shown in the main waveform display of the Sample Editor is indicated by a blue rectangle in the thumbnail, while the current selection range is shown in blue.

- You can move the blue rectangle in the thumbnail to view other sections of the clip.
  Click in the lower half of the rectangle and drag to the left or right to move it.
- You can resize the blue rectangle (by dragging its left or right edge) to zoom in or out, horizontally.
- You can define a new viewing area by clicking in the upper half of the overview and dragging a rectangle with the mouse.

The ruler

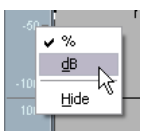
The Sample Editor ruler is located between the thumbnail and the waveform display. It shows the timeline in the display format specified in the Project Setup dialog (see “The Project Setup dialog” on page 33). If you like, you can select an independent display format for the ruler by clicking on the arrow button to the right of it and selecting an option from the pop-up menu that appears (this affects the values in the info line too). For a list of the display format options, see “The ruler” on page 31.

The waveform display and the level scale

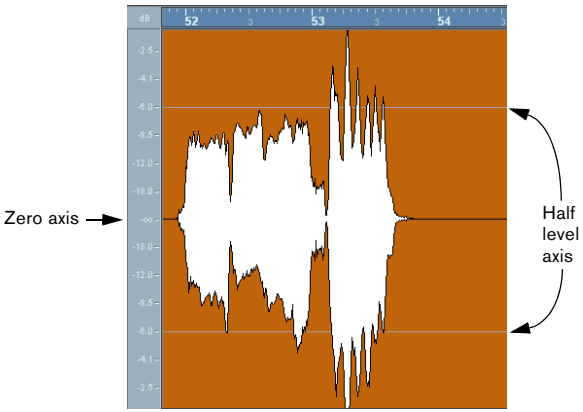


The waveform display shows the waveform image of the edited audio clip – in the style selected in the Preferences (Event Display–Audio page), see “Adjusting how parts and events are shown” on page 37. To the left of the waveform display, a level scale can be shown, indicating the amplitude of the audio.

- When the level scale is shown, you can select whether the level should be shown as a percentage or in dB.
  This is done by right-clicking the level scale and selecting an option from the pop-up menu that appears. This also allows you to hide the level scale.



- To display the level scale after hiding it, right-click to bring up the Quick menu and activate “Level Scale” on the Elements submenu.
- This submenu also allows you to select whether you want the zero axis and/or the half level axis indicated in the waveform display.



General Operations

Zooming

Zooming in the Sample Editor is done according to the standard zoom procedures, with the following special notes:

- The vertical zoom slider changes the vertical scale relative to the height of the editor window, in a way similar to the waveform zooming in the Project window (see "Zoom and view options" on page 34).
The vertical zoom will also be affected if the option "Zoom Tool Standard Mode" (Preferences on the Editing–Tools page) is deactivated and you drag a rectangle with the Zoom tool.

- The following options relevant to the Sample Editor are available on the Zoom submenu (on the Edit menu and the Quick context menu):

Option	Description
Zoom In	Zooms in one step, centering on the position cursor.
Zoom Out	Zooms out one step, centering on the position cursor.
Zoom Full	Zooms out so that the whole clip is visible in the editor.
Zoom to Selection	Zooms in so that the current selection fills the screen.
Zoom to Selection (Horiz.) (Edit menu only)	Zooms in horizontally so that the current selection fills the screen.
Zoom to Event (Edit menu only)	Zooms in so that the editor shows the section of the clip corresponding to the edited audio event. This is not available if you opened the Sample Editor from the Pool (in which case the whole clip is opened for editing, not an event).
Zoom In/Out Vertical (Edit menu only)	This is the same as using the vertical zoom slider (see above).

- You can also zoom by resizing the rectangle in the thumbnail display.
See "The thumbnail display" on page 263.

- The current zoom setting is shown in the info line, as a "samples per screen pixel" value.

- Note that you can zoom in horizontally to a scale with less than one sample per pixel!
This is required for drawing with the Pencil tool (see "Drawing in the Sample Editor" on page 271).

- If you have zoomed in to one sample per pixel or less, the appearance of the samples depend on the option "Interpolate Audio Images" in the Preferences (Event Display–Audio page).
If the option is deactivated, single sample values are drawn as "steps". If the option is activated, they are interpolated to "curves" form.

Auditioning

While you can use the regular play commands to play back audio when the Sample Editor is open, it is often useful to listen to the edited material only.

⇨ When auditioning, audio will be routed to the Control Room (if the Control Room is activated) or to the Main Mix (the default output bus). For information about routing, see the chapter "VST Connections: Setting up input and output busses" on page 10.

⇨ You can adjust the auditioning level with the miniature level fader on the toolbar.

By using key commands

If you activate the "Playback Toggle triggers Local Preview" option in the Preferences (Transport page), you can use the [Space] bar to audition. This is the same as clicking the Audition icon on the toolbar.

By using the Audition icon

Clicking the Audition icon on the toolbar plays back the edited audio, according to the following rules:

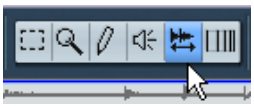
- If you have made a selection, this selection will be played back.
- If there is no selection, but the option "Show Event" is activated (see "Show audio event" on page 271), the section of the clip corresponding to the event will be played back.
- If there is no selection, and "Show Event" is deactivated, playback will start at the cursor position (if the cursor is outside the display, the whole clip will be played back).
- If the Loop icon is activated, playback will continue repeatedly until you deactivate the Audition icon. Otherwise, the section will be played back once.

⇨ Note that there is a separate Play button for auditioning regions. See "Auditioning regions" on page 270.

By using the Speaker tool

If you click somewhere in the waveform display with the Speaker (“Play”) tool and keep the mouse button pressed, the clip will be played back from the position at which you clicked. Playback will continue until you release the mouse button.

Scrubbing



The Scrub tool allows you to locate positions in the audio by playing back, forwards or backwards, at any speed:

1. Select the Scrub tool.
2. Click in the waveform display and keep the mouse button pressed.
   The project cursor is moved to the position at which you click.
3. Drag to the left or right.
   The project cursor follows the mouse pointer and the audio is played back. The speed and pitch of the playback depends on how fast you move the pointer.

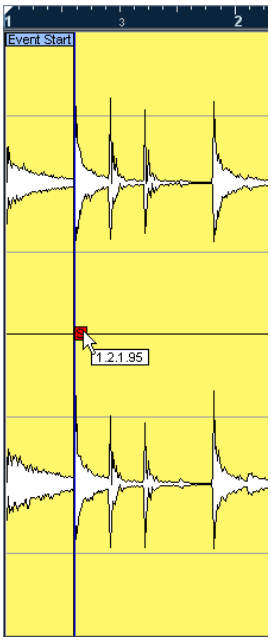
- You can adjust the response of the Scrub tool with the Scrub Response (Speed) setting in the Preferences (Transport–Scrub page).
  There you will also find a separate Scrub Volume setting.

Adjusting the snap point

The snap point is a marker within an audio event (or clip, see below). This is used as a reference position when you are moving events with snap activated, so that the snap point is “magnetic” to whatever snap positions you have selected.

By default, the snap point is set at the beginning of the audio event, but often it is useful to move the snap point to a “relevant” position in the event, such as a downbeat, etc.

1. Activate the “Audio Event” option so that the event is displayed in the editor.
2. Scroll so that the event is visible, and locate the “S” flag in the event.
   If you haven’t adjusted this previously, it will be located at the beginning of the event.



3. Click on the “S” flag and drag it to the desired position.
   When you drag the snap point, a tool tip shows its current position (in the format selected on the Sample Editor ruler).

- If the Scrub tool is selected when you move the snap point, you will hear the audio while dragging (just like when scrubbing).
  This makes it easier to find the correct position.

You can also adjust the snap point by setting the project cursor:

1. Place the cursor at the desired position (intersecting the event).
You may want to do this by scrubbing, to spot the right position exactly.

2. Right-click to open the Quick menu and select “Snap Point To Cursor” from the Audio submenu.
The snap point will be set to the position of the cursor. This method can also be used in the Project window and the Audio Part Editor.

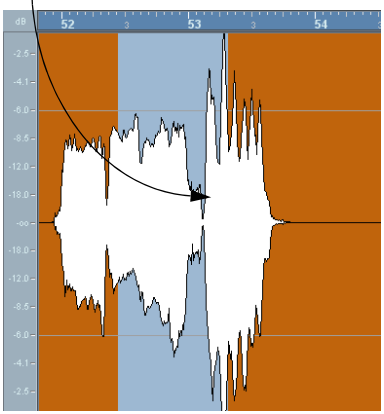
⚠ When you set the Grid Start in the Definition tab, the snap point will be moved to the Grid Start (see “Manually adjusting grid and tempo of your audio” on page 275).

- It is also possible to define a snap point for a clip (for which there is no event yet).
To open a clip in the Sample Editor, double-click it in the Pool (or drag it from the Pool to the Sample Editor). After having set the snap point using the procedure described above, you can insert the clip into the project from the Pool or the Sample Editor, taking the snap point position into account.

Making selections

To select an audio section in the Sample Editor, you click and drag with the Range Selection tool.

A selected range



- If Snap to Zero Crossing is activated on the toolbar, the start and end of the selection will always be at zero crossings (see “Snap to Zero Crossing” on page 271).

- You can resize the selection by dragging its left and right edge or by [Shift]-clicking.

- The current selection is indicated in the corresponding fields in the Range tab of the Sample Editor Inspector.
You can fine-tune the selection by changing these values numerically. Note that the values are relative to the start of the clip, rather than to the project timeline.

Using the Select menu

In the Select menu in the Range tab and in the Select submenu of the Edit menu you can find the following options:

Function	Description
Select All	Selects the whole clip.
Select None	Selects no audio (the selection length is set to “0”).
Select in Loop	Selects all audio between the left and right locator.
Select Event	Selects the audio that is included in the edited event only. This is not available if you opened the Sample Editor from the Pool (in which case the whole clip is opened for editing, not an event).
Locators to Selection (Range tab only)	Sets the locators to encompass the current selection. This is available if you have selected one or several events or made a selection range.
Locate Selection (Range tab only)	Moves the project cursor to the beginning or end of the current selection. For this to be available, you must have selected one or more events or parts, or made a selection range.
Loop Selection (Range tab only)	This activates playback from the start of the current selection and keeps starting over again when reaching the selection end.
From Start to Cursor (Edit menu only)	Selects all audio between the clip start and the project cursor.
From Cursor to End (Edit menu only)	Selects all audio between the project cursor and the end of the clip. For this to work, the project cursor must be within the clip boundaries.
Left Selection Side to Cursor (Edit menu only)	Moves the left side of the current selection range to the project cursor position. For this to work, the cursor must be within the clip boundaries.
Right Selection Side to Cursor (Edit menu only)	Moves the right side of the current selection range to the project cursor position (or the end of the clip, if the cursor is to the right of the clip).

Editing selection ranges

Selections in the Sample Editor can be processed in several ways. Please note:

- If you attempt to edit an event that is a shared copy (i.e. the event refers to a clip that is used by other events in the project), you are asked whether you want to create a new version of the clip or not (if you haven't made a "permanent" choice already – see below).

Select "New Version" if you want the editing to affect the selected event only. Select "Continue" if you want the editing to affect all shared copies. Note: If you activate the option "Do not show this message again" in the dialog, any further editing you do will conform to the selected method ("Continue" or "New Version"). You can change this setting at any time with the "On Processing Shared Clips" pop-up menu in the Preferences (Editing–Audio page).

- Any changes to the clip will appear in the Offline Process History, making it possible to undo them at a later point (see "The Offline Process History dialog" on page 251).

Cut, Copy and Paste

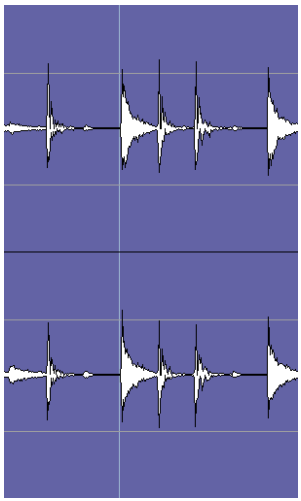
The Cut, Copy and Paste commands (on the Edit menu in the Process tab of the Sample Editor Inspector or in the main Edit menu) work according to the following rules:

- Selecting Copy copies the selection to the clipboard.
- Selecting Cut removes the selection from the clip and moves it to the clipboard.

The section to the right of the selection is moved to the left to fill out the gap.

- Selecting Paste copies the data on the clipboard into the clip.

If there is a selection in the editor, this will be replaced by the pasted data. If there is no selection, the pasted data will be inserted starting at the selection line. The section to the right of the line will be moved to make room for the pasted material.



The pasted data will be inserted at the selection line.

Delete

Selecting Delete (on the Edit menu in the Process tab of the Sample Editor Inspector or in the main Edit menu or pressing [Backspace]) removes the selection from the clip. The section to the right of the selection is moved to the left to fill out the gap.

Insert Silence

Selecting "Insert Silence" (on the Edit menu in the Process tab of the Sample Editor Inspector or in the Range submenu of the main Edit menu) will insert a silent section with the same length as the current selection, at the selection start.

- The selection will not be replaced, but moved to the right to make room.

If you want to replace the selection, use the "Silence" function instead (see "Silence" on page 247).

Processing

Processing (on the Select Process menu in the Process tab of the Sample Editor Inspector or in the Process submenu on the Audio menu) can be applied to selections in the Sample Editor, as can the effects (on the Select Plug-in menu in the Process tab of the Sample Editor Inspector or in the Plug-ins submenu on the Audio menu). See the chapter “Audio processing and functions” on page 238.

Creating a new event from the selection

You can create a new event that plays only the selected range, using the following method:

1. Make a selection range.

2. Press [Ctrl]/[Command] and drag the selection range to the desired audio track in the Project window.

Creating a new clip or audio file from the selection

You can extract a selection from an event and either create a new clip or a new audio file, in the following way:

1. Make a selection range.

2. Right-click to open the Quick menu and select “Bounce Selection” from the Audio submenu.

A new clip is created and added to the Pool, and another Sample Editor window will open with the new clip. The new clip will refer to the same audio file as the original clip, but will only contain the audio corresponding to the selection range.

Working with regions

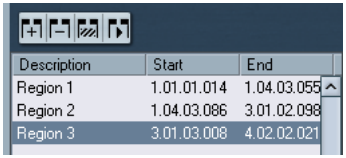
Regions are sections within a clip. One of the main uses for regions is Cycle recording, in which the different “takes” are stored as regions (see “Recording audio in cycle mode” on page 73). You can also use this feature for marking important sections in the audio clip. Regions can be dragged into the Project window from the Editor or the Pool to create new audio events. You can also export a region to disk as a new audio file, from the Pool.

Regions are best created, edited and managed in the Sample Editor.

Creating a region

1. Select the range you want to convert into a region.

2. Click the “Show Regions” button on the toolbar, or activate the “Regions” option on the Elements submenu on the Quick menu.
The regions list is displayed to the right in the Sample Editor window.



3. Click the Add region button above the Regions list (or select “Event or Range as Region” from the Advanced submenu of the Audio menu).
A region is created, corresponding to the selected range.

4. To name the region, click on it in the list and enter a new name.
Regions can be renamed at any time, using this procedure.

- When a region is selected in the Regions list, it is instantly displayed and selected in the Sample Editor.

Creating regions from Hitpoints

If your audio event contains calculated hitpoints, you can choose to automatically create regions from hitpoints. This can be useful to isolate recorded sounds. For further information on hitpoints, see “Working with hitpoints and slices” on page 278.

Editing regions

The region selected in the list is displayed in gray in the waveform display and thumbnail.

There are two ways to edit the start and end position of a region:

- Click and drag its start and end handles in the waveform display (with any tool).
  When you move the pointer over the handles, it will automatically change to an arrow pointer to indicate that you can drag the handles.
- Edit the Start and End positions numerically in the Regions list.
  The positions are shown in the display format selected for the ruler and info line, but are relative to the start of the audio clip, rather than the project timeline.

Auditioning regions

You can listen to a region by selecting it in the list and clicking the Play Region button (above the list). The region will play back once or repeatedly, depending on whether the Loop icon on the toolbar is activated or not.

Making selections from regions

If you select a region in the list and click the Select Region button above, the corresponding section of the audio clip is selected (as if you had selected it with the Range Selection tool). This is useful if you want to apply processing to the region only.

- Note that you can also double-click a region in the Pool to have its audio clip open in the Sample Editor with the area of the region automatically selected.

Creating new events from regions

You can create new audio events from regions, using the following method:

1. Click in the Region's leftmost column in the list and keep the mouse button pressed.
2. Move the pointer to the desired audio track and position in the Project window.
3. Release the mouse button.
   A new event is created.

- You can also use the function "Events from Regions" from the Advanced submenu of the Audio menu for this (see "Region operations" on page 55).

Removing regions

To remove a region from a clip, select it in the list and click the Remove Region button above the list.

Exporting regions as audio files

If you create a region in the Sample Editor, the region can be exported to disk as a new audio file. This is done from the Pool, see "Exporting regions as audio files" on page 308.

Drawing in the Sample Editor

It is possible to edit the audio clip at sample level by drawing with the Pencil tool. This can be useful if you need to manually edit out a spike or click, etc.

1. Zoom in to a zoom value lower than 1.
This means that there is more than one screen pixel per sample.

2. Select the Pencil tool.

3. Click and draw at the desired position in the waveform display.
When you release the mouse button, the edited section is automatically selected.

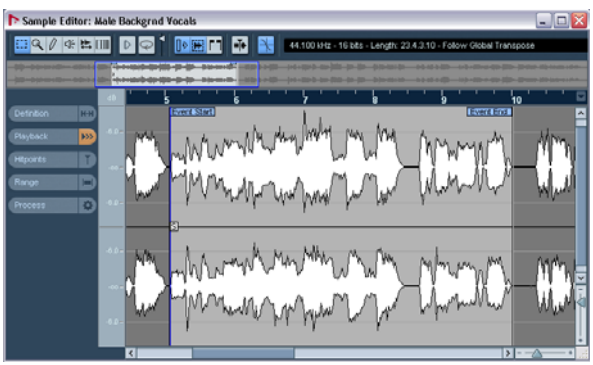
⚠ Any changes created by drawing will appear in the Offline Process History, making it possible to undo them at a later stage (see "The Offline Process History dialog" on page 251).

Options and settings

Show audio event

⚠ This is only available if you opened the Sample Editor by double-clicking an audio event in the Project window or the Audio Part Editor and not, if you opened the audio event from within the Pool.

When the Show Audio Event button is activated on the toolbar (or the option "Audio Event" is activated on the Elements submenu on the Quick menu), the section corresponding to the edited event is highlighted in the waveform display and Thumbnail. The sections of the audio clip not belonging to the event are shown with a dark gray background.



- In this mode, you can adjust the start and end of the event in the clip by dragging the event handles in the waveform display.
When you move the pointer over the event handles (no matter what tool may be selected), it takes on the shape of an arrow, to indicate that you can click and drag.

Snap to Zero Crossing

Snap to Zero Crossing activated.

When this option is activated, all audio edits are done at zero crossings (positions in the audio where the amplitude is zero). This helps you avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

- This setting affects the Sample Editor only. In the Project window and other editors, the Snap to Zero Crossing setting on the Project menu toolbar or in the Preferences (Editing–Audio page) is used.

⇨ If hitpoints have been calculated, these will also be taken into account when snapping to zero crossings.

Autoscroll

Autoscroll activated.

When this option is activated, the waveform display will scroll during playback, keeping the project cursor visible in the editor.

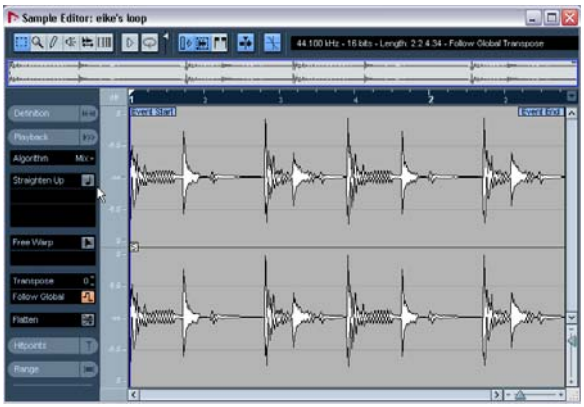
Audio Warp realtime processing / Tempo matching audio to the project tempo

Audio warp is the generic name for the realtime time-stretching and pitch-shifting functions in Nuendo. The main audio warp features are tempo-matching any audio loop to the project tempo (see "Determining the tempo of an audio loop and slicing your audio" on page 277) and matching up an audio clip with fluctuating tempo to a fixed tempo.

If you want to tempo match an audio loop to the project tempo, you will normally work with loops with straight beats. In this case you will only need to activate the Straighten Up mode.

Proceed as follows:

1. Import your loop into the project and double-click it to open it in the Sample Editor.



2. Open the Playback tab in the Sample Editor Inspector and activate the Straighten Up mode.
Your loop will automatically adapt to the project tempo.

If you want to use an audio file instead, or if the beat of your loop is not straight, further adjustments could be necessary. These are described in the following sections.

Determining the audio tempo automatically and time-stretching your audio

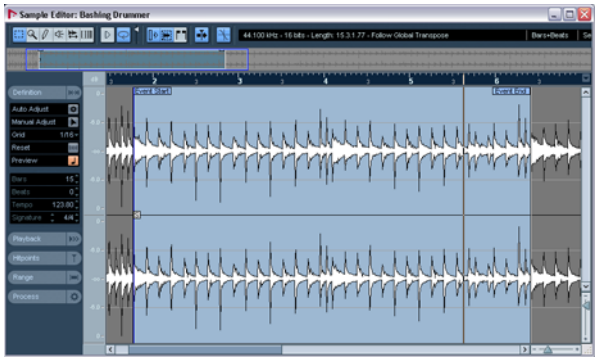
If you want to use an audio file with an unknown tempo in your project context, the easiest way to determine the tempo is to define a loop. You can then determine the tempo of the loop automatically (or manually) and finally match the tempo of this loop to the project tempo in Nuendo.

1. Import a suitable audio file, for example a drum loop and double-click on it to open it in the Sample Editor.

2. Make sure that the first downbeat of the audio clip is aligned with the first beat of the first bar in the Sample Editor.

If your audio file is a two or four bar loop, you can import it into your project and proceed with step three, if you have a longer audio file, possibly with an upbeat, you have the following possibilities to define a loop:

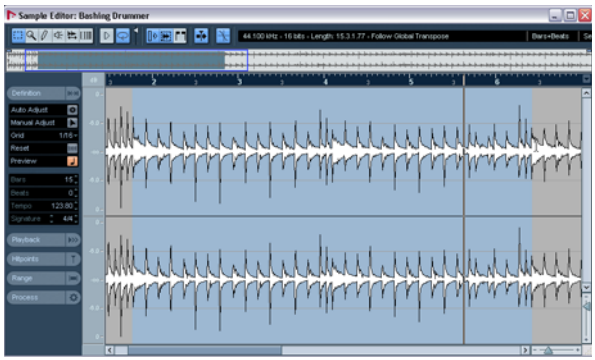
- Resize your event by adjusting the Event Start and the Event End and make sure that the Preview mode is activated.



Or

- Make a selection range in a longer clip and click the Audition Loop button.

Adjust the selection range until the loop is smooth.

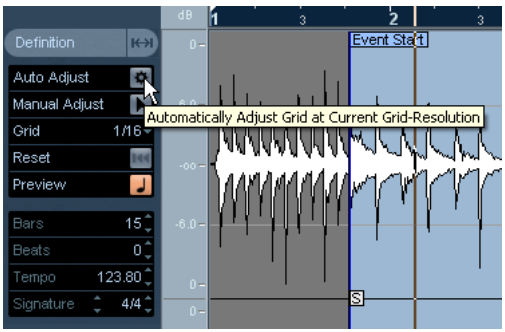


A 4 bar loop has been selected.

3. Open the Definition tab and make sure the Bars value corresponds to the length of the audio file, or the selection range, respectively.

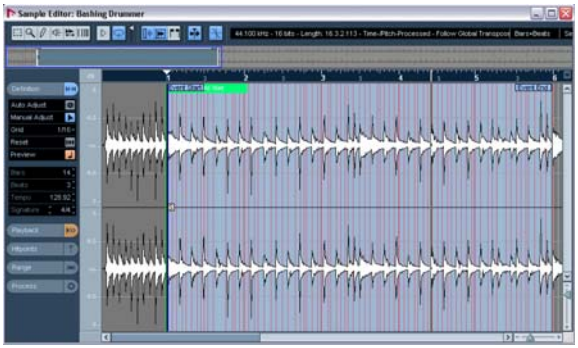
If necessary, listen to your audio to determine the correct bar length.

4. Cick the Auto Adjust button to automatically adjust the grid to the audio file.



When you click Auto Adjust, the following happens:

- If you created a loop by defining a selection range in a longer audio file, the snap point (S symbol) will be moved to the loop start.
- In the waveform, vertical lines will be displayed. The thick lines should match the bar positions and the thin lines the beat positions. You can adjust these lines by means of the Manual Adjust tool, see below.
- In the Definition tab the Manual Adjust tool will be activated (see "Manually adjusting grid and tempo of your audio" on page 275).



- In the Playback tab the Straighten Up button will be switched on (see "About the Straighten Up mode" on page 275).

5. Open the Playback tab to select an algorithm that should be applied on realtime playback.

In this pop-up you can find various options that govern the audio quality of the realtime time-stretching. There are presets for common types of audio material and an Advanced option where you can manually set warp parameters:

Option	Description
Drums	This mode is best for percussive sounds, because it will not change the timing of your audio. Using this option for pitched audio will lead to noticeable artefacts. In this case, you can try the Mix mode.
Plucked	This should be used for audio with transients and a relatively stable spectral sound character (e.g. plucked instruments).
Pads	Use this mode for pitched audio with slower rhythmics and a stable spectral sound character. This will minimize sound artefacts, but the rhythmic accuracy will not be preserved.
Vocals	This mode was optimized for slower signals with transients and a prominent tonal character (e.g. vocals).
Mix	This mode will preserve the rhythm and minimize the artefacts for pitched material which does not meet the above criteria (i.e. with a less homogenous sound character). This will be selected by default for audio that is not categorized.
Advanced	This allows for a manual tweaking of the time-stretching parameters. By default, the settings that are shown when you open the dialog are those of the last used preset (except if the Solo mode was selected, see below). The Advanced settings are described in more detail below this table.
Solo	This mode will preserve the formants of the audio. It should only be used for monophonic material (solo woodwind/brass instruments or solo vocals, monophonic synths or string instruments that do not play harmonies).

If you select the Advanced menu item, a dialog opens where you can manually adjust the three parameters that govern the sound quality of the time-stretching:

Parameter	Description
Grainsize	The realtime time-stretching algorithm splits the audio into small pieces called “grains”. This parameter determines the size of the grains. For material with many transients you should use low Grainsize values for best results.
Overlap	Overlap is the percentage of the whole grain that will overlap with other grains. Use higher values for material with a stable sound character.
Variance	Variance is also a percentage of the whole length of the grains and sets a variation in positioning so that the overlapping area will sound smooth. A Variance setting of 0 will produce a sound akin to time-stretching used in early samplers, whereas higher settings will produce more (rhythmic) “smearing” effects but less audio artefacts.

6. If you are satisfied with the result, i.e. the vertical lines match bars and beats positions, close the Sample Editor and activate playback.

If your audio file contained an upbeat and you resized the audio event to a smooth loop with the event handles, you might want to move the audio event to the beginning of the project:

The loop will now automatically adjust to the project tempo, and follow any further tempo changes you make! In the Project window, the audio event will have a note symbol and two arrows in the upper right corner. The note symbol indicates Straighten Up mode and the arrow indicates that the file is stretched.

About the Straighten Up mode

The Straighten Up mode is one of the key audio warp features. It allows you to lock audio clips to the project tempo by using realtime time-stretching. This is very useful if you want to use loops in your project and do not want to worry too much about timing.

Straighten Up mode is automatically activated if the Preview button on the Definition tab is activated and the tempo of the audio file or loop has been specified either automatically by clicking the Auto Adjust button or manually by using the Manual Adjust tool.

When this mode is activated, audio events will adapt to any tempo changes in Nuendo, just like MIDI events. However, using Straigthen Up function should not be confused with quantizing: the timing, i.e. the rythmic feeling will be maintained.

The Straighten Up mode in the Playback tab is automatically activated, when the audio tempo (time positions) is specified and the internal audio quantization (musical positions) has been defined.

It is also possible to activate/deactivate Straighten Up mode from within the Pool by clicking the respective checkbox in the Straighten Up column.

When you have correctly set a tempo or length for an audio clip, this information is saved with the project. This allows you to import files into the project with Straighten Up mode already activated. The tempo (if set) is also saved when exporting files.

⚠ Nuendo supports ACID® loops. These loops are standard audio files but with embedded tempo/length information. When ACID® files are imported into Nuendo, Straighten Up mode is automatically activated and the loops will adapt to the tempo set in the project.

Manually adjusting grid and tempo of your audio

If you want to manually adjust the grid and the tempo of your audio file, because you have a very special loop and the automatic functions did not lead to satisfying results, proceed as follows:

1. Open the Definition tab in the Sample Editor Inspector and activate the Manual Adjust tool.

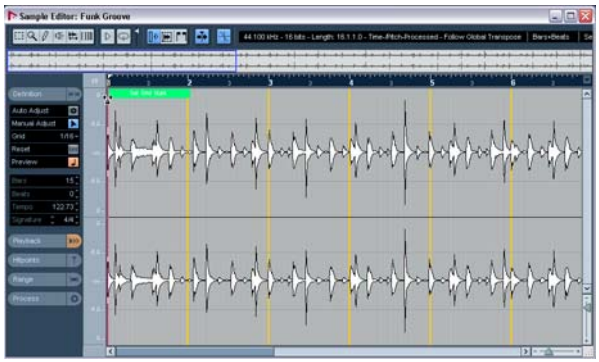
The Sample Editor ruler does not reflect the audio event position in the Project window, but the length of the audio file in bars and beats. With the Manual Adjust tool you can manipulate this time grid for the audio file. If you select the Manual Adjust tool and move the mouse in the Sample Editor the pointer turns to a flag. Depending on the position, the tool can have the following functions:

Function	Description
Set Grid Start (green)	This tool is shown at the clip start. When it is displayed, you can drag it with the mouse to the first downbeat in order to set the grid start at this position.
Stretch Bars (red)	This tool is shown at beat positions. When it is displayed, you can drag it with the mouse to beat positions in order to set the start of the next bar. All grid positions will be stretched.
Stretch Previous - Move Next (pink)	This tool is shown at bar positions when you hold down [Alt]/[Option]. When it is displayed, you can drag it with the mouse to bar positions in order to set the start of the next bar. The tempo of the last bar will be changed, i.e. the beat/grid positions of the last bar will be stretched, while all following grid positions will be moved.
Adjust Beat Position - Single (blue)	This tool is shown at beat positions when you hold down [Ctrl]/[Command]. When it is displayed, you can drag it with the mouse to adjust single beat positions, the previous and next beat will be locked. Edited or locked beats will be displayed in red.

⚠ You can change the modifiers for this in the “Define Auto Grid” category in the Preferences dialog (Editing-Tool Modifier page).

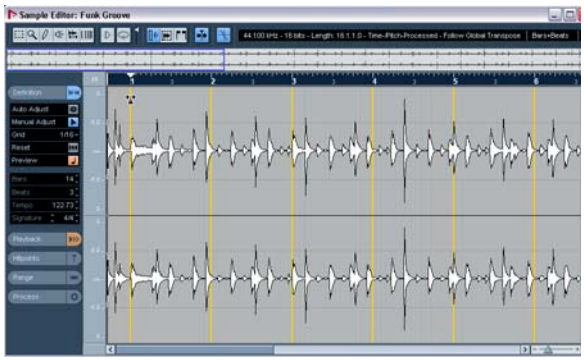
2. Audition the file to determine where the first downbeat occurs.

3. Move the mouse pointer to the beginning of the audio file until the pointer changes to a green flag (Set Grid Start).



4. Click and drag the green flag to the right until it matches the first downbeat in the sample and release the mouse button.

Now the ruler grid is offset so that it starts on the first downbeat in the sample.



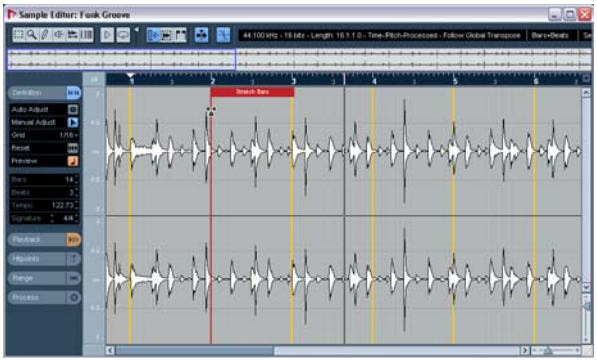
5. Make sure that the length in bars shown in the lower section of the Definition tab corresponds to your settings.

6. Audition the file to determine where the next downbeat occurs, i.e. the first beat of the second bar in the sample.

7. Place the mouse pointer at the start of the second bar in the waveform display.

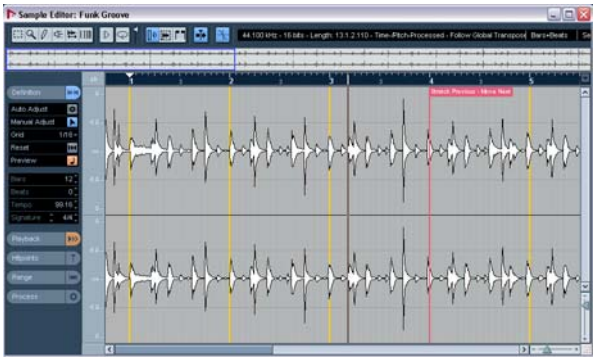
8. Click and drag the red flag (Stretch Bars) to the left or right until the second bar in the ruler is aligned with the position of the second downbeat of the sample, and release the mouse button.

The start of the next bar is set, and all grid positions will be stretched.

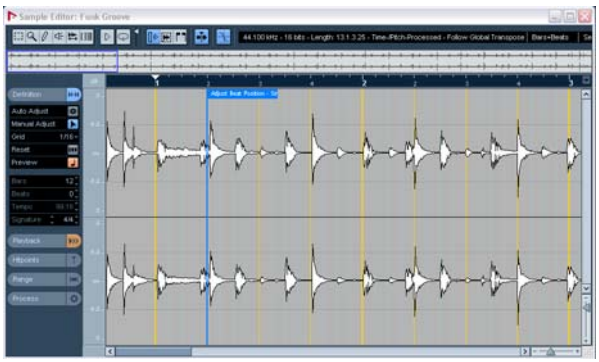


9. Check the other beats and hold down [Alt]/[Option] to use the pink flag (Stretch Previous - Move Next) if necessary.

This flag is shown at bar positions. When you drag it with the mouse, the start of the next bar is set, and the tempo of the last bar will be changed.



10. Now have a look at the single beats in between the bars, and, if necessary, hold down [Ctrl]/[Command] to use the blue flag (Adjust Beat Position - Single) to adjust them.
Drag the flag until the single beat position is aligned with the waveform, and release the mouse button.



11. Activate playback.
If you find that the beat sounds too straight, you can either adjust the Quantize value on the Playback tab or move the Swing slider to add swing.

The loop will automatically adjust to the project tempo, and follow any further tempo changes you make! In the Project window, the audio event will have a note symbol and two arrows in the upper right corner. The note symbol indicates Straighten Up mode and the arrow indicates that the file is stretched.

Determining the tempo of an audio loop and slicing your audio

1. Import a suitable audio file, for example a drum loop.

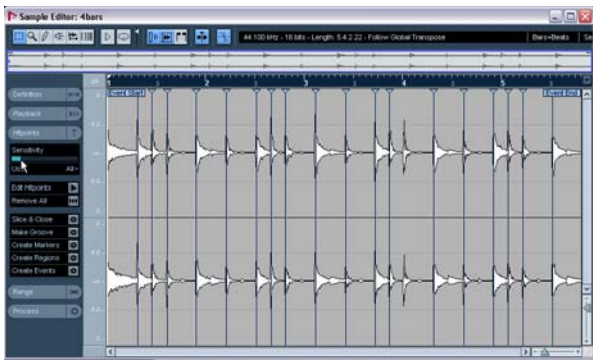
2. Double-click the loop to open it in the Sample Editor.
If your want to work with longer audio file, possibly with an upbeat, define a loop or resize the event as described in the section “Determining the audio tempo automatically and time-stretching your audio” on page 272.

3. Open the Definition tab and make sure the length in bars corresponds to the actual audio file.
If necessary, listen to your audio and enter the correct bar length.

4. On the Hitpoints tab, open the “Use” pop-up and select the desired option.
This affects which hitpoints should be shown when moving the Sensitivity slider (see “Setting the sensitivity” on page 280).

5. Adjust the Sensitivity slider.
The hitpoints are shown.

6. If necessary, select the Edit Hitpoints tool to edit hitpoints manually.
You can add, delete and listen to hitpoints by pressing [Alt]/[Option] and clicking in the waveform. For detailed informations about hitpoints and their editing, see below.



7. Now, click the Slice & Close button in the Hitpoints tab to create audio slices from your hitpoints.
The loop will be sliced and adjusted to the project tempo. The Sample Editor will be closed.

In the following sections you will find more detailed information on editing and using hitpoints.

Working with hitpoints and slices

Hitpoint detection is a special feature of the Sample Editor. It detects attack transients in an audio file and then adds a type of marker, a “hitpoint”, at each transient. These hitpoints allow you to create “slices”, where each slice ideally represents each individual sound or “beat” in a loop (drum or other rhythmic loops work best with this feature). When you have successfully sliced the audio file, you can do a number of useful things with it:

- Change the tempo without affecting the pitch.
- Extract the timing (a groove map) from a drum loop. This can then be applied to quantize other events.
- Replace individual sounds in a drum loop.
- Edit the actual playing in the drum loop without affecting the basic feel.
- Extract sounds from loops.

⇨ The term “loop” is used throughout this chapter. Loop in this context usually means an audio file with a musical time base, i.e. the length of the loop represents a certain number of bars and/or beats at a certain tempo. Playing the loop back at the right tempo in a cycle set to the correct length will produce a continuous loop without gaps.

⚠ When a selection range is defined, hitpoints will only be detected within this range.

Using hitpoints

The basic functionality of using hitpoints to slice up a loop is to make a loop fit the tempo of a song, or alternatively to create a situation that allows the song tempo to be changed while retaining the timing of a rhythmic audio loop, just like when using MIDI files.

Which audio files can be used?

Here are some guidelines as to what type of audio files are suited for slicing using hitpoints:

- Each individual sound in the loop should have some noticeable attack.

Slow attacks, legato playing etc. may not produce the desired result.

- Poorly recorded audio might be difficult to slice correctly.

In these cases, try to normalize the files or to remove DC Offset.

- There may be problems with sounds drowned in smearing effects, like short delays.

Calculating hitpoints and slicing a loop

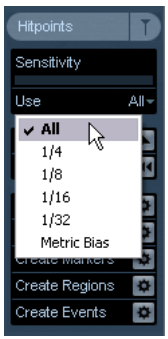
Before proceeding, find a suitable loop using the criteria above. Proceed as follows:

1. Open the event or clip for editing in the Sample Editor.

You can do this by double-clicking an event on an audio track in the Project window or a clip in the Pool. In this example, we assume you work with an event on a track.

2. Open the Hitpoints tab in the Sample Editor Inspector and select an option from the Use pop-up.

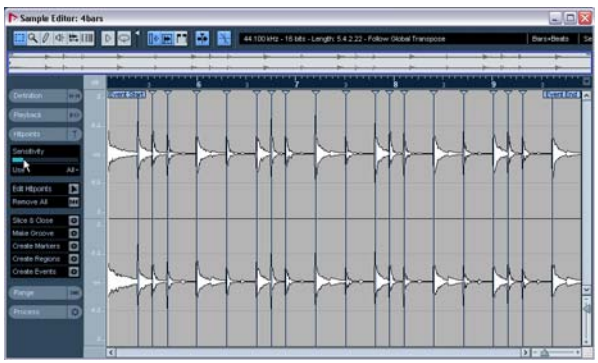
These settings don’t affect the actual detection but rather which hitpoints will be shown afterwards. If you e.g. know that your loop is based on 1/16th notes, select “1/16”. If you’re uncertain, set this to “All” – you can change this setting afterwards if needed (see “Setting the sensitivity” on page 280).



The Use pop-up menu

3. Adjust the sensitivity slider.

Now, as you can see, hitpoints have been set at the beginning of each sound in the loop.



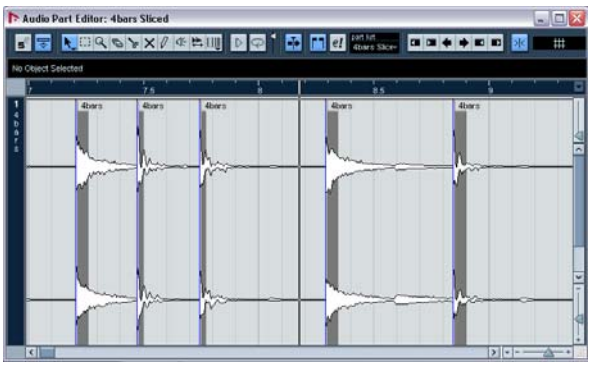
4. If you now move the hitpoint sensitivity slider to the left, this gradually hides the hitpoints. Moving the slider to the right increases the sensitivity to reveal additional hitpoints detected during the calculate process.
The basic aim is to add, remove or edit the hitpoints in various other ways so that one individual sound is played between each hitpoint. For details, see "Editing hitpoints" on page 279.

5. Verify the tempo and bars in the Definition tab.

In the next step, the loop will adapt to the project tempo set in Nuendo.

6. In the Hitpoints tab, click on the Slice & Close button to create audio slices from hitpoints. (You can also use the option "Create Audio Slices from Hitpoints" from the Audio menu.)
The following happens:

- The Sample Editor closes.
- The audio event is "sliced" so that there is a separate event for each hitpoint.
- The audio event is replaced by an audio part, containing the slices (double-click the part to view the slices in the Audio Part Editor).
- The loop is automatically adapted to the project tempo.



The slices in the Audio Part Editor. Here, the project tempo was higher than the loop's original tempo – the slice events overlap slightly.

- Sliced clips are represented by a different icon in the Pool.

Dragging the sliced clip from the Pool to an audio track will create an audio part with the slices adapted to the project tempo, just as above.

7. If you activate cycle playback on the Transport panel, the loop should now play back seamlessly at the tempo set in the program!

8. To make the loop follow any further tempo changes, make sure the track is set to "Musical time base" by using the respective button in the Track list or Inspector (the button should show a note symbol – see "Switching between musical and linear time base" on page 40).

- Note that if the project tempo is lower than the original tempo of the loop, there may be audible gaps between each slice event in the part.
This can be remedied by using the Close Gaps function on the Advanced submenu of the Audio menu, see "Close Gaps" on page 284. You should also consider activating auto fades for the respective audio track – fade-outs set to about 10 ms will help eliminate any clicks between the slices when you play back the part. See "Auto Fades and Crossfades" on page 96.

- If the project tempo is higher than the loop's original tempo, you may want to activate auto crossfades for the track.
You can use the Close Gaps functions in this case as well, see "Close Gaps" on page 284.

Editing hitpoints

In this section, we go back a bit and look at what can be done with hitpoints in the Sample Editor. There are two ways to invoke the hitpoint calculation:

- Use the sensitivity slider on the Hitpoints tab of the Sample Editor Inspector.

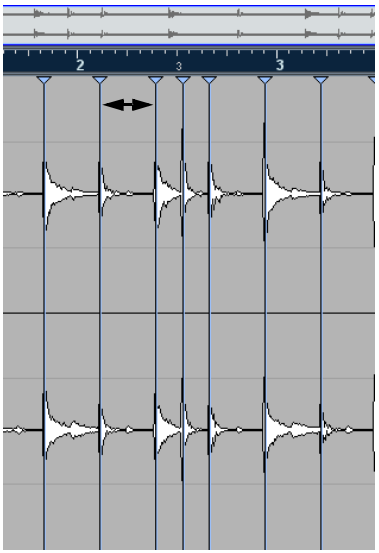
- Select Calculate Hitpoints from the Hitpoints submenu on the Audio menu.

For some loops, this may be all that is needed to set the hitpoints so that each slice to be created will contain a single "hit" or sound. However, there will almost certainly be cases when the automatic calculation may add a hitpoint where there shouldn't be one, and fail to add a hitpoint where one is needed, even if the sensitivity slider is set to maximum. If there are too many or too few hitpoints in a loop, it will most probably not play back properly.

When this occurs, you have to edit the hitpoints manually in the Sample Editor.

Auditioning slices

A slice is a section of the waveform, from one hitpoint to the next.



The first thing you should do before editing hitpoints is to listen to each slice in the Sample Editor to determine what they contain. The aim is to avoid “double hits”, like a snare hit being followed by a hi-hat hit within the same slice. You also want to determine whether any hitpoints have been added that should be removed:

1. Open a loop in the Sample Editor.

If you have already created slices, you can open them in the Sample Editor by double-clicking any event in the Audio Part Editor. If it is a new loop, follow the instructions below.

2. Open the Hitpoints tab and select the Edit Hitpoints tool.

When you point in the waveform display, the pointer changes to a speaker icon.

Click on this button to edit hitpoints

3. Now you can simply point and click in any slice area and the corresponding slice will be played back from the beginning to the end.

Listen for “double hits” and slices that contain parts of a single sound.

If you find hitpoints that need to be removed or instances where a hitpoint needs to be added, the first thing to try is to change the sensitivity setting – see the following section.

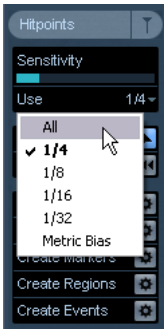
Setting the sensitivity

The loop is first analyzed to determine where hitpoints should appear (where the individual “beats” in the loop are), then you manually set the sensitivity with the sensitivity slider to determine how many hitpoints there should be.

- Try raising the sensitivity to add “missing” hitpoints and lowering it to remove unwanted hitpoints.

This may or may not work, depending on the situation, but as a general rule you should try this first.

- Audition the slices again to determine if changing the sensitivity has improved matters.



The “Use” pop-up menu in Hitpoints tab of the Sample Editor Inspector affects which hitpoints are shown and is a useful tool for removing unwanted hitpoints. The options on the pop-up menu are:

Option	Description
All	All hitpoints are shown (taking the sensitivity slider into account).
1/4, 1/8, 1/16, 1/32	Only hitpoints that are close to the selected note value positions within the loop will be shown (e.g. close to exact sixteenth note positions, if the 1/16 option is selected). Again, the sensitivity slider is taken into account.
Metric Bias	This is like the “All” mode, but all hitpoints that are close to even meter divisions (1/4 notes, 1/8 notes, 1/16 notes, etc.) get a “sensitivity boost” – they are visible at lower sensitivity slider settings. This is useful if you are working with dense or cluttered material with a lot of hitpoints, but you know that the material is based on a strict meter. By selecting Metric Bias it will be easier to find the hitpoints close to the meter position (although most other hitpoints are also available, at higher sensitivity settings).

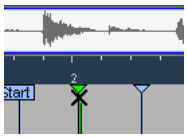
If your main reason for slicing the loop is to change the tempo, you generally need as many slices as you can get, but never more than one per individual “hit” in the loop.

If you want to create a groove (see “Creating groove quantize maps” on page 283), you should try to get approximately one slice per eighth note, sixteenth note or whatever the loop requires.

Disabling slices

You might run into situations where there are too many slices – a single sound may have been split into two slices, for example. You could of course reduce the sensitivity to get rid of the hitpoints you don’t want, but then other hitpoints could disappear too, which may be undesirable. What you need to do in a situation like this is to disable an individual slice:

1. Open the Hitpoints tab in the Sample Editor Inspector and select the Edit Hitpoints tool.
2. Press [Alt]/[Option] and move the pointer to the handle (the triangle).
The pointer turns into a cross.



3. Click on the handle of the hitpoint you wish to disable.
The hitpoint handle is diminished and its line disappears to indicate that it is disabled.
4. Now, the hitpoint won’t be taken into account when you create slices.
5. To reactivate a disabled hitpoint, [Alt]/[Option]-click on the hitpoint handle in Edit Hitpoints tool.

Locking slices

If you lock a hitpoint by clicking on its handle with the Edit Hitpoints tool, it will stay even if you drag the sensitivity slider all the way to zero. This can be used in situations where one or several slices contain double hits, but raising the sensitivity adds a lot of unwanted slices.

1. Find the place where you hear double hits when auditioning.
2. Remember the current slider setting.
3. Raise the sensitivity slider to a higher value so that a hitpoint appears, separating the two sounds.
Most likely this will add a lot of other unwanted hitpoints as well.
4. Audition to make sure you got what you wanted.
5. Point at the handle with the Edit Hitpoints tool.
The speaker icon changes to a normal arrow pointer.

6. Click on the handle to lock the new slice.
Locked hitpoints are displayed in a darker color.

7. Drag the sensitivity slider to the original setting.
The locked hitpoint will remain shown.

- You can unlock a locked hitpoint by clicking it again with the Edit Hitpoints tool.

Setting hitpoints manually

If you cannot get the desired result by adjusting sensitivity, disabling or locking, you can add, move and delete hitpoints manually.

⚠ "Use Snap" may alter the timing. In some cases it might be better to deactivate it, especially if you just want to generate a groove quantize. However, if you create slices afterwards, auto fades will then be necessary.

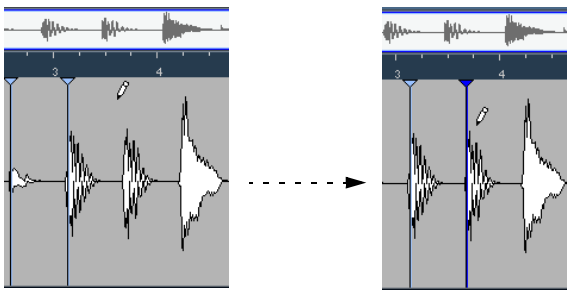
Manually adding hitpoints can be done in situations where a hitpoint is missing at a specific point, but doesn't appear even if the sensitivity is set to full.

1. Zoom in on the waveform at the point where you wish to add a hitpoint.

2. Select the Edit Hitpoints tool to audition the area and make sure that the start of the sound is in view.

3. Activate Snap to Zero Crossing on the Sample Editor toolbar.
By finding zero crossings in the waveform (positions where the amplitude is close to zero), manually added slices won't introduce any clicks or pops. All hitpoints found by the Calculate function are automatically placed at zero crossings.

4. With the Edit Hitpoints tool selected press [Alt]/[Option] so that the mouse pointer changes to a pencil tool and click just before the start of the sound.
A new hitpoint appears. Manually added hitpoints are locked by default.



- If you click and keep the mouse button pressed, you can adjust the position of the new hitpoint by dragging.
Releasing the mouse button adds the hitpoint.

5. Audition the new slice with the Audition tool to make sure you got what you wanted.

If you manually added a hitpoint, and it was either placed too far away from the start of the sound or too far into the sound, you can manually move the hitpoint. It is also possible to move calculated hitpoints this way.

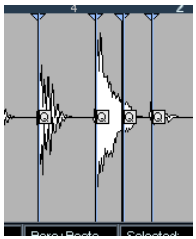
1. Make sure Snap to Zero Crossing is activated on the Sample Editor toolbar.

2. Select the Edit Hitpoints tool.

3. Click on the hitpoint handle and drag it to the new position.

To delete a hitpoint, select the Edit Hitpoints tool and drag the hitpoint out of the Sample Editor window. Hitpoints that you have created manually can also be deleted by clicking their handle.

Match-Quantizing audio



⚠ Sounds with a slow attack have their rhythmic center at some point before the peak.

Optionally, hitpoints can have individual Q-points. These are mainly used for audio quantizing. Their function is to define the point to which the quantizing will apply. Sometimes a slice might have a slow attack, and a peak further into the slice which you wish to use as the Q-point. When you apply quantize, the Q-point will define where the warp tab will be added. This also defines the point which will be stretched to a grid position when quantizing.

- To activate Q-points, open the Preferences (Editing–Audio page) and activate the option “Hitpoints have Q-Points”.
  Next time you use the Calculate Hitpoints function, the hitpoints will have Q-points.

- To offset the position of a Q-point in relation to the hitpoint, simply click on the “Q” icon and drag it to the right to the desired position.

Creating slices

⚠ Only when the audio tempo has been defined and the audio grid matches the project tempo, your slices will be straight (quantized).

When you have specified the correct loop length and time signature and worked on the hitpoints in the Sample Editor so that one sound per slice is heard, it is time to actually slice the file (if that is what you want to do – there are other uses for hitpoints as well, as described on the following pages). This is done either by clicking on the Slice & Close button in the Hitpoints tab of the Sample Editor Inspector or by selecting “Create Audio Slices from Hitpoints” from the Hitpoints submenu on the Audio menu.

The following happens:

- If you edited an event on an audio track, the Sample Editor closes.

- The audio event is “sliced” so that there is a separate event for each hitpoint.
  In other words, the sections between the hitpoints become separate events, all referring to the same original file.

- On the audio track, the former audio event is replaced by an audio part that contains the slices.
  If you edited a clip from the Pool, you need to drag it to an audio track to get a part with the slices.

⚠ When you create slices, all events containing the edited clip will also be replaced.

See also the section “Calculating hitpoints and slicing a loop” on page 278.

- The loop is automatically adapted to the tempo set in Nuendo.
  This takes the loop length you specified into account: e.g., if the loop was one bar long, the part is resized to fit exactly one bar in the Nuendo tempo, and the slices are moved accordingly, keeping their relative positions within the part.

You can change the tempo and have the loop automatically follow (provided that the track is set to musical time base, see “Switching between musical and linear time base” on page 40). Furthermore, you can double-click the part to edit the slices in the Audio Part Editor to:

- Remove or mute slices.
- Change the loop by reordering, replacing or quantizing slices.
- Apply processing or effects to individual slices.
- Create new files from individual slices using the “Bounce Selection” function on the Audio menu.
- Realtime transpose and stretch slices.
- Edit slice envelopes.

Creating groove quantize maps

You can generate groove quantize maps based on the hitpoints you have created in the Sample Editor. Groove quantizing is not meant for correcting errors, but for creating rhythmic feels. This is done by comparing your recorded music with a “groove” (a timing grid generated from the file) and moving the appropriate notes so that their timing matches the one of the groove. In other words, you can extract the timing from an audio loop and use it for quantizing MIDI parts (or other audio loops, after slicing them).

Proceed as follows:

1. Check the audio tempo and define the audio grid as described above.

2. Create and edit hitpoints as described above.
   You don’t have to create slices – just set up the hitpoints.

   - You should try to get approximately one slice per eighth note, sixteenth note or whatever the loop requires when setting hitpoints for extracting a groove.
     It can be helpful to use one of the note value-based options on the “Use” pop-up menu when you’re setting up the hitpoints (see “Setting the sensitivity” on page 280).

3. When you have finished setting the hitpoints, click on the Make Groove button in the Hitpoints tab of the Sample Editor Inspector or select “Create Groove Quantize from Hitpoints” from the Hitpoints submenu on the Audio menu.
   The groove is extracted.

4. If you now pull down the Quantize Type pop-up menu in the Project window you will find an additional item at the bottom of the list, with the same name as the file from which you extracted the groove.
This groove can now be selected as a base for quantizing, just like any other quantize value. See "The Quantizing functions" on page 352.

5. If you want to save this Groove, open the Quantize Setup dialog and store it as a preset.

⇨ You can also create grooves from a MIDI part by selecting the part and dragging it on the grid display in the middle of the Quantize Setup dialog or by selecting "Part to Groove" from the Advanced Quantize submenu on the MIDI menu.

Other hitpoint functions

On the Hitpoints tab of the Sample Editor Inspector and on the various submenus of the Audio menu, you will also find the following functions:

Create Markers

If an audio event contains calculated hitpoints, you can click on the Create Markers button in the Hitpoints tab to add markers – one for each hitpoint (see "Using the Marker track" on page 111). This can be useful to snap to hitpoints, e.g. for locating hitpoints and for using the Timewarp tool (see "The Time Warp tool" on page 422).

Create Regions

If your audio event contains calculated hitpoints, you can click the Create Regions button in the Hitpoints tab to automatically create regions from hitpoints. This can be useful to isolate recorded sounds, in order to upload them, e.g. to HALion either as velocity or keyzones.

When you make a selection, regions will only be calculated from the hitpoints that are contained in the selection.

Create Events

When you simply wish to create separate events according to the hitpoints for a file, you can click on the Create Events button in the Hitpoints tab. This means that you do not have to make the same considerations as when slicing for tempo changes. You can use any method you like to set hitpoints.

- The slices created will appear in the Project window as separate events.

Close Gaps

This Advanced submenu function on the Audio menu is useful, if you have sliced a loop for tempo changes. Lowering the tempo below the loop's original tempo will create gaps between the slices. The lower the tempo is in relation to the original tempo, the wider the gaps will be. Close Gaps can be used to remedy this.

1. Set the desired tempo.

2. Select the part in the Project window.

3. Select "Close Gaps" from the Audio menu – Advanced submenu.
Now time-stretch is applied on each slice to close the gaps. Depending on the length of the part and the algorithm set in the Preferences, this can take a little while.

4. The waveform is redrawn and the gaps are closed!

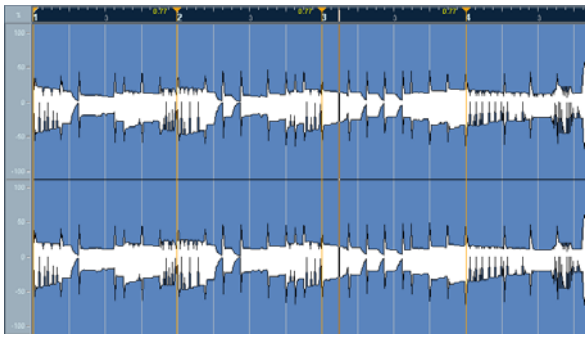
- Note that this feature creates new clips in the Pool, one for each slice.

- Close Gaps can also be used when the project tempo is higher than the original loop tempo.
This will use the time-stretch function to compress the slices to fit.

- If you decide to change the tempo again after using the Close Gaps function, you should undo the Close Gaps operation or start over again, using the original unstretched file.

- You can also use this function on individual events (in the Audio Part Editor or Project window).
The events don't have to be slices – you can use Close Gaps simply to stretch an audio event to the start position of the next event.

Free Warp



Warp tabs are a kind of marker or anchor that can be attached to musically relevant time positions in an audio event, e.g. the first beat of every bar. Warp tabs can be dragged to the corresponding time positions in the project, and the audio will be stretched accordingly.

A typical application of warp tabs is to use them to synchronize audio to video, i.e. manipulate audio that is not musical.

You can also use warp tabs for further tweaking after having applied Straighten Up (see "About the Straighten Up mode" on page 275).

⚠ When you change the Straighten Up mode, select another Quantize value or move the Swing slider, all your warp edits will be lost.

Using the Free warp tool

Warp tabs are created using the Free Warp tool on the Playback tab of the Sample Editor, but can also be created from hitpoints (see "Creating warp tabs from hitpoints" on page 287). In this example, we will show how a file with a slightly varying tempo can be locked to a steady tempo by using warp tabs.

1. Open the audio file you wish to process in the Sample Editor.

2. Activate the "Use snap" button in the Sample Editor toolbar.

When you activate this button, warp tabs will snap to zero crossings and hitpoints (if shown).

3. Determine the original tempo (if this is non-varying) or the length of the file (see "Determining the audio tempo automatically and time-stretching your audio" on page 272).

4. Click the Auto Adjust button so that the audio event is stretched to the project tempo.

The Straighten Up mode is automatically activated.

5. Select the Free Warp tool by clicking on it.

For aligning the tempo, you should use Bars and Beats as the ruler resolution. When you place the mouse pointer in the waveform display, it changes to a clock with arrows on either side, and a vertical line in the middle which represents the pointer. When you move the pointer in the waveform window, it shows the position in bars, beats and ticks as well as in seconds.

6. Line up the audio file so that the first beat of the first bar (in the audio event) starts on the first beat of a bar in the project.

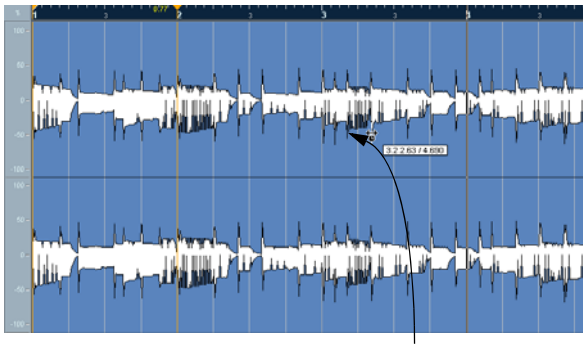
- If the audio file doesn't start on a downbeat, you can use the Event Start handle in the Sample Editor and adjust the position in the Project window so that the first downbeat in the sample is aligned with the first beat of a bar in the grid.

Now the musical first downbeat should be aligned with the first beat of a bar in the project. The next step is to see where the first warp tab needs to be added. It may be useful to hear the metronome click to determine when the tempo of the audio clip drifts from the project tempo. To hear the metronome, activate the Click button on the Transport panel and play back using the transport controls.

7. Play back the audio file, either by auditioning in the Sample Editor or from the Transport panel, and determine where the first beat of a bar in the audio event does not match the corresponding ruler position in the project.

If you find it difficult to pinpoint an exact position in the audio event, you can switch to the Scrub tool and/or zoom in the view. Switch back to the Free Warp tool when you have found the position.

8. In our example, the first beat of the third bar in the audio event is slightly offset from the corresponding grid position and thus needs to be moved back a bit.

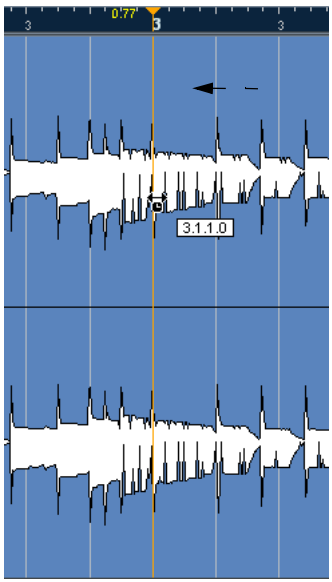


The third downbeat in the audio event.

9. Place the pointer at the position of the first beat of the third bar in the audio event and click and hold.

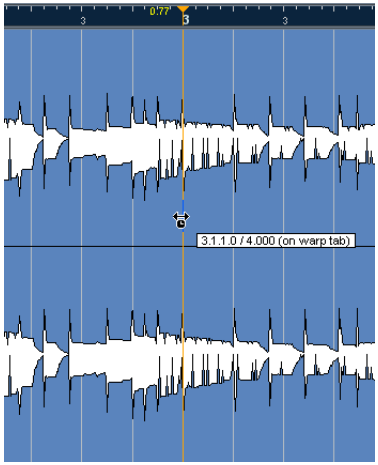
When you click, a warp tab is added. If the position where you clicked was off, you can adjust it by dragging the tab in the ruler.

10. With the mouse button still pressed, drag the warp tab so that the position lines up with the first beat of the bar in the ruler.



11. Release the mouse button.

Now the first beat in the audio event is perfectly aligned with the corresponding position in the project!



- You can also first add warp tabs at the relevant musical positions and change their positions later, see "Editing warp tabs" on page 287.

Next to the warp tab handle in the ruler, a number is shown. This number indicates the warp factor, i.e. the amount of stretch. Warp factor numbers higher than 1.0 indicate that the audio region preceding the warp tab is expanded and will play back slower. Warp factor numbers lower than 1.0 indicate that the audio region preceding the warp tab is compressed and will play back faster.

⇨ Note that this ratio is limited to a range between 0.1 and 10. This factor is updated when you change the project tempo with Straighten Up mode enabled or apply the timestretch tool in the project.

12. Continue to use the same method to align the first beat in each bar to the corresponding ruler position.

You only have to add warp tabs where the downbeat in the audio file drifts from the ruler position and/or if you want to lock a warp tab so that it is not moved when editing other points.

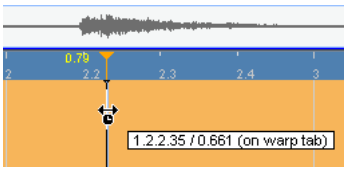
When you are done, the previously varying tempo of the audio event will be metronome-steady and will adapt to any tempo in Nuendo.

This example illustrates the general methods of using warp tabs and the Free Warp tool. But you can of course use warp tabs for other operations than aligning downbeats to grid positions. With the Free Warp tool, you can literally stretch any region within a sample to any position!

Editing warp tabs

Moving the destination position of existing warp tabs

To move a destination position of a warp tab (and thus stretch the audio), select the Free Warp tool and position the pointer on the Warp line in the waveform so that the line in the middle of the pointer becomes blue. Then click and drag to move the position of the warp tab.

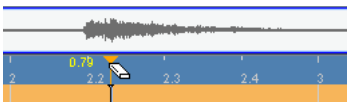


Moving the source position of existing warp tabs

If you simply wish to change the position of a warp tab regarding the audio, click and drag the warp tab header in the ruler. However, this will change the warping.

Deleting warp tabs

To delete a warp tab, press [Shift] so that the pointer becomes an eraser and click on the warp tab.



Unstretching audio files

By selecting “Unstretch Audio” from the Realtime Processing submenu of the Audio menu, all realtime time-stretching (by sizing or by warp tabs) can be removed.

⇨ Note that realtime transpose (in the infoline) and Straighten Up mode will not be removed by this.

Whether the “Unstretch Audio” menu item is available depends on whether the time-stretching was applied on the event or clip level:

- If you sized an audio event in the Project window using “Sizing Applies Time Stretch” (see “Resizing events using time stretch” on page 49), you can undo the time-stretching by selecting the event in the Project window and then applying “Unstretch Audio”.
  This will remove all time-stretching and warp tabs.
- When you have entered a tempo and/or length using the Definition tab, this information is saved for the source clip and all events that use it.

Creating warp tabs from hitpoints

You can also create warp tabs from hitpoints selecting “Create Warp Tabs from Hitpoints” on the Realtime Processing submenu of the Audio menu.

For descriptions of how hitpoints are created and edited please see “Using hitpoints” on page 278.

Realtime pitch-shifting of audio events

Audio events can be pitch-shifted in realtime just like MIDI events. The process is very simple:

1. Open the audio event in the Sample Editor and open the Playback tab.

2. Set a value in the corresponding field in the Transpose section.
The value range is up/down two octaves in semitone steps.

3. Press [Enter].
The audio event is now transposed to the set value using pitch-shift.

4. If a root key is specified or if the Transpose track has been added, you can click the Follow Global mode to activate/deactivate Global Transpose.
Event transpose will be added to the Global transpose value.

For more information on the transpose functions and the Transpose track, see the chapter "The Transpose functions" on page 114.

- You can also select the audio event in the Project window and change the Transpose value on the infoline. In this case, you can also fine-tune selected audio events in cent steps (100ths of a semitone) by entering a value in the Finetune field to the right.

⚠ Audio and MIDI events cannot be transposed simultaneously.

Flattening the realtime processing

You can "flatten" any realtime processing at any time. This can be done to serve two purposes; to conserve CPU power and to optimize the sound quality of the processing.

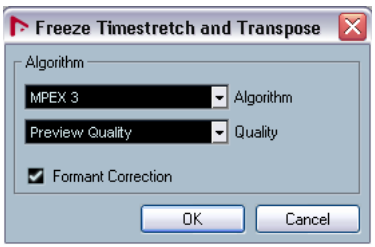
- Select the audio event(s) you wish to process and select "Flatten Timestretch and Transpose" from the Realtime Processing submenu of the Audio menu.
You should also use this function before applying any offline processing. When the flatten processing is applied, a copy of the original file is automatically created in the Pool so that the original audio clip remains intact.

Selecting an algorithm for the flattening

When you flatten the realtime processing, you can use the MPEX 3 algorithm to process the audio, which may produce better sound quality than the realtime processing. This is also the only way to achieve polyphonic formant conserving pitch-shifting, apart from offline processing. Proceed as follows:

1. Select the audio event(s) you wish to process.

2. Click the Flatten button on the Playback tab of the Sample Editor Inspector, or select "Flatten Timestretch and Transpose" from the Realtime Processing submenu of the Audio menu.
A dialog appears where you can select an algorithm for the processing. You can either select the MPEX 3 algorithm, which will produce the highest sound quality, or the Realtime algorithm which is much quicker but will not improve the audio quality of the processing (although it will lessen the CPU load).



The MPEX3 algorithm allows you to select one of seven different quality settings:

Option	Description
Preview	This mode should only be used for preview.
Mix Fast	This mode is a very fast mode for preview. This works best with composite music signals (mono or stereo material).
Solo Fast	Use this mode or single instruments (monophonic material) and voice.
Solo Musical	Same as above but higher quality.
Poly Fast	Use this for processing monophonic and polyphonic material. This is the fastest setting that gives still very good results. You can use this for drum loops, mixes, chords.
Poly Musical	Use this for processing monophonic and polyphonic material. This is the recommended MPEX default quality setting. You can use this for drum loops, mixes, chords.
Poly Complex	This high quality setting is quite processor intense and should be used only when processing difficult material or for stretch factors above 1,3.

⇨ Note that you can only select the MPEX 3 algorithm if the time-stretching factor is between 0.5 and 2 throughout the whole event. For audio that has been stretched with a factor outside this range, only the Realtime algorithm can be used.

- If the audio has been transposed, the dialog also contains the option “Formant Correction”. Activate this if you want to e.g. avoid a “chipmunk voice” effect.

3. Select an algorithm and click OK.

When the processing is finished, any loop that was previously stretched in realtime or had been pitch-shifted will play back exactly the same, but Straighten Up mode will be deactivated and the realtime pitch-shifting will be set to 0.

The audio clip is now like any standard audio clip before applying realtime processing, i.e. it will not follow tempo changes. The flattening processing function is best used when you have determined the tempo or key of a project, but you can of course always adapt the audio to a new key or tempo. In this case, it is better to revert back to the original audio clip rather than to process the already processed file again.

19

The Audio Part Editor

Background

The Audio Part Editor allows you to view and edit the events inside audio parts. Essentially, this is the same type of editing that you do in the Project window, which means that this chapter contains a lot of references to the chapter "The Project window" on page 22.

Audio parts are created in the Project window in one of the following ways:

- By selecting one or several audio events on the same track, and selecting "Events to Part" from the Audio menu.
- By gluing together two or more audio events on the same track with the Glue Tube tool.
- By drawing an empty part with the Pencil tool.
- By double-clicking between the left and right locator on an audio track.

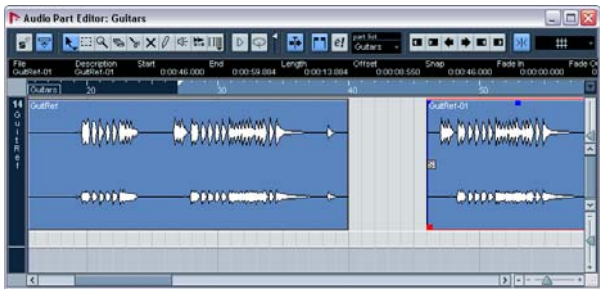
With the last two methods, an empty part is created. You can then add events to the part by pasting, or by using drag and drop from the Pool.

Opening the Audio Part Editor

You open the Audio Part Editor by selecting one or more audio part(s) in the Project window and double-clicking on any one of them (or using the Edit-Open key command, by default [Ctrl]/[Command]-[E]). The Audio Part Editor can display several parts at once, and you can also have more than one Audio Part Editor open at the same time.

⇨ Double-clicking on an audio event in the Project window will open the Sample Editor (see "Opening the Sample Editor" on page 259).

Window overview



The toolbar

The tools, settings and icons on the toolbar have the same functionality as in the Project window, with the following differences:

- A Solo button (see "Auditioning" on page 293).
- Separate tools for auditioning (Speaker) and scrubbing (see "Scrubbing" on page 293).
- No Line, Glue Tube or Color tools.
- Play and Loop icons and an Audition Volume control (see "Auditioning" on page 293).
- Independent Track Loop settings (see "The independent track loop function" on page 293).
- Part List controls for handling several parts: activating parts for editing, restricting editing to active parts only and showing part borders (see "Handling several parts" on page 294).

⇨ You can customize the toolbar by hiding or reordering its items.

See "The Setup dialogs" on page 506.

The ruler and info line

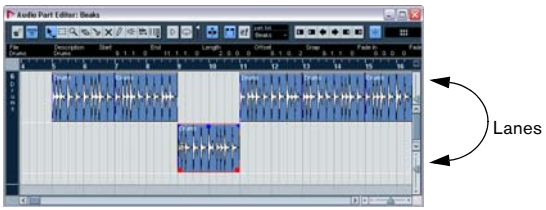
These have the same functionality and appearance as their counterparts in the Project window.

- Note that you can select a separate display format for the Audio Part Editor ruler by clicking on the arrow button on the right and selecting an option from the pop-up menu that appears.

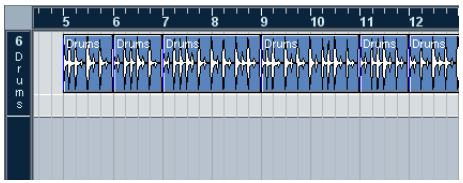
For a list of the available formats, see "The ruler" on page 31.

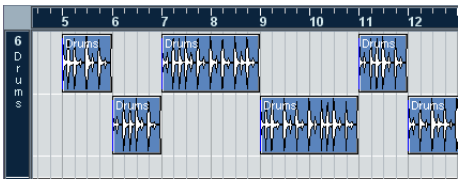
About lanes

If you make the editor window larger, this will reveal additional space below the edited events. This is because an audio part is divided vertically in lanes.



Lanes can make it easier to work with several audio events in a part:





In the top figure it is unnecessarily hard to discern, select and edit the separate events. In the bottom figure, some of the events have been moved to a lower lane, making selection and editing much easier.

- To move an event to another lane without accidentally moving it horizontally, press [Ctrl]/[Command] and drag it up or down.

This is the default modifier key for this – you can adjust this in the Preferences if you like.

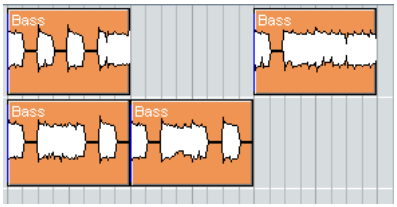
Overlapping events

Only one event per track can be played back at the same time! This means that if you have overlapping events (on the same lane or different lanes) these will cut each other off, according to the following rules:

- For events on the same lane, the ones that are on top (visible) will be played.

To move overlapping events to the front or back, use the Move to Front and Move to Back functions on the Edit menu.

- For events on different lanes, the event on the lowest lane gets playback priority.



The overlapping sections of the upper event will not be played since the event on the lower lane has playback priority!

Imagine the following situation: You have two overlapping audio events, with the top event audible during playback. What happens when you mute the audible event?

- By default, you will not hear the overlapped event when muting an event that has playback priority over another event.

This default behavior ensures that you don't suddenly hear audio events that previously were not part of your mix.

- In the Preferences dialog (Editing–Audio page) you will find the option "Treat Muted Audio Events like Deleted". When you activate this option, any events overlapped by a muted event will become audible.

Operations

⚠ Zooming, selecting and editing in the Audio Part Editor are done just as in the Project window (see "Operations" on page 33).

- Note that if a part is a shared copy (i.e. you have previously copied the part by [Alt]/[Option]+[Shift]-dragging), any editing you perform will affect all shared copies of this part.

To indicate that it is a shared copy, its name is displayed in italics and a symbol is displayed in the lower right corner of the part in the Project window (see "Aligning events" on page 45).

Auditioning

There are three ways to listen to the events in the Audio Part Editor:

By using the Speaker tool

If you click somewhere in the editor's event display with the Speaker tool and keep the mouse button pressed, the part will be played back from the position where you clicked. Playback will continue until you release the mouse button.

By using the Audition icon

The Audition and Audition Loop icons.

Clicking the Audition icon on the toolbar plays back the edited audio, according to the following rules:

- If you have selected events in the part, only the section between the first and last selected event will be played back.
- If you have made a range selection, only this section will be played back.
- If there is no selection, the whole part will be played back. If the project cursor is within the part, playback starts from the current cursor position. If the cursor is outside the part, playback starts from the beginning of the part.
- If the Audition Loop icon is activated, playback will continue until you deactivate the Audition icon. Otherwise, the section will be played back once.

- When auditioning with the Speaker tool or Audition icon, audio will be routed directly to the Control Room or to the Main Mix (the default output bus), if the Control Room is disabled.

By using regular playback

You can of course use the regular playback controls while in the Audio Part Editor. Furthermore, if you activate the Solo Editor button on the toolbar, only the events in the edited part will be played back.

The independent track loop function

The independent track loop is a sort of "mini-cycle", affecting only the edited part. When the loop is activated, the events in the parts that are within the loop will be repeated continuously and completely independent – other events (on other tracks) are played back as usual. The only "interaction" between the loop and the "regular playback" is that every time the cycle starts over again, so does the loop.

To set up the independent track loop, proceed as follows:

1. Turn on the loop by clicking the Independent Track Loop button on the toolbar.

If it isn't visible, right-click the toolbar and add the Independent Track Loop Settings section – see "The Setup dialogs" on page 506.

When the loop is activated, the cycle isn't shown in the editor's ruler. Now you need to specify the length of the loop:

2. [Ctrl]/[Command]-click in the ruler to set the start and [Alt]/[Option]-click to set the end of the loop.

You can also edit the loop start and end positions numerically in the fields next to the Loop button.

The loop is indicated in purple in the ruler.

⇨ The events will be looped as long as the Loop button is activated and the Audio Part Editor window is open.

Scrubbing

In the Audio Part Editor, the Scrub tool has a separate icon on the toolbar. Apart from that, scrubbing works exactly as in the Project window (see "Scrubbing" on page 42).

Handling several parts

When you open the Audio Part Editor with several parts selected – all on the same track or on different tracks – they might not all "fit" in the editor window, which can make it hard to get an overview of the different parts when editing.

Therefore, the toolbar features a few functions to make working with multiple parts easier and more comprehensive:

- The Part List menu lists all parts that were selected when you opened the editor, and lets you select which part should be active for editing.
  When you select a part from the list, it is automatically made active and centered in the display.

⇨ Note that it is also possible to activate a part by clicking on it with the Arrow tool.

- The button "Edit Active Part Only" lets you restrict editing operations to the active part only.
  If you for example select "All" from the Select submenu on the Edit menu with this option activated, all events in the active part will be selected but not the events in other parts.

"Edit Active Part Only" activated on the toolbar.

- You can zoom in on an active part so that it fills the screen by selecting "Zoom to Event" from the Zoom submenu on the Edit menu.

- The button "Show Part Borders" can be used if you want to see clearly defined borders for the active part.
  When this is activated, all parts except the active one are grayed out, making the borders easily discernible. There are also two "markers" in the ruler with the name of the active part, marking its beginning and end. These can be moved freely to change the part borders.

"Show Part Borders" activated on the toolbar.

- It is possible to cycle between parts, making them active, with key commands.
  In the Key Commands dialog – Edit category, there are two functions: "Activate Next Part" and "Activate Previous Part". If you assign key commands to these, you can use them to cycle between parts. Please refer to "Setting up key commands" on page 518 for instructions on how to set up key commands.

Common methods

Assembling a "perfect take"

When you record audio in Cycle mode, either an event or a region (or both) is created for each recorded lap (see "Recording audio in cycle mode" on page 73). These events and regions are named "Take X", where "X" is the number of the take. You can create a perfect take by putting together sections of the different takes in the Audio Part Editor.

⇨ The procedure below will not work if you recorded with "Keep Last" mode selected on the Transport panel.
In that case, only the last take will be kept on the track (although the previous takes will be available as regions in the Pool).

First, you have to create an audio part from the takes. This procedure is slightly different depending on whether you choose to create events or regions.

Creating an audio part from events

1. In the Project window, use the Object Selection tool to draw a rectangle around the recorded events.
   This is necessary, since clicking on the event may just select the event on top (the last take). If in doubt, check the info line – the info text should be yellow.

2. Pull down the Audio menu and select "Events to Part".
   The events are converted to an audio part.

- Note that the events cycle record mode also makes it easy to combine different takes in the Project window – see "Create Events mode (Preferences)" on page 74.

Creating an audio part from regions

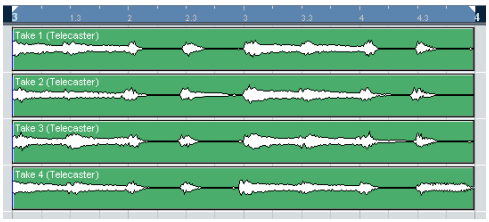
1. In the Project window, select the event you recorded in Cycle mode.
After recording, this will play the last take.

2. Pull down the Audio menu and select “Events to Part”.
You are asked whether you want to “Create part using regions”.

3. Click “Regions”.
The regions are converted to an audio part.

Assembling a take

1. Double-click the part to open the Audio Part Editor.
Now, the different takes will be placed on different lanes, with the last take at the bottom.



2. Use the tools to cut out pieces of the takes and assemble the final result.
This can include splitting with the Scissors tool, resizing events with the Arrow tool or deleting with the Eraser tool.

- Remember that the events on the lowest lane have playback priority.
Use the Audition icon to audition the result.

3. Close the Audio Part Editor.
You have now assembled a “perfect take”!

Options and Settings

The following options and settings are available in the Audio Part Editor:

- Snap

You can specify an independent Snap mode (and snap value for the Grid mode) in the editor. The functionality is exactly the same as in the Project window.

- Autoscroll

When Autoscroll is activated on the toolbar, the window will scroll during playback, keeping the project cursor visible in the editor. This setting can be activated or deactivated individually for each window.

- Snap to Zero Crossing

When this option is activated, all audio edits are done at zero crossings (positions in the audio where the amplitude is zero). This helps you avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

20

The Pool

Background

What is the Pool?

Every time you record on an audio track, a file is created on your hard disk. A reference to this file – a clip – is also added to the Pool. Two general rules apply to the Pool:

- All audio and video clips that belong to a project are listed in the Pool.
- There is a separate Pool for every project.

The way the Pool displays folders and their contents is similar to the way the Mac OS X Finder and the Windows Explorer display folders and lists of files.

What can you do in the Pool?

In the Pool you can, among other things, perform the following operations:

Operations that affect files on disk

- Import clips (audio files can automatically be copied and/or converted).
- Convert file formats.
- Rename clips (this will also rename the referred files on disk), and regions.
- Delete clips (if you select the "Move to Trash" option and empty the Trash folder – see "Deleting clips" on page 302).
- Prepare File Archives for backup.
- Minimize files.

Operations that only affect clips

- Copy clips.
- Audition clips.
- Organize clips.
- Apply audio processing to clips.
- Save or import complete Pool files.

Opening the Pool

You open the Pool in any of the following ways:

- By clicking the Pool icon in the Project window.

- By selecting "Pool" on the Project menu or "Open Pool Window" on the Media menu.
- By using a key command (by default [Ctrl]/[Command]+[P] – note that using this key command a second time will close the Pool again).

The content of the Pool is divided into three main folders:

- The Audio folder

This contains all audio clips and regions currently in the project.

- The Video folder

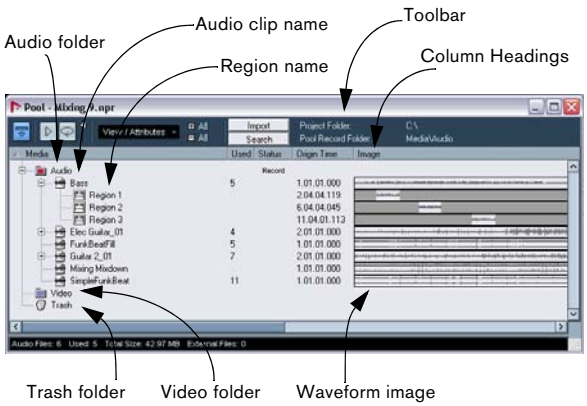
This contains all video clips currently in the project.

- The Trash folder

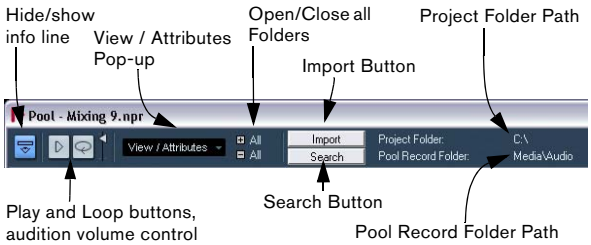
Unused clips can be moved to the Trash folder for later permanent removal from the hard disk.

These folders cannot be renamed or deleted from the Pool, but any number of subfolders can be added (see "Organizing clips and folders" on page 308).

Window overview

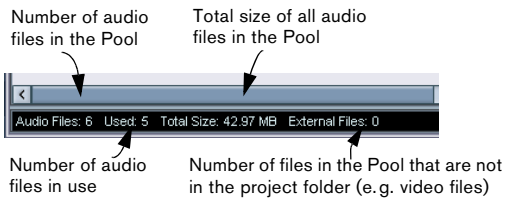


Toolbar overview



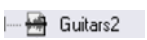
The info line

Click the “Show Info” button on the toolbar to show or hide the info line at the bottom of the Pool window. It shows the following information:



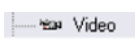
How clips and regions are displayed in the Pool

- Audio clips are represented by a waveform icon followed by the clip name.



- Audio regions are represented by a region icon followed by the region name.

- Video clips are represented by a camera icon followed by the clip name.



The Pool window columns

Various information about the clips and regions can be viewed in the Pool window columns. The columns contain the following information:

Column	Description
Media	This column contains the Audio, Video and Trash folders. If the folders are opened, the clip or region names are shown and can be edited. This column is always shown.
Used	This column displays the number of times a clip is used in the project. If a column row is empty, the corresponding clip is not used.
Status	This column displays various icons that relate to the current Pool and clip status. See “About the Status column symbols” on page 299 for a description of the icons.
Straighten up	The checkbox in this column allows you to activate or deactivate Straighten up. If the Tempo column (see below) displays “???”, you have to enter the correct tempo before you can activate Straighten up.
Tempo	This shows the tempo of audio files for which a tempo has been set. If no tempo has been specified, the column displays “???”.
Sign.	This is the time signature, e.g. “4/4”.
Key	This ist the root key, if one was specified for the file.
Info	This column shows the following information for audio clips: The sample rate, bit resolution, number of channels and the length in seconds. For regions, it displays start and end times in frames, and for video clips the frame rate, number of frames, and length in seconds.
Type	This column shows the file format of the clip.
Date	This column shows the date when the clip was created.
Origin Time	This column shows the original start position where a clip was recorded in the project. As this value can be used as a basis for the option “Insert into Project” in the Media or context menu (and other functions), you can change it if the Origin Time value is independent (i.e. not for regions). This can either be done by editing the value in the column, or by selecting the corresponding clip in the Pool, moving the project cursor to the new desired position and selecting “Update Origin” from the Audio menu.
Image	This column displays waveform images of audio clips or regions.
Path	This column shows the path to the location of a clip on the hard disk.
Reel Name	If you have imported an OMF file (see “Exporting and importing OMF files” on page 494), they may include this attribute, in which case it is shown in this column. The Reel Name describes the 'physical' reel or tape from which the media was originally captured.

About the Status column symbols

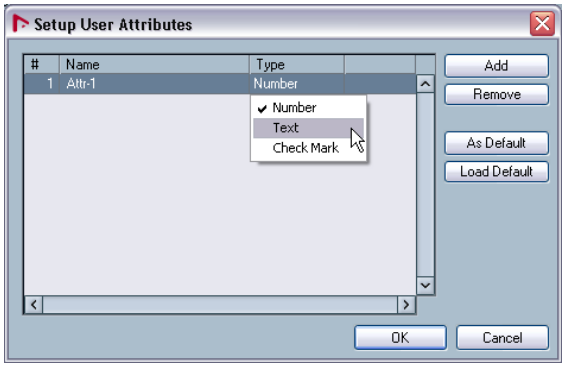
The Status column can display various symbols that relate to the clips status. The following symbols can be shown:

Symbol	Description
Record	This indicates the current Pool Record folder (see "Changing the Pool Record folder" on page 308).
	This symbol is shown if a clip has been processed.
?	The question mark indicates that a clip is referenced to the project but is missing from the Pool (see "About missing files" on page 305).
	This indicates that the clip file is external, i.e. located outside the current Audio folder for the project.
	This indicates that the clip has been recorded in the currently open version of the project. This is useful for finding recently recorded clips quickly.

User Attributes

You can define your own attributes for elements in the pool. This is handy when you have a large number of audio files in the Pool. You can use the attributes to sort items in the pool or merely keep track of some aspect of your project.

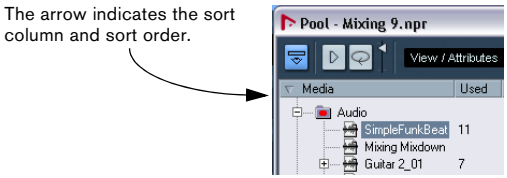
Simply select the "Define User Attributes" option from the View/Attributes pop-up and create as many new attributes as you need. These attributes will then get their own columns in the Pool. Each attribute can be defined as checkbox, text field or number. You can then specify the user attributes for each file, thus categorizing them further. All user attributes you created are automatically available as search criteria in the Pool and can be added as separate elements to the search pane (or replace the search criteria above the Location parameter, see above). This allows for a very detailed search, helping you to master even the largest sound database.



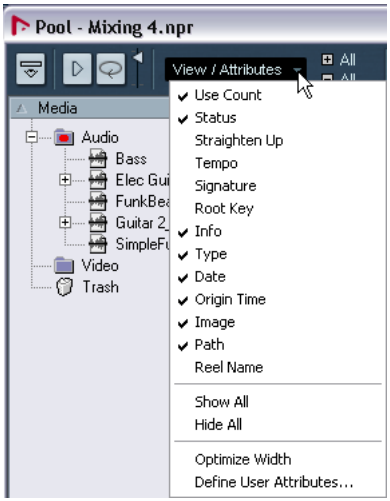
Setting up a talent name attribute to keep track of ADR takes.

Sorting the Pool contents

You can sort the clips in the Pool by name, date etc. This is done by clicking on the corresponding column heading. Clicking again on the same heading switches between ascending and descending sort order.



Customizing the view

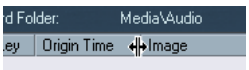


- You can specify which of the columns should be shown or hidden by selecting the View/Attributes pop-up on the toolbar and selecting/deselecting items.
- You can rearrange the order of the columns by clicking on a column heading and dragging the column to the left or right.

The mouse pointer changes to a hand when you place it on the column heading.

- The width of a column can also be adjusted by placing the pointer between two column headers and dragging left or right.

The pointer changes to a divider when you place it between two column headers.



Operations

⇨ Most of the Pool-related main menu functions are also available on the Pool context menu (opened by right-clicking in the Pool window).

Renaming clips or regions in the Pool

To rename a clip or a region in the Pool, select it and click on the existing name, type in a new name and press [Return].

⇨ In case of a clip, this will also rename the referred files on disk!

⚠ Renaming a clip in the Pool is much preferred to renaming it outside Nuendo (for example on the computer desktop). This way, Nuendo already “knows” about the change, and won’t lose track of the clip the next time you open the project. See “About missing files” on page 305 for details about lost files.

Renaming multiple clips or regions

You can also rename multiple clips or regions in the Pool using the “Rename…” command from the Edit menu.

1. Select one or more audio clips, video clips or regions in the Pool.

You can only select one type of object at a time.

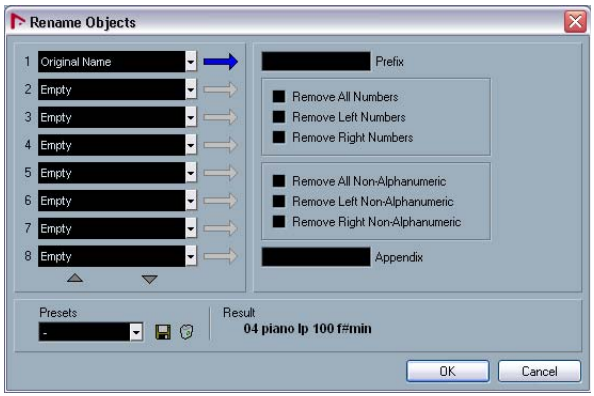
2. From the Edit menu, select “Rename…”.

A dialog with several options for renaming objects automatically will open.

3. Set the parameters for renaming objects and press [Return].

Setting parameters of the Rename Object dialog

The Rename Object dialog provides a great deal of flexibility and options when renaming multiple objects in Nuendo. In addition to simple prefix, suffix, and incremental numeric additions to names, you can remove certain characters, include timestamp information and more.



The Rename Objects dialog

Each of the eight fields found in the left section of the Rename Objects dialog can be used to add an element to the name generated for each object.

The first line will create text or numbers at the left of the new name. The eighth and last line will create text or numbers at the very right of the new name.

Each of the eight lines can add one of the following elements including a prefix and suffix for each item (You can use a prefix to create a space separating items in the generated name.):

Option	Description
Free Text	Any text you would like to include in the name.
Original Name	The original name given to the object. There are options to remove all numbers or non-alphanumerics or just the ones on the left or right sides.
Number	An increasing or decreasing number starting with a minimum amount of digits and a starting number (i.e. 001, 002 etc.).
Project Time	The current location of the clip in the project window using any of the seven ruler formats (Bars+Beats, Timecode etc.).
Date	The date that the file was created in several formats.
File Extension	The file type.
Audio Bitsize	The bit depth of the audio file.
Samplerate	The samplerate of the audio file.
Audio Tempo	The audio tempo for that clip if it has been assigned.
User Attribute	Any one of the custom attributes created in the Setup User Attributes dialog (see “User Attributes” on page 299).

An example of the result is displayed in the bottom of the window for reference. All of these parameters can be saved as a preset as well.

Copying clips in the Pool

To make a duplicate clip, proceed as follows:

1. Select the clip you wish to copy.
2. Select “New Version” on the Media menu.

A new version of the clip appears in the same Pool folder, with the same name but with a “version number” after it, to indicate that the new clip is a duplicate. The first copy made of a clip will logically get the version number “2” and so on. Regions within a clip are copied too, but keep their name.

⚠ Copying a clip does not create a new file on disk, but just a new edit version of the clip (referring to the same original file).

Inserting clips into a project

By using menus

1. Select the clip(s) you want to insert into the project.
2. Pull down the Media menu and select an “Insert into Project” option.

“At Cursor” will insert the clip(s) at the current project cursor position. “At Origin” will insert the clip(s) at their Origin Time position(s).

- Note that the clip will be positioned so that its snap point is aligned with the selected insert position.

You can also open the Sample Editor for a clip by double-clicking it, and perform the insert operation from there. This way you can set the snap point before inserting a clip.

3. The clip is inserted on the selected track or on a new audio track.

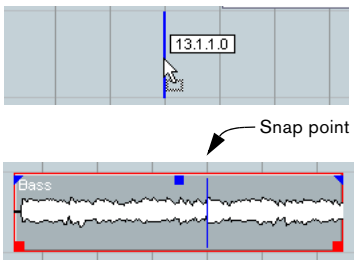
If several tracks are selected, the clip will be inserted on the first selected track.

By using drag and drop

You can use drag and drop to insert clips into the Project window. You can also use drag and drop from the Sample Editor for a clip by making a selection range and pressing [Ctrl]/[Command] while dragging. Note:

- Snap is taken into account if activated.
- While you drag the clip in the Project window, its position will be indicated by a marker line and a numerical position box.

Note that these indicate the position of the snap point in the clip. For example, if you drop the clip at the position 10.00, this will be where the snap point ends up. See "Adjusting the snap point" on page 266 for information on how to set the snap point.



- If you position the clip in an empty area in the event display (i.e. below existing tracks), a new track is created for the inserted event.

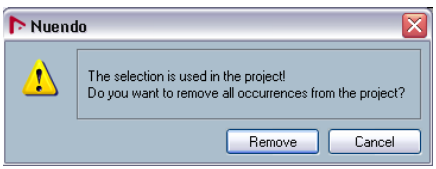
Deleting clips

Removing clips from the Pool

To remove a clip from the Pool without deleting it from the hard disk, proceed as follows:

1. Select the clip(s) and select "Delete" from the Edit menu (or press [Backspace] or [Delete]).

⇨ If you try to delete a clip that is used by one or more events, the program will ask you if you want to remove these events from the project.



If you cancel, neither the clip nor the associated events are deleted.

2. Click Remove.

A new prompt asks whether you want to move the clip to the Trash or remove it from the Pool.

3. Select "Remove from Pool".

The clip is no longer associated with the project, but still exists on the hard disk and can be used in other projects etc. This operation can be undone.

Deleting from the hard disk

To delete a file permanently from the hard disk, it must first be moved to the Trash folder:

1. Follow the instructions for deleting clips above and click the Trash button.

Alternatively, you can drag and drop clips into the Trash folder.

2. Select "Empty Trash" on the Media menu. Select one of the two options in the alert:

- Click "Erase" to delete the file on the hard disk permanently.

This operation cannot be undone!

⚠ Before you permanently delete audio files from the hard disk, make sure that they are not used by another project!

- Click "Remove from Pool" to remove the clip from the Pool but to keep the file.

⇨ To retrieve a clip or region from the Trash Folder, drag and drop it back into an Audio or Video folder.

Removing unused clips from the Pool

This function finds all clips in the Pool that are not used in the project. You can then decide whether to move them to the Pool Trash folder (where they can be permanently deleted) or to remove them from the Pool:

1. Select "Remove Unused Media" on the Media or context menu.

A message appears asking you whether you want to move the file to the trash or to remove it from the Pool.

2. Make your selection.

Removing regions

To remove a region from the Pool, select it and select "Delete" from the Edit menu (or press [Backspace] or [Delete]).

⇨ Note that for regions, there is no alert if the region is used in the project!

Locating events and clips

Locating events via clips in the Pool

If you want to find out which events in the project refer to a particular clip in the Pool, proceed as follows:

1. Select one or more clips in the Pool.

2. Select “Select in Project” on the Media menu.
All events that refer to the selected clip are now selected in the Project window.

Locating clips via events in the Project window

If you want to find the clip for an event in the Project window, proceed as follows:

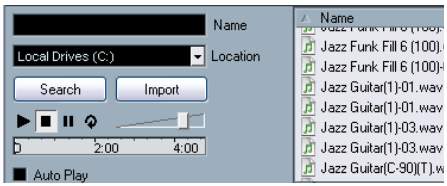
1. Select one or more events in the Project window.

2. Pull down the Audio menu and select “Find Selected in Pool”.
The corresponding clip(s) will be located and highlighted in the Pool. If the Pool window isn’t already open, it will be opened.

Searching for audio files

The Pool can help you locate audio files in your Pool, on your hard disk or other media. This works much like the regular file search, but with a couple of extra features:

1. Click the Search button in the toolbar.
A search pane appears at the bottom of the window, displaying the search functions.



The search pane in the Pool.

By default, the search parameters available in the search pane are “Name” and “Location”. For using other filter criteria, see “Extended search functionality” on page 304.

2. Specify the name of the file(s) to search for in the Name field.
You can use partial names or wildcards (*). Note that only audio files of the supported formats will be found.

3. Use the Location pop-up menu to specify where to search.
The pop-up menu will list all your local drives and removable media.

- If you want to limit the search to certain folders, choose “Select Search Path” and select the desired folder in the dialog that appears.
The search will include the selected folder and all subfolders. Note also that folders you have recently selected using the “Select Search Path” function will appear on the pop-up menu, allowing you to quickly select any of them.

4. Click the Search button.
The search is started and the Search button is labeled Stop – click this to cancel the search if needed.

When the search is finished, the found files are listed to the right.

- To audition a file, select it in the list and use the playback controls to the left (Play, Stop, Pause and Loop).
If Auto Play is activated, selected files will automatically be played back.

- To import a file into the Pool, double-click on it in the list or select it and click the Import button.

5. To close the search pane, click the Search button in the toolbar again.

The Find Media window

Alternatively to the search pane in the Pool, you can open a stand-alone Find Media window by selecting the “Search Media…” option from the Media or context menu (also available from the Project window). This offers the same functionality as the search pane.

- To insert a found clip or region directly into the project from the Find Media window, select it in the list in the dialog and select one of the “Insert into Project” options from the Media menu.
The options are described in the section “Inserting clips into a project” on page 301.

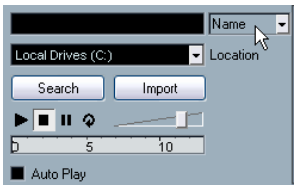
Extended search functionality

Apart from the search criterion Name, additional search filters and user attributes are available. To use them, proceed as follows:

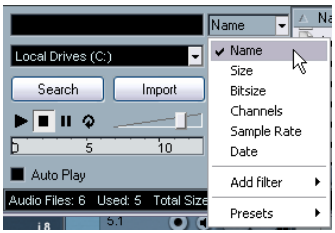
1. Set up a couple of user attributes using the “View/Attributes” pop-up menu.

2. Click the Search button on the toolbar.
The Search pane is displayed in the lower part of the Pool window.

3. Move the mouse pointer over the “Name” text to the right of the name field, until an arrow is displayed, and click it.



Move the mouse pointer over the “Name” text to the right of the name field and click…



… to show the Extended Search pop-up menu.

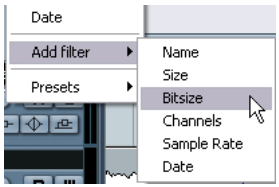
4. The Extended Search pop-up menu opens.
This contains six options determining which search criteria will be displayed above the Location field (Name, Size, Bitsize, Channels, Sample Rate or Date). It also contains all the user attributes you specified and the Add Filter and Presets submenus.

The search criteria have the following parameters:

- Name: partial names or wildcards (*)
- Size: Less than, more than, equal, between (two values), in seconds, minutes, hours and bytes
- Bitsize (resolution): 8, 16, 32, 64
- Channels: mono, stereo and from 3 to 16
- Sample Rate: various values, choose “Other” for free setting
- Date: various search ranges

5. Select one of the topmost 6 options in the pop-up menu to change the search option above the Location pop-up menu.
This way, you can choose e.g. to display the Size or Sample Rate parameter instead of the Name field.

6. If you want to display more search options, select the desired element from the Add filter submenu.
This allows you e.g. to add the Size or the Sample Rate parameters to the already displayed Name and Location parameters.



This allows for a very detailed search, helping you to master even the largest sound database.

- You can store presets of your search filter settings. For this, click Store Presets in the Presets submenu and enter a name for the preset.

Existing presets will be found at the bottom of the list. To remove a preset, click on the preset to activate it, then select Remove Preset.

- It is also possible to further refine the search options by including your user attributes in the search criteria.
When user attributes have been defined, these will appear on the pop-up menu (see above).

About missing files

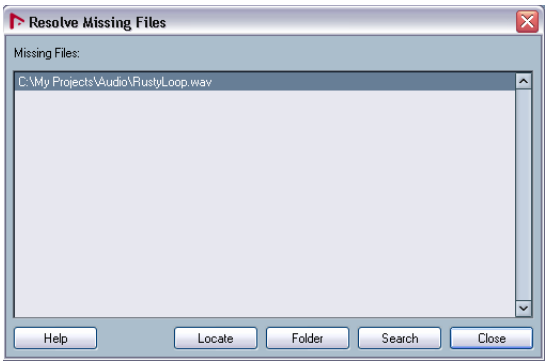
When you open a project, the Resolve Missing Files dialog (see below) may open, warning you that one or more files are “missing”. If you click Close, the project will open anyway, without the missing files. In the Pool, you can check which files are considered missing. This is indicated by a question mark in the Status column.

A file is considered missing under one of the following conditions:

- The file has been moved or renamed outside the program since the last time you worked with the project, and you ignored the Resolve Missing Files dialog when you opened the project for the current session.
- You have moved or renamed the file outside the program during the current session.
- You have moved or renamed the folder in which the missing files are located.

Locate missing files

1. Select “Find Missing Files” from the Media or context menu.
The Resolve Missing Files dialog opens.



2. Decide if you want the program to try to find the file for you (Search), if you want to do it yourself (Locate) or if you want to specify in which directory the program should search for the file (Folder).

- If you select Locate, a file dialog opens, allowing you to locate the file manually.
Select the file and click “Open”.
- If you select Folder, a dialog opens to let you specify the directory in which the missing file can be found.
This might be the preferred method if you have renamed or moved the folder containing the missing file, but the file still has the same name. Once you select the correct folder, the program finds the file and you can close the dialog.
- If you select Search, a dialog opens to let you specify which folder or disk should be scanned by the program.
Click the Search Folder button, select a directory or a disk and click the Start button. If found, select the file from the list and click “Accept”. Afterwards Nuendo tries to map all other missing files automatically.

Reconstructing missing edit files

If a missing file cannot be found (e.g. if you have accidentally deleted it from the hard disk), it will normally be indicated with a question mark in the Status column in the Pool. However, if the missing file is an edit file (a file created when you process audio, stored in the Edits folder within the project folder), it may be possible for the program to reconstruct it by recreating the editing to the original audio file:

1. Open the Pool and locate the clip(s) for which files are missing.
2. Check the Status column – if it says “Reconstructible”, the file can be reconstructed by Nuendo.
3. Select the reconstructible clips and select “Reconstruct” from the Media menu.
The editing is performed and the edit files are recreated.

Removing missing files from the Pool

If the Pool contains audio files that cannot be found or reconstructed, you may want to remove these. For this, select “Remove Missing Files” from the Media or context menu. This will remove all missing files from the Pool as well as their corresponding events from the Project window.

Auditioning clips in the Pool

There are three methods you can use to audition clips in the Pool:

- By using key commands.

If you activate the “Playback Toggle triggers Local Preview” option in the Preferences (Transport page), you can use the [Space] bar to audition. This is the same as clicking the Audition icon on the toolbar.

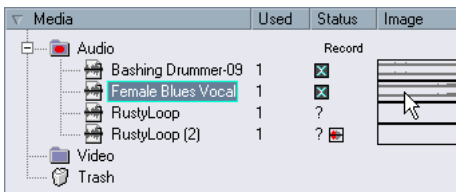
- By selecting a clip and activating the Play button.

The whole clip will play back, unless you stop playback by clicking the Play button again.

The Play button.

- By clicking somewhere in the waveform image for a clip.

The clip will play from the position in the waveform you click until the end of the clip, unless you stop playback by clicking the Play button, or by clicking anywhere else in the pool window.



Click in the waveform image to audition a clip.

- The audio will be routed directly to the Control Room, if the Control Room is activated. When the Control Room is deactivated, the audio will be routed to the Main Mix (the default output) bus, bypassing the audio channel’s settings, effects and EQs.

You can adjust the auditioning level with the miniature level fader on the toolbar. This does not affect the regular playback level.

If you have activated the Loop button before you audition, the following will happen:

The Loop button.

- If you click the Play button to audition a clip, it will repeat indefinitely until you stop playback by clicking the Play or Loop button again.

- If you click in the waveform image to audition, the section from the point you clicked to the end of the clip will repeat indefinitely until you stop playback.

Opening clips in the Sample Editor

The Sample Editor allows you to perform detailed editing on the clip (see “The Sample Editor” on page 258). You can open clips in the Sample Editor directly from the Pool in the following ways:

- If you double-click on a clip waveform icon or a clip name in the Media column, the clip will open in the Sample Editor.

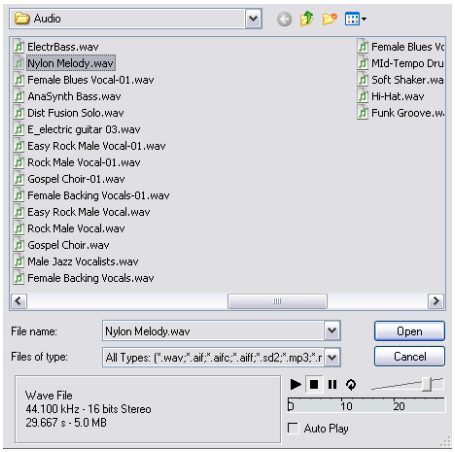
- If you double-click on a region in the Pool, its clip will open in the Sample Editor with the region selected.

One practical use for this is to set a snap point for a clip (see “Adjusting the snap point” on page 266). When you later insert the clip from the Pool into the project, you can have it properly aligned according to the set snap point.

Import Medium…

The Import Medium dialog lets you import files directly into the Pool. It is opened from the Media or context menu or with the Import button in the Pool window.

Clicking the Import button opens the Import dialog:



This is a standard file dialog, where you can navigate to other folders, audition files etc. The following audio file formats can be imported:

- Wave (Normal or Broadcast, see "Broadcast Wave files" on page 441)
- AIFF and AIFC (Compressed AIFF)
- REX or REX 2 (see "Importing ReCycle files" on page 493)
- Dolby Digital AC3 file (ac3 – if you have the Steinberg Dolby Digital Encoder installed in your system)
- DTS file (dts – if you have the Steinberg DTS Encoder installed in your system)
- SD2 (Sound Designer II)
- MPEG Layer 2 and Layer 3 (mp2 and mp3 files – see "Importing compressed audio files" on page 493)
- Ogg Vorbis (ogg files – see "Importing compressed audio files" on page 493)
- Windows Media Audio (Windows – see "Importing compressed audio files" on page 493)
- Wave64 (w64 files)

They may have the following characteristics:

- Stereo or mono
- Any sample rate (although files with another sample rate than the one used in the project will play back at the wrong speed and pitch – see below).
- 8, 16, 24 bit or 32 bit float resolution

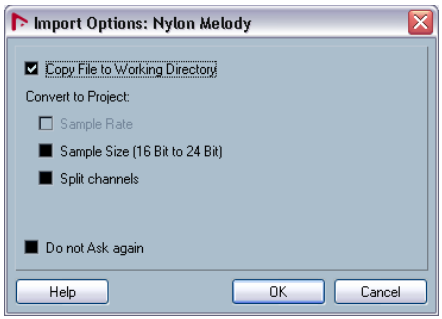
The following videos formats can also be imported:

- AVI (Audio Video Interleave)
- MOV and QT (QuickTime)
- WMV (Windows only)
- DV (Mac OS X only)
- MPEG 1 and 2 video files.

⚠ For video files to be played back correctly, the right codecs have to be installed.

⇨ It is also possible to use the commands on the Import submenu on the File menu to import audio or video files into the Pool.

When you select a file in the Import Medium dialog and click Open, the Import Options dialog opens:



It contains the following options:

- Copy File to Working Directory.

Activate this if you want a copy of the file to be made in the Audio folder of the project, and have the clip refer to this copy. If the option is off, the clip will refer to the original file in the original location (and will thus be marked as "external" in the Pool – see "About the Status column symbols" on page 299).

- Convert to Project section:

Here you can choose to convert the sample rate (if the sample rate is different than the one set for the project) or the sample size, i.e. resolution (if the sample size is lower than the record format used in the project). The options are only available if necessary. Note that if you are importing several audio files at once, the Import Options dialog will instead contain a "Convert if needed" checkbox. When this is activated, the imported files will be converted only if the sample rate is different or the sample size is lower than the project's.

- Split Channels

If this is activated, stereo and multi-channel files will be split into a corresponding number of mono files – one for each channel – and these will be imported into the Pool. Note that if you use this option, the imported files will always be copied to the Audio folder of the project, as described above.

- Do not Ask again.

If this is activated, files will always be imported according to the settings you have made, without this dialog appearing. This can be reset in the Preferences (Editing–Audio page).

⇨ You can always convert files later by using the Convert Files (see "Convert Files" on page 310) or Conform Files (see "Conform Files" on page 310) options.

Importing audio CD tracks

You can import tracks (or sections of tracks) from an audio CD directly into the Pool by using the “Import Audio CD” function on the Media menu. This opens a dialog in which you can specify which tracks should be copied from the CD, converted to audio files and added to the Pool.

For details about the Import Audio CD dialog, see “Importing audio CD tracks” on page 491.

Exporting regions as audio files

If you have created regions within an audio clip (see “Working with regions” on page 269), these can be exported as separate audio files. To create a new audio file from a region, proceed as follows:

1. In the Pool, select the region you wish to export.
2. On the Audio menu, select “Bounce Selection”.
A browser dialog opens.
3. Select the folder in which you want the new file to be created.
A new audio file is created in the specified folder. The file will have the name of the region and will automatically be added to the Pool.

⇨ If you have two clips that refer to the same audio file (different “versions” of clips, e.g. created with the “Convert to Real Copy” function), you can use the Bounce Selection function to create a new, separate file for the copied clip.
Select the clip, select Bounce Selection and enter a location and name for the new file.

Changing the Pool Record folder

The Pool Record folder.

In the Pool Record folder, all audio clips that you record in the project will end up. The Pool Record folder is indicated by the text “Record” in the Status column and by a red dot on the folder itself, as shown in the picture above. By default, this is the main Audio folder. You can, however, at any time create a new Audio subfolder and designate this as your Pool Record folder. Proceed as follows:

1. Select the Audio folder or any audio clip.
You cannot designate the Video folder (or a subfolder in it) as the Pool Record folder.
2. Select “Create Folder” on the Media or context menu.
A new empty audio subfolder appears in the Pool.
3. Select the new folder.
4. Select “Set Pool Record Folder” on the Media or context menu, or click in the Status column of the new folder.
The new folder now becomes the Pool Record folder, and any audio recorded in the project will be saved in this folder.

Organizing clips and folders

If you accumulate a large number of clips in the Pool, it may sometimes be difficult to quickly find specific items. In such cases, organizing clips in new subfolders with suitable names that reflect the content can be a solution. For example, you could put all sound effects in one folder, all lead vocals in another etc. Proceed as follows:

1. Select the type of folder, audio or video, for which you want to create a subfolder.
You cannot put audio clips in a video folder and vice versa.
2. Select “Create Folder” on the Media on context menu.
A new empty subfolder named “New Folder” appears in the Pool.
3. Click on the name and enter an appropriate name for the folder.
4. Drag and drop the clips you wish to move to the new folder.
5. Repeat steps 1-4 as necessary.

Applying processing to clips in the Pool

You can apply audio processing to clips from within the Pool in the same way as to events in the Project window. Simply select the clip(s) and choose a processing method from the Audio menu. To find out more about audio processing, see the chapter “Audio processing and functions” on page 238.

Undoing processing

If you have applied processing to a clip, in the Project window, the Sample Editor, or in the Pool, this is indicated by the red and gray waveform symbol in the Status column. This processing can always be undone using the Offline Process History, see "The Offline Process History dialog" on page 251.

Freeze Edits

You can use the Freeze Edits function to create a new file with processing applied or to replace the original with a processed version, see "Freeze Edits" on page 253.

Minimize File

The option "Minimize File" on the Media or context menu allows you to change the size of audio files according to the audio clips referenced in a project. The files produced using this option will only contain the audio file portions actually used in the project. This can significantly reduce the size of the project, if large portions of the audio files are unused. Therefore, the option is useful for archiving purposes after you have completed a project.

⇨ This operation will permanently alter the selected audio files in the Pool. This cannot be undone!
If this is not what you want, you can use the option "Save Project to New Folder" on the File menu instead, see "Save Project to New Folder" on page 489. This function also has the option of minimizing files, but copies all files into a new folder, leaving the original project untouched.

Proceed as follows:

1. Select the file(s) you wish to minimize in the Pool.

2. Select "Minimize File" on the Media menu.
An alert appears, informing you that the entire Edit History will be cleared. Click Minimize to proceed or Cancel to stop the process.

3. After the minimizing is finished, another alert appears, because the file references in the stored project have become invalid.
Click Save Now to save the updated project or click Later to proceed with the unsaved project.

Only the audio portions actually used in the project remain in the corresponding audio file(s) in the Pool Record folder.

Prepare Archive

The option "Prepare Archive" on the Media menu is useful if you want to archive a project. It verifies that every clip referenced in the project is located in the same folder, and takes actions if that is not the case:

- Any files that are located outside the current project folder will be copied into it.
Please note that audio files that reside within the project folder will not be copied to the audio folder. You will therefore have to copy them there manually before backing up the audio folder or save them separately during backup, see below.

- If any processing has been applied, you will be asked whether you want to Freeze Edits.
If you do this, you don't have to archive the Edits folder. Everything belonging to the project will be contained in the project file and the Audio folder.

Once you have performed a Prepare Archive, you can copy the project file, the Audio folder and any other audio material you saved in the project folder to backup disks, etc.

It is not necessary to archive the Images folder, since these Images can be recreated by Nuendo. You may also find a file with the extension ".csh" in the project folder. This contains image information for edited clips and other data that can be recreated, so it can safely be deleted.

⚠ Video clips are always referenced and not stored in the project folder.

Importing and exporting Pool files

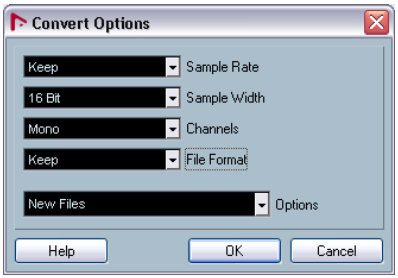
You can import or export a Pool as a separate file (file extension ".npl"), by using the "Import Pool" and "Export Pool" options on the Media or context menu.

When you import a Pool file, the file references in it are "added" to the current Pool.

⇨ Since the audio and video files are only referenced but not saved in the Pool file, the Pool import is only useful if you have access to all referenced files (which preferably should have the same file paths as when the Pool was saved).

⇨ You can also save and open libraries. These are standalone Pool files that are not associated with a project.
See "Working with libraries" on page 490.

Convert Files



Selecting the option “Convert Files” on the Media or context menu opens the Convert Options dialog which operates on selected files. Use the pop-up menus to specify which audio file attributes you want to keep and which you want to convert. The available settings are:

- Sample Rate

Keep as is, or convert to a sample rate between 8.000 and 96.000 kHz.

- Sample Width

Keep the sample width (resolution) as is, or convert to 16 bit, 24 bit or 32 Bit float.

- Channels

Keep as is, or convert the file to Mono or Stereo Interleaved.

- File Format

Keep as is, or convert to Wave, AIFF, Wave 64 or Broadcast Wave format.

Options

When you convert a file, you can use the Options pop-up to set one of the following options regarding what to do with the new file:

Option	Description
New Files	Creates a copy of the file in the audio folder and converts this new file according to the chosen attributes. The new file is added to the Pool, but all clip references will still point to the original, unconverted file.
Replace Files	Converts the original file without changing clip references. The references are however saved with the next save action.
New + Replace in Pool	Creates a new copy with the chosen attributes, replaces the original file with the new one in the Pool and redirects the current clip references from the original file to the new file. This is the option to select if you want your audio clips to refer to the converted file, but still want to keep the original file on disk (e.g. if the file is used in other projects).

Conform Files

By using this command, you will change all selected files that have different file attributes than what is specified for the project, to conform to this standard.

Proceed as follows:

1. Select the clips in the Pool.
2. Select “Conform Files” on the Media menu.

A dialog opens allowing you to choose between keeping or replacing the original unconverted files in the Pool. The following applies:

- Clip/event references in the pool are always redirected to the conformed files.
- If any “keep” option is selected, original files remain in the Project’s Audio folder and new files are created.
- If you select the “Replace” option, files in the Pool and in the Project’s Audio folder are replaced.

Extract Audio from Video

This Media menu item allows you to extract the audio from a video file on disk. It automatically generates a new audio clip that will appear in the Pool Record folder. The resulting clip will have the following properties:

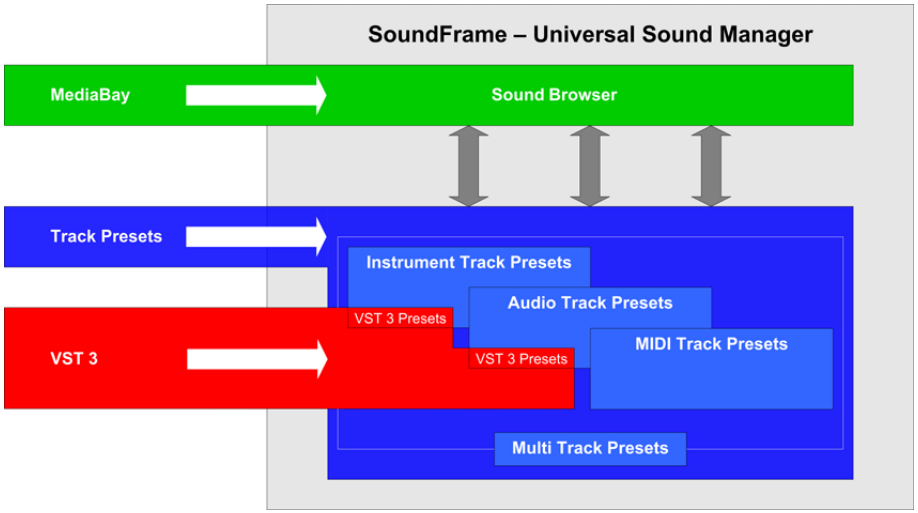
- It will get the same file format and sample rate/width as in the current project.
- It will get the same name as the video file.

⇨ This function is not available for mpeg video files.

21

SoundFrame

Introduction



The Nuendo SoundFrame

One of the biggest challenges in typical project studio environments is how to manage the ever-growing number of plug-ins, instruments, presets, etc. Nuendo provides a truly universal, fully integrated solution to this problem: SoundFrame.

What constitutes SoundFrame?

The Nuendo SoundFrame is what links the MediaBay and instrument tracks as well as track and VST3 presets.

- The MediaBay is a universal Media Management System providing different views that allows you to find and tag media files, quickly import media files into projects and more (see "The MediaBay" on page 314).
- Instrument tracks are a sound-oriented combination of MIDI tracks and VST Instruments, another way of applying sounds to tracks easily (see "VST Instruments and Instrument tracks" on page 189).
- Track presets are a combination of track settings, effects and mixer settings that can be applied to new tracks of various types. So right from the start, you can set up your tracks for a specific sound (see "Track Presets" on page 327).
- With the introduction of the VST3 plug-in standard, Nuendo makes use of VST presets as an additional way to apply sounds to instrument tracks and effects to audio track (see "Inserts and EQ settings from track presets" on page 337). Plug-in parameters can be saved as VST presets, and you can also generate VST presets (i.e. sounds) from VST2 Instruments.

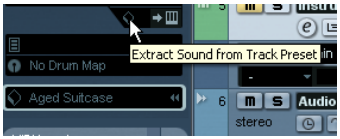
You can identify SoundFrame features through the SoundFrame logo.

The SoundFrame logo

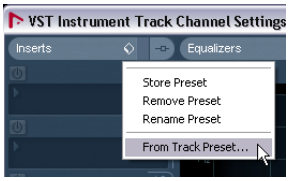
The SoundFrame logo is used in various places in Nuendo, for example:

- In the Inspector as a button for applying track presets. You will only see track presets corresponding to the type of track you are working on.

- In the Inspector for instrument tracks as a button for extracting sounds.



- In the Inspector or the Channel settings window as buttons for extracting Inserts or EQ settings from track presets.



What can SoundFrame do for you?

- SoundFrame allows you to manage any sound from any software or hardware synthesizer under a single, unified user interface.

- SoundFrame can help you find any sound, not only by instrument but also by category, type, style, character or other attributes (Track presets organized in the MediaBay).

- SoundFrame comes with more than 1000 ready-to-play sounds, which are also conveniently organized by instrument category, type, and character. These can even be instantly previewed before loading (Instrument track presets managing the VST instruments – again organized in the MediaBay).

- SoundFrame can manage your VST plug-in presets. These can be organized and categorized to form one big effects library (VST presets organized in the MediaBay).

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The MediaBay

Introduction

Modern media production involves having to deal with a multitude of media files, e.g. audio, MIDI, video, etc.

Nuendo features a powerful media file management database that allows you to control all your media files from within your sequencer program. This may involve several different tasks:

- You can browse the folders of your file system to view folders and files.
- You can define searches to find specific files and filter the search results.
- You can organize your files in a folder structure.
- You can use the tagging features to assign your files to specific categories, and use these categories as the basis for your searches.

Which file formats are supported?

The following media file formats are supported by the Nuendo Media Management System:

- Audio: .wav, .w64, .aiff, .aifc, .rex, .rx2, .mp3, .mp2, .ogg, .sd2, .wma (Windows only)
- MIDI: .mid and .midiloop
- Track Presets: .trackpreset

These are templates for audio tracks, MIDI tracks and instrument tracks. Track Presets are described in detail in the chapter "Track Presets" on page 327.

- VST Presets: .vstpreset

VST presets are files containing all parameter settings for a particular VST plug-in. VST preset files are described in detail in the section "Inserts and EQ settings from track presets" on page 337.

- Video: .avi, .mov, .qt, .mpg, .wmv (Windows only)
- Project files (from Cubase, Nuendo, Sequel): .cpr, .npr, .steinberg-project

Accessing the Media Management System

Nuendo provides the following options to access the Media Management System:

- Pull down the Media menu and select "Open MediaBay", "Open Loop Browser" or "Open Sound Browser" (or use the respective key commands).

When one of these windows is open, selecting the menu option or using the key command will close it instead.

The preconfigured windows of the Media Management System

The Media Management System in Nuendo can be accessed via the MediaBay, the Loop Browser or the Sound Browser.

Which of these to use depends entirely on your working environment, and you may find that you want to change the default setup to better meet your requirements.

- By default, the MediaBay is configured to show all window sections and display all file types. The default search mode is Details search.

If you want to work on media files of various types, if you have to move files to different locations using the Browser section, or if you want to perform other general file management tasks, the MediaBay is probably the best view configuration.

- The Loop Browser is configured to show audio files, with Category search mode selected by default.

Use this if your focus is on audio files of any kind.

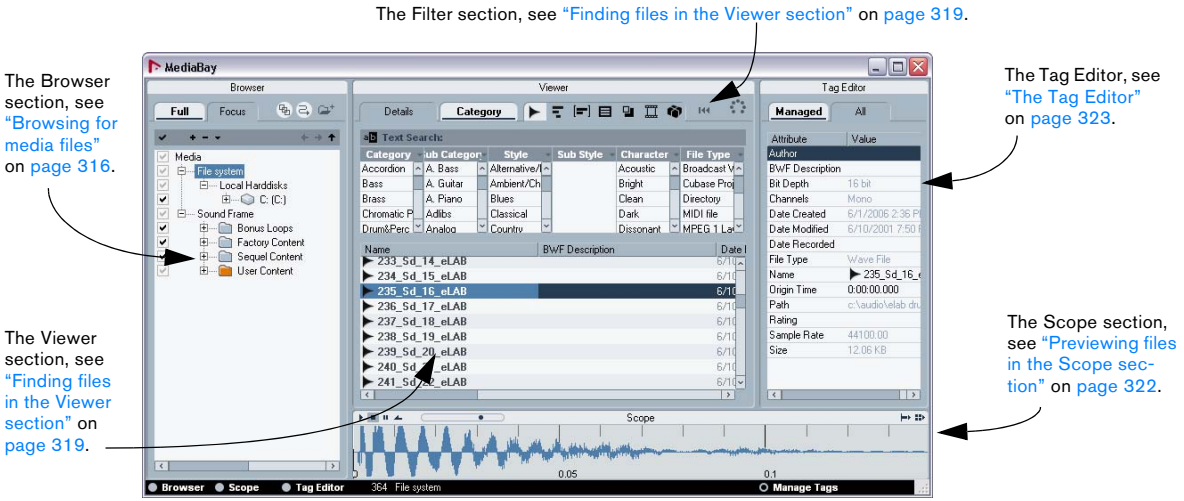
- The Sound Browser is focussed on the SoundFrame node (see "The SoundFrame node" on page 318). Its filter buttons are set to showing track preset and VST preset files. Its default search mode is the Category search.

Use this if you want to work with the available presets.

Whenever you read about the "MediaBay" in this manual, please remember the following:

⇨ The MediaBay is only one of these three preconfigured views of the Nuendo Media Management System. In the MediaBay window, all controls of the Media Management System are visible by default, so we will refer to the MediaBay throughout this manual when describing functions. However, what you can do in the MediaBay can also be done in the Loop Browser and the Sound Browser.

Window overview



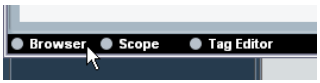
The info line

The info line is located at the bottom of the window.

The info line shows the number of files displayed in the Viewer section and the path to the folder selected in the Browser section in which these files were found.

MediaBay sections

You can use the three buttons below the Browser section to show/hide the respective sections in the MediaBay window. The Viewer section cannot be hidden.



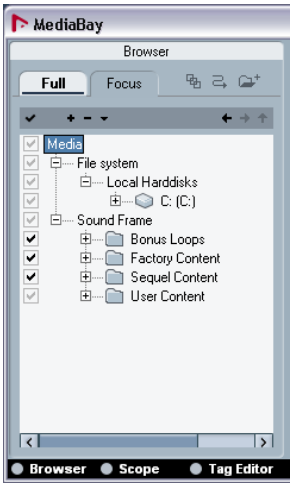
Click this button to hide the Browser section.

- You can change the size of the individual sections by dragging the divider line between two sections.
- When saving a Nuendo project, the current status of the MediaBay is also saved.

This means that if the MediaBay was open when you saved a project, it will be opened again the next time you open this particular project. The last MediaBay window configuration will also be restored.

Browsing for media files

To the left in the default MediaBay window you will find the Browser section.



The Browser section of the MediaBay window

⇨ Note that the Browser section can only show folders; any media files contained in a selected folder are displayed in the Viewer section to the right.

This also depends on the "Deep Results" setting, see "Filtering the Viewer display" on page 319.

Scanning operations

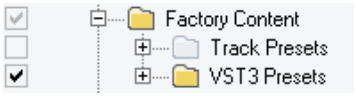
When you open the MediaBay, the Loop Browser or the Sound Browser for the first time, a scan for the media files needs to be performed. Specify which folders or directories should be included in the scan by activating the check boxes to the left of their name. Depending on the amount of media files on your computer, the scan may take a while. The scan result is saved in the MediaBay database.

- To include a folder, activate its check box.

These folders will be scanned for files.

- You can also only scan individual subfolders.

This will be reflected in the icon for the folder the subfolder resides in.



Only the VST3 Presets subfolder of the Factory Content folder will be scanned for files. The Track presets folder will not be searched.

When you select a folder in the Browser display, the MediaBay will scan this folder and all its subfolders for media files, even if they have been scanned before (unless “Rescan on select” is deactivated, see below).

- When “Stop scanning folders when closing MediaBay” is activated in the Preferences dialog (MediaBay page), Nuendo will scan for media files only when the MediaBay window is open. When this is deactivated, the folders will be scanned in the background, even when the MediaBay window is not open.

Even if scanning in the background is activated, Nuendo will not scan folders while playing back or recording.

Scanning indicator and status

At the top right in the in the Viewer section, you will find the scanning indicator, which shows whether the MediaBay is scanning for files or whether the scan is complete.

When this indicator appears, a scan is performed.

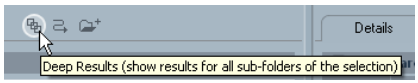
- When the folders specified in the Browser section are being scanned, the scanning indicator appears.
- When the scan is complete, the scanning indicator will not be shown.

The scanning status for the individual folders in the Browser section is indicated by the color of the icons:

- A red icon means that this folder is currently being scanned.
- A light blue icon means this folder has been scanned.
- Orange folder icons are displayed when a scanning process was interrupted.
- Yellow icons are displayed for folders that have not been scanned.

Deep Results

Clicking the “Deep Results” button switches the Viewer display between showing only the folders and files contained in the selected folder, and showing the files contained in the selected folder and in any subfolders (without showing the subfolders).



The Deep Results button

About “Rescan on Select”

The “Rescan on Select” button

- When this button is activated, selecting a folder in the Browser section will always cause this folder to be rescanned. This ensures that the MediaBay will always display the current content of a folder.

⚠ When a folder contains a large number of media files, the scanning process may take some time – you may want to deactivate “Rescan on Select”, if you know that you haven’t made any changes to the content of your media folders since they were last scanned.

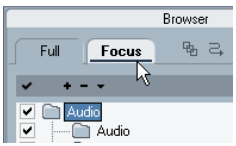
- When “Rescan on Select” is deactivated, you can always right-click in the Browser section and select “Refresh” from the context menu to force a rescan of the currently selected folder.

Folder operations

The Browser section shows the folder structure of your computer's file system in a way very similar to the Windows Explorer or the Mac OS Finder:

- Click on the folder icons in the Browser display to select the corresponding folder.
- Double-click on the folder icons in the Browser display to open the corresponding folder.
- When a folder contains subfolders, this is indicated by a plus icon in front of the folder icon. The plus icon changes to a minus icon when the folder is open. To open or close a folder, you can also click the plus/minus icons.
- You can switch the Browser display between the Full view and the Focus view.

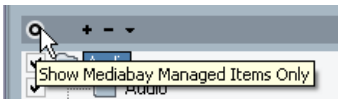
Focussing a selected folder means showing only this folder and any subfolders it contains. Any folder levels above the focussed folder are not displayed. When you switch back to the Full view, the entire file system node can be accessed.



The Focus view for the Audio folder.

- You can hide all folders not being scanned for files by clicking the "Show Mediabay Managed Items Only" button.

This will keep the list less cluttered.



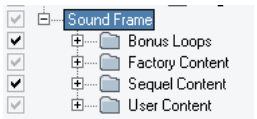
- Use the buttons "Previous Browse Location", "Next Browse Location" and "Browse Containing Folder" to navigate to folders.

Click "Previous Browse Location" or "Next Browse Location" to select the previous or next folder in a sequence of previously selected folders. Clicking the "Browse Containing Folder" button will select the parent folder of the previously selected folder.

- You can create a new folder inside the folder selected in the Browser section by clicking the "Create New Folder" button (the folder icon).

A dialog is opened in which you can enter a name for the new folder.

The SoundFrame node



The SoundFrame node in the Browser section.

The Browser section provides a shortcut to user content and factory content files, including the preset folders. You find this node at the top of the Browser folder hierarchy, at the same level as the File System node.

- The folders below the SoundFrame node represent the folders in which content files and newly created track presets, VST presets, etc. are stored by default.

To find out the "true" location of such a file, right-click on it in the Viewer section and select "Open in Explorer" (Win)/"Reveal in Finder" (Mac). This will open an Explorer/Finder window in which the corresponding file is highlighted.

Creating Favorites

If you constantly find yourself returning to specific folders during your work, you can save these browse locations as presets so that selecting such a preset will take you to the folder instantly. Proceed as follows:

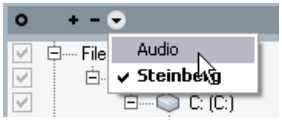
1. Select the desired folder in the folder display.
2. Click the Add Browse Location Preset button (the "+" icon).

A naming dialog for the new preset is displayed.

3. Accept the default name (the complete folder path) or enter a new name for the preset.

4. Click OK.

The new preset is added to the Select Browse Location Presets pop-up menu (which can be opened by clicking on the down arrow icon).



When you now open the Select Browse Location Presets pop-up menu and select the new preset, the respective preset folder will be selected in the Browser display.

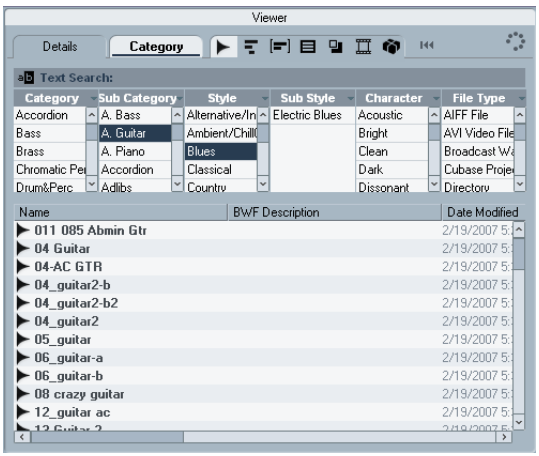
- To remove a preset from the Select Browse Location Presets pop-up, select it from the pop-up and click the "Remove Browse Location Preset" button (the "-" icon).

Finding files in the Viewer section

The Viewer section consists of two panes: the Filter section at the top and below it, the Viewer display. In the Filter section, you can set up filters and define searches for specific files. The Viewer display lists any files contained in the folder selected in the Browser, and tags of these files. How to set up the tag display in the Viewer is described in the section "Managing the tag lists" on page 323.

⇨ Note that it is only possible to edit tags in the Viewer if "Allow Editing in Viewer" is activated in the Preferences dialog (MediaBay page).

When this preference is deactivated, editing is only possible in the Tag Editor (see "Editing tags in the Tag Editor" on page 324).



The Viewer section

Depending on your settings, the number of files displayed in the Viewer can be huge (the info line at the bottom of the window shows the number of files found with the current filter settings). Therefore, the MediaBay provides a number of ways to display only specific files and to perform very refined file searches.

⇨ By default, the number of files displayed in the Viewer section is limited to 10,000 files. You can change this by specifying a new value for "Maximum Number of Results in Viewer" in the Preferences dialog (MediaBay page).

Filtering the Viewer display

The MediaBay provides a number of filter buttons that can be used to limit the number of files displayed in the Viewer section.

- At the top of the Viewer section you will find the filter buttons that can be used to show all supported file types or any combination of file types.

For example, when you activate the Audio and the MIDI filter buttons, only the audio and the MIDI files contained in the folder selected in the Browser will be displayed. When none (or all) of these buttons are activated, files of all supported types will be displayed.

The filter buttons. The display is filtered to show only audio files.

Defining searches for specific files

The filter buttons let you find files according to the folder(s) they might be located in, or according to their file type. However, you can also perform very detailed searches for files that meet certain criteria.

- The Details search mode allows you to perform a search for a specific file tag value.

You define which tag to search for, e.g. "Name", and specify the corresponding value, e.g. "myfilename.wav".

- In Category search mode, the Filter section will display all values found for a specific tag (or "category"). Selecting one of these values will result in a list of files all showing this particular tag value.

For example, you could look for sample rates and pick 44.1 kHz to give you a list of all files with that particular sample rate. But Category search mode becomes really interesting when making extensive use of tagging – see "Performing a Category search" on page 320 and "Tagging media files" on page 325.

- Once a search operation has been completed, the very first entry in the Viewer list is selected. When you now press [Tab] once, this selected entry will receive the focus and you can use the Up and Down arrow keys to browse the list of files.

Performing a Details search

The following section briefly describes how to perform a search for a particular file name in the file system.

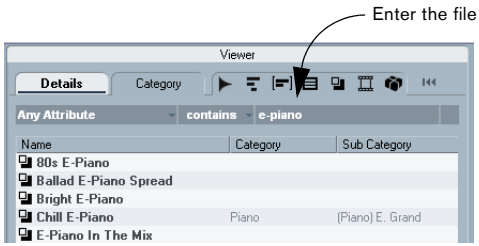
Proceed as follows:

1. Select the root folder of your hard disk in the Browser section.

2. Select the Details search mode by clicking on the Details tab at the top of the Filter section.

3. By default, the tag pop-up menu to the left is set to “Any Attribute”, and the condition pop-up menu in the middle is set to “contains”.
Leave these as they are.

4. Enter part of the name of the file that you wish to find in the text field to the right.
Note how the search is performed anew every time you enter a new letter. Detail searches are not case sensitive.



A Details search for files whose names contain “e-piano”.

- The Tag pop-up menu shows an alphabetical list of file tags you can choose from. At the top of the pop-up menu, the MediaBay maintains a smaller list of the last 5 tags selected during previous searches.
Note that you can select more than one tag. This will create an OR condition: the files found will match either one or the other tag. Click OK to set the tag(s) to search for. How to configure the tag list is described in the section “Managing the tag lists” on page 323.

- To reset all search fields to their default settings, click the Reset button in the top right corner of the Filter section.
This will also reset the tag list settings.

The Reset button in the Filter section

- The condition pop-up menu contains the following options:

Option	Description
contains	The searched tag value must contain the text or number specified in the text field to the right.
omits	The searched tag value must not contain the text or number specified in the text field to the right.
equals	The searched tag value must match the text or number specified in the text field to the right, including any file extension. Note however, that detail searches for text are not case sensitive.
>=	The searched tag value must be higher than, or equal to, the number specified in the field to the right.
<=	The searched tag value must be lower than, or equal to, the number specified in the field to the right.
is empty	You can use this option to find files for which certain tags have not been specified yet.
range	When “range” is selected, you can specify a lower and an upper limit for the searched tag value in the fields to the right.

- Note that for all conditions except “range”, you can enter more than one string in the text field (separate different search strings with a space).
These strings form an AND condition, i.e. the files found will match all strings entered in the field.

- To open a new filter line, move the mouse pointer to the right end of the text field and click the “+” button that appears.
This way, you can set up up to five additional filter lines in which you can define new search conditions. Note that two or more filter lines form an AND condition, i.e. the files searched for must match the conditions defined in all filter lines. Click the “-” button for a filter line to remove it.

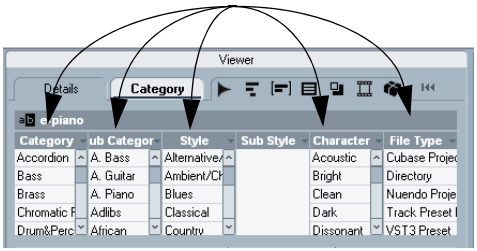
Performing a Category search

The MediaBay allows you not only to view and edit some of the standard file attributes found in all computer files, but it also provides preconfigured tags, or “categories”, that you can use to organize your media files.

The advantages of such categorization become obvious when having to find one specific file, e.g. a certain guitar sound, among large numbers of media files from various contexts, without knowing the name of that file.

When you select the Category search mode, the Filter section will show the tag columns, each with its own list of tag values.

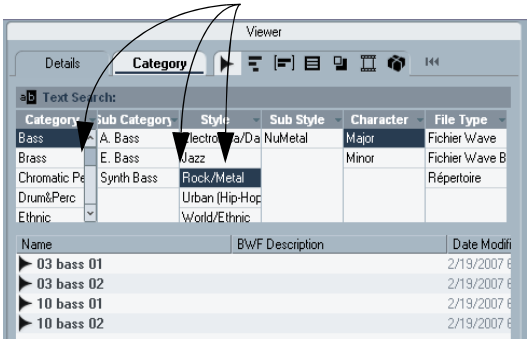
These tag values were found in the currently selected folder.



The default setup of Category search mode

By clicking on individual tag values in the tag columns, you define the search filter: only the files that match the selected tag values will be displayed in the Viewer. Select more tag values from other columns to further refine your search.

The files displayed in the Viewer match the selected tag values.

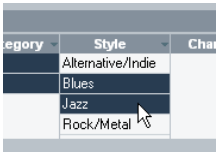


⚠ By default, the first two tag columns are set to “Category” and “Sub Category”. These tags are directly linked to each other: for each Category value, there is a number of Sub Category values. Changing to a different Category value in the first tag column will give you different values in the Sub Category column!

⚠ Each tag column displays only the tag values found in the folder selected in the Browser section of the MediaBay! This means that selecting a different folder in the Browser may lead to the display of different Category search settings.

- Selected tag values in the same tag column form an OR condition.

This means that files must be tagged according to either one or the other value to be displayed in the Viewer section.



For the “Style” tag, the files found will show either the “Blues” OR the “Jazz” tag value.

- Tag values in different columns form an AND condition.

This means that files must be tagged according to all these values to be displayed in the Viewer section.

The files found will belong to the “E. Guitar” sub category tag AND show “Blues” for the Style tag.

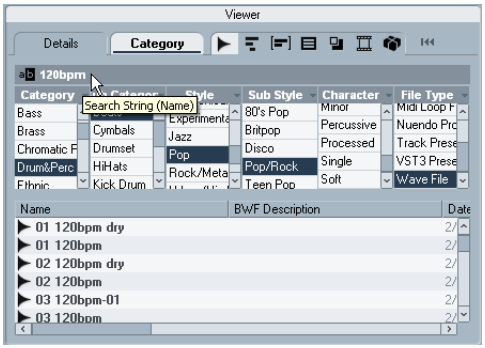
Categorization by tagging makes it easy to organize your media files. How to assign tag values to your files is described in the section “The Tag Editor” on page 323 and in the section “Tagging media files” on page 325.

⇨ Note that you can use existing tags or use the user tag feature (see “Defining user tags” on page 324) to create your own categories.

Category searches are used not only in the MediaBay, but throughout Nuendo in various SoundFrame-related contexts (see the chapter “SoundFrame” on page 311).

Further options for Category searches

- The text field at the top serves as an additional name filter: you can enter a file name or part of a file name here.
This corresponds to a “Name: contains” Details search, which means that the name of the searched file must contain the text you enter here.
See also “Performing a Details search” on page 320.



In addition to the filter defined by the tag columns, the name of the searched file must contain “120bpm”.

- You can change which tag is displayed at the top of each tag column by clicking on the tag and selecting a different tag from the Filter tag list pop-up menu.
How to configure the Filter tag list is described in the section “Managing the tag lists” on page 323.

- To select a tag value, simply click on it. To deselect it, click the value again.
Note that you can select more than one value in each tag column.

- Click the Reset button on the top right of the Filter section to clear all settings in the tag columns.
This will also reset the tag list settings.

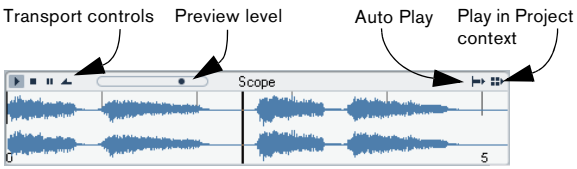
Previewing files in the Scope section

Below the Viewer you will find the Scope section. It allows you to play back files selected in the Viewer section.

The elements visible in this section and their functions depend on the type of media file selected in the Viewer.

⚠ The Scope section does not play back video files or project files. Also, it is not possible to preview audio track presets in the MediaBay (see below).

Previewing audio files



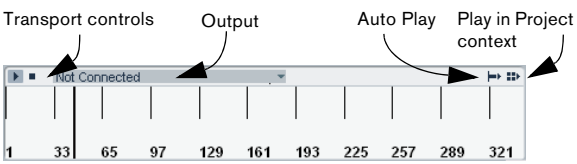
The Scope section for an audio file.

- To preview an audio file, simply click the Start button.

- When Auto Play is activated, selecting a file in the Viewer will automatically start playback.

- When “Play in Project context” is activated, the file will be played back together with the current project, starting at the current project cursor position.

Previewing MIDI files



The Scope section for a MIDI file.

- To preview a MIDI file (.mid), you first have to select an output device in the Output pop-up.
The “Auto Play” and “Play in Project context” options work in the same way as with audio files.

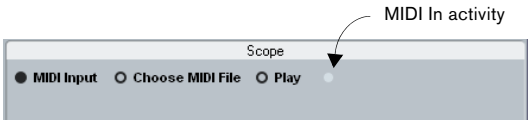
- Auto Play and “Play in Project context” work as for audio files, see above.

Previewing MIDI loops

- To preview a MIDI loop file, click the Start button.

- Auto Play works as for audio files, see above.
MIDI Loops are always played in the project context.

Previewing track and instrument presets



The Scope section for a MIDI track preset.

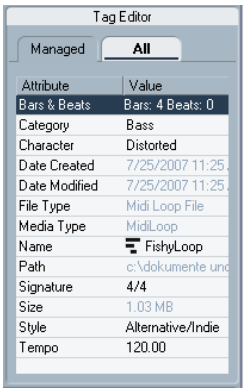
Track presets for MIDI or Instrument tracks and VST plug-in presets require MIDI notes for previewing. There are two ways these notes can be sent to the track template:

- Click the “MIDI Input” button and play MIDI notes on a MIDI keyboard connected to your system.
- Clicking “Choose MIDI File” will open a file dialog where you can navigate to a MIDI file. When you now click “Play”, the notes received from the MIDI file will be played with the settings of the track preset applied.

Track presets for audio tracks cannot be previewed in the MediaBay. You can do this in the Apply Track Template dialog (for further information, see “Previewing track or VST presets before applying” on page 336).

The Tag Editor

When a file is selected in the Viewer section, the Tag Editor shows a two-column list of tags and tag values for this file.



Tags for media files (also called “attributes”) are sets of metadata providing additional information on the file. The different types of media files have different tags: for example, for .wav audio files you will find standard tags like name, length, size, sample rate, etc., while for .mp3 files, additional tags such as “Artist” or “Genre” are available.

The Media Management System provides further tags, such as “Category” or “Character”.

You have access not only to the standard tags and the preconfigured tags provided by Nuendo, but you can also define your own tags and add these to your files.

The following sections describe how to set up the various tag lists, how to edit tags in the Tag Editor, and how to define user tags.

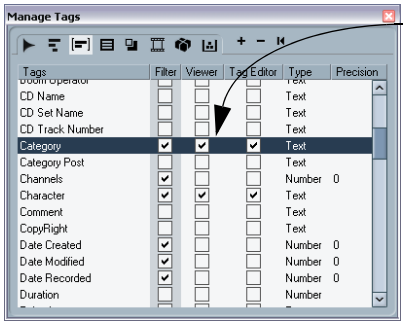
Managing the tag lists

Lists of tags and tag values are used in various places in the MediaBay window. You can configure these lists and define certain tag properties in the Manage Tags dialog.

Proceed as follows:

1. Open the Manage Tags dialog by clicking on the Manage Tags button in the lower right corner of the MediaBay window.
2. Click one of the filter buttons at the top of the Manage Tags dialog to select the file type for which you want to configure the tag lists.

   The Manage Tags dialog shows a list of all tags available for the media files supported by the MediaBay, and three columns of checkboxes, one for the Filter section, one for the Viewer and one for the Tag Editor.
3. To display a certain tag in the Filter tag lists, the Viewer or the Tag Editor, activate the corresponding checkbox for this tag:



The “Category” tag is selected for display in the Filter tag lists, the Viewer and in the Tag Editor.

4. Close the Manage Tags dialog by clicking its close box.

   Your settings will be applied.

- The Type column shows whether the value for a tag is a number, text or a Yes/No-type switch. The Precision column shows the number of decimals displayed after a point for number tags.

- Click and drag in the tag display to select several tags (click somewhere outside the selected area to deselect).
This way, you can activate/deactivate all selected check boxes in one go.

- To return to the default tag display settings for the Filter, Viewer and Tag Editor sections, click the “Reset to Default” button (above the tag display) in the Manage Tags dialog.

Displaying tags in the Tag Editor

You can switch the tag display in the Tag Editor:

- Click on “Managed” to show only the tags activated for display in the Manage Tags dialog.
Use this view to limit the tag display to only those tags that are of interest to you.

- Click on “All” to show all tags for the file selected in the Viewer for which values are available.
Use this display if you wish to see all tags, including standard file attributes such as Name, Size or Date Modified.

Displaying tags in the Viewer

Most of the time, tags displayed in the MediaBay are sorted alphabetically. Only in the Viewer can you change the tag display order:

- Move the mouse pointer to a column heading, click and drag that heading to a different position in the display.

Editing tags in the Tag Editor

You can use the Tag Editor to edit tag values of the various media files.

⇨ Note that changing a tag value in the Tag Editor may permanently change the corresponding file.

When it comes to editing, you will notice that there are different types of tags:

- “Display only” tags cannot be edited. Their values are displayed in a slightly lighter color.
In this case, the file format probably doesn’t permit changing this value, or changing a particular value makes no sense (e.g. you cannot change the file size in the MediaBay, because you have no way of adding or removing media information).

- Most tag values can be edited by double-clicking in the Value column of the Tag Editor.
Tag values can be text, numbers or yes/no switches. Simply enter/change the text, number or Yes/No setting in the field displayed for a value.

Renaming a file in the Tag Editor

- When clicking in the Value column for “Category”, “Sub Category” or “Style”, a pop-up menu opens from which you can choose a value.
The tags “Category” and “Sub Category” are directly linked to each other. The “Category” pop-up allows you to set a category, the “Sub Category” pop-up allows you to set a category and a corresponding sub category. If you pick a sub category from a category that is different from the category set for the “Category” tag, this tag will be changed as well.

- Clicking in the Value column for the “Character” tag will open the Edit Character dialog.
Click a radio button on the left or the right side and then click OK to define values for the Character tag.

- Clicking in the Value column for the Rating tag allows you to rate the file on a scale from 1 – 5.
For example, use this to indicate the file’s sound quality or its suitability for a certain purpose.

Defining user tags

You can define your own tags and save these in the MediaBay. You can use such user tags for example to define your own filter categories, further refining the categorization of your media files.

To define a user tag, proceed as follows:

1. Open the Manage Tags dialog by clicking the Manage Tags button in the lower right corner of the MediaBay window.

2. Click on the Add Tag button.
The Add User Tag dialog opens.

3. Enter a name for the new tag and define its type.
Tags can be of type “Text”, “Number” or “Yes/No” switch.

- For tags of type “Number”, you can also specify how many decimals should be displayed after a decimal point.
Enter the corresponding value in the Precision field.

4. Click OK.
The new tag is added to the list of available tags and can be displayed in the Tag Editor and the Viewer.

- To remove a user tag, select it in the Tags list and click the Remove Tag button.
The tag will be removed from all tag lists in which it was previously displayed.

Media management

General handling

- You can use the [Tab] key on your computer keyboard to move the focus between the different sections of the MediaBay window. Use the arrow keys to navigate to different folders, files or tags.

- When assigning tag values, note that you can select several files and assign the same tag value to all files.

File management

You can use the MediaBay for various file management tasks, similar to what you can do in the Windows Explorer/Mac OS Finder.

- When the option "Show file extensions" is activated in the Preferences dialog (MediaBay page), file name extensions (e.g. ".wav" or ".cpr") will be displayed in the MediaBay. When this is deactivated, file extensions will not be shown.

Browser operations

The following tasks can be performed in the Browser section:

- To delete a folder, right-click on the folder icon and select "Delete from Disk" from the context menu.
A warning message is displayed, asking you to confirm that you really want to move this folder to the operating system's trash folder.

- To rename a folder, select it in the list, click on its name and enter a new name.

- You can drag & drop a folder to a different location.
You will be asked if you wish to copy or move the folder to the new location.

Viewer operations

- You can move/copy a file from the Viewer section to a different location by clicking and dragging it to a different folder in the Browser section.
You will be asked if you wish to copy or move the file to the new location.

- To insert a file into the project, right-click the file and select one of the "Insert into project" options from the context menu.
This will import this file into your current project, either at the start of the project or at the current cursor position.

- To delete a file, right-click on it in the Viewer and select "Delete" from the context menu.
A warning message is displayed, asking you to confirm that you really want to move this file to the operating system's trash folder.

- When the option "Allow Editing in Viewer" is activated in the Preferences dialog–MediaBay page, you can also edit tags in the Viewer.
Otherwise this is possible only in the Tag Editor.

Tagging media files

The search functions, especially the Category search mode, become a truly powerful media management tool when making extensive use of tagging.

Media files are usually organized in complex folder structures to provide a logical way of guiding the user to the desired files, with the folder and/or file names indicating the instrument, style, tempo etc.

To find a particular sound or loop in such a folder structure can be very time consuming – tagging is the answer! To assign a number of meaningful tags, e.g. to a library of loop files, proceed as follows:

1. Copy the loop files to your hard disk.
Tagging means editing the files, so you need them on your system.

2. Open the MediaBay and browse to where the new loops are located.

3. Navigate to a folder containing loops.
For example, you might have a folder containing Metal style drum loops, at 120 bpm.

4. In the Viewer, select all files contained in this folder.
Make sure that the Deep Results button is deactivated, so that only files contained in this folder are displayed.

5. Assign tags that reflect the information indicated by the folder structure.

In the above example, you would put “Metal” as a value for the Style tag, and “Drums” for the Instrument tag. The Tag Editor also allows you to display a “Tempo” tag, for which you could specify a value of “120”.

You can now use the Category search mode to find quickly all Metal style drum loops at 120 bpm, without the need to navigate through a large number of folders and subfolders.

23

Track Presets

Introduction

Track presets are templates that you can create from audio, MIDI or instrument tracks – or several of these tracks. With these track presets, you can then create new tracks or apply them to existing tracks of the same type.

The idea behind track presets is:

- To allow you to quickly access, browse, select, change and preview sounds.
- To give you an easy way to reuse channel settings across projects.

Track presets are part of the SoundFrame concept (see “SoundFrame” on page 311) and organized in the Sound Browser (a view of the MediaBay, see “The MediaBay” on page 314). This allows you to categorize track presets with tags like “EPiano” or “Jazz” and search for these tags.

Related topics

Nuendo offers a variety of related functions that allow you to handle presets of program settings:

- You can save and load channel settings in the mixer (not for MIDI), see “Saving mixer settings” on page 146.
- You can save and load inserts rack and EQ presets, see “Inserts and EQ settings from track presets” on page 337.
- You can export and import tracks as track archives , see “Exporting and importing tracks” on page 500.

Types of track presets

There are four kinds of track presets:

- Audio
- Instrument (this also includes certain VST3 presets, see “VST (Instrument) presets” on page 330)
- MIDI
- Multi (any number of the three preset types above in any sequence)

Since the purpose of track presets is to make sound handling easier, only parameters are saved that are relevant for the sound of a certain track.

Audio track presets

Track presets for audio tracks include all inserts and effects that “define” the sound. Since there are big differences between the typical settings for a trumpet and a human voice, for example, audio track presets are a quick way to optimize your track.

For example, you can:

- Easily audition your audio track with the factory presets.
- Use the factory presets as a starting point for your own editing.
- Save the audio settings that you optimized for an artist with which you often work and use the resulting audio track preset for future recordings.

Data saved in audio track presets

- Insert FX settings
- EQ settings (including VST effect presets)
- Volume + Pan
- Input Gain + Phase

⇨ Note that volume, pan, input gain and input phase will be restored only when creating a new track from a track preset.

Instrument track presets

Instrument track presets are best choice when handling sounds of simple, mono-timbral VST Instruments. Like the instrument track, they offer both MIDI and audio features.

- You can use instrument track presets like the audio track presets above for auditioning your tracks, inspiration, or saving your preferred sound settings.
- In addition, you can directly extract sounds from instrument track presets and VST presets for use in instrument tracks.

VST presets also behave like instrument track presets, see “VST (Instrument) presets” on page 330.

Data saved in instrument track presets

- Audio Insert FX
- Audio EQ
- Audio Volume + Pan
- Audio Input Gain + Phase
- MIDI Insert FX
- MIDI Track Parameters
- Input Transformer
- VST Instrument

And also:

- Staff settings
- Color settings

⇨ Volume, pan, input gain and input phase will be restored only when creating a new track from a track preset.

MIDI track presets

MIDI tracks offer more possibilities than instrument tracks; therefore, they should be used for multi-timbral VST Instruments and external instruments.

Due to the resulting complex settings, more details have to be taken into account when working with MIDI track presets, to ensure that the saved settings are really usable as presets for new tracks.

- To ensure that saved MIDI track presets for external instruments will work again with the same instrument later, install the instrument as MIDI device, because in this case the MIDI interface and the connecting ports are irrelevant. (For this to work, the MIDI device has to have exactly the same name as in the original setup.) For more information about this, see the separate pdf document “MIDI Devices”.

Include MIDI Channel or MIDI Patch

There is an additional Include option when creating MIDI track presets:

- Choose “MIDI Patch” if you want to save the MIDI track preset with the currently set patch. This is useful if your external MIDI device offers sounds as certain patches but does not require any specific channel settings.

- Choose “MIDI Channel” if you want to save the MIDI track preset with the currently set channel. This is useful if you have the sounds of an external device always on the same channel, e.g. strings on channel 12, trumpets on channel 13.

⇨ The choice is exclusive – you can either save the channel or the patch, but not both.

Example 1: Multi-timbral external instrument

Assume you have a multi-timbral external instrument (for example, a MIDI Expander), with all sounds available on all channels, but the sounds (patches) might change.

In this case, set it up as an external instrument, open a MIDI track and select it as output. In the Programs List, select a patch. Then save the MIDI track preset with the patch included.

Example 2: Multi-timbral external instrument with pre-configured setup

In a rarer case we have a multi-timbral external instrument (for example, a Sampler) which is completely pre-configured. There is no sound (patch) to configure, but only the device and the MIDI channel to know.

In this case, include the channel in the MIDI track preset so that the correct channel will be called up.

Example 3: VSTi as pre-configured setup

If you want to use a MIDI track preset for a pre-configured VST Instrument setup, the following conditions have to be met:

- The VST Instrument(s) are installed in the VST Instruments window.
- The VST Instrument patches have not been changed since the track preset was saved (that means for example that no other FXP/FXB was installed in the meantime).

To ensure this, use a template project with the VSTi setup included and put the sounds (track presets) of this template project into specific subfolders, as they only work within this setup.

Data saved in MIDI track presets

- MIDI Modifiers (Transpose etc.)
- MIDI Inserts (FX)
- Output + Channel or Program Change
- Input Transformer
- Volume + Pan

And also:

- Staff settings
- Color settings

⇨ Note that volume and pan will be restored only when creating a new track from a track preset.

Multi track presets

If you select more than one track when creating a track preset, the settings of all selected tracks will be saved as one multi track preset. Since you can apply a multi track preset only if the target tracks are of the same type, number and sequence as the tracks in the track preset, multi track presets are useful when you have a reoccurring situation with very similar tracks and settings.

For example, this would be the case for:

- Recording setups that require several microphones, e.g. when recording a drum set or a choir, where you record always under the same conditions and have to edit the resulting tracks in a similar way.

- Layered tracks, where you use several tracks to generate a certain sound instead of manipulating only one track.

Data saved in multi track presets

For each track type, the respective track preset parameters are saved in the same sequence as the tracks in the Project window.

VST presets

As of VST3, VST presets make it easy for you to work with VST plug-ins and instruments, substituting the .fxp and .fxb files of the VST2 standard.

There are two kinds of VST presets:

- VST presets based on effect plug-ins
- VST presets based on VST Instrument plug-ins

⇨ In this manual, the wording “VST presets” stands for VST3 Instrument presets, unless stated otherwise.

VST effect plug-in presets

VST effect plug-ins are available in VST3 and VST2 format, for example as insert effects like Expander or Limiter. Therefore, VST effect presets can be part of audio track presets, see also “SoundFrame” on page 311.

VST (Instrument) presets

VST3 (Instrument) presets (extension .vstpreset) are media files that can be managed in the Sound Browser and to which you can assign tags. VST presets are also listed in dialogs like the “Add Track” dialog, see below.

The VST presets behave like instrument track presets in the context of the Project window and contain a VST Instrument and its settings but no modifiers, MIDI inserts, inserts or EQ settings:

- You can create instrument tracks from VST presets just like from instrument track presets, see “Creating tracks from track presets or VST presets” on page 333.
  In the Inspector of the new instrument track, the VST Instrument, the selected program and the name of the applied VST preset are displayed.

- You can apply VST presets to instrument tracks just like instrument track presets, see “Applying audio, MIDI and instrument track presets” on page 334.

- When selecting VST presets in the Browse presets section or the Sound Browser, you can preview them like instrument track presets, see “Creating tracks from track presets or VST presets” on page 333.

- Like with instrument tracks presets, you can extract the “sound” of VST presets, see “Extracting sound from an instrument track or VST preset” on page 335.

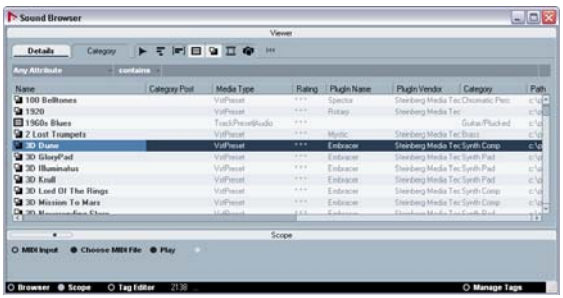
The programs of VST2 plug-ins also can be converted to VST3 presets. For more information about plug-ins, please refer to the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

Browsing for presets

Using the Sound Browser

When browsing track presets, the quickest way is to use the Sound Browser, as it is set up specifically to display track and VST presets.

To open this browser, select “Open Sound Browser” on the Media menu.



The Sound Browser.

In the Sound Browser, you can preview track and VST presets as well as select them to drag and drop them into the project to create new tracks (see “Creating tracks from track presets or VST presets” on page 333) or to apply them to existing tracks (see “Applying audio, MIDI and instrument track presets” on page 334).

The general handling of the Sound Browser is the same as for the MediaBay, see “The MediaBay” on page 314.

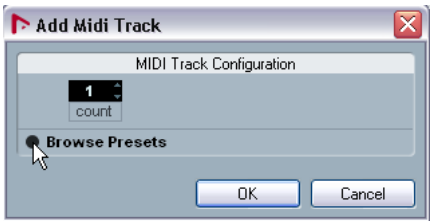
SoundFrame-related dialogs

When you work with track presets, you will find the same user interface in all “Add Track” and “Browse Sounds” dialogs and the Presets browser.

⇨ Note that some of the dialogs will save their last state. They may therefore not look exactly like the dialogs described below.

Browse Presets section

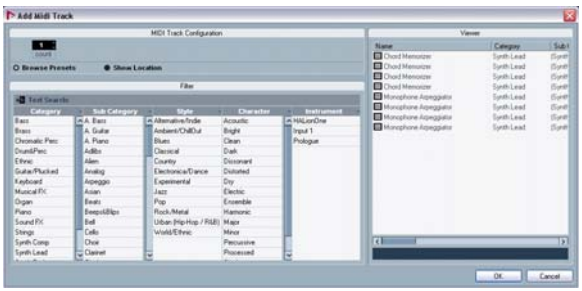
When you create a new track, the Add Track dialog opens:



The “Add MIDI Track” dialog.

(For a more detailed description of the Add Track dialog, see “Handling tracks” on page 38.)

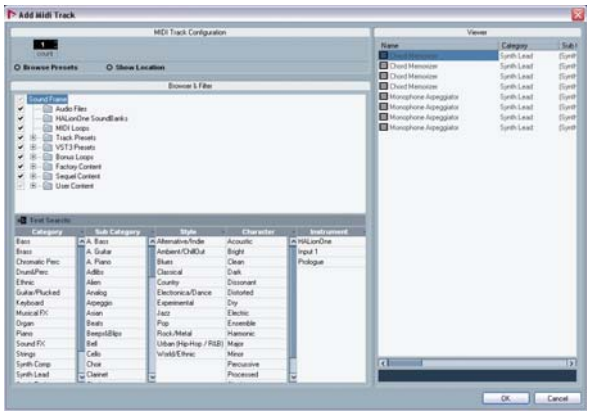
Click “Browse Presets...” to open the Browse Presets section with the Category search and a list of all available presets. For details, see “Performing a Category search” on page 320.



The Add Track dialog with the Browse Presets section opened.

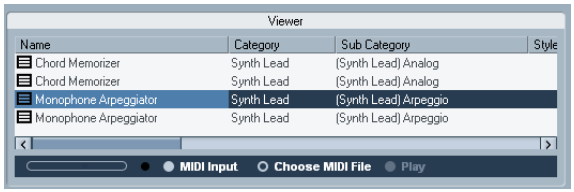
Browser section

In addition to the Browse Presets section, you can click “Show Location” to open the Browser section. It is similar to the one in the MediaBay (see “Browsing for media files” on page 316), but only necessary if you want to take an explicit look at the contents of Presets subfolders, as you can’t move up to other folders.



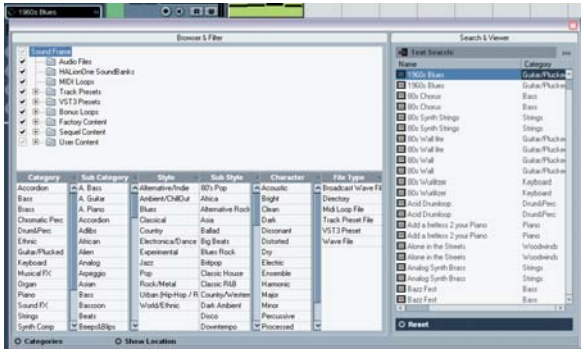
The Add Track dialog for a MIDI track with all sections open.

When you select a MIDI or instrument track preset (or a VST preset), you can see a preview section below the list. The preview works like the one in the Scope section in the MediaBay (see “Previewing MIDI, instrument and VST presets independently of tracks” on page 336).



The Presets browser

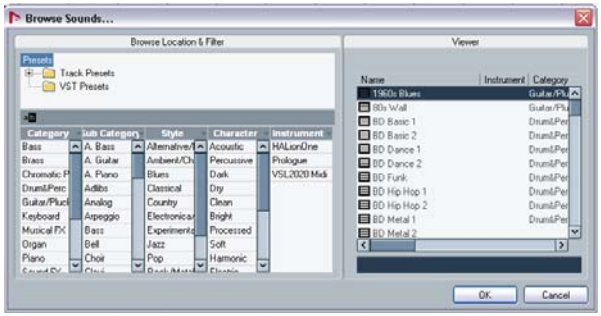
When you apply a track or VST preset to an existing track or when you extract a sound, the Presets browser opens, allowing you e.g. to preview the presets.



The Presets browser for an audio track preset.

The Browse Sounds dialog

Normally, the view of the Browse Presets section is filtered to show only track presets of a certain kind. Therefore, if you want to see all available presets, e.g. also multi track and VST presets, you can open the Browse Sounds dialog.



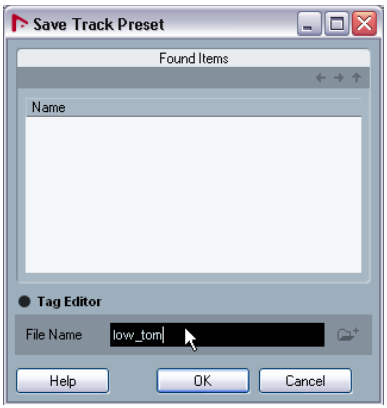
Browse Sounds dialog showing all available track and VST presets.

Creating a track preset

A track preset is created from an existing audio, MIDI or instrument track – or several of these tracks. Proceed as follows:

1. Select one or more tracks in the Project window.
If several are selected, all of them are stored in one combined multi track preset, see "Multi track presets" on page 330.

2. Right-click one of the selected tracks in the track list to open the context menu and select "Create Track Preset".
The Save Track Preset dialog opens. The buttons on top work like the corresponding ones in the MediaBay, see "Folder operations" on page 318.



3. Enter a file name in the "File Name" field.
The track preset file name extension .trackpreset is assigned automatically.

In the case of MIDI files, you have the additional option of including the MIDI channel or the MIDI patch, see "Include MIDI Channel or MIDI Patch" on page 329.

4. If you want to apply tags, click on "Tag Editor".
The available tags are displayed (on how to edit the list of available tags, see "Managing the tag lists" on page 323). To enter a value, click in the value field. For many tags, e.g. "Character" and "Style", pop-up menus open in which you can select an entry. In case of a free text entry, enter the text in the text field. For more information about the Tag Editor, see "Editing tags in the Tag Editor" on page 324.

⇨ As the category search is based on the tags, we highly recommend that you use them.

5. Click OK to create the track preset.

Track presets are saved in the "Track Presets" folder in default subfolders named according to their track type (audio, MIDI, instrument and multi). For further information, see "Where are the settings stored?" on page 514.

⚠ You cannot change the default folders, but you can add further subfolders, e.g. "drums" and "choir".

All presets are available under the (virtual) Sound Frame node, see "The SoundFrame node" on page 318.

Creating tracks from track presets or VST presets

Creating tracks via drag and drop

1. Open the Sound Browser.
You can also drag and drop from the Windows Explorer or the Mac OS Finder, but in this case, no preview for MIDI and instrument track presets is possible.

2. Select a track or VST preset from the list of all presets.
At this point you can preview selected MIDI and instrument track presets as well as VST presets, see "Previewing MIDI, instrument and VST presets independently of tracks" on page 336.

3. Drag and drop the track preset onto the track list in the Project window.
One or more (in case of multi track presets) tracks will be created. If you drag and drop a VST instrument preset, this will result in an instrument track.

Creating tracks in the Browse Sounds dialog

1. Right-click the track list to open the context menu and, on the Add Track submenu, select "Browse Sounds…".
The Browse Sounds dialog opens.

2. Select a track or VST preset from the list of all presets.
At this point you can preview selected MIDI and instrument track presets as well as VST presets, see "Previewing MIDI, instrument and VST presets independently of tracks" on page 336. If you want to list a certain track preset type only, open the respective folder in the Browser section.

3. Click OK to create one or more (in case of multi track presets) tracks.

Creating one or more audio, MIDI or instrument tracks with the Add Track function

1. To create one or more new tracks from a track preset, proceed as if adding a new track by selecting the corresponding option on the context menu (or by using the key command).
A dialog opens, in this example the "Add Audio track" dialog:

- If you want to create more than one track of this type, enter the number in the Count field.

2. Click "Browse Presets" to open the Browse Presets section of the "Add Track" dialog.
The view is filtered to show only the corresponding track presets, e.g. if you choose "Add Audio Track", only audio track presets will be displayed.

3. Select a track or VST preset.
At this point, you can preview selected MIDI and instrument track presets as well as VST presets, see "Previewing MIDI, instrument and VST presets independently of tracks" on page 336.

4. Click OK to create the track(s).
The new track(s) will be named after the original track (not the track preset).

⇨ As adding multiple tracks is not available as menu option, multi track presets can only be used for track creation via drag and drop or the "Browse Sounds" dialog.

Applying track presets

Track presets can be applied to tracks of their own type only, i.e. audio track presets to audio tracks, etc.

When you apply a track preset, all saved settings are applied, see "Types of track presets" on page 328.

- For instrument tracks, VST presets are also available. Since VST presets have no modifiers, MIDI inserts, inserts or EQs, applying them leads to removal of your current settings for these, see "Inserts and EQ settings from track presets" on page 337.

Applying audio, MIDI and instrument track presets

Applying track or VST presets via drag and drop

1. Open the Sound Browser from the Media menu.
You can also drag and drop from the Windows Explorer or the Mac OS Finder, but in this case, no preview for track presets is possible.

2. Select a track or VST preset.
At this point, you can preview selected presets, see "Previewing track or VST presets before applying" on page 336.

3. Drag and drop it onto a track of the same type.

Applying track or VST presets in the Inspector or the context menu of the track

Proceed as follows:

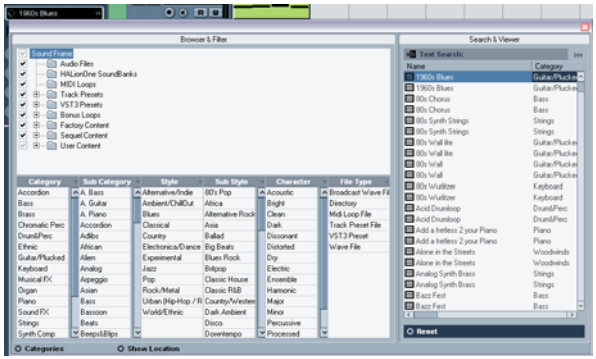
1. Select a track in the Project window.

2. Click the SoundFrame button in the Inspector or right-click the track to open the context menu and select "Apply Track Preset".

Click here to open the Presets browser.

In both cases, the Presets browser opens. Here, the files are sorted by categories.

3. Select a track or VST preset from the list to the right.



At this point you can preview selected presets, see "Previewing track or VST presets before applying" on page 336.

4. Click outside the browser to apply the selected preset or click the Reset button below the list to return to the unchanged track.

⇨ Once the track preset is applied, you cannot undo the changes!

In the Inspector, you can see which preset was applied last, in this example "Jazz Bazz".

Applying a multi track preset

To be able to apply a multi track preset, certain requirements have to be met. Proceed as follows:

1. Select several tracks in your project.
The selected tracks have to be of the same type, number and sequence as the tracks in the track preset.

2. Right-click the track to open the context menu and select "Apply Track Preset".
The Presets browser opens. Only multi track presets corresponding to the selection of tracks in the project will be shown.

3. Select a multi track preset from the list.

4. Click outside the browser to apply the selected preset or click the Reset button below the list to return to the unchanged track.

⇨ Once the track preset is applied, you cannot undo the changes!

Reloading track or VST presets

To revert to the default settings of the applied preset, click the "Reload Track Preset" button.

Applying another track or VST preset

To apply another track or VST preset, open the Presets browser as described above and select another preset.

Removing a track or VST preset from a track

It is not possible to remove an applied preset from a track and return to the previous state. If you are unsatisfied with the track settings, you can either edit the settings manually or apply another preset.

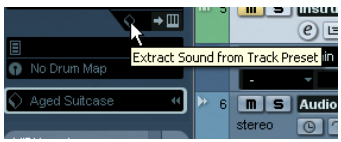
Extracting sound from an instrument track or VST preset

For instrument tracks, you can extract the "sound" of an instrument track preset or VST preset, that means the VST Instrument and its settings.

Proceed as follows:

1. Select the instrument track to which you want to apply a sound.

2. Click the SoundFrame button below the Output Routing field in the Inspector.



The Presets browser opens, showing a list of all available presets.

3. Select an instrument track preset or VST preset and click OK.

The VST instrument and its settings (but no inserts, EQs and modifiers) of the existing track are overwritten with the data of the track preset. The previous VST instrument for this instrument track is removed and the new VST instrument with its settings is set up for the instrument track. Note that the VST instrument of an instrument track does not show up in the VST Instrument window but only in the Plug-In Information window, see the separate manual "Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4".

Previewing track and VST presets

You can preview all types of track and VST presets except for multi track presets.

Previewing track or VST presets before applying

When you apply a track preset to an existing track, the corresponding dialog opens. Here you can preview the track presets before applying them permanently. This works for audio, MIDI and instrument track presets as well as for VST presets.

You can use this preview for listening to the changes in the output in real time. Proceed as follows:

1. Set your target track to cycle and play back the loop.

2. Select a track preset in the list.

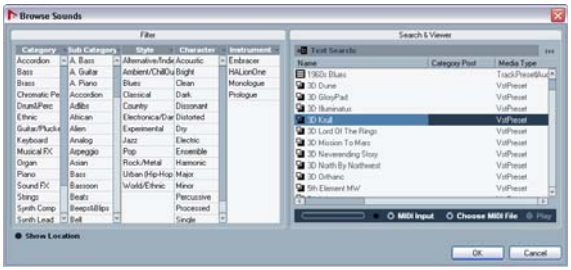
3. Hit the Play button on the Transport panel to listen to the track with all settings from the track preset applied to it.

4. Click outside the browser to apply the selected preset or click the Reset button below the list to return to the unchanged track.

Previewing MIDI, instrument and VST presets independently of tracks

You can also preview MIDI and instrument track presets as well as VST presets in the Sound Browser or in dialogs with the Browse Presets section open.

For example, when you open the "Browse Sounds" dialog and select a MIDI or instrument track preset or a VST preset, preview buttons appear on the lower right. (In the Sound Browser, the preview buttons appear in the Scope section.)



Track-independent preview, for example a VST preset in the "Browse Sounds" dialog.

Two preview options are available:

Previewing with standard MIDI input

1. Click the MIDI Input button.

2. Play some MIDI notes via your MIDI input device, for example a keyboard.

The Activity meter on the far right mirrors the MIDI in activity.

⇨ For this to work, "In All Inputs" has to be activated for your MIDI input device (this is the default setting), as only MIDI data incoming via "All MIDI Inputs" is used for preview.

Previewing using a MIDI file

1. Click the Choose MIDI File button.

A file dialog opens.

2. Select a MIDI file (.mid) to be played back with the track or VST preset applied and click OK.

3. Click the MIDI Input button.

The Play button will become available.

4. Click "Play".

The program applies the track or VST preset to the MIDI file.

- In the Browse Sounds dialog, clicking OK will create a new track (see "Creating tracks in the Browse Sounds dialog" on page 333).

⇨ The MIDI file selection is not saved when closing the dialogs or the Sound Browser. Therefore, you have to select a new file the next time you want to preview a preset using a MIDI file.

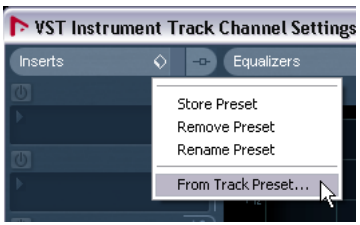
Inserts and EQ settings from track presets

Instead of handling complete track presets, it is also possible to apply settings for Inserts or Equalizers from track presets.

This can be done via the Inspector or via the Channel settings window.

- In the Inspector, select e.g. an Instrument track and click the SoundFrame button on the Inserts or Equalizers tab to open the presets pop-up menu. There, select the option “From Track Preset…”.

- In the Channel Settings window for a MIDI track, instrument track or audio channel track (opened by clicking the “e” button in the Inspector), click on the SoundFrame button in the Inserts section and select “From Track Preset…” in the pop-up menu.



The Presets browser opens, showing all available track presets that contain Inserts or EQ settings. Select the track preset whose Inserts or EQs you want to apply and click outside the browser.

- For information on the general handling of Inserts presets, see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

- For information on the general handling of EQ presets, see “Using EQ presets” on page 140.

24

Track Quick Controls

Introduction

Nuendo can give you instant access to up to eight parameters of each audio track, MIDI track or instrument track. This is done with the aid of the so-called quick controls, set up on the Quick Controls Inspector tab for these tracks.

The Quick Controls tab can be used as a kind of track control center, an area in which your most important parameters are assembled in one place. This saves you from having to click your way through the various windows and sections pertaining to your track.

Also, Nuendo allows you to assign these quick controls very quickly to an external remote control device. This gives you manual control of your most important track parameters.

Setting up the Quick Controls tab

The Quick Controls tab in the track Inspector is available for all audio tracks, MIDI tracks and Instrument tracks. It is displayed by default.

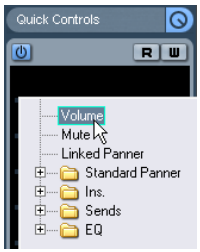
The Quick Controls tab in the Inspector.

Assigning parameters to quick controls

The opened Quick Controls tab shows eight slots, one for each quick control. To start with, these slots are empty. Proceed as follows to assign track parameters to the quick control slots:

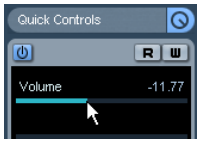
1. In the Quick Controls tab, click on the first quick control slot.

A context menu is opened. This context menu lists all parameters currently accessible for this particular track.



2. Double-click the parameter that you want to assign to the first quick control slot.

The parameter name and its value are displayed in the slot. You can change the value by dragging the quick control's slider.



The track's main volume parameter is assigned to quick control 1.

You can now repeat these steps for each quick control slot until all eight slots are associated with track parameters!

Renaming a quick control

By default, the parameter name as listed in the browser pop-up menu for available track parameters is displayed in the quick control slot.

- To rename a quick control, simply double-click on the name in the slot to select it, enter a new name and press [Enter].

Replacing a quick control assignment

- To replace a parameter assignment with a different parameter, click on the corresponding quick control slot and double-click on a different parameter in the browser pop-up menu list.

The parameter assignment in this slot is changed.

Removing a quick control assignment

To remove a parameter from a slot, you have the following possibilities:

- Double-click the parameter name to select it and press the [Delete] or [Backspace] key. Confirm this operation by pressing [Enter].
- Click in the corresponding slot and select “No parameter” from the browser pop-up menu.

The parameter assignment is removed, and the quick control slot is empty.

Options and settings

- Quick control assignments are saved with the current project.
- Since quick control settings are part of the track setup, you can save them as track presets, allowing you to re-use your settings across different projects.

Track presets are described in the chapter “Track Presets” on page 327.

- You can automate all parameter settings on the Quick Controls tab using the Read/Write Enable buttons (R and W) at the top right.

The automation features of Nuendo are described in detail in the chapter “Automation” on page 213.

Quick controls and automatable parameters

The quick controls feature has one special extension that should be used with caution: you can use quick controls not only to access certain parameters of the current track, but also to control all automatable parameters.

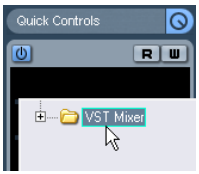
This makes it possible to use the Quick Controls tab of a dedicated track as a kind of “mini mixer”, controlling parameters on other tracks. Proceed as follows:

1. Create a new, empty audio track and open its Quick Controls tab.

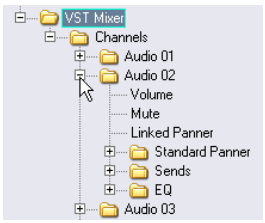
This track has no events or parts.

2. Hold down the [Ctrl]/[Command] key and click on the slot for quick control 1.

The parameter selection context menu is opened, but it lists not the parameters of the current track, but all automatable parameters.



3. Click the + sign in the list to open the VST Mixer folder.



The pop-up lists all channels available in the mixer of your current project.

4. Now assign a parameter of one particular channel to quick control 1, and another parameter of another channel to quick control 2.

Here, quick controls 1-5 have been set up to control the main volume of five audio tracks.

The Quick Controls tab has become a “secondary” mixer, dedicated to quick-controlling parameters on other tracks.

⚠ Quick controls that are assigned that way cannot work when saved as track presets.

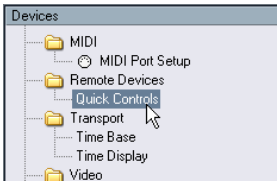
Setting up quick controls on an external remote controller

Quick controls become really powerful when used in combination with a remote controller.

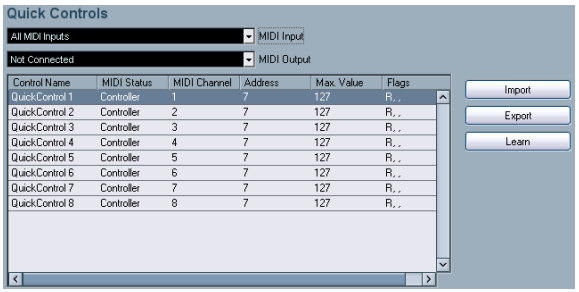
Setting up the connection between the slots on the Quick Controls Inspector tab and a remote control device is easy. Proceed as follows:

1. In Nuendo, open the Device Setup dialog from the Devices menu.

2. In the Devices list on the left, select the Quick Controls option.



This will open the Quick Controls section on the right of the dialog:



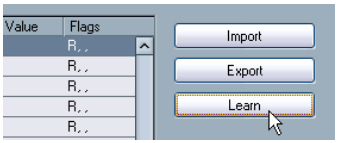
3. With your remote controller device connected to Nuendo via MIDI, select the corresponding MIDI port on your computer in the MIDI Input pop-up (or select “All MIDI Inputs”).
If your remote controller has its own MIDI input and supports MIDI feedback, you can connect your computer to the device input. Then, select the corresponding MIDI port in the MIDI Output pop-up.

4. Click “Apply” to apply your settings.

5. Select “QuickControl1” in the “Control Name” column.

6. Move the control (knob, fader or other) on your remote control device that you want to use for the first quick control.

7. In the Device Setup dialog, click the Learn button.



8. Repeat the last 3 steps for the other quick controls.

You have now associated the slots on the Quick Control tab with control elements on your external remote controller. Moving a control element will automatically change the value of the parameter assigned to the corresponding quick control.

- The remote controller setup for quick controls is saved globally, i.e. independent of any projects.
If you have various remote controllers, you can store and load several quick control setups using the Export and Import buttons.

25

MIDI realtime parameters and effects

Introduction

For each MIDI track, you can set up a number of track parameters, or modifiers, and MIDI effects. These affect how the MIDI data is played back, “transforming” MIDI events in real time before they are sent to the MIDI outputs.

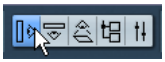
On the following pages, the available parameters and effects are described. Keep in mind:

- The actual MIDI events will not be affected – the changes happen “on the fly”.
- Since the modifier settings don’t change the actual MIDI data on the track, they will not be reflected in the MIDI editors. To convert the track settings to “real” MIDI events, use the Freeze MIDI Modifiers function or the Merge MIDI in Loop function (see “Making your settings permanent” on page 357).

The Inspector – General handling

The MIDI modifiers and effects are set up in the Inspector (although some settings are available in the mixer as well). Here’s a brief rundown on how to handle the Inspector:

- To show or hide the Inspector, click the Inspector icon on the Project window toolbar.



- For a MIDI track, up to nine sections are available. Which of these sections are displayed in the Inspector is determined in the setup context menu or the Setup dialog of the Inspector.

  For information about setting up the Inspector, see “The Setup dialogs” on page 506.

- You can fold or unfold the sections individually by clicking on the section name.

  Clicking the name for a hidden section brings it to view and hides the other sections. [Ctrl]/[Command]-clicking the tab allows you to hide or show a section without affecting other sections. Finally, [Alt]/[Option]-clicking a tab shows or hides all sections in the Inspector.

The Inspector for a MIDI track.

⇨ Folding or hiding (via the Setup dialog) a section does not affect the functionality but merely hides the section from view.

This means your settings will still be active even if you fold or hide the Inspector settings.

Basic track settings

The topmost Inspector section contains the basic settings for the selected MIDI track.

These are settings that either affect the basic functionality for the track (mute, solo, enable record, etc.) or send out additional MIDI data to the connected devices (program change, volume, etc.). The section contains all settings in the Track list (see "The Track list" on page 25), with a few additional parameters:

Parameter	Description
Track name field	Click once to show/hide the topmost Inspector section. Double-click to rename the track.
Edit button	This opens the Channel Settings window for the track (a window showing a channel strip with volume fader and other controls, along with effect settings – see "Using Channel Settings" on page 137).
Mute/Solo buttons	Mutes or solos the MIDI track.
Read/Write buttons	Used for automating the track settings – see "Enabling and disabling the writing of automation data" on page 214.
Open Device Panels button	If the MIDI track is routed to a device with a panel, clicking this button opens the respective panel. For more information, see the separate PDF document "MIDI Devices".
Input transformer button	Opens the Input Transformer dialog, allowing you to transform incoming MIDI events in real time, see "The Input Transformer" on page 397.
Record enable button	Activate this to make the track ready for recording.
Monitor button	When this is activated (and the option "MIDI Thru Active" is activated in the Preferences–MIDI page), incoming MIDI will be routed to the selected MIDI output.
Toggle Time-base button	Switches between musical (tempo related) and linear (time related) time base for the track. See "Switching between musical and linear time base" on page 40.
Lock button	Activate this to disable all editing of all events on the track.
Lane Display Type button	Allows you to divide the tracks in lanes. For more about lanes, see "Recording audio in Stacked mode" on page 75.
Volume	Use this to adjust the level for the track. Changing this setting will move the track's fader in the mixer window, and vice versa. See "Setting volume in the mixer" on page 132 for more about setting levels.
Pan	Use this to adjust the panning of the track.
Delay	This adjusts the playback timing of the MIDI track. Positive values delay the playback while negative values cause the track to play earlier. The values are set in milliseconds.
In/Out/Chn pop-ups	This is where you select MIDI input, MIDI output and MIDI channel for the track.
Edit Instrument button	If the MIDI track is routed to a VST instrument, clicking this button opens the control panel for the VST instrument.
Bank and Patch Selector pop-up	Allows you to select a sound, see below. (If no bank is available, only the Patch selector is shown.)
Apply Track Preset button	Allows you to apply a track preset, see "Applying track presets" on page 334.

⇨ Note that the functionality of the Bank and Patch selector settings (used for selecting sounds in the connected MIDI instrument) depends on the instrument to which the MIDI output is routed, and how you have set it up in the MIDI Device Manager.

The MIDI Device Manager allows you to specify which MIDI instruments and other devices are connected to the various MIDI outputs, thus making it possible to select patches by name. See the separate PDF document "MIDI Devices" for details about the MIDI Device Manager.

⇨ Many of the basic track settings are duplicated in "mixer channel strip form" in the MIDI Fader section of the Inspector (see below).

Other Inspector sections

Apart from the basic track settings (see above), the MIDI Modifiers (see “MIDI Modifiers” on page 346) and the effect sections (see “MIDI effects” on page 348), the Inspector for a MIDI track also contains the following sections:

The MIDI Fader section

This contains a single channel strip, allowing you to set volume, pan, mute/solo and other parameters for the track, and a panel view of the active sends/inserts. This is a “mirror” of the track’s channel strip in the Nuendo mixer – see “The MIDI channel strips” on page 131.

The Notepad section

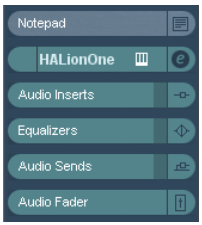
This is a standard notepad, allowing you to enter notes and comments about the track. Each track has its own notepad in the Inspector.

The Network section

This contains controls related to Nuendo’s Network functions. See the Networking pdf document for information.

VST Instrument section

If the MIDI track is routed to a VST Instrument, a new subpanel will appear at the bottom of the Inspector, labeled with the name of the VST instrument. Clicking this section shows a duplicate of the Inspector settings for the VST Instrument channel. This makes it easy to adjust the channel settings for the VST Instrument while you are editing the MIDI track.



- If the VST Instrument has multiple outputs (and thus several mixer channels), there will be a setting called “Output” at the top of the VST Instrument section.

New sub-panels will also be added in the following cases:

- When a MIDI track is routed to an external instrument or effect that has an associated MIDI Device. In this case, the new subpanel will get the name of the device.
- When a MIDI track is routed to an effect plug-in that also receives audio data, i.e. that is used as an insert effect for an audio track (e.g. MIDI Gate), a sub-panel for this audio track appears in the MIDI track inspector.
- If a MIDI track is routed to a plug-in assigned to a FX Channel track, a corresponding FX sub-panel is added to the Inspector.

⇨ For an easy way to combine MIDI and VST instruments, check out instrument tracks (see “VST Instruments and Instrument tracks” on page 189).

User Panel section

This allows you to display MIDI device panels, which are control panels for external hardware. This is described in the separate PDF document “MIDI Devices”.

Quick Controls section

This allows you to configure quick controls, e.g. to use remote devices. See the chapter “Track Quick Controls” on page 338.

MIDI Modifiers

The following settings will affect the MIDI events on the track in real time during playback. They will also be in effect if you play “live” with the track selected and record enabled (provided that “MIDI Thru Active” is activated on the Preferences–MIDI page). This makes it possible to e.g. transpose or adjust the velocity of your live playing.

⇨ If you want to compare the result of your modifier settings with the “unprocessed” MIDI, you can use the Bypass button in the MIDI Modifiers section.
When this is activated, the MIDI Modifiers settings will be temporarily disabled. A bypassed section is indicated by a yellow Bypass button.

Transpose

This allows you to transpose all notes on the track in semitones. The available range is -127 to +127 semitones, but remember that the total range of MIDI note numbers is 0 to 127. Furthermore, not all instruments can play back notes over the whole range. Therefore, extreme transpositions can give rather strange and unwanted results.

- You can also transpose individual MIDI parts using the Transpose field in the info line.
The transposition in the info line (for the individual part) is added to the transpose value you have set up for the whole track in the Inspector.

⇨ This setting is also affected by the global Transpose settings. For detailed information, see the chapter “The Transpose functions” on page 114.

Velocity Shift

This setting lets you change the dynamics of all notes on the track. The value in this field is added to the velocity of each note message that is sent out (use negative values to lower the velocities). The range is -127 to +127 with 0 representing no change in velocity.

Note that the effect of changing the velocity depends on the sound and instrument.

⇨ You can also adjust the velocity of events in individual MIDI parts using the Velocity field in the info line.
The velocity shift in the info line (for the individual part) is added to the velocity shift you have set up for the whole track in the Inspector.

Velocity Compression

This function multiplies the velocity values with the factor you specify. This factor is set using a numerator (left value) and a denominator (right value), resulting in a fractional number (1/2, 3/4, 3/2 etc.). For example, if you set the factor to 3/4, the velocities will be three quarters of their original values. This will also affect the difference in velocity between the notes, thus compressing or expanding the velocity scale. Typically, you would combine this setting with the Velocity Shift parameter. An example:

Let’s say you have three notes with the velocity values 60, 90 and 120, and wish to “even out” the velocity differences somewhat. If you set the Velocity Compression value to 1/2, the notes will play back with the velocities 30, 45 and 60. By adding 60 in the Velocity Shift field, the notes will play back with the velocities 90, 105 and 120, meaning you have compressed the velocity range.

In a similar way, you can use Velocity Compression values greater than 1/1 together with negative values in the Velocity Shift field, to expand the velocity range.

⚠ Remember that the maximum velocity is always 127 no matter how much you try to expand.

Length Compression

This value adjusts the lengths of all notes on the track. As with Velocity Compression, the value is set with a numerator and denominator. For example, the value 2/1 means that all note lengths will be doubled, while 1/4 means all note lengths will be a quarter of the actual lengths.

Random

The Random settings let you introduce random variations to various properties of MIDI notes. Anything from very subtle variations to dramatic changes can be applied. There are two separate "random generators", set up in the following way:

1. Pull down the Random pop-up menu and select which note property should be randomized.
The options are position, pitch, velocity and length.

⇨ Keep in mind that depending on the content of the track, certain parameter changes might not be immediately noticeable or have any effect at all (as would be the case if applying random length to a percussion track playing "one-shot" samples for example).
To best audition the random changes, choose a track with clearly defined rhythm and note content (as opposed to a string pad).

2. Set the desired range of random deviation by entering values in the two number fields.
The two values govern the limits of the randomization, so that the values will vary between the left value and the right value (you cannot set the left value higher than the right value). The maximum random range for each property is listed in the table below:

Property	Range
Position	-500 to +500 ticks
Pitch	-120 to +120 semitones
Velocity	-120 to +120
Length	-500 to +500 ticks

⇨ You can make independent settings for the two random generators.

▪ To deactivate the Random function, pull down the Random pop-up menu(s) and select "OFF".

Range

The Range function lets you specify a note (pitch) or velocity range and either force all notes to fit within this range, or exclude all notes outside this range from playback. As with the Random function, there are two separate Range settings. Set them up as follows:

1. Pull down the Range pop-up menu and select one of the following four modes:

Mode	Description
Vel. Limit	This function affects all velocity values outside the specified range. Velocity values below the Min setting (the lower limit of the range) are set to the Min value, and velocity values above the Max setting are set to the Max value. Notes with velocity values within the set range are not affected. Use this if you want to force all velocity values to fit within a certain range.
Vel. Filter	Velocity Filter works by excluding all notes with velocity values outside the specified range. Notes with velocity values below the Min setting or above the Max setting will not be played back. Use this to "isolate" notes with certain velocity values.
Note Limit	This function allows you to specify a pitch range, and forces all notes to fit within this range. Notes outside the specified range are transposed up or down in octave steps until they fit within the range. Note: If the range is too "narrow", so that some notes cannot be fit within the range by octave-transposing, these notes will get a pitch in the middle of the range. For example, if you have a note with a pitch of F3, and the range is C4-E4, that note will be transposed to D4.
Note Filter	Note Filter works by excluding all notes with pitches outside the specified range. Notes lower than the Min setting or higher than the Max setting will not be played back. Use this to "isolate" notes with certain pitches.

2. Use the two fields to the right to set the minimum and maximum values.
These values will be shown as numbers (0-127) for the velocity modes and as note numbers (C-2 to G8) for the pitch modes.

⇨ Note that you can make independent settings for the two Range functions.

▪ To deactivate the Range function, pull down the Range pop-up menu(s) and select "OFF".

MIDI effects

Nuendo comes with a number of MIDI effect plug-ins, capable of transforming the MIDI output from a track in various ways.

Just like the MIDI modifiers, MIDI effects are applied in real time to the MIDI data played back from the track (or to MIDI you play live “thru” the track).

What are MIDI effects?

Although a MIDI effect can be similar to an audio effect, it’s important to remember that you’re not processing the sound resulting from MIDI playback, but the MIDI data (the “instructions” for how the music should be played back).

A MIDI effect will change properties of the MIDI events (e.g. change the pitch of notes) and/or generate new MIDI events (for example, a MIDI delay may add new MIDI notes, “echoing” the original notes).

⇨ The included MIDI effect plug-ins are described in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

Insert and send effects

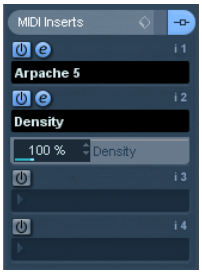
As with audio effects, there are two ways to route the MIDI events on a track to an effect:

⇨ If you add an insert effect, the MIDI events will be sent to the effect, which will process the data and pass it on to the track’s MIDI output (or to another insert effect).
In other words, the MIDI events will be routed “through” the insert effect.

⇨ If you use a send effect, the MIDI events will be sent both to the track’s MIDI output and to the effect.
That is, you will get both the unprocessed MIDI events and the output of the MIDI effect. Note that the effect can send its processed MIDI data to any MIDI output – not necessarily to the one used by the track.

There are separate sections in the Inspector for MIDI inserts and MIDI sends.

MIDI Inserts section



This allows you to add up to four MIDI insert effects. The section contains the following items:

Item	Description
Preset Management button	Click this to open the track presets pop-up menu and select an insert preset or apply an insert from a track preset, see “Inserts and EQ settings from track presets” on page 337.
Bypass button	Click this to temporarily disable all insert effects for the track (useful for comparing with the unprocessed MIDI, etc.).
Inserts section tab	This is in blue if an insert effect is activated.
Effect selection pop-up menu (x 4)	Selecting an effect from this pop-up menu automatically activates it and brings up its control panel (which can be a separate window or a number of settings below the insert slot in the Inspector). To remove an insert effect completely, select “No Effect”.
On button (x 4)	Allows you to turn the selected effect on or off.
Edit button (x4)	Click this to bring up the control panel for the selected effect. Depending on the effect, this may appear in a separate window or below the insert slot in the Inspector. Clicking the button again hides the control panel.

⇨ Effects that display their controls in the Inspector can be opened in a separate control panel window by pressing [Alt]/[Option] and clicking the Edit button.

MIDI Sends section

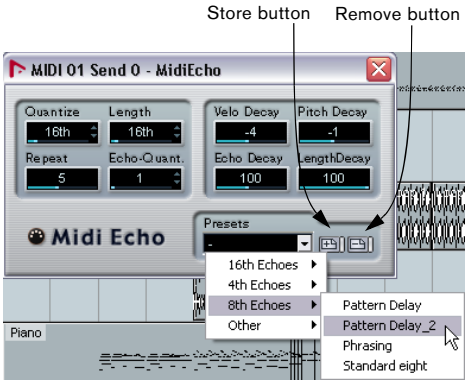
This allows you to add up to four MIDI send effects. Unlike audio send effects, you can select and activate send effects individually for each track. The section contains the following items:

Item	Description
Bypass button	Click this to temporarily disable all send effects for the track (useful for comparing with the unprocessed MIDI, etc.).
Sends section tab	This is in blue if any send effect is activated.
Effect selection pop-up menu (x 4)	Selecting an effect from this pop-up menu automatically activates it and brings up its control panel (which can be a separate window or a number of settings below the send slot in the Inspector). To remove a send effect completely, select “No Effect”.
On button (x 4)	Allows you to turn the selected effect on or off.
Pre/Post button (x4)	If this is activated, the MIDI signals will be sent to the send effects before the MIDI modifiers and insert effects.
Edit button (x4)	Click this to bring up the control panel for the selected effect. Depending on the effect, this may appear in a separate window or below the sends slot in the Inspector. Clicking the button again hides the control panel.
Output pop-up menu (x4)	This determines to which MIDI output the effect should send the processed MIDI events.
Channel setting (x4)	This determines on which MIDI channel the effect should send the processed MIDI events.

⇨ Effects that display their controls in the Inspector can be opened in a separate control panel window by pressing [Alt]/[Option] and clicking the Edit button.

About presets

Several of the MIDI plug-ins come with a number of presets for instant use. The controls for handling presets consist of a Presets pop-up menu along with Store (+) and Remove (-) buttons.



- To load a preset, select it from the Presets pop-up menu.
- To store your current settings as a preset, click the (+) button to the right.

  A dialog appears, asking you to specify a name for the preset. The stored preset will then be available for selection from the pop-up menu for all instances of that MIDI plug-in, in all projects.
- To remove a stored preset, select it and click the (-) button to the right.

Applying a MIDI insert effect – an example

Here is a step-by-step example of how to add a MIDI insert effect to a MIDI track:

1. Select the MIDI track and open the Inspector.

2. Open the MIDI Inserts tab in the Inspector.

- Alternatively you could use the mixer: bring up the extended mixer panel and select “Inserts” on the view options pop-up menu for the track’s channel strip.

3. Click in one of the insert slots to open the MIDI effect pop-up menu.

4. Select the desired MIDI effect from the pop-up menu.
The effect is automatically activated (the power button for the insert slot lights up) and its control panel appears, either in a separate window or in the MIDI Inserts section below the slot (depending on the effect).

Now all MIDI from the track will be routed through the effect.

5. Use the control panel to make settings for the effect.
All included MIDI effects are described in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.

- You can bypass the insert effect by clicking its power button (above the insert slot).

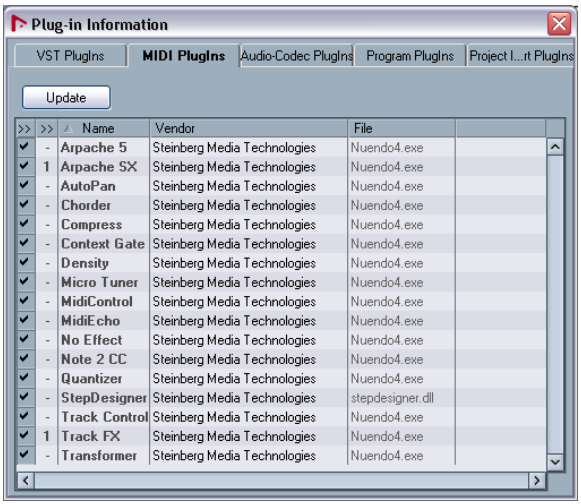
- To bypass all insert effects for the MIDI track, use the bypass button in the MIDI Inserts section in the Inspector, in the mixer channel strip or in the Track list.

- To remove an insert effect, click in its slot and select “No Effect”.

Managing plug-ins

Selecting Plug-in Information from the Devices menu opens a window in which all loaded plug-ins, audio and MIDI, are listed.

- To view the MIDI effect plug-ins, click the MIDI Plug-ins tab.



- The leftmost column allows you to deactivate plug-ins.
This is useful if you have plug-ins installed that you don’t want to use in Nuendo. Only plug-ins that are activated (ticked checkbox) will appear on the MIDI effect pop-up menus.
Note that plug-ins that are currently in use cannot be deactivated.

- The second column shows how many instances of each plug-in are currently used in the project.

- The remaining columns show various information about each plug-in and cannot be edited.

26

MIDI processing and quantizing

Introduction

This chapter describes the various MIDI processing functions available on the MIDI menu. They offer various ways to edit MIDI notes and other events, either in the Project window or from within a MIDI editor.

MIDI functions vs. MIDI modifiers

In some cases, the result of a MIDI function can also be obtained by using MIDI modifiers and effects (see "MIDI realtime parameters and effects" on page 342). For example, the operations "Transpose" and "Quantize" are available as MIDI modifiers as well as MIDI functions.

The main difference is that MIDI modifiers and effects don't affect the actual MIDI events on the track in any way, while MIDI functions change the events "permanently" (although recent changes can be undone).

Use the following guidelines to decide which path to choose for operations that are available both as modifiers or effects and as functions:

- If you want to adjust a few parts or events only, use MIDI functions. The MIDI modifiers and effects affect the output of the whole track (although they can be made permanent in a specific area with the Merge MIDI in Loop function).
- If you want to experiment with different settings, use MIDI modifiers and effects.
- MIDI modifiers and effects settings are not reflected in the MIDI editors, since the actual MIDI events aren't affected. This can be potentially confusing; if you've e.g. transposed notes using modifiers, the MIDI editors will still show the notes with their original pitch (but they will play back at their transposed pitch). Therefore MIDI functions are a better solution if you want to see the effects in the MIDI editors.

What is affected by the MIDI functions?

Which events are affected when you use a MIDI function depends on the function, the active window and the current selection:

- Some MIDI function only apply to MIDI events of a certain type.

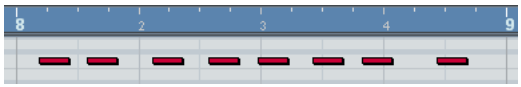
  For example, quantization affects notes only, while the Delete Controllers function obviously applies to MIDI controller events.
- In the Project window, the MIDI functions apply to all selected parts, affecting all events (of the relevant types) in them.
- In the MIDI editors, the MIDI functions apply to all selected events. If no events are selected, all events in the edited part(s) will be affected.

The Quantizing functions

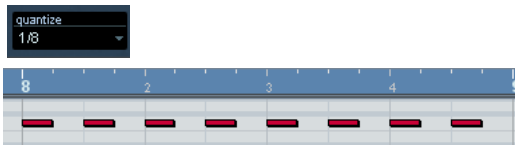
What is quantizing?

Quantizing in its fundamental form is a function that automatically moves recorded notes, positioning them on exact note values:

For example, if you record a series of eighth notes, some of them may end up slightly beside the exact eighth note positions.



Quantizing the notes with the quantize grid set to eighth notes will move the "misplaced" notes to exact positions.



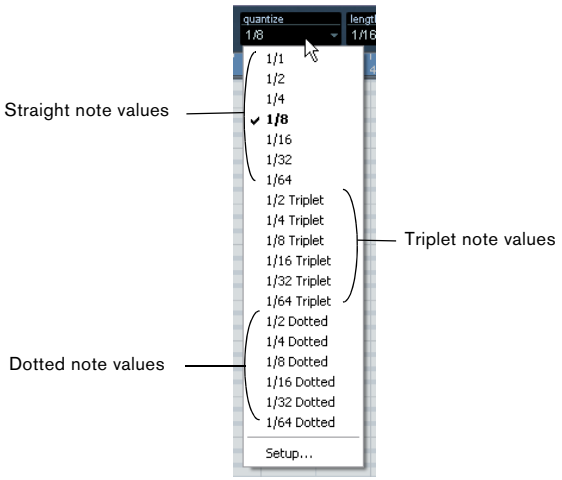
However, quantizing is not only a method of correcting errors, it can also be used creatively in various ways. For example, the "quantize grid" does not have to consist of perfectly straight notes, some notes can automatically be excluded from quantizing, etc.

⇨ When quantizing MIDI, only MIDI notes are affected (no other event types).

However, you can choose to move the controllers together with their respective notes by activating the "Move Controller" option in the Quantize Setup dialog, see "The Move Controller setting" on page 355.

Setting up quantize on the toolbar

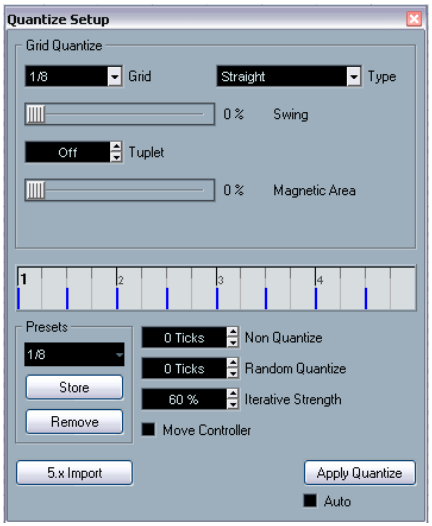
At its most basic, setting up quantizing consists of selecting a note value from the Quantize pop-up menu on the toolbar (in the Project window or a MIDI editor).



This allows you to quantize to exact note values (straight, triplet or dotted notes) only.

Setting up quantize in the Quantize Setup dialog

If you want more options than those available on the pop-up menu, select “Quantize Setup…” from the MIDI menu (or “Setup…” from the Quantize pop-up menu) to open the Quantize Setup dialog.



⚠ Any settings you make in the dialog are immediately reflected in the Quantize pop-up menus. However, if you want your settings permanently available on the Quantize pop-up menus, you have to use the presets functions (see “Presets” on page 354).

The grid display in the middle of the dialog shows one bar (four beats), with blue lines indicating the quantize grid (the positions that notes will be moved to). Value changes in the grid, presets and quantize options will be graphically reflected here, see below.

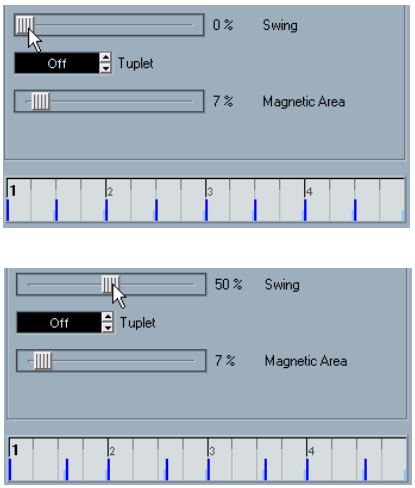
The Quantize Setup dialog contains the following settings:

The Grid and Type pop-ups

These are used to determine the basic note value for the quantizing grid. In other words, these have the same functionality as the Quantize pop-up menu on the toolbar.

Swing

The Swing slider is only available when a straight note value is selected for the grid and Tuplet is off (see below). It lets you offset every second position in the grid, creating a swing or shuffle feel. When you adjust the Swing slider, the result is shown in the grid display.



A straight eighth note grid compared with a grid with 60% swing.

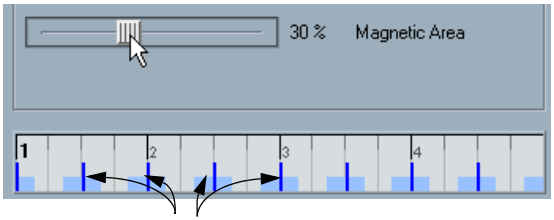
Tuplet

Allows you to create more rhythmically complex grids by dividing the grid into smaller steps.

Magnetic Area

This allows you to specify that only notes within a certain distance from the grid lines should be affected by quantizing.

- When the slider is set to 0%, the Magnetic Area function is deactivated, i.e. all notes are affected by quantizing.
  If you move the slider gradually to the right, you will note how the magnetic areas are shown around the blue lines in the grid display.



Only notes within the indicated zones will be affected by quantizing.

Presets

The controls in the lower left corner of the dialog allow you to store the current settings as a preset, which will then be available on the Quantize menus on the toolbars. The usual preset procedures apply:

- To store the settings as a preset, click the Store button.
- To load a stored preset into the dialog, just select it from the pop-up menu.
  This is useful if you want to modify an existing preset.
- To rename the selected preset, double-click on the name and type in a new one.
- To remove a stored preset, select it from the pop-up menu and click Remove.
- You can also create presets by extracting existing grooves from a MIDI part.
  Just select the desired MIDI part and drag it on the grid display in the middle of the Quantize Setup dialog or open the Advanced submenu on the MIDI menu and select “Part to Groove” (see “Part to Groove” on page 356).

Apply and Auto

These functions allow you to apply quantizing directly from the dialog, see below.

⚠ If you don't want to apply the quantizing you have set up in the dialog, close the window by clicking its standard close box.

The Non Quantize setting

This additional setting affects the result of the quantizing. It allows you to set a "distance" in ticks (120ths of sixteenth notes).

Events that already are within the specified distance from the quantize grid will not be quantized. This allows you to keep slight variations when you quantize, but still correct notes that are too far from the grid.

The Random Quantize setting

This additional setting affects the result of the quantizing. It allows you to set a "distance" in ticks (120ths of sixteenth notes).

Events will be quantized to random positions within the specified "distance" from the quantize grid, thus creating a more "loose" quantizing. Much like the Non Quantize setting, this allows for slight variations, while at the same time keeping notes from ending up too far from the grid.

The Iterative Strength setting

Here you specify how much the notes should be moved towards the grid when using the Iterative Quantize function, see below.

The Move Controller setting

When this is activated, controllers related to notes (pitch bend, etc.) are automatically moved with the notes when these are quantized.

Applying quantize

There are several ways to apply the quantize:

- The standard method is to select "Over Quantize" from the MIDI menu (or using a key command, by default [Q]). This quantizes the selected MIDI parts or notes according to the current Quantize pop-up menu setting.
- You can also apply quantizing directly from the Quantize Setup dialog, by clicking the "Apply Quantize" button.
- If you activate the "Auto" checkbox in the Quantize Setup dialog, any change you make in the dialog is immediately applied to the selected MIDI parts or notes. A great way of using this feature is to set up a playback loop, and adjust the settings in the dialog until you get the desired result.

⚠ When you apply quantize, the result is based on the original position of the notes. Therefore, you can freely try out different quantize settings with no risk of "destroying" anything. See also "Undo Quantize" on page 356.

The Auto Quantize function

If you activate the Auto Q button on the Transport panel, all MIDI recordings you make are automatically quantized according to the settings you have made in the Quantize Setup dialog.

Iterative Quantize

Another way to apply "loose" quantization is to use the Iterative Quantize function on the MIDI menu. It works like this:

Instead of moving a note to the closest quantize grid position, Iterative Quantize moves it only part of the way. You specify how much the notes should be moved towards the grid with the "Iterative Strength" setting in the Quantize Setup dialog.

Iterative Quantize also differs from "regular" quantization in that the operation is not based on the notes' original positions but on their current, quantized position. This makes it possible to repeatedly use Iterative Quantize, gradually moving the notes closer to the quantize grid until you've found the desired timing.

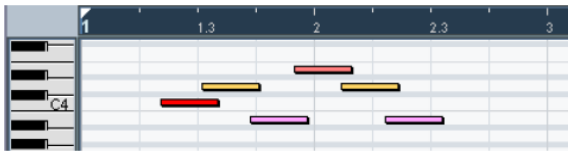
Advanced Quantize functions

Quantize Lengths

⚠ This function is only available from within the MIDI editors.

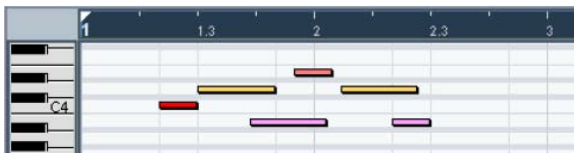
This function (on the Advanced Quantize submenu on the MIDI menu) will quantize the length of the notes, without changing their start positions. At its most basic level, this function will set the length of the notes to the Length Quantize value on the MIDI editor toolbar. However, if you have selected the “Quantize Link” option on the Length Quantize pop-up menu, the function will resize the note according to the quantize grid, taking the Swing, Tuplet and Magnetic Area settings into account. An example:

1. Length Quantize set to “Quantize Link”.



2. Some 1/16th notes.

3. Here, the quantize value has been set to straight 1/16th notes with Swing at 100%. Since Snap is activated (see “Snap” on page 370), the quantize grid is reflected in the note display’s grid.



4. Selecting Quantize Lengths will adjust the note lengths according to the grid. If you compare the result to the first figure above, you will find that notes that started within the odd sixteenth note “zones” show the longer grid length, and notes in the even zones have the shorter length.

Quantize Ends

The Quantize Ends function on the Advanced Quantize submenu will only affect the end positions of notes. Apart from that, it works just like regular quantizing, taking the Quantize pop-up menu setting into account.

Undo Quantize

As mentioned above, the original position of each quantized note is stored. Therefore, you can make the selected MIDI notes revert to their original, unquantized state at any time by selecting Undo Quantize from the Advanced Quantize submenu. This is independent from the regular Undo History.

Freeze Quantize

There may be situations when you want to make the quantized positions “permanent”. For example, you may want to quantize notes a second time, having the results based on the current quantized positions rather than the original positions. To make this possible, select the notes in question and select “Freeze Quantize” from the Advanced Quantize submenu. This makes the quantized positions permanent.

⚠ After you have performed a Freeze Quantize for a note, you cannot undo its quantization.

Part to Groove

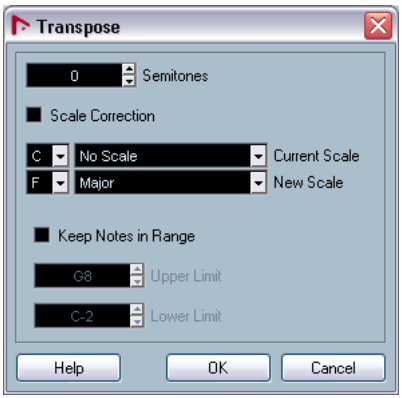
With this function, you can extract the groove from a selected MIDI part and turn it into a Quantize preset.

You can also extract grooves from audio, using e.g. hitpoints (see “Creating groove quantize maps” on page 283), or audio parts, rex parts or drum parts that have been processed with the Detect Silence function. Since audio contains no velocity information, velocity will remain unchanged after applying a Groove that you extracted from audio.

In both cases, the resulting groove appears on the Quantize menus and you apply it as you would any Quantize preset. You can also view and edit the resulting quantize settings in the Quantize Setup dialog.

Transpose

The Transpose item on the MIDI menu opens a dialog with settings for transposing the selected notes:



⇨ You can also use the Transpose track for transposing, see "The Transpose functions" on page 114.

Semitones

This is where you set the amount of transposition.

Scale Correction

Scale Correction transposes the selected notes by forcing them to the closest note of the selected scale type. This can be used for creating interesting key and tonal changes, either by itself or in conjunction with the other settings in the Transpose dialog.

- To activate Scale Correction, click the checkbox.
- Select a root note and scale type for the current scale from the upper pop-up menus.
- Select a root note and scale type for the new scale from the lower pop-up menus.
  Make sure to select the correct root note if you want to keep the result in the same key as the original notes, or select an entirely different key if you want to experiment.

Keep Notes in Range

When this is activated, transposed notes will remain within the Upper and Lower Limit values.

- If a note ends up outside the limits after transposition, it will be shifted to another octave, keeping the correct transposed pitch if possible.
  If this isn't possible (if you have set a very narrow range between the Upper and Lower Limit), the note will be transposed "as far as possible", i.e. to the Upper or Lower Limit note. If you set the Upper and Lower Limits to the same value, all notes will be transposed to this pitch!

OK and Cancel

Clicking OK performs the transposition. Clicking Cancel closes the dialog without transposing.

Making your settings permanent

The settings described in the chapter "MIDI realtime parameters and effects" on page 342 do not change the MIDI events themselves, but work like a "filter", affecting the music on playback. Therefore, you may want to make them permanent, i.e. convert them to "real" MIDI events, for example to transpose a track and then edit the transposed notes in a MIDI editor. For this, you can use two commands from the MIDI menu:

- "Freeze MIDI Modifiers" – This applies all filter settings permanently to the respective track.
  With this function, the settings are "added" to the events on the track, and all modifiers will be set to zero.
- "Merge MIDI in Loop" – This merges all selected tracks (or parts) to create a new track.
  The settings are applied during the merge and will still be displayed later in the respective menus.

These two functions are described in the following sections.

Freeze MIDI Modifiers

The “Freeze MIDI Modifiers” function affects the following settings for MIDI tracks:

- Several settings on the main tab of the Inspector (program and bank selection and the Delay parameter).
- The settings on the MIDI Modifiers tab (i.e. Transpose, Velocity Shift, Velocity Compression and Length Compression).
- The settings on the MIDI Inserts tab (if, e.g., you are using an arpeggiator and want to convert the added notes to real events).

The following settings for MIDI parts are taken into account as well:

- The Transpose and Velocity settings for parts displayed on the info line – the Volume setting is not taken into account.

To use the “Freeze MIDI Modifiers” function, proceed as follows:

1. Select the desired MIDI track.
2. Pull down the MIDI menu and select “Freeze MIDI Modifiers”.
The Inspector settings will be converted to MIDI events and inserted at the beginning of the part(s). All notes of the part(s) will be modified accordingly and the Inspector settings will be reset.

Merge MIDI in Loop

The function “Merge MIDI in Loop” combines all MIDI events on all unmuted tracks, applies MIDI modifiers and effects and generates a new MIDI part, containing all the events as you would hear them play back. Proceed as follows:

1. Make sure only the desired MIDI track(s) are unmuted.
If you only want to include events from a single track in the merge operation, you may want to solo the track.
2. Set up the left and right locator around the area you want to merge.
Only events starting within this area will be included.
3. Select the track on which you want the new part to be created.
This can be a new track or an existing track. Data in the cycle area on the track can be kept or overwritten (see below).
4. Select “Merge MIDI in Loop” from the MIDI menu.
A dialog appears with the following options:

Option	Description
Include Inserts	If this is activated, any MIDI insert effects currently activated for the track(s) will be applied.
Include Sends	If this is activated, any MIDI send effects currently activated for the track(s) will be applied.
Erase Destination	If this is activated, all MIDI data between the left and right locator on the destination track will be deleted.
Include Chase	If this is activated, events placed outside the selected part but relating to it will be included in the processing, e.g. a Program Change right before the left locator. For more about chase events, see “About Chase” on page 63.

5. Click OK.
A new part is created between the locators on the destination track, containing the processed MIDI events.

Applying effects to a single part

Normally, the MIDI modifiers and effects affect a whole MIDI track. This may not always be what you want – you may want to apply some MIDI effects to a single part for example (without having to create a separate track for that part only). The Merge MIDI in Loop function can help:

1. Set up your MIDI modifiers and MIDI effects the way you want them for the part.
This will of course affect the whole track, but focus on the part for now.
2. Set the locators to encompass the part.
Simply select the part and choose Locators to Selection from the Transport menu (or use the corresponding key command, by default [P]).
3. Make sure the track holding the part is selected in the Track list.
4. Select Merge MIDI in Loop.
5. In the dialog that appears, activate the desired effect options, make sure that Erase Destination is activated and click OK.
Now a new part is created on the same track, containing the processed events. The original part is deleted.
6. Turn off or reset all MIDI modifiers and effects, so that the track plays back as usual.

Dissolve Part

The Dissolve Part function on the MIDI menu has two separate uses:

- When you work with MIDI parts (on MIDI channel “Any”) containing events on different MIDI channels.
  Dissolve Part separates the events according to MIDI channel.

- When you want to separate MIDI events according to pitch.
  A typical example would be drum and percussion tracks, where each pitch usually corresponds to a separate drum sound.

⇨ When dissolving a part into either separate channels or separate pitches, you can automatically remove the silent (empty) areas of the resulting parts by activating the “Optimized Display” checkbox in the Dissolve Part dialog.

Dissolving parts into separate channels

Setting a track to MIDI channel “Any” will cause each MIDI event to play back on its original MIDI channel, rather than a channel set for the whole track. There are two main situations when “Any” channel tracks are useful:

- When you record several MIDI channels at the same time.
  You may for example have a MIDI keyboard with several keyboard zones, where each zone sends MIDI on a separate channel. Recording on an “Any” channel track allows you to play back the recording with different sounds for each zone (since the different MIDI notes play back on separate MIDI channels).

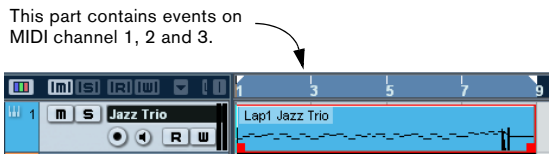
- When you have imported a MIDI file of Type 0.
  MIDI files of Type 0 contain only one track, with notes on up to 16 different MIDI channels. If you were to set this track to a specific MIDI channel, all notes in the MIDI file would be played back with the same sound; setting the track to “Any” will cause the imported file to play back as intended.

The Dissolve Part function scans MIDI parts for events on different MIDI channels and distributes the events into new parts on new tracks, one for each MIDI channel found. This allows you to work with each musical part individually. Proceed as follows:

1. Select the part(s) containing MIDI data on different channels.
2. Select “Dissolve Part” from the MIDI menu.
3. In the dialog that appears, select the “Separate Channels” option.

Now, for each MIDI channel used in the selected part(s), a new MIDI track is created and set to the corresponding MIDI channel. Each event is then copied into the part on the track with the corresponding MIDI channel. Finally, the original part(s) are muted.

An example:



Selecting “Dissolve Part” creates new parts on new tracks, set to channel 1, 2 and 3. Each new part contains only the events on the respective MIDI channel.

Dissolving parts into separate pitches

The Dissolve Part function can also scan MIDI parts for events of different pitches, and distribute the events into new parts on new tracks, one for each pitch. This is useful when the different pitches are not used in a regular melodic context, but rather for separating different sounds (e.g. MIDI drum tracks or sampler sound FX tracks). By dissolving such parts, you can work with each sound individually, on a separate track. Proceed as follows:

1. Select the part(s) containing MIDI data.
2. Select “Dissolve Part” from the MIDI menu.
3. In the dialog that appears, select the “Separate Pitches” option.
   A new MIDI track is created for each used pitch in the selected part(s). The events are then copied into the parts on the track for the corresponding pitch. Finally, the original part(s) are muted.

Repeat Loop

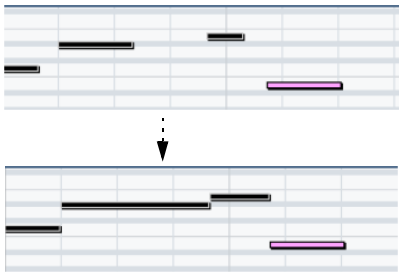
With this function, the events inside the independent track loops will be repeated until the end of the part, i.e. the notes that were previously only played repeatedly are now actual notes on the MIDI track. Events to the right of the independant track loop (within the same part) will be replaced by this function. For more information about independent track loops, see “The independent track loop” on page 369.

Other MIDI functions

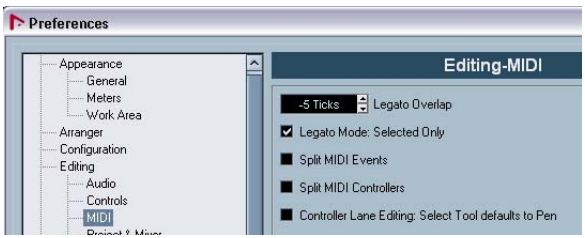
The following items can be found in the Functions submenu of the MIDI menu:

Legato

Extends each selected note so that it reaches the next note.



You can specify the desired gap or overlap with the “Legato Overlap” setting in the Preferences (Editing–MIDI page).



When using Legato with this setting, each note will be extended to end 5 ticks before the next note.

When you activate the “Legato Mode: Selected Only” option, the length of the note will be adjusted so that it reaches the next selected note, allowing you e.g. to only apply Legato to your bass line (when playing on a keyboard).

Fixed Lengths

⚠ This function is only available from within the MIDI editors.

This function resizes all selected notes to the length set with the Length Quantize pop-up menu on the MIDI editor toolbar.

Delete Doubles

This function removes double notes, i.e. notes of the same pitch on the exact same position. Double notes can occur when recording in Cycle mode, after Quantizing, etc.

⚠ This function always affects whole MIDI parts.

Delete Controllers

This function removes all MIDI controllers from the selected MIDI parts.

⚠ This function always affects whole MIDI parts.

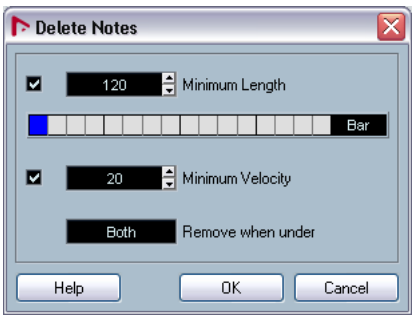
Delete Continuous Controllers

This function removes all “continuous” MIDI controller events from the selected MIDI parts. Therefore, “on/off” events such as sustain pedal events are not removed.

⚠ This function always affects whole MIDI parts.

Delete Notes

Allows you to delete very short or weak notes. This is useful for automatically removing unwanted “ghost notes” after recording. Selecting “Delete Notes…” opens a dialog in which you set up the criteria for the function.



The parameters have the following functionality:

Minimum Length

When the Minimum Length checkbox is activated, the note length is taken into account, allowing you to remove short notes. You can either specify the minimum length (for notes to be kept) in the value display or by dragging the blue line in the graphical length display below.

- The graphical length display can correspond to 1/4 bar, one bar, two bars or four bars.

You change this setting by clicking in the field to the right of the display.

In this case, the whole length display corresponds to two bars, and the Minimum Length is set to 1/32nd notes (60 ticks).

Minimum Velocity

When the Minimum Velocity checkbox is activated, the velocity of notes is taken into account, allowing you to remove weak notes. You specify the minimum velocity (for notes to be kept) in the value display.

Remove when under

This setting is only available when both Minimum Length and Minimum Velocity is activated. By clicking the value display, you select whether both length and velocity criteria must be met for notes to be deleted, or whether one of the criteria will suffice.

OK and Cancel

Clicking OK performs the automatic delete according to the rules set up. Clicking Cancel closes the dialog without deleting notes.

Restrict Polyphony

Selecting this item opens a dialog in which you can specify how many “voices” should be used (for the selected notes or parts). Restricting the polyphony this way is useful when you have an instrument with limited polyphony and want to make sure all notes will be played. The effect is achieved by shortening notes as required, so that they end before the next note starts.

Pedals to Note Length

This function scans for Sustain pedal on/off events, lengthens the affected notes to match the Sustain pedal off position, and then removes the Sustain Controller on/off events.

Delete Overlaps (mono)

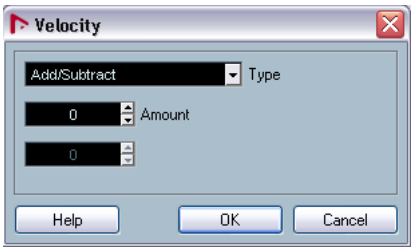
This function allows you to make sure that no notes of the same pitch overlap (i.e. that one starts before the other ends). Overlapping notes of the same pitch can confuse some MIDI instruments (a new Note On is transmitted before the Note Off is transmitted). This command can then be used to automatically solve the problem.

Delete Overlaps (poly)

This function shortens notes when required, so that no note begins before another ends. This happens regardless of which pitch the notes have.

Velocity

This function opens a dialog that allows you to manipulate the velocity of notes in various ways.



The following types of velocity processing are available:

Add/Subtract

This simply adds a fixed number to the existing velocity values. You set the value (positive or negative) with the Amount parameter.

Compress/Expand

Compresses or expands the “dynamic range” of MIDI notes by scaling the velocity values according to the Ratio setting (0 – 300%). The principle behind this is that multiplying different velocity values with a factor higher than 1 (over 100%) will also make the differences between velocity values greater, while using a factor lower than 1 (under 100%) will make the differences smaller. In short:

- To compress (“even out” velocity differences), use ratio values below 100%.
  After compression, you would probably want to add a velocity amount (with the Add/Subtract function) to maintain the average velocity level.
- To expand (create greater difference in velocity), use ratio values above 100%.
  Before you expand, you may want to adjust the velocity with the Add/Subtract function, so that the average velocity is somewhere in the middle of the range. If the average velocity is high (near 127) or low (near 0), expansion will not work properly, simply because velocity values can only be between 0 and 127!

Limit

This function allows you to make sure that no velocity values fall outside a given range (the Lower and Upper values). Any velocity values outside this range are raised/lowered to exactly the Lower/Upper values.

Fixed Velocity

This function sets the velocity of all selected notes to the Insert Velocity value on the toolbar in the MIDI editors.

Thin Out Data

Thins out MIDI data. Use this to ease the load on your external MIDI devices if you have recorded very dense controller curves etc.

You can also manually thin out the controller data by using the quantize function in the Key Editor.

Extract MIDI Automation

This option allows you to automatically convert continuous controller data of a MIDI part into MIDI track automation data. Proceed as follows:

1. Select the desired MIDI part containing the continuous controller data.
2. Select “Extract MIDI Automation”. (This command is also available on the Key Editor context menu.)
   The controller data will automatically be removed from the controller lane in the editor.
3. In the Project window, open the automation track(s) for the respective MIDI track. You will find that an automation track has been created for each of the continuous controllers in the part.

⇨ Please note that this function can only be used for continuous controllers. Data such as Aftertouch, Pitchbend or SysEx cannot be converted to MIDI track automation data.

⚠ This is an extremely useful function as it allows you to quickly and easily convert the continuous controllers of your recorded MIDI parts into MIDI track automation data, making them available for editing in the Project window.

⇨ Remember that to be able to hear the automation data, you have to activate the Read button for the respective automation track(s).

Reverse

This function inverts the order of the selected events (or of all events in the selected parts), causing the MIDI music to play backwards. Note that the effect is different from reversing an audio recording. With MIDI, the individual notes will still play as usual in the MIDI instrument – it’s only the order of playback that is changed.

Merge Tempo from Tapping

This function allows you to create a complete tempo track based on your tapping, see the section “Merge Tempo From Tapping” on page 422.

27

The MIDI editors

About editing MIDI

There are several ways to edit MIDI in Nuendo. You can use the tools and functions in the Project window for large-scale editing, or use the functions on the MIDI menu to process MIDI parts in various ways (see "What is affected by the MIDI functions?" on page 352). For hands-on graphical editing of the contents of MIDI parts, you use the MIDI editors:

- The Key Editor is the default MIDI editor, presenting notes graphically in an intuitive piano roll-style grid.
  The Key Editor also allows for detailed editing of non-note events such as MIDI controllers. For more information, see "The Key Editor – Overview" on page 366.
- The Score Editor (Nuendo Expansion Kit only) shows MIDI notes as a musical score and comes with advanced tools and functions for notation, layout and printing.
- The Drum Editor (Nuendo Expansion Kit only) is similar to the Key Editor, but takes advantage of the fact that with drum parts, each key corresponds to a separate drum sound.
- The List Editor shows all events in the selected MIDI parts as a list, allowing you to view and edit their properties numerically.
  For more information, see "The List Editor – Overview" on page 383.
- The Edit In-Place function allows you to edit MIDI parts directly in the Project window.
  This is similar to working in the Key Editor, but makes it easier to edit MIDI in context with other track types. See "Edit In-Place" on page 381.
- You can also edit MIDI in the Project Browser.
  Like the List Editor, the Project browser shows the events in a list and allows you to perform numerical editing. However, you will probably find the List Editor better suited for MIDI editing, since it has various dedicated features and functions for this. The Project Browser is described in the chapter "The Project Browser" on page 428.

⇨ You can define each of the editors mentioned above as your default MIDI editor, see below.

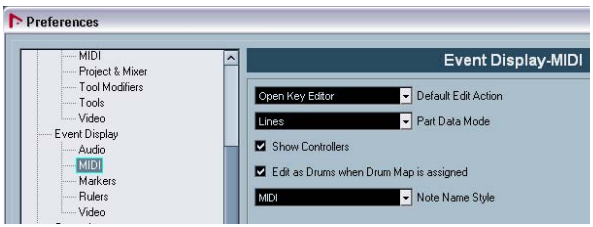
About this chapter

Please note that features that are identical in these editors will be described in the Key Editor section. The sections about the Inplace-Editor (see "Edit In-Place" on page 381) and the List Editor (see "The List Editor – Overview" on page 383) describe the specific features of these editors only.

Opening a MIDI editor

There are two ways to open a MIDI editor:

- Select one or several parts (or a MIDI track, with no parts selected) and select Open Key Editor, Open Score Editor (Nuendo Expansion Kit only), Open Drum Editor (Nuendo Expansion Kit only), Open List Editor or Open In-Place Editor from the MIDI menu (or use the corresponding key command).
  The selected parts (or all parts on the track, if no part was selected) will open in the chosen editor.
- Double-click a part to open it in the default editor.
  Which editor opens depends on the Default Edit Action setting in the Preferences (Event Display–MIDI page).



Nuendo Expansion Kit only: If the option "Edit as Drums when Drum Map is assigned" is activated and a drum map is selected for the edited track, the Drum Editor will open. This way you can double-click to open the Key Editor (or the Score Editor, List or Edit In-Place Editor, depending on your preferences) but drum tracks will automatically open in the Drum Editor.

⇨ If the part you open for editing is a shared copy, any editing you perform will affect all shared copies of this part.
Shared copies are created by pressing [Alt]/[Option]+[Shift] and dragging, or by using the Repeat function with the "Shared copies" option activated. In the Project window, shared copies are indicated by the part name in italics and an icon in the bottom right corner of the part (see "Aligning events" on page 45).

Handling several parts

When you open a MIDI editor with several parts (or a MIDI track containing several parts) selected, you might find it somewhat hard to get an overview of the different parts when editing.

For such cases the editor toolbar features a few functions to make working with multiple parts easier and more comprehensive:

- The Part List menu lists all parts that were selected when you opened the editor (or all parts on the track, if no parts were selected), and lets you select which part should be active for editing.

  When you select a part from the list, it is automatically made active and centered in the note display.

⇨ Note that it is also possible to activate a part by selecting an event within this part with the Arrow tool.

- The button “Edit Active Part Only” lets you restrict editing operations to the active part only.

  For example, if you select “All” from the Select submenu on the Edit menu with this option activated, only events in the active part will be selected. Similarly, if you select notes by dragging with the Arrow tool (making a selection rectangle), only the notes in the active part will be selected.

“Edit Active Part Only” activated on the toolbar.

- You can zoom in on the active part so that it fills the screen by selecting “Zoom to Event” from the Zoom submenu on the Edit menu.

- The button “Show Part Borders” can be used if you want to see clearly defined borders for the active part.

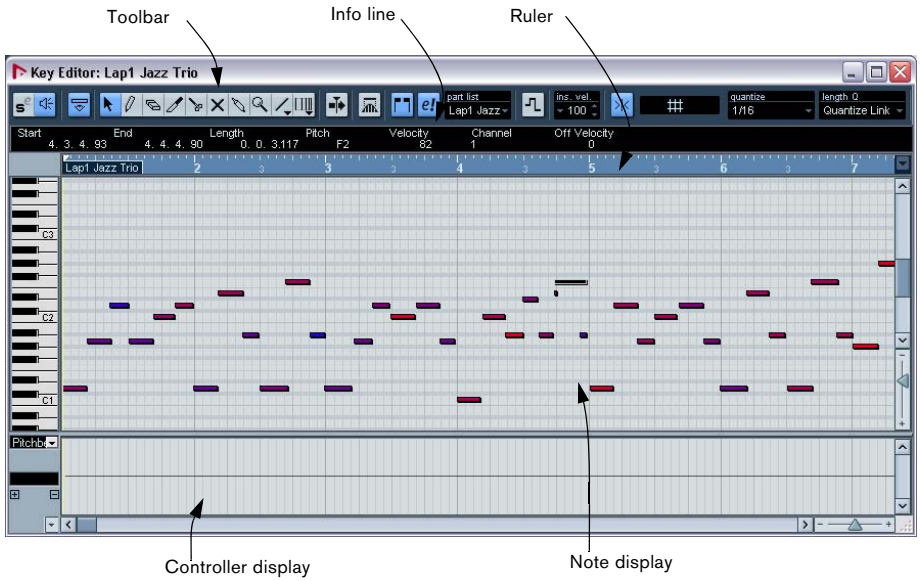
  When this is activated, all parts except the active one are grayed out, making the borders easily discernible. In the Key Editor, there are also two “markers” in the ruler with the name of the active part, marking its beginning and end. These can be moved freely to change the size of the part.

“Show Part Borders” activated on the toolbar.

- It is possible to cycle between parts (making them active) using key commands.

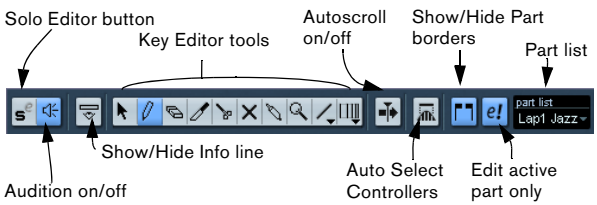
  In the Key Commands dialog – Edit category, you will find two functions for this: “Activate Next Part” and “Activate Previous Part”. If you assign key commands to these, you can use them to cycle between parts in the editors. For further information, see “Setting up key commands” on page 518.

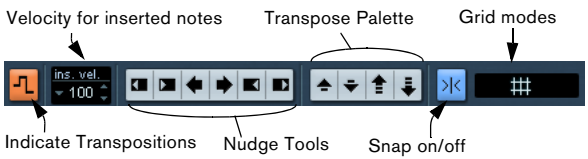
The Key Editor – Overview

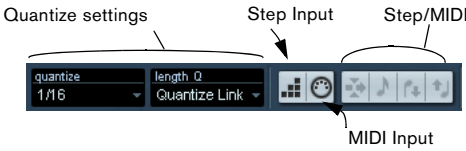


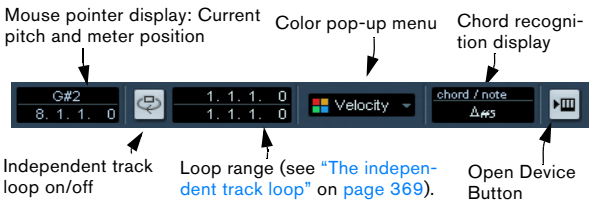
The toolbar

As in other windows, the toolbar contains tools and various settings. You can specify which toolbar items should be shown and store/recall different toolbar configurations – see "The Setup dialogs" on page 506.









The info line

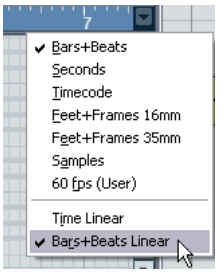
The info line shows information about selected MIDI notes. You can edit all values on the info line using regular value editing (see "Editing on the info line" on page 375 for details). Length and position values are displayed in the format currently selected for the ruler (see below).

- To hide or show the info line, click the icon in the toolbar.

The ruler

The ruler shows the time line, by default in the display format selected on the Transport panel. You can select a separate format for a MIDI editor ruler on the Ruler pop-up menu, opened by clicking the arrow button to the right of it. For a list of the available formats, see “The ruler” on page 31.

At the bottom of the pop-up menu, there are two additional items:

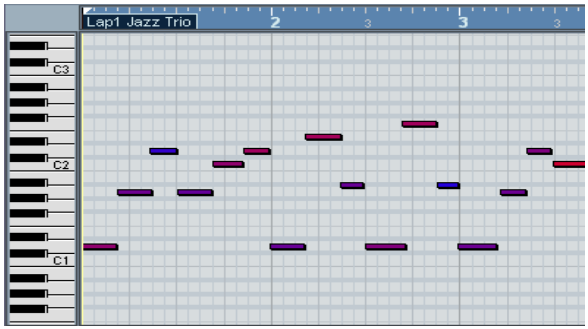


- If “Time Linear” is selected, the ruler, note display and controller display will be linear in relation to time.
  This means that if the ruler shows bars and beats, the distance between the bar lines will vary depending on the tempo.

- If “Bars+Beats Linear” is selected, the ruler, note display and controller display will be linear in relation to tempo.
  This means that if the ruler shows bars and beats, the distance between beats will be constant.

In most cases, you would probably set the display format to “Bars+Beats” in “Bars+Beats Linear” mode when editing MIDI.

The note display

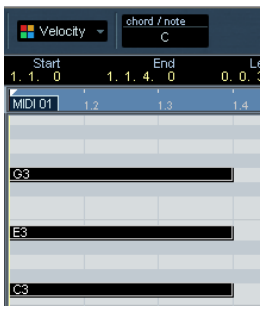


The note display is the main area in the Key Editor. It contains a grid in which MIDI notes are shown as boxes. The width of a box corresponds to the note length, and the vertical position of a box corresponds to the note number (pitch), with higher notes higher up in the grid. The piano keyboard to the left serves as a guide for finding the right note number.

For a description on how to display colors in the note display, see “Coloring notes and events” on page 370.

The chord recognition function

Nuendo features a handy chord recognition function that helps you identify chords in the Key Editor note display. To find out which chord is formed by simultaneously played notes, place the project cursor over the notes. All MIDI notes currently “touched” by the project cursor are analyzed and the chord recognition display in the toolbar shows you which chord the notes form.



In the picture above, the project cursor touches the notes C, Eb and G. As shown in the chord recognition display, this results in a C minor chord.

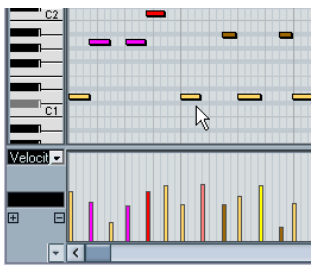
The controller display

The area at the bottom of the Key Editor window is the controller display. This consists of one or several controller lanes, each showing one of the following properties or event types:

- Velocity values of the notes.
- Pitch Bend events.
- Aftertouch events.
- Poly Pressure events.
- Program Change events.
- Any type of continuous controller event.

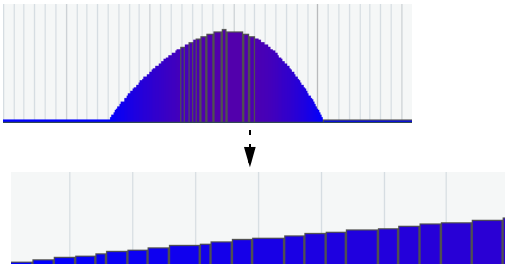
To change the size of the controller display, drag the divider between the controller display and the note display. This will make the controller display larger and the note display smaller, or vice versa.

Velocity values are shown as vertical bars in the controller display, with higher bars corresponding to higher velocity values:



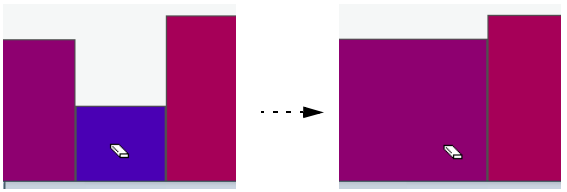
Each velocity bar corresponds to a note in the note display.

Events in the controller display (that is, anything other than velocity values) are shown as “blocks”, the heights of which correspond to the “values” of the events. However, events that have been recorded (or drawn with a low quantize value) may appear more like “filled curves”, simply because they are positioned very closely:



If you zoom in on the upper “curve”, you will find that it consists of separate events.

⇨ Unlike notes, events in the controller display have no length. The value of an event in the display is “valid” until the start of the next event:



If you delete the second event…

…the first event will be “valid” until the start of the third event.

For a description of editing in the controller display, see “Editing in the controller display” on page 377.

Key Editor operations

Zooming

Zooming in the Key Editor is done according to the standard zoom procedures, using the zoom sliders, the Zoom tool or the Zoom submenu on the Edit menu.

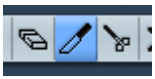
- When you drag a rectangle with the Zoom tool, the result depends on the option “Zoom Tool Standard Mode: Horizontal Zooming Only” in the Preferences (Editing–Tools page).
  If this is activated, the window will only be zoomed horizontally; if not, the window will be zoomed both horizontally and vertically.

Using the Trim tool

The Trim tool allows you to change the length of note events by cutting off the end or the beginning of notes. It is available in the Key Editor and in the List Editor.

Using the Trim tool means moving the note-on or the note-off event for one or several notes to a position defined with the mouse. Proceed as follows:

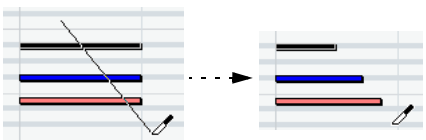
1. Select the Trim tool in the toolbar.
The mouse pointer changes to a knife symbol.



2. Locate the notes that you wish to edit.

- To edit a single note, click on it with the Trim tool. The range between the mouse cursor and the end of the note will be removed.
You can use the mouse position display in the toolbar to find the exact position for the trim operation.

- To edit several notes, click and drag with the mouse across the notes.
A line is displayed. The notes will be trimmed along this line.



Trimming the end of three note events.

- By default, the Trim tool will cut off the end of notes. To trim the beginning of the note(s), press [Alt]/[Option] while dragging.

- If you press [Ctrl]/[Command] while dragging, you will get a vertical trim line, allowing you to set the same start or end time for all edited notes.

You can change the Trim tool key commands in the Preferences (Editing–Tool Modifiers page).

⇨ Note that when you trim the beginning of a note in the List Editor, the note may move to a different position in the list (since other events may now begin before the edited event).

⇨ Note that the trimmed note ends don't snap to the grid.

Playing back

You can play back your music as usual when working in a MIDI editor. There are several features designed to make editing easier during playback:

Solo button

If you activate the Solo button, only the edited MIDI parts will be heard during regular playback.

Autoscroll

As described in the section "Autoscroll" on page 57, the Autoscroll function makes the window "follow" the project cursor during playback, so that the current play position is visible at all times. However, when you are working in a MIDI editor, you may want to deactivate Autoscroll – this way, the events you are working with will stay visible.

The Autoscroll buttons in each of the MIDI editors are independent of the Project window Autoscroll setting, which means that Autoscroll can be activated in the Project window and deactivated in the MIDI editor you are working in.

The independent track loop

The independent track loop is a sort of "mini-cycle", affecting only the MIDI part being edited. When the loop is activated, the MIDI events within the loop will be repeated continuously and completely independent – other events (on other tracks) will be played back as usual. The only "interaction" between the loop and the "regular playback" is that every time the cycle starts over again, so does the loop.

To set up the independent track loop, proceed as follows:

1. Activate the loop by clicking on the Loop button on the toolbar.
If it isn't visible, right-click the toolbar and add the Independent Track Loop Settings section – see "The Setup dialogs" on page 506.

When the loop is activated, the cycle isn't shown in the ruler.

2. Now you need to specify the length of the loop. You have the following possibilities:

- [Ctrl]/[Command]-click and [Alt]/[Option]-click in the ruler to set the start and end of the loop, respectively.
- Edit the loop start and end positions numerically in the fields next to the Loop button.
- Click and drag in the upper part of the ruler to move the locators to the desired positions.

The independent track loop is indicated in purple in the ruler.

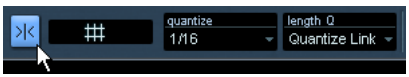
⇨ The MIDI events will be looped as long as the Loop button is activated and the MIDI editor window is open.

To turn the loop into actual MIDI notes, use the Repeat Loop function on the MIDI menu, see "Repeat Loop" on page 360.

Auditioning

If the speaker icon on the toolbar is activated, individual notes will automatically be played back (auditioned) when you move or transpose them, or when you create new notes by drawing. This makes it easier to hear what you're doing.

Snap



Snap activated on the toolbar.

The Snap function helps you find exact positions when editing in a MIDI editor. It does this by restricting horizontal movement and positioning to certain positions. Operations affected by snap include moving, duplicating, drawing, sizing, etc.

- How Snap works depends on the Snap mode pop-up menu next to the Snap button.
See "Snap" on page 55.
- When the "Bars+Beats" display format is selected in the ruler, the snap grid is set by the quantize value on the toolbar.
This makes it possible to snap not only to straight note values but also to swing grids set up in the Quantize Setup dialog (see "The Quantizing functions" on page 352).

When any of the other display formats is selected in the ruler, positioning is restricted to the displayed grid, i.e. you can snap in finer increments by zooming in, and in coarser increments by zooming out the display.

Coloring notes and events

By using the Colors pop-up menu on the toolbar, you can select a color scheme for the events in the editor. The following options are available:

Option	Description
Velocity	The notes get different colors depending on their velocity values.
Pitch	The notes get different colors depending on their pitch.
Channel	The notes get different colors depending on their MIDI channel value.
Part	The notes get the same color as their respective part in the Project window. Use this option when you are working with two or more tracks in an editor, to make it easier to see which notes belong to which track.
GridMatch	The notes get different colors depending on their time position. This mode makes it easy to see e.g. if the notes in a chord start at the exact same beat.

When any of the options (apart from "Part") is selected, you can select "Setup" from the Colors pop-up menu. This opens a dialog in which you can specify which colors should be associated with which velocities, pitches or channels, respectively.

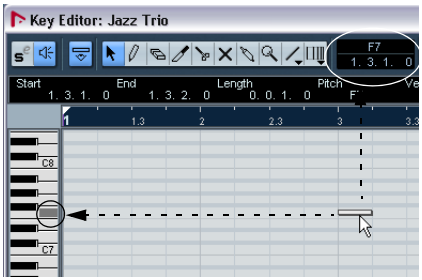
Creating and editing notes

To draw in new notes in the Key Editor, you use the Pencil tool or the Line tool.

Drawing notes with the Pencil tool

With the Pencil tool, you insert single notes by clicking at the desired time (horizontal) and pitch position (vertical).

- When you move the pointer in the note display, its bar position is indicated in the toolbar, and its pitch is indicated both in the toolbar and on the piano keyboard to the left.
This makes it easy to find the right note and insert position.



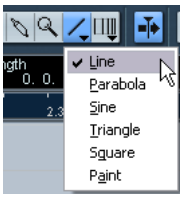
- If Snap is activated, this determines the start position of the created note.

- If you click once, the created note will have the length set on the Length Quantize pop-up menu on the toolbar.
You can create a longer note by clicking and dragging. The length of the created note will be a multiple of the Length Quantize value.

Drawing notes with the Line tool

The Line tool can be used for creating series of contiguous notes. To do so, click and drag to draw a line and then release the mouse button.

⇨ The Line tool has several different modes.
To select one of the modes, click on the Line tool icon on the toolbar when the tool is already selected. This opens a pop-up menu from which you can select one of the Line tool modes.



The tool icon will change appearance according to the selected mode.

Mode	Description
Line	This is the default mode for the Line tool. When this mode is selected, you click and drag to create a straight line, in any angle. When you release the mouse button a series of notes will be created, aligned with the line. If Snap is activated, the notes will be spaced and sized according to the Quantize value.
Parabola, Sine, Triangle, Square	These modes insert events along different curve shapes. While they can be used for creating notes, they're probably best suited for controller editing (see "Adding and editing events in the controller display" on page 379).
Paint	Allows you to insert multiple notes by dragging with the mouse button pressed. If Snap is activated, the notes will be positioned and sized according to the Quantize and Length Quantize values. If you press [Ctrl]/[Command] while painting, movement will be restricted to horizontal only (i.e. the painted notes will have the same pitch).

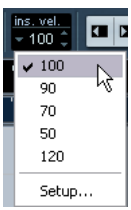
Setting velocity values

When you draw notes in the Key Editor, the notes will get the velocity value set in the insert velocity field on the toolbar.

You can use one of four different methods for determining the velocity:

- When a key command is assigned for the Select tool–Edit Velocity action (in the Editing–Tool Modifiers page of the Preferences dialog), you can select one or more notes, press [Ctrl]/[Command]+[Shift] and click on one of the selected notes to change the velocity.
The cursor changes into a speaker and, next to the note, a field with the velocity value appears – the Note Velocity slider. Move the mouse pointer up or down to change the value. Value changes will be applied to all selected notes, as you can see in the controller lane.

- Selecting a predefined velocity value from the insert velocity pop-up menu.
The menu contains five different predefined velocity values. The "Setup…" item opens a dialog that allows you to specify which five velocity values should be available on the pop-up menu. (This dialog can also be opened by selecting "Insert Velocities…" from the MIDI menu.)



- Manually entering the desired velocity value by clicking in the insert velocity field and typing in the desired value.

- Using a key command.

You can assign a key command to each of the five available velocity values in the Key Commands dialog (MIDI category – the items Insert Velocity 1-5). This allows for quick switching between different velocity values when entering notes. See "Setting up key commands" on page 518 for instructions on how to set up key commands.

Selecting notes

Selecting notes is done using any of the following methods:

- Use the Arrow tool.

The standard selection techniques apply, like selecting by clicking on the note or using a selection rectangle. Note that when you press [Shift] and click on notes or draw a selection rectangle, these notes will be added to the overall selection. When you press [Ctrl]/[Command] and click on notes or draw a selection rectangle, these notes will be removed from the overall selection (standard Windows behavior).

- Use the Select submenu on the Edit menu or Quick menu.

The Select menu options are:

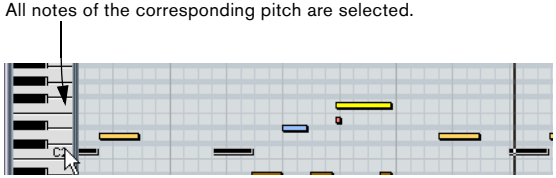
Option	Description
All	Selects all notes in the edited part.
None	Deselects all events.
Invert	Inverts the selection – all selected events are deselected and all notes that were not selected are selected instead.
In Loop	Selects all notes that are partially or completely inside the boundaries of the left and right locators (only visible if locators are set).
From Start to Cursor	Selects all notes that begin to the left of the project cursor.
From Cursor to End	Selects all notes that end to the right of the project cursor.
Equal Pitch – all Octaves	This function requires that a single note is selected. It selects all notes of this part that have the same pitch (in any octave) as the currently selected note.
Equal Pitch – same Octave	As above, but selects notes of the exact same pitch only (same octave).
Select Controllers in Note Range	Selects the MIDI controller data within range of the selected notes, see below.

- You can also use the left and right arrow keys on the computer keyboard to step from one note to another.

If you press [Shift] and use the arrow keys, the current selection will be kept, allowing you to select several notes.

- To select all notes of a certain pitch, press [Ctrl]/[Command] and click on the desired key in the keyboard display to the left.

All notes of the corresponding pitch are selected.



You can also press [Shift] and double-click on a note to select all the following notes of the same pitch – or use the Equal Pitch functions on the Select submenu.

- If the option "Auto Select Events under Cursor" is activated in the Preferences (Editing page), all notes "touched" by the project cursor are automatically selected.

Toggle selections

If you want to toggle the selected elements within a selection rectangle, press [Ctrl]/[Command] and enclose the same elements within a new selection rectangle. Once you release the mouse button, the previous selection is deselected and vice versa.

Selecting controllers within the note range

You can select the controllers within the range of the selected notes. The following applies:

- When the Auto Select Controllers button is activated on the toolbar, the controllers will always be selected when the respective notes are selected.

- When you select "Select Controllers in Note Range" on the Select submenu of the Edit menu, the controllers within the note range (i.e. between the first/leftmost and last/rightmost note) will be selected.

Please note that for this to work, only two notes have to be selected. All controllers within this range will be selected.

- A note range lasts until the start of the next note or the end of the part.

- Selected controllers for notes are moved when the corresponding notes are moved.

Moving and transposing notes

To move notes in the editor, use any of the following methods:

- Click and drag to a new position.

All selected notes will be moved, maintaining their relative positions. If Snap is activated, this determines to which positions you can move the notes, see "Snap" on page 370.

⚠ Note also that you can restrict movement to horizontal or vertical only by holding down [Ctrl]/[Command] while dragging.

- Use the up and down arrow keys on the computer keyboard.

This method allows you to transpose the selected notes, without risking to move them horizontally. You can also use the Transpose function (see "Transpose" on page 357) or the info line (see "The info line" on page 366) for this. Note that pressing [Shift] and using the up and down arrow keys will transpose notes in steps of one octave.
Transport is also affected by the global transpose setting, see "The Transpose functions" on page 114.

- Use the Move to Cursor function on the Edit menu.

This moves the selected notes to the project cursor position.

- Select a note and adjust its position or pitch on the info line.

See "Editing on the info line" on page 375.

- Use the Move buttons in the Nudge palette on the toolbar.

This moves the selected note(s) by the amount set on the Quantize pop-up menu.
By default, the Nudge palette isn't shown on the toolbar – see "The Setup dialogs" on page 506 for more information.

⇨ Note that when you move selected notes to a different position, any selected controllers for these notes will move accordingly.
See also "Moving and copying events" on page 380.

You can also adjust the position of notes by quantizing (see "The Quantizing functions" on page 352).

Duplicating and repeating notes

Notes are duplicated much in the same way as events in the Project window:

- Hold down [Alt]/[Option] and drag the note(s) to a new position.

If Snap is activated, this determines to which positions you can copy notes (see "Snap" on page 370).

- Selecting Duplicate from the Edit menu creates a copy of the selected note and places it directly after the original.

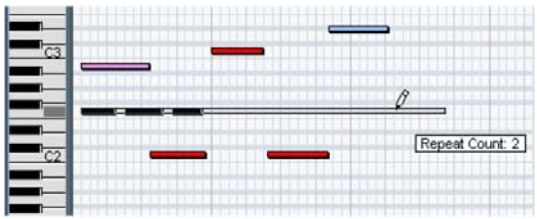
If several notes are selected, all of these are copied "as one unit", maintaining the relative distance between the notes.

- Selecting Repeat from the Edit menu opens a dialog, allowing you to create a number of copies of the selected note(s).

This works like the Duplicate function, but you can specify the number of copies.

- You can also perform the Repeat function by dragging: Select the note(s) to repeat, press [Alt]/[Option], click the right edge of the last selected note and drag to the right.

The longer to the right you drag, the more copies are created (as indicated by the tool tip).

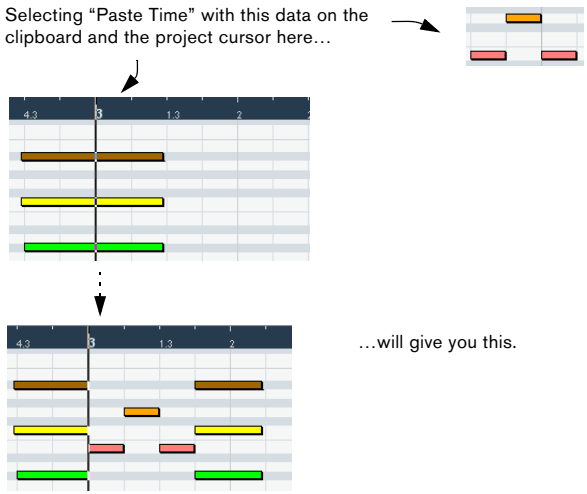


Using cut and paste

You can use the Cut, Copy and Paste options on the Edit menu to move or copy material within a part or between different parts. When you paste copied notes, you can either use the regular Paste function or the function "Paste Time" from the Range submenu of the Edit menu.

- "Paste" inserts the copied notes at the project cursor position without affecting existing notes.

- "Paste Time" inserts at the project cursor position, but moves (and if necessary, splits) existing notes to make room for the pasted notes.



Resizing notes

To resize a note, use one of the following methods:

- Position the arrow tool at the start or end of the note, so that the pointer takes on the shape of a small double arrow. Click and drag to the left or right to resize the note.
This method allows you to resize the note from either direction.

- Click with the Pencil tool within the note box and drag to the left or the right (to make the note shorter or longer, respectively).

With both these methods, the resulting length will be a multiple of the Length Quantize value on the toolbar.

- Use the Trim Start/End buttons on the Nudge palette on the toolbar.
This resizes the selected note(s) by moving their start or end positions, in steps according to the Length Quantize value on the toolbar. By default, the Nudge palette isn't shown on the toolbar – see "The Setup dialogs" on page 506 for more information.

- Select the note and adjust its length on the info line.
See "Editing on the info line" on page 375 for details on info line editing.

- Use the Trim tool, see "Using the Trim tool" on page 369.

Splitting notes

There are three ways to split notes:

- Clicking on a note with the Scissors tool splits the note at the position you pointed (taking the Snap setting into account if activated).
If several notes are selected, they are all split at the same position.

- If you select "Split at Cursor", all notes that are intersected by the project cursor are split at the cursor position.

- If you select "Split Loop", all notes that are intersected by the left or right locator are split at the locator positions.

Gluing notes

Clicking on a note with the Glue Tube tool will "glue it together" with the next note of the same pitch. The result will be one long note spanning from the start of the first note to the end of the second note and with the properties (velocity, etc.) of the first note.

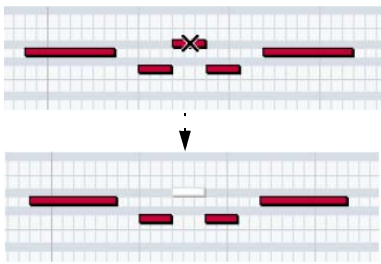
Muting notes

Individual notes can be muted in the Key Editor, as opposed to muting an entire MIDI part in the Project window. This allows you to exclude notes from playback, but keep the option to bring them back again at any time. To mute a note, use one of the following methods:

- Click on it with the Mute tool.

- Drag a rectangle with the Mute tool, enclosing all notes you want to mute.

- Select the note(s) and choose Mute from the Edit menu.
The default key command for this is [Shift]+[M].



Muted notes are "dimmed" in the note display.

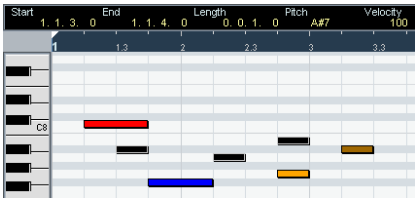
To unmute a note, either click it or enclose it with the Mute tool, or select it and choose Unmute from the Edit menu. The default key command for this is [Shift]+[U].

Deleting notes

To delete notes, either click on them with the Eraser tool or select them and press [Backspace].

Editing on the info line

The info line shows the values and properties of the selected event(s). If a single event is selected, its values are displayed on the info line. If several events are selected, the info line shows the values of the first of these events in yellow.



Several events selected.

You can edit the values on the info line using regular value editing. This allows you to move, resize, transpose or change velocity of events in a very precise manner. It's also possible to click the Pitch or Velocity field in the info line and play a note on your MIDI keyboard – the pitch or velocity will be adjusted according to the note you played.

⇨ If you have several events selected and change a value, all selected events will be changed by the set amount.

⇨ If you have several events selected, hold down [Ctrl]/[Command] and change a value, the change will be absolute.

In other words, the value setting will be the same for all selected events.

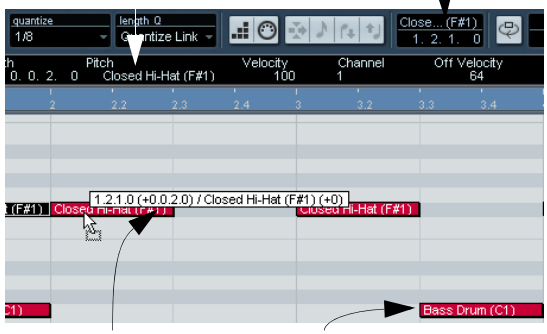
How the Key Editor handles drum maps (Nuendo Expansion Kit only)

When a drum map is assigned to a MIDI track, the Key Editor will display the drum sound names as defined by the drum map.

The drum sound names are displayed…

…in the Mouse Note Value field…

…in the info line, in the Pitch field…



…when dragging a note…

…in the event itself (provided the zoom factor is high enough).

This allows you to use the Key Editor for drum editing, e.g. when editing drum note lengths (which may be necessary for some external instruments) or when editing several parts, to identify drum events.

Editing notes via MIDI

You can change the properties of notes via MIDI. For example, this can be a fast way to get the right velocity value, since you will hear the result even as you edit:

1. Select the note you want to edit.
2. Click on the MIDI connector symbol on the toolbar.

Click this button to enable editing via MIDI.

3. Use the note buttons on the toolbar to decide which properties should be changed by the MIDI input.
You can enable editing of pitch, note-on and/or note-off velocity.

With this setting, the edited notes will get the pitch and velocity values of the notes input via MIDI, but the note-off velocities will be kept as they are.

4. Play a note on your MIDI instrument.
The note selected in the editor will get the pitch, velocity and/or note-off velocity of the played note.

The next note in the edited part is automatically selected, making it easy to quickly edit a series of notes.

- If you want another try, select the note again (e.g. by pressing the left arrow key on the computer keyboard) and again play a note on your MIDI instrument.

Step input

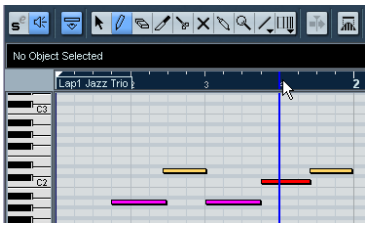
Step input, or step recording, is when you enter notes one at a time (or one chord at a time) without worrying about the exact timing. This is useful e.g. when you know the part you want to record but are not able to play it exactly as you want it.

Proceed as follows:

1. Click the Step Input button on the toolbar to activate Step Input mode.

2. Use the note buttons to the right to decide which properties should be included when you input the notes.
For example, you may not want to include the velocity and/or note-off velocity of the played notes. It's also possible to turn off the pitch property, in which case all notes will get the pitch C3, no matter what you play.

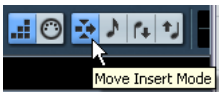
3. Click anywhere in the note display to set the start position (the desired position of the first note or chord).
The step input position is shown as a blue line in the note display, and in the lower mouse pointer display in the toolbar.



4. Specify the desired note spacing and length with the Quantize and Length Quantize pop-up menus.
The notes you input will be positioned according to the Quantize value and have the length set with the Length Quantize value. For instance, if you set Quantize to 1/8 notes and Length Quantize to 1/16 note, the notes will be sixteenth notes, appearing on each eighth note position.

5. Play the first note or chord on your MIDI instrument.
The note or chord appears in the editor and the step input position advances one quantize value step.

⇨ If Insert mode is activated, all notes to the right of the step input position will be moved to "make room" for the inserted note or chord.



Insert mode activated.

6. Continue in the same way with the rest of the notes or chords.
You can adjust the Quantize or Length Quantize value as you go along, to change the timing or note lengths. You can also move the step input position manually by clicking anywhere in the note display.

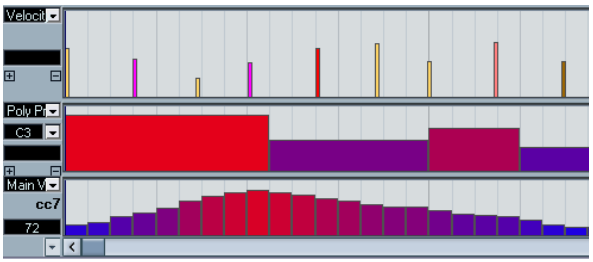
- To insert a "rest", press the right arrow key on the computer keyboard.
This advances the step input position one step.

7. When you're done, click the Step Input button again to deactivate step input.

Editing in the controller display

About controller lanes

By default, the controller display has a single lane, showing one event type at a time. However, you can add lanes by right-clicking in the display and selecting “Create new controller lane” from the Quick menu. This allows you to view and edit different controllers at the same time.



The controller display with three lanes set up.

- To remove a lane, right-click in it and select “Remove this Lane” from the Quick menu, or click on the minus button.

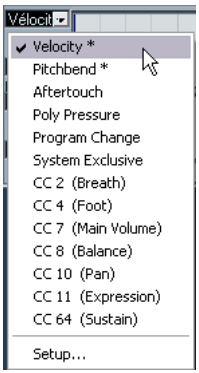
This hides the lane from view – it doesn’t affect the events in any way.

- If you remove all lanes, the controller display will be completely hidden.

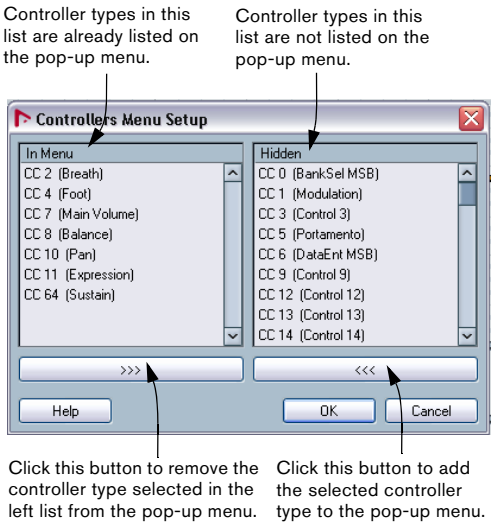
To bring it back again, select “Create new controller lane” from the Quick menu.

Selecting the event type

Each controller lane shows one event type at a time. To select which type should be displayed, use the pop-up menu to the left of the lane.



- Selecting “Setup…” opens a dialog in which you can specify which continuous controller event types should be available on the pop-up menu.



- Each MIDI track has its own controller lane setup (number of lanes and selected event types).

When you create new tracks, they get the controller lane setup used last.

Controller lane presets

Once you have added the required number of controller lanes and selected the event types you need, you can store this combination as a controller lane preset. You could for example have a preset with one velocity lane only, another with a combination of velocity, pitch bend and modulation, and so on. This can make working with controllers much quicker.

- To add the current controller lane setup as a preset, pull down the pop-up menu to the left of the horizontal scrollbar and select “Add”.

Enter a name for the preset in the dialog that appears and click OK.

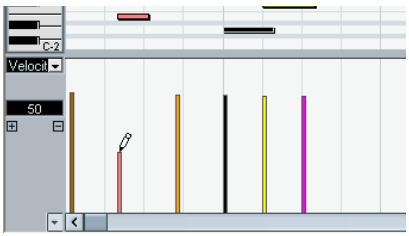
- To apply a stored preset, select it from the pop-up menu.

This immediately brings up the controller lanes and event types in the preset.

- To remove or rename presets, select “Organize” from the pop-up.

Editing velocity values

When “Velocity” is selected for viewing, the lane shows the velocity of each note as a vertical bar.



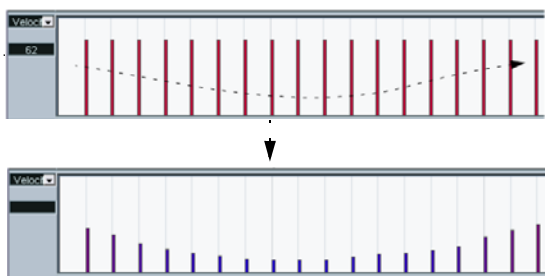
Velocity values are edited with the Pencil or the Line tool. The different tools and Line tool modes offer several possibilities, as listed below.

⇨ If the option “Controller Lane Editing: Select Tool defaults to Pen” is activated in the Preferences (Editing–MIDI page), the Arrow tool automatically switches to the Pencil tool when you move the pointer into the controller display.
If you want to use the Arrow tool to select events in the controller display, press [Ctrl]/[Command].

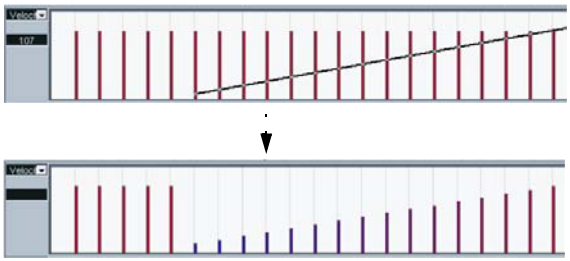
⇨ If the Speaker icon (Acoustic Feedback) is activated on the toolbar, the notes will be played back when you adjust the velocity, allowing you to audition your changes.

- You can use the Pencil tool to change the velocity of a single note: click on its velocity bar and drag the bar up or down.
While you drag, the current velocity value is shown in the display to the left.

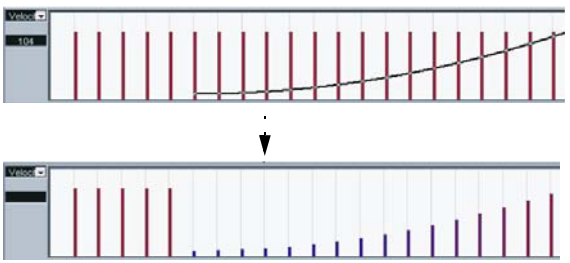
- You can use the Pencil tool or the Line tool in Paint mode to change the velocity values of several notes by painting a “freehand curve”.
When editing velocity, these two methods have the same functionality.



- Use the Line tool in Line mode for creating linear velocity ramps.
Click where you want the ramp to start and drag the cursor to where you want the ramp to end. When you release the mouse button, the velocity values are aligned with the line between the two points.



- Parabola mode works in the same way, but aligns the velocity values to a Parabola curve instead.
Use this for smooth, “natural” velocity fades, etc.



- The remaining three Line tool modes (Sine, Triangle and Square) align the velocity values to continuous curve shapes (see below).

Note:

- If there is more than one note at the same position (e.g. a chord), their velocity bars will overlap in the controller lane.
If none of the notes are selected, all notes at the same position will be set to the same velocity value when you draw. To edit the velocity of only one of the notes at the same position, first select the note in the note display. Now, editing will only affect the velocity of the selected note.

You can also adjust the velocity of a single note by selecting it and changing its velocity value on the info line.

Adding and editing events in the controller display

When any option other than “Velocity” is selected for a controller lane, you can create new events or edit the values of existing events using the Pencil tool or the Line tool in its various modes:

- Clicking with the Pencil tool or the Line tool in Paint mode creates a new event.

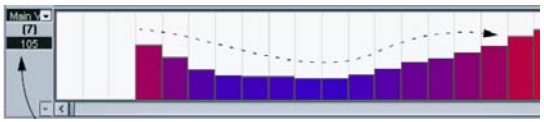
Note the “Select Tool defaults to Pen” option – see “Editing velocity values” on page 378.

- Press [Alt]/[Option] and use the Pencil tool or the Line tool in Paint mode to modify the value of an event (without creating a new one).

Note that you can click and drag to change or add multiple events, draw controller curves, etc. You can press or release [Alt]/[Option] while drawing, switching dynamically between “edit mode” and “create mode”.

If you want to enter or adjust a single event, click once with the Pencil tool or the Line tool in Paint mode.

If you want to “paint a curve”, drag the tool (with the mouse button pressed):



When you move the pointer in the controller lane, the corresponding value is displayed in this field.

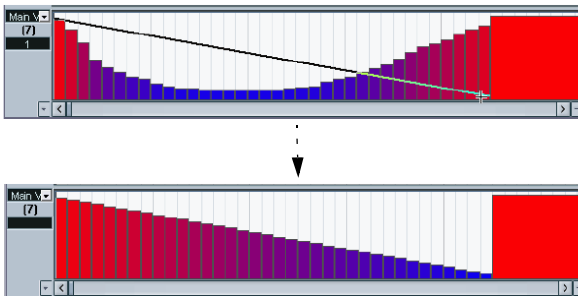
⇨ With the Pencil tool and the Line tool in Paint mode, the quantize value determines the “density” of created controller curves (if Snap is activated, see “Snap” on page 370).

For very smooth curves, you should use a small quantize value or turn off Snap. However, this will create a very large number of MIDI events, which can cause MIDI playback to “stutter” in some situations. A medium-low density is often sufficient.

- Clicking and dragging with the Line tool in Line mode shows a line in the controller lane, and creates events with values aligned to this line.

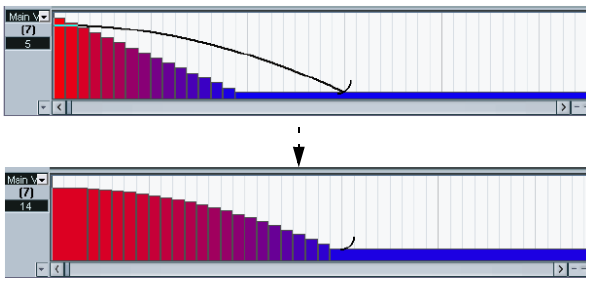
This is the best way to draw linear controller ramps. If you press [Alt]/[Option], no new events are created – use this mode for modifying existing controller curves.

Converting a controller curve to a ramp using the Line tool.



- The Parabola mode works in the same way, but aligns the values to a parabola curve instead, giving more “natural” curves and fades.

Note that the result depends on the direction from which you draw the parabola.



- In Parabola mode, you can use modifier keys to determine the shape of the parabola curve.

If you press [Ctrl]/[Command], the parabola curve will be reversed. If you press [Alt]/[Option]+[Ctrl]/[Command] while Snap is activated, you can change the position of the whole curve (in both cases the snap value for the positioning will be a quarter of the quantize value). If you press [Shift], the exponent will be increased or decreased.

⇨ In Line and Parabola modes, the length quantize value determines the “density” of created controller curves (if Snap is activated).

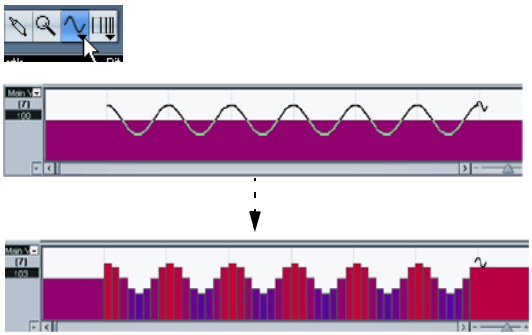
For very smooth curves, you should use a small length quantize value or turn off Snap. To avoid over-dense controller curves (which may cause MIDI playback to “stutter”), use a medium-low density.

- The Sine, Triangle and Square modes create events with values aligned to continuous curves.

In these modes, the quantize value determines the period of the curve (the length of one curve “cycle”) and the length quantize value determines the density of the events (the lower the length quantize note value, the smoother the curve).

- In Sine, Triangle and Square mode you can also use modifier keys to determine the shape of the curve.

If you press [Ctrl]/[Command] you can change the phase of the beginning of the curve, if you press [Alt]/[Option]+[Ctrl]/[Command] while snap is activated you can change the position of the whole curve (in both cases the snap value for the positioning will be a quarter of the quantize value).



⇨ You can also set the curve period freely by holding down [Shift] when you insert events in Sine, Triangle or Square mode.

Activate Snap, [Shift]-click and drag to set the length of one period. The period length will be a multiple of the quantize value.

- In Triangle and Square mode, you can press [Shift] + [Ctrl]/[Command] to change the maximum position of the triangle curve (to create sawtooth curves) or the pulse of the square curve. As in other modes, you can press [Alt]/[Option] if you want to change the existing events rather than creating new ones. Again, the snap value for the positioning will be a quarter of the quantize value.

Moving and copying events

You can move or duplicate events in a controller lane, much like you can with notes:

1. Click with the Arrow tool to select the events you want to cut or copy.

If the option “Controller Lane Editing: Select Tool defaults to Pen” is activated in the Preferences (Editing–MIDI page), you need to press [Ctrl]/[Command] to get the Arrow tool.

2. Click and drag the events to move them.

If Snap is activated, this determines to which positions you can move the events (see “Snap” on page 370).

- If you hold down [Alt]/[Option] and drag, the events will be copied rather than moved.

⚠ If there is an event of the same type at the exact same position already, this will be replaced by the moved event.

⚠ Remember that a non-note event doesn’t have a length – it’s “valid” until the next event (see “The controller display” on page 368.

⚠ When the Auto Select Controllers button is activated in the Key Editor toolbar, selecting controller events will also select the corresponding notes. Moving events (either using cut/copy/paste or drag & drop) in the note display will also move the corresponding controller events and vice versa. See also “Selecting controllers within the note range” on page 372.

Using cut, copy and paste

You can use the standard Cut, Copy and Paste options on the Edit menu to move or copy events in the controller display:

1. Select the events you want to cut or copy.
2. Select Cut or Copy from the Edit menu.
3. If you want to paste the events into another MIDI part, open that part in another Key Editor window.
4. Position the project cursor where you want to paste the events.
5. Select Paste from the Edit menu.

The events on the clipboard are added, starting at the project cursor position, maintaining their relative distances. If a pasted event ends up at the same position as an existing event of the same type, the old event is replaced.

Deleting events in the controller display

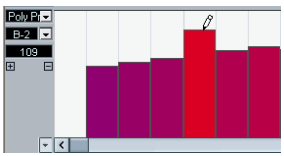
You delete events by clicking on them with the Eraser tool or by selecting them and pressing [Backspace]. Please note:

- Deleting a controller event makes the last event before this valid up until the next event. It does not “zero” any controller changes.
- You can delete notes by deleting their velocity bars in the controller display.

Please be aware that if there is more than one note on the same position, there may still only be one velocity bar visible – make sure you delete only the desired notes!

Adding and editing Poly Pressure events

Poly Pressure events are special, in that they “belong to” a specific note number (key). That is, each Poly Pressure event has two editable values: the note number and the amount of pressure. Therefore, when Poly Pressure is selected on the event type pop-up menu, there are two value fields to the left of the controller display, one for the note number and one for the amount:



To add a new Poly Pressure event, proceed as follows:

1. Select Poly Pressure on the event type pop-up menu.
2. Set the note number by clicking on the keyboard display.

The selected note number is displayed in the upper value field to the left of the controller display. Note that this only works for the topmost lane. If you have selected “Poly Pressure” for several controller lanes, you have to type in the desired note number directly in the lower value field to the left of each lane.

3. Use the Pencil tool to add a new event, just as when adding regular controller events.

To view and edit existing Poly Pressure events, proceed as follows:

1. Select Poly Pressure on the event type pop-up menu.
2. Click on the arrow button next to the note number field to the left of the controller lane.

A pop-up menu appears, listing all note numbers for which there already are Poly Pressure events.

3. Select a note number from the pop-up menu.

The Poly Pressure events for the selected note number are shown in the controller lane.

4. Use the Pencil tool to edit the events as usual.

Press [Alt]/[Option] to edit existing events without adding any new ones.

- Poly Pressure events can also be added and edited in the List Editor.

Edit In-Place

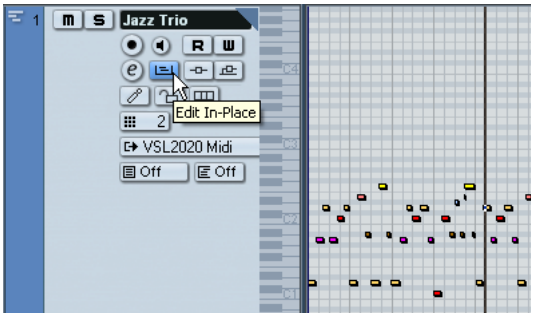
The Edit In-Place function makes it possible to edit MIDI parts directly in the Project window, for quick and efficient editing in context with other tracks.

To open the In-Place editor for one or more selected tracks, you have the following possibilities:

- Select “Open In-Place Editor” on the MIDI menu.
- Use a key command, by default [Ctrl]/[Command]+[Shift]+[I].
- Toggle the In-Place Editor for all selected tracks by clicking on the respective button above the Track list.

- To open a single MIDI track, you can also click the Edit In-Place button in the Track list (if necessary, expand the Track list to see the button).

This expands the MIDI track to show something like a miniature Key Editor, allowing you to edit MIDI notes and controllers.



- To zoom or scroll the In-Place Editor, point at the left part of the piano keyboard display so that the pointer changes to a hand. Now you can click and drag to the right or left to zoom in or out vertically, and drag up or down to scroll the editor.

- Clicking on the little gray triangle in the upper right corner of the Track list for the edited track brings up a local toolbar with some settings specific to the In-Place Editor.

For descriptions of these settings, see "The toolbar" on page 366.

- Just like in the Key Editor, you can edit velocity or continuous controllers at the bottom of the In-Place Editor.
To change which controller type is shown, click in the controller name field directly below the piano keyboard and select a controller type from the pop-up menu. To add or remove controller lanes, right-click below the controller name field and select an option from the context menu that appears.

- When you select a MIDI note, the Project window info line shows information about that note, just like the info line in the Key Editor.
You can perform the same editing here as on the Key Editor info line, see "Editing on the info line" on page 375.

- The Snap button and Snap type pop-up menu on the Project window toolbar govern snapping in the In-Place Editor, but the snap grid is set using the Quantize pop-up menu.

- To close the In-Place Editor for one or several selected tracks, you can use the key command or click the "Toggle the In-Place Editor" button above the Track list.

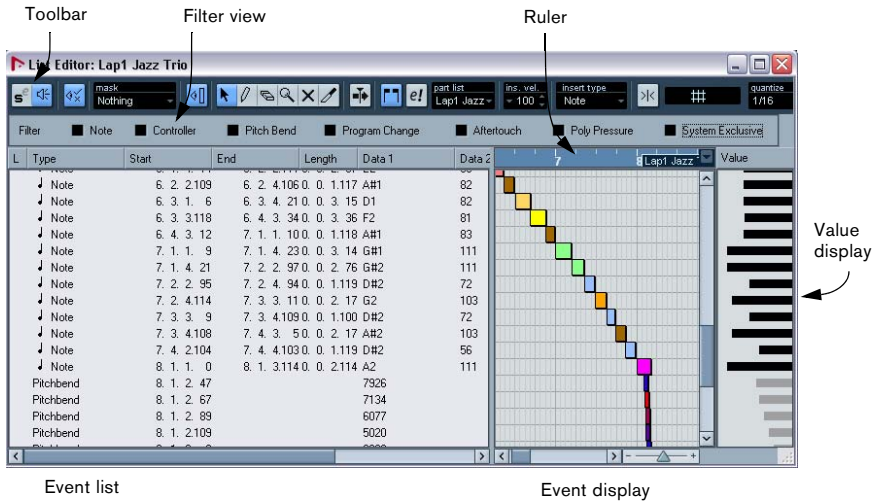
- To close the In-Place Editor for one track, you can click the Edit In-Place button in the Track list or double-click below the controller display in the In-Place Editor.

Working with Parts

If you work with parts in the In-Place Editor, some editing functions are available. You can:

- change the length of the parts by clicking on the lower part edges (so that the mouse pointer changes to a double arrow) and dragging it to the left or right.
- drag and drop notes from one part to the other.
- change the length of notes by clicking on them and dragging the double arrow to the left or right.

The List Editor – Overview



The toolbar

The toolbar contains several items that are the same as in the Key Editor (edit solo, snap, quantize settings, etc.). These are described earlier in this chapter. The following toolbar items are unique to the List Editor:

- The Insert pop-up menu is used when creating new events.
  This is where you determine what type of event to add (see "Inserting events" on page 384).
- The Mask pop-up menu and Filter view (Show Filter View button) allow you to hide events from view, based on their type and other properties.
  See "Filtering" on page 385.
- The Value View button can be used for hiding and showing the Value display (see below).

The List Editor has no info line (numerical editing is available in the list instead).

⇨ If you see an empty or incomplete list of items although the items are visible in the Key Editor, check if you have activated any filters (see "Filtering" on page 385).

The list

This lists all events in the selected MIDI part(s), in the order (from top to bottom) in which they are played back. You can edit the event properties by using regular value editing, see "Editing in the list" on page 384.

The event display

This shows the events graphically. The vertical position of an event in the display corresponds to its entry in the list (i.e. to the playback order), while the horizontal position corresponds to its actual position in the project. This is where you add new parts or events, drag to move them, etc.

The value display

This display shows the "value" of each event, allowing for easy viewing and graphical editing. Typically, the value shown is the "Data 2" or "Value 2" property (amounts to MIDI controller events, velocity for notes, etc.). You can show or hide this display by clicking the "Show List Value View" button on the toolbar.

List Editor operations

Customizing the view

You can click and drag the divider between the list and the event display to make one area wider and the other narrower. Furthermore, the list can be customized in the following ways:

- You can change the order of the columns by dragging the column headings.
- You can resize columns by dragging the dividers between the column headings.

Setting the display format

Just like in the Project window, you set the display format (bars+beats, seconds, etc.) by right-clicking in the ruler and selecting an option from the pop-up menu. This setting affects both the ruler and all start, end and length values shown in the list.

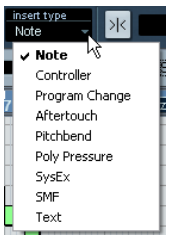
Zooming

You can change the horizontal magnification in the event display by using the zoom slider below the display or the Zoom tool (the magnification glass).

Inserting events

To add a new event to the edited part, proceed as follows:

1. Use the Insert pop-up menu on the toolbar to select the event type.



2. Select the Pencil tool and click in the event display at the desired position (relative to the ruler).

If you are creating note events, you can click and drag to set the length of the note.

The new event appears in the list and in the display. Its properties will be set to default values, but can be adjusted in the list.

- Notes will get the insert velocity value set in the insert velocity field on the toolbar. See "Setting velocity values" on page 371.

Editing in the list

The list allows you to perform detailed numerical editing of the events properties. The columns have the following functionality:

Column	Description
L	Locate column. An arrow in this column indicates the event that starts closest before the project cursor position. If you click in this column for an event, the project cursor is moved to the start of that event. Double-clicking moves the cursor position and starts/stops playback – useful for auditioning when editing in the list.
Type	The event type. This cannot be changed.
Start	The start position of the event, shown in the format selected for the ruler. Changing this is the same as moving the event. Note that moving the event past any other event in the list will re-sort the list (the list always shows the events in the order they are played back).
End	This is only used for note events, allowing you to view and edit the end position of a note (thereby resizing it).
Length	This is only used for note events. It shows the length of the note – changing this resizes the note and automatically changes the End value as well.
Data 1	This is the "data 1" or "value 1" property of the event. The content of this depends on the event type – for notes, this is the pitch, for example. Where applicable, the values are shown in the most relevant form. For instance, the Data 1 value for notes is shown as a note number in the format selected in the Preferences (Event Display–MIDI page). See also the table in the section "Editing in the value display" on page 386.
Data 2	This is the "data 2" or "value 2" property of the event. The content of this depends on the event type – for notes, this is the velocity value, for example. See the table in the section "Editing in the value display" on page 386.
Channel	The MIDI channel of the event. Note that this setting is normally overridden by the channel setting for the track. To make a MIDI event play back on "its own" channel, set its track to channel "Any" in the Project window.
Comment	This column is used for some event types only, providing an additional comment about the event.

- You can edit several events at once. If several events are selected and you edit a value for one event, the other selected events' values will be changed as well.

Normally, any initial value differences between the events will be maintained – i.e. the values will change by the same amount. If you press [Ctrl]/[Command] when you edit, however, all events will get the same value.

⇨ For SysEx (system exclusive) events, you can only edit the position (Start) in the list.
However, when you click the Comment column, the MIDI SysEx Editor opens, in which you can perform detailed editing of system exclusive events (see "Working with System Exclusive messages" on page 410).

Editing in the event display

The event display allows you to edit the events graphically using the tools on the toolbar. You can edit single events as well as several selected events simultaneously.

- To move an event, click and drag it to a new position.

Note that moving the event past any other event in the display will re-sort the list (the list always shows the events in the order they are played back). As a result, the vertical position of the event in the display will change as well.

- To make a copy of an event, press [Alt]/[Option] and drag it to a new position.
- To resize a note, select it and drag its end point with the Arrow tool as in the Project window.

This only works with notes.

- To mute or unmute an event, click on it with the Mute tool.

You can mute or unmute several events in one go by enclosing them in a selection rectangle with the Mute tool.

- You can select a color scheme for the events with the Colors pop-up menu on the toolbar.

This affects how all MIDI events are shown in the List and Key editors – see "Coloring notes and events" on page 370.

- To delete an event, select it and press [Backspace] or [Delete], or click on it with the Eraser tool in the event display.

Filtering

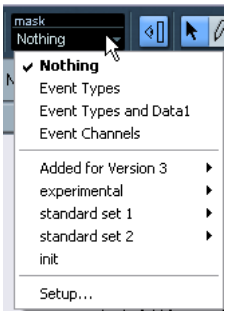
Clicking the "Show Filter View" button on the toolbar opens an additional filter bar that allows you to hide specific event types from view. For example, it may be hard to find note events if the part contains a lot of controllers. By hiding these, the list becomes more manageable.

- To hide an event type, activate its checkbox on the filter view.
- To see one event type only (hide all other event types), press [Ctrl]/[Command] and click its checkbox. If you [Ctrl]/[Command]-click again, all checkboxes are cleared (all events will be visible).

⇨ The event types remain hidden even if you close the filter view.
To make sure you see all events, open the filter view and check that all checkboxes are deactivated.

⇨ The filter view does not remove, mute or change the events in any way.

Masking



The Mask function is similar to the filter view but allows you to hide events based on other criteria as well. Proceed as follows:

1. Select an event (or several events) of the type you want to view.
2. Pull down the Mask pop-up menu on the toolbar and select one of the options.

The results are as follows:

Option	Description
Event Types	Only events with the type of the selected event will be shown. This does the same as the filter view but is quicker if you only want to view a single event type.
Event Types and Data 1	Only events of the same type and with the same "Data 1" value will be shown. For example, if a note event is selected, only notes with the same pitch will be shown. If a controller event is selected, only controllers of the same type will be shown.
Event Channels	Only events with the same MIDI channel value as the selected event will be shown.

In addition to the above options, the menu also gives you access to the presets available in the Logical Editor (see "The Logical Editor, Transformer and Input Transformer" on page 387). Furthermore, the "Setup…" item on the Mask pop-up menu gives you direct access to the Logical Editor. In that editor you can create very complex masking settings.

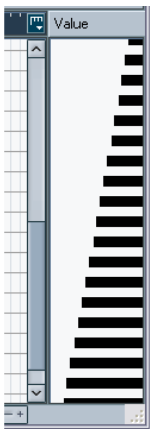
When you apply any of the presets from the Logical Editor or use the Logical Editor to create masking settings yourself, only the events that meet the criteria specified will be visible.

- To deactivate the Mask function, select "Nothing" from the Mask pop-up menu.

The most typical usage of the Mask function is to view a certain type of controller only (e.g. Modulation, Breath Control, etc.). Since these are all the same event types (controller), this would not be possible using the filter view. With the "Event Types and Data 1" option on the Mask pop-up menu, it is!

Editing in the value display

The value display to the right of the event display is a tool for quick viewing and editing of multiple values, e.g. velocities or controller amounts. The values are shown as horizontal bars, with the bar length corresponding to the value.



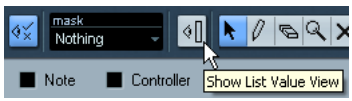
A velocity ramp in the value display.

You edit the values by clicking and dragging. Note that the pointer automatically takes on the shape of the Pencil tool when you move it into the value display – you don't have to select the Pencil tool for this.

Exactly which value is shown for an event depends on the event type. The following table shows what is displayed and edited in the Data columns and the value display:

Event type	Data 1	Data 2	Value display
Note	Pitch (note number)	Velocity	Velocity
Controller	Controller type	Controller amount	Controller amount
Program Change	Program number	Not used	Program number
Aftertouch	Aftertouch amount	Not used	Aftertouch amount
Pitch Bend	Bend amount	Not used	Bend amount
SysEx	Not used	Not used	Not used

- The value display can be hidden from view by clicking the "Show List Value View" button on the toolbar, so that it is not lit.



28

The Logical Editor, Transformer and Input Transformer

Introduction

Most of the time you will perform your MIDI editing graphically in one of the main graphic editors. But there are times when you want more of a “search and replace” function on MIDI data, and that’s where the Logical Editor comes in.

The principle for the Logical Editor is this:

- You set up *filter conditions* to find certain events.

This could be events of a certain type, with certain attributes or values or on certain positions, in any combination. You can combine any number of filter conditions and make composite conditions using AND/OR operators.

- You select the basic *function* to be performed.

The options include Transform (changing properties of the found events), Delete (removing the events), Insert (adding new events based on the found events’ positions) and more.

- You set up a list of *actions*, which specify exactly what should be done.

This is not necessary for all functions. For example, the Delete function does not require any additional action specifications – it simply removes all found events. The Transform function on the other hand requires that you specify which properties should be changed and in which way (transpose notes by a certain amount, adjust velocity values, etc.).

By combining filter conditions, functions and the specific actions, you can perform very powerful processing.

To master the Logical Editor you need some knowledge about how MIDI messages are structured. However, the Logical Editor also comes with a rich selection of presets, allowing you to access its processing powers without delving into its more complicated aspects, see “Selecting a preset” on page 389.

⚠ Studying the included presets is an excellent way to learn the workings of the Logical Editor! Many of them can also be used as starting points when you set up your own editing operations using the Logical Editor.

About the Transformer MIDI effect

The Transformer effect is a real-time version of the Logical Editor, allowing you to apply editing to the events played back from a track “on the fly”. The Transformer contains virtually the same settings and functions as the Logical Editor – where there are differences between the two, this is clearly stated on the following pages.

About the Input Transformer

Again, this is very similar to the Logical Editor. Just like the Transformer effect, the Input Transformer works in real time. However, the Input Transformer filters out and transforms MIDI data as it is recorded. In other words, the settings you make in the Input Transformer will affect the actual MIDI events you record.

The Input Transformer is described in the section “The Input Transformer” on page 397. However, we recommend that you make yourself familiar with the Logical Editor first, since they share many features and principles.

About the Project Logical Editor

There is also a “Project Logical Editor” available via the Edit menu. This is described in the chapter “The Project Logical Editor” on page 399.

Opening the Logical Editor

1. Select the desired parts or events.

What will be affected by the operation depends on the current selection:

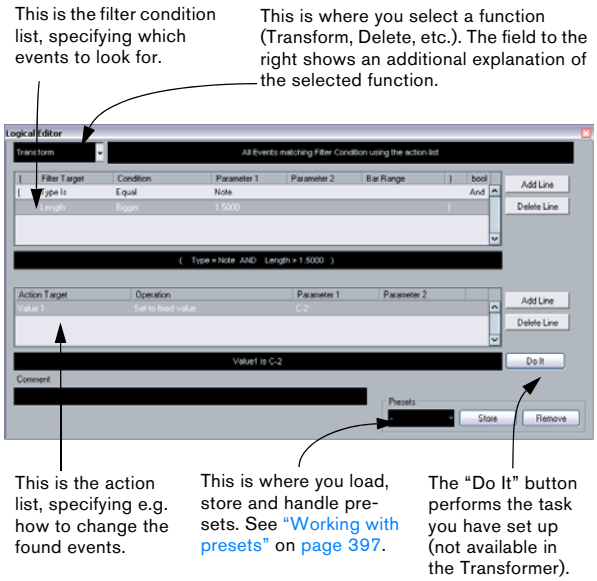
- In the Project window, edits using the Logical Editor are applied to all selected parts, affecting all events (of the relevant types) in them.
- In the MIDI editors, edits using the Logical Editor are applied to all selected events. If no events are selected, all events in the edited part(s) will be affected.

You can change the selection while the Logical Editor window is open.

2. Select “Logical Editor…” from the MIDI menu.

⇨ For details on how to open the Transformer (and other MIDI effects), see “MIDI realtime parameters and effects” on page 342.

Window overview



Selecting a preset

To understand the Logical Editor, it might be a good idea to start by exploring the included presets. These are found on the Presets pop-up menu at the bottom of the window, to the right.

- To load a preset, select it from the Presets pop-up menu.

The window will show the settings stored in the preset. As the preset is not applied to the MIDI events yet, you can load different presets just to study them without affecting any events. You can also edit the preset before applying it.

- To apply the loaded preset (i.e. to perform the operations defined in the Logical Editor), click Do It.

⇨ You can also select Logical Presets directly from the MIDI menu.

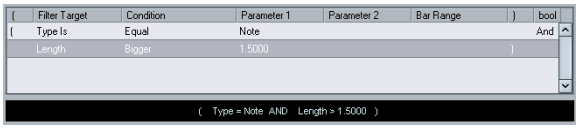
This allows you to apply a preset to the selected MIDI part directly, without having to open the Logical Editor.

⇨ It is also possible to select and apply Logical Presets directly in the List Editor (from the Mask menu). You can also open the Logical Editor from the List Editor.

For information on how to create and handle your own presets, see "Working with presets" on page 397.

Setting up filter conditions

General procedure



The upper list is where you set up the filter conditions, determining which events to find. The list contains one or several conditions, each on a separate line.

⇨ If you want to start from scratch (as opposed to basing your settings on an existing preset), you may want to initialize the settings by selecting the Init option from the Presets pop-up menu.

- To add a new line (condition), click the Add Line button to the right.

The new line is added at the bottom of the list. If there are many lines, you may need to use the scrollbar to the right to view them.

- To remove a line, click anywhere on it to select it and click the Delete Line button to the right.

You set up a filter condition line by clicking in the columns and selecting options from the pop-up menus that appear. Here is a brief description of the columns:

Column	Description
Left bracket	This is used for "bracketing" several lines together when creating conditions with multiple lines and the boolean operators And/Or. See "Combining multiple condition lines" on page 393.
Filter Target	Here you select which property to look for when finding events. Your choice here affects the available options in the other columns as well, see below!
Condition	This determines how the Logical Editor should compare the property in the Filter Target column to the values in the Parameter columns (Equal, Unequal, Bigger, etc. – see the separate table below). The available options depend on the Filter Target setting.
Parameter 1	Here you set which value the event properties should be compared to (a numeric value, a position or a choice from a pop-up menu, depending on the Filter Target). For example, if the Filter Target is "Position" and Condition is "Equal", the Logical Editor will look for all events starting at the position you specify in the Parameter 1 column.
Parameter 2	This column is only used if you have selected one of the "Range" options in the Condition column. Typically, this allows you to find all events with values inside (or outside) the range between Parameter 1 and Parameter 2.

Column	Description
Bar Range	This column is only used if the Filter Target is “Position” and one of the “Bar Range” options is selected in the Condition column. In these cases, you use the Bar Range column to specify “zones” within each bar (allowing you to find e.g. all events on or around the first beat of every bar). See “Searching for events at certain positions” on page 390.
Right bracket	This is used for “bracketing” several lines together. See “Combining multiple condition lines” on page 393.
bool	This allows you to insert the boolean operators And/Or, when creating conditions with multiple lines. See “Combining multiple condition lines” on page 393.

- You can also set up filter conditions by dragging MIDI events directly into the upper list.

If the list contains no line entries, a MIDI event dragged into this section will form conditions including the state and type of the event. If it contains entries, the dragged event(s) will initialize the matching parameters. E.g. if a length condition is used, the length will be set according to the event length.

Conditions

The options in the Condition column have the following meaning (note that the available Condition options depend on the Filter Target setting):

Condition	Events will be found if their Filter Target property…
Equal	…has the exact same value as set up in the Parameter 1 column.
Unequal	…has any value other than the one set up in the Parameter 1 column.
Bigger	…has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	…has a value that is the same as or higher than the one set up in the Parameter 1 column.
Less	…has a value lower than the one set up in the Parameter 1 column.
Less or Equal	…has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	…has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	…has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.
Inside Bar Range	…is within the “zone” set up in the Bar Range column (Position only), in each bar within the current selection.
Outside Bar Range	…is outside the “zone” set up in the Bar Range column (Position only), in each bar within the current selection.
Before Cursor	…is before the song cursor position (Position only).
Beyond Cursor	…is after the song cursor position (Position only).
Inside Track Loop	…is inside the set track loop (Position only).
Inside Cycle	…is inside the set cycle (Position only).
Exactly matching Cycle	…exactly matches the set cycle (Position only).
Note is equal to	…is the note specified in the Parameter 1 column, regardless of octave (Pitch only). Lets you find e.g. all C notes, in all octaves.

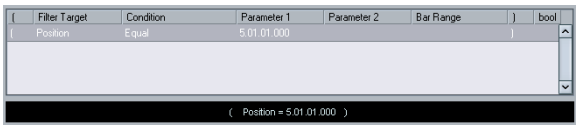
⇨ The Conditions for the “Property” filter target are different, see “Searching for properties” on page 392.

Below, the different Filter Targets (and their corresponding Condition and Parameter options) are described in more detail.

Searching for events at certain positions

Selecting Position in the Filter Target column lets you find events starting at certain positions, either relative to the start of the song or within each bar.

- If you select any condition other than the Range or Bar Range options, you set up a specific position (in bars, beats, sixteenth notes and ticks) in the Parameter 1 column.

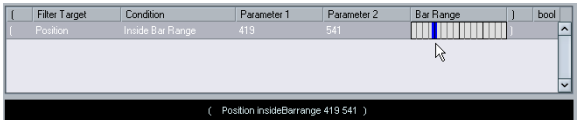


Here, the Logical Editor will find all events at 5.1.1. in the project.

- If you select Inside Range or Outside Range in the Condition column, you set the start position of the range in the Parameter 1 column and the end position in the Parameter 2 column.

The Logical Editor will then find all events inside or outside this position range.

▪ If you select one of the Bar Range options in the Condition column, the Bar Range column will show a graphic bar display. You specify the range within the bar by clicking and dragging in the bar display (the specified Bar Range is indicated in blue).
The Logical Editor will then find all events starting inside or outside this Bar Range, in all bars (within the current selection).



Here, the Logical Editor will find events starting around the second beat in each bar.

Searching for notes of certain lengths

Only note events have lengths (actually, a note is made up of separate note-on and note-off events but in Nuendo it's considered as a single event with a length). Therefore, the "Length" Filter Target is only valid if you're specifically searching for notes – there has to be another condition line with the Filter Target "Type", Condition "Equal" and Parameter 1 set to "Note". See "Combining multiple condition lines" on page 393 for more about using multiple filter conditions.

Searching for Value 1 or Value 2

A MIDI event is composed of several values. The meanings of value 1 and 2 depend on the type of event:

Event type	Value 1	Value 2
Notes	The Note Number/Pitch.	The velocity of the note.
PolyPressure	The key that was pressed.	The amount of pressure for the key.
Controller	The type of Controller, displayed as a number.	The amount of Control Change.
Program Change	The Program Change number.	Not used.
Aftertouch	The amount of pressure.	Not used.
Pitchbend	The "fine tune" of the bend. Not always used.	The coarse amount of bend.

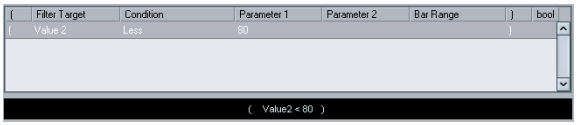
⇨ System Exclusive events are not included in the table above, since they don't use value 1 and 2.

Since value 1 and 2 have different meanings for different events, searching for e.g. value 2 = 64 would both find notes with the velocity 64 and controllers with the amount 64, etc. If this is not what you want, you can add an additional filter condition line with the Filter Target "Type", specifying which type of events to find (see below).

⚠ This is particularly useful when searching for note pitch or velocity values, as described below.

The general procedures when searching for value 1 or 2 are:

▪ If you select any Condition other than the Range options, you set up a specific value in the Parameter 1 column.



Here, the Logical Editor will find all events with a value 2 less than 80.

▪ If you select Inside Range or Outside Range in the Condition column, the range consists of the values between Parameter 1 and Parameter 2.
Note that Parameter 1 should have the lower value.

Searching for note pitch or velocity

If you add another condition line with the Filter Target "Type", Condition "Equal" and Parameter 1 set to "Note", the Logical Editor will "know" you are searching for pitch or velocity. This has the following benefits:

- The Filter Targets Value 1 and Value 2 will be displayed as "Pitch" and "Velocity" respectively, making it easier to grasp the function of the filter condition.
- Pitch values in the Parameter columns will be displayed as note names (C3, D#4, etc.). When entering pitch values you can either type a note name or a MIDI note number (0–127).
- When Value 1 (pitch) is selected as Filter Target, an additional option appears in the Condition column: "Note is equal to". When this is selected, you specify a note name in the Parameter 1 column but without any octave number (C, C#, D, D#, etc.). The Logical Editor can then find all notes of a certain key, in all octaves.

See "Combining multiple condition lines" on page 393 for more info on working with multiple filter condition lines.

Searching for controllers

There is similar extended functionality when searching for controllers: If you've added an additional "Type = Controller" condition line, the Logical Editor will "know" you are searching for controllers. The Parameter 1 column will then show the names of the MIDI controllers (Modulation, Volume, etc.) when Value 1 is selected as Filter Target.

Searching for MIDI channels

Each MIDI event contains a MIDI channel setting (1–16). Normally, these settings are not used, since the MIDI event plays back on the MIDI channel set for its track. However, you can come across MIDI parts with events set to different channels, for example in the following scenarios:

- If you have recorded MIDI from an instrument sending on several different channels (e.g. a master keyboard with different key zones).
- If you have imported a MIDI file of type 0 (with a single track, containing MIDI events with different channel settings).

Searching for MIDI channel values is straightforward; you select a Condition and enter a MIDI channel (1–16) in the Parameter 1 column (and, if you've selected one of the Range Conditions, a higher channel in the Parameter 2 column, creating a value range).

Searching for event types

Selecting Type as the Filter Target allows you to find events of a certain type only.

- The Condition column contains only three options: Equal, Unequal and All Types.
- Clicking the Parameter 1 column displays a pop-up menu, listing the available event types (Note, PolyPressure, Controller, etc.).

The Logical Editor will find all events matching or not matching the selected type (depending on the Condition).

⚠ As mentioned above, selecting Type = Note or Type = Controller adds some additional functionality to the Logical Editor. You should make it a habit to add a Type condition when applicable.

Searching for properties

On the Filter Target pop-up menu you will find an option called Property. This allows you to search for properties that are not part of the MIDI standard but rather event-specific Nuendo settings.

When the Property option is selected, the Condition column has two options: "Property is set" and "Property is not set". Which property to look for is selected in the Parameter 1 column. The options are "muted" and "selected". Two examples:

Here, the Logical Editor will find all muted events.

Here, the Logical Editor will find all events that are selected but not muted.

Searching for event contexts

On the Filter Target pop-up menu you will find an option called "Last Event". This can be used to perform context dependent searches (especially useful in the Input Transformer).

"Last Event" indicates the state of an event which has already passed the Input Transformer/Logical Editor. The condition has to be combined with Parameter 1 and Parameter 2.

A few examples on how the Last Event filter target can be used:

Here, the action will only be performed when the sustain pedal is down:

Fiiter Target	Condition	Parameter 1	Parameter 2
Last Event	Equal	MIDI Status	176/Controller
Last Event	Equal	Value 1	64
Last Event	Bigger	Value 2	64

In this example, the action will be performed when the note C1 is pressed (the “Note is playing” condition is only available in the Input Transformer and in the Transformer effect):

Filter Target	Condition	Parameter 1	Parameter 2
Type is	Equal	Note	
Last Event	Equal	Note is playing	36/C1

In this example, the action will be performed after playing the C1 note:

Filter Target	Condition	Parameter 1	Parameter 2
Last Event	Equal	Value 1	36/C1

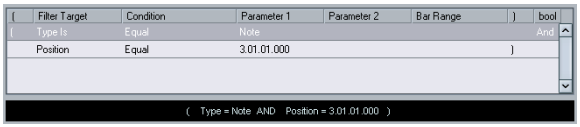
Combining multiple condition lines

As described above, you can add condition lines by clicking the Add Line button to the right of the list. The result of combining condition lines depends on the boolean And/Or operators and the brackets.

The bool column

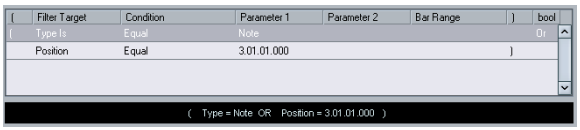
By clicking in the “bool” column to the right in the list, you can select a boolean operator: “And” or “Or”. A boolean operator separates two condition lines and determines the result in the following way:

⇨ If two condition lines are separated by a boolean And, both conditions must be fulfilled for an event to be found.



The Logical Editor will only find events that are notes and start at the beginning of the third bar.

⇨ If two condition lines are separated by a boolean Or, one of the conditions (or both) must be fulfilled for an event to be found.



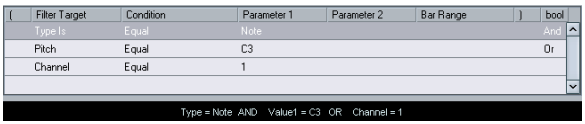
The Logical Editor will find all events that are notes (regardless of their position) and all events starting at the beginning of the third bar (regardless of their type).

⚠ When you add a new condition line, the boolean setting defaults to And. Therefore, if all you want to do is set up two or more conditions that all must be met for an event to be found, you don’t have to think about the boolean column – just add the required lines and make the usual filter settings.

Using brackets

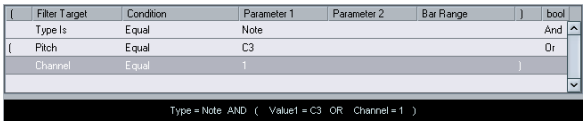
The bracket (parenthesis) columns let you enclose two or more condition lines, dividing the conditional expression into smaller units. This is only relevant when you have three or more condition lines and want to use the boolean Or operator. This is how it works:

⇨ Without brackets, the conditional expressions are evaluated according to their order in the list.



In this case we have the expression Type = Note AND Pitch = C3 (Win)/60 (Mac) OR Channel = 1, without brackets. This means that the Logical Editor will find all MIDI notes with the pitch C3, as well as all events (regardless of their type) set to MIDI channel 1.

Maybe you wanted to find all notes that either had the pitch C3 or the MIDI channel 1 (but no non-note events)? Then you need to add some brackets:

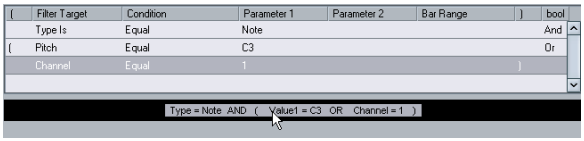


Here the expression is Type = Note AND (pitch = C3 (Win)/60 (Mac) OR Channel = 1), which will find what you want. The rule behind this is:

⇨ Expressions within brackets are evaluated first.
If there are several layers of brackets, these are evaluated “from the inside out”, starting with the innermost brackets.

You add brackets by clicking in the bracket columns and selecting an option. Up to triple brackets can be selected.

Editing filter conditions as text



The area directly below the filter condition list shows you the current filter conditions as text. It also allows you to enter and edit the filter conditions in textual form. For tips on the syntax, please study the included presets.

⇨ There is no additional functionality involved when editing filter conditions as text; it is simply another way to make settings.
When you enter something in the text field you will see the corresponding settings appear in the filter condition list (provided that you have used the correct syntax).

Selecting a function

The pop-up menu in the top left corner of the Logical Editor is where you select the function – the basic type of editing to be performed. When you select an option from the pop-up menu, the field to the right displays a comment, making it easier to see what the function does.

⚠ In the Logical Editor, processing isn’t performed until you click the Do It button. When using the Transformer MIDI effect, there is no Do It button – the current settings are automatically applied in real time during playback or live playing.

Below, the available options are listed. Note that some options are available in the Logical Editor only – not in the Transformer effect.

Delete

Deletes all events found by the Logical Editor. In the case of the Transformer, this function will remove (or “mute”) all found events from the “output stream” – the actual events on the track are not affected.

Transform

Changes one or several aspects of the found events. You set up exactly what should be changed in the action list, see “Specifying actions” on page 395.

Insert

This will create new events and insert these into the part(s) (Logical Editor) or the output stream (Transformer). The new events will be based on the events found by the Logical Editor’s filter conditions, but with any changes you have set up in the action list applied.

Another way of expressing this is that the Insert function copies the found events, transforms them according to the action list and inserts the transformed copies among the existing events.

Insert Exclusive

This will transform the found events according to the action list. Then, all events that were not found (that didn’t meet the filter conditions) are deleted (Logical Editor) or removed from the output stream (Transformer).

Copy (not available in the Transformer)

This will copy all found events, transform them according to the action list and paste them into a new part on a new MIDI track. The original events are not affected.

Extract (not available in the Transformer)

This works like Copy, but will cut the found events instead. Or in other words, Extract will transform all found events and move them to a new part on a new MIDI track.

Select (not available in the Transformer)

This will simply select all found events, highlighting them for further work in the regular MIDI editors.

Specifying actions

The lower list in the Logical Editor window is the action list. This is where you specify any changes that should be made to the found events (relevant for all function types except Delete and Select).

The handling of the action list is similar to the filter condition list, but without the brackets and booleans. You simply add lines by clicking the Add Line button to the right, and fill out the columns as required. To remove a superfluous action line, select it and click the Delete Line button.

Action Target

This is where you select the property that should be changed in the events:

Option	Description
Position	Adjusting this value will move the events.
Length	Lets you resize the events (notes only).
Value 1	This adjusts value 1 in the events. As described in the section "Searching for Value 1 or Value 2" on page 391, the meaning of value 1 depends on the event type. For notes, value 1 is the pitch.
Value 2	This adjusts value 2 in the events. As described in the section "Searching for Value 1 or Value 2" on page 391, the meaning of value 2 depends on the event type. For notes, value 2 is the velocity value.
Channel	Allows you to change the MIDI channel setting. See "Searching for MIDI channels" on page 392.
Type	Allows you to change an event from one type to another, e.g. transform aftertouch events to modulation events.
Value 3	This adjusts value 3 in the events, which is used for handling of Noteoff-velocity when searching for properties. See "Searching for properties" on page 392.

Operation

This setting determines what to do with the Action Target. The options on this pop-up menu are different depending on the selected Action Target. Below, all available operations are listed:

Add

Adds the value specified in the Parameter 1 column to the Action Target.

Subtract

Subtracts the value specified in the Parameter 1 column from the Action Target.

Multiply by

Multiplies the Action Target value with the value specified in the Parameter 1 column.

Divide by

Divides the Action Target value by the value specified in the Parameter 1 column.

Round by

This "rounds" the Action Target value using the value specified in the Parameter 1 column. In other words, the Action Target value is changed to the closest value that can be divided by the Parameter 1 value.

For example, if the Action Target value is 17 and Parameter 1 is 5, the result of rounding will be 15 (the closest value that can be divided by 5). Another word for this type of operation would be "quantizing", and it's actually possible to use it for this, by setting the Action Target to "Position" and specifying a quantize value with Parameter 1 (in ticks, with 480 ticks per quarter note).

Set Random Values between

This will set the Action Target value to a random value within the range specified with Parameter 1 and 2.

Set Relative Random Values between

This will add a random value to the current Action Target value. The added random value will be within the range specified with Parameter 1 and 2. Note that these can be set to negative values.

For example, if you set Parameter 1 to -20 and Parameter 2 to +20, the original Action Target value will get a random variation, never exceeding ±20.

Set to fixed value

This sets the Action Target to the value specified in the Parameter 1 column.

Add Length

This is only available when Action Target is set to Position. Furthermore, it is only valid if the found events are notes (and thus have a length). When Add Length is selected, the length of each note event will be added to the Position value. This can be used for creating new events (using the Insert function) positioned relative to the end positions of the original notes.

Transpose to Scale

This is only available when Action Target is set to Value 1, and when the filter conditions are specifically set up to find notes (a “Type = Note” filter condition line has been added). When “Transpose to Scale” is selected, you can specify a musical scale using the Parameter 1 and 2 columns. Parameter 1 is the key (C, C#, D, etc.) while Parameter 2 is the type of scale (major, melodic or harmonic minor, etc.).

Each note will be transposed to the closest note in the selected scale.

Use Value 2

This is only available when Action Target is set to Value 1. If this option is selected, the Value 2 setting in each event will be copied to the Value 1 setting.

For example, this would be useful if you are transforming all Modulation controllers to Aftertouch events (since controllers use Value 2 for their amount, while Aftertouch uses Value 1 – see “Searching for Value 1 or Value 2” on page 391).

Use Value 1

This is only available when Action Target is set to Value 2. If this option is selected, the Value 1 setting in each event will be copied to the Value 2 setting.

Mirror

This is only available when Action Target is set to Value 1 or Value 2. When this option is selected, the values will be “mirrored” or “flipped” around the value set in the Parameter 1 column.

In the case of notes, this will invert the scale, with the key set in the Parameter 1 column as “center point”.

Linear Change in Loop Range

This will affect events within the loop range (between the left and right locators) only. It will create a linear “ramp” of values (replacing the original values) starting at the value in the Parameter 1 column and ending at the Parameter 2 value.

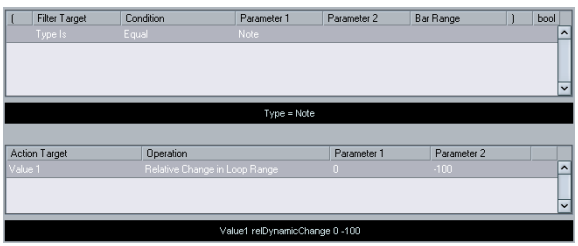
This can be used for creating linear controller sweeps, velocity ramps, etc.

Relative Change in Loop Range

As with the previous option, this will create a ramp of values, affecting events in the cycle loop range only. However, here the changes are “relative”, meaning that values will be added to the existing values.

In other words, you set up a value ramp starting at Parameter 1 and ending at Parameter 2 (note that the Parameter values can be negative). The resulting value ramp is then added to the existing values for the events within the cycle loop range.

For example, if you apply this to note velocities with Parameter 1 set to 0 and Parameter 2 set to -100, you create a velocity fade-out, keeping the original velocity relations:



Applying the defined actions

Once you have set up filter conditions, selected a function and set the required actions (or loaded a preset), you apply the actions defined with the Logical Editor by clicking the Do It button.

Logical Editor operations can be undone just like any other editing.

⇨ Again, when using the Transformer MIDI effect there is no Do It button. The processing is applied to the events played back from the track (or played live “thru” the track) as soon as you set it up.
Since no existing events on the track are affected by the Transformer setting, there is no need for undo.

Working with presets

The Presets section in the bottom right section of the window allows you to load, store and manage Logical Editor presets. A preset contains all settings in the window, which means you can simply load a preset and click Do It.

⇨ To load a preset, select it from the Presets menu.

Storing your own settings as a preset

If you have made Logical Editor settings that you want to use again, you can store them as a preset:

1. You can enter some explanatory text in the Comment field.
An extra description of the preset can be useful, especially if the settings are complex.

2. Click the Store button in the Presets section.
A dialog for specifying a name for the new preset is displayed.

3. Enter a name for the preset and click OK.
The preset is stored.

⇨ To remove a preset, load it and click the Remove button.

Organizing and sharing presets

The Logical Editor presets are stored within the application folder in the Presets\Logical Edit subfolder (see also “Where are the settings stored?” on page 514). While these files cannot be edited “manually”, you can reorganize them (e.g. putting them in subfolders) like any files.

This also makes it easy to share presets with other Nuendo users, by transferring the individual preset files.

⇨ The list of presets is read each time the Logical Editor is opened.

The Input Transformer

This function allows you to selectively filter out and change MIDI data coming to a MIDI track before it is recorded. The Input Transformer is very similar to the Transformer MIDI effect, but contains four independent “modules”, for which you can set up different filtering and actions if you like. You can activate any or all of these four modules.

Here are some of the things the Input Transformer allows you to do the following:

- Set up split keyboard combinations for recording left and right hands separately.
- Turn a controller like a foot pedal into MIDI notes (for playing bass drum the right way).
- Filter out one specific type of MIDI data on one MIDI channel only.
- Turn aftertouch into any controller (and vice versa).
- Invert velocity or pitch.

Again: four of these things can be done at the same time.

Opening the Input Transformer

To open the Input Transformer for a MIDI track, select the track and click the Input Transformer button in the Inspector to open the pop-up menu:

- Select Global to make Input Transformer settings that affect all MIDI inputs (and thereby all MIDI tracks).

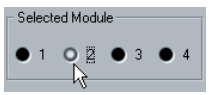
- Select Local to make Input Transformer settings for this track only.

In both cases, the button lights up and the Input Transformer opens.

Handling the four modules

The Input Transformer is really four separate transformers, or modules.

- You select which module to view and make settings for by clicking its button in the Selected Module section.



Module 2 selected for viewing and editing.

- The checkboxes in the Active Module section determine which module(s) are active.

Here, modules 1, 2 and 4 are active.

The two modes

The Mode pop-up menu contains two options: Filter and Transform.

- In Filter mode, only the filter conditions (the upper list) are taken into account. All events matching the conditions set up will be filtered out (excluded from the recording).

- In Transform mode, events matching the filter conditions will be transformed according to the settings in the action list (the lower list).

Setting up filtering and actions

This is done just like in the Logical Editor. Here is a brief rundown:

- Click the Add Line buttons to add lines to the filter condition list or action list.
  To remove a line, click it to select it and click the Delete Line button to the right.

- Clicking the columns in the filter condition list opens pop-up menus allowing you to specify the conditions to match.

- Clicking the columns in the action list opens pop-up menus allowing you to specify what should be done to the found events (when Transform mode is selected).

For detailed descriptions of the filter conditions and action columns, see “General procedure” on page 389.

- Selecting the Init option from the Presets pop-up menu will reset the selected module, removing all filter condition and target list lines.

- The Input Transformer has no “Do It” button – the settings are active as soon as you activate an Active Module checkbox.
  The settings made in the activated modules will affect all MIDI data you record on the track.

⇨ Closing the Input Transformer window does *not* turn it off – you need to deactivate all Active Module checkboxes for this!
A lit Input Transformer button in the Inspector indicates that one or more modules are active.

29

The Project Logical Editor

Introduction

On the Edit menu you will find the function “Project Logical Editor…” that opens a Project Logical Editor for the entire project. It works similar as the Logical Editor on the MIDI menu, see “The Logical Editor, Transformer and Input Transformer” on page 387. The most important difference is, that the Logical Editor for MIDI works on event level whereas the Project Logical Editor works on project level, and is therefore a very powerful tool for “search and replace” functions in your project.

⇨ The MIDI events in the MIDI parts will not be affected by the Project Logical Editor operations. If you want to change MIDI notes or controller data, you have to use the Logical Editor, see “The Logical Editor, Transformer and Input Transformer” on page 387.

⚠ When we speak of “events” in this chapter, we refer to all the Project window elements that can be modified with the Project Logical Editor, e.g. MIDI parts, audio events and parts, Transpose parts, Arranger parts, automation events, etc.

The Project Logical Editor allows you to create “macros”, e.g. for special track type operations on tracks that are named identically. You can use its functions to delete all muted MIDI parts or to toggle the open state of all folder tracks in your project, etc.

Included with the Project Logical Editor are a number of presets that give you an impression of the great possibilities that this feature offers, see “Selecting a preset” on page 401. Many of them can also be used as starting points when you set up your own editing operations.

The principle for the Project Logical Editor is this:

- You set up *filter conditions* to find certain events.

This could be events of a certain type, with certain attributes or values or on certain positions, in any combination. You can combine any number of filter conditions and make composite conditions using AND/OR operators.

- You select the basic *function* to be performed.

The options are Transform (changing properties of the found events), Delete (removing the events) and Select (selecting the found events).

- You set up a list of *actions*, which specify exactly what should be done.

This is not necessary for all functions. For example, the Delete function does not require any additional action specifications – it simply removes all found events.

By combining filter conditions, functions and the specific actions, you can perform very powerful processing.

⚠ The Project Logical Editor allows all kind of settings that may not always make sense. Experiment a bit before applying your edits to important projects. You can undo the operations by using the Undo command on the Edit menu.

Opening the Project Logical Editor

1. Open the desired project.

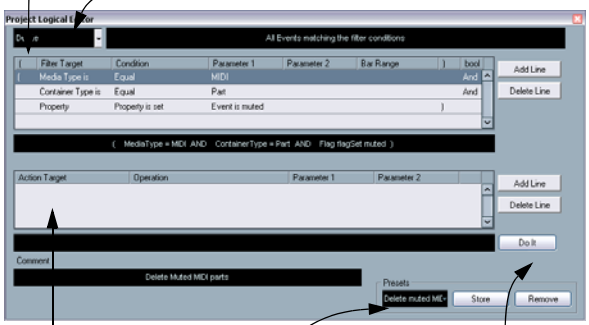
All elements in the project will be affected, you do not have to make any selection.

2. Select “Project Logical Editor…” from the Edit menu.

Window overview

This is the filter condition list, specifying which events to look for.

This is where you select a function (Transform, Delete, etc.). The field to the right shows an additional explanation of the selected function.



This is the action list, specifying e.g. how to change the found events.

This is where you load, store and handle presets. See “Working with presets” on page 409.

The “Do It” button performs the task you have set up.

Selecting a preset

To understand the Project Logical Editor, it might be a good idea to start by exploring the included presets. These are found on the Presets pop-up menu at the bottom of the window, to the right.

- To load a preset, select it from the Presets pop-up menu.

The window will show the settings stored in the preset. As the preset is not applied to the events yet, you can load different presets just to study them without affecting any events. You can also edit the preset before applying it.

- To apply the loaded preset (i.e. to perform the operations defined in the Project Logical Editor), click Do It.

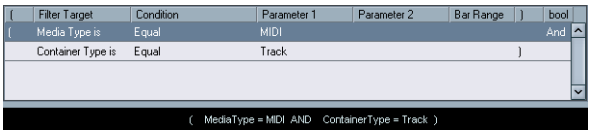
⇨ You can also open the Edit menu and select Presets directly from the "Process Project Logical Editor" submenu.

This allows you to apply a preset directly, without having to open the Project Logical Editor.

For information on how to create and handle your own presets, see "Working with presets" on page 409.

Setting up filter conditions

General procedure



The upper list is where you set up the filter conditions, determining which elements to find. The list contains one or several conditions, each on a separate line.

⇨ If you want to start from scratch (as opposed to basing your settings on an existing preset), you may want to initialize the settings by selecting the Init option from the Presets pop-up menu.

- To add a new line (condition), click the Add Line button to the right.

The new line is added at the bottom of the list. If there are many lines, you may need to use the scrollbar to the right to view them.

- To remove a line, select it and click the Delete Line button to the right.

You set up a filter condition line by clicking in the columns and selecting options from the pop-up menus that appear. Here is a brief description of the columns:

Column	Description
Left bracket	This is used for "bracketing" several lines together when creating conditions with multiple lines and the boolean operators And/Or. See "Combining multiple condition lines" on page 406.
Filter Target	Here you select which property to look for when finding elements. Your choice here affects the available options in the other columns as well, see below!
Condition	This determines how the Project Logical Editor should compare the property in the Filter Target column to the values in the Parameter columns (see the separate table below). The available options depend on the Filter Target setting.
Parameter 1	Here you set which value the element properties should be compared to (depending on the Filter Target). For example, if the Filter Target is "Position" and Condition is "Equal", the Project Logical Editor will look for all elements starting at the position you specify in the Parameter 1 column.
Parameter 2	This column is only used if you have selected one of the "Range" options in the Condition column. Typically, this allows you to find all elements with values inside (or outside) the range between Parameter 1 and Parameter 2.
Bar Range	This column is only used if the Filter Target is "Position" and one of the "Bar Range" options is selected in the Condition column. In these cases, you use the Bar Range column to specify "zones" within each bar (allowing you to find e.g. all elements on or around the first beat of every bar). See "Searching for elements at certain positions" on page 404.
Right bracket	This is used for "bracketing" several lines together. See "Combining multiple condition lines" on page 406.
bool	This allows you to insert the boolean operators And/Or, when creating conditions with multiple lines. See "Combining multiple condition lines" on page 406.

Below, the different Filter Targets (and their corresponding Condition and Parameter options) are described in more detail.

Searching for Media types

1. Select Media Type in the Filter Target pop-up menu.
This allows you to find elements of certain types of media only.

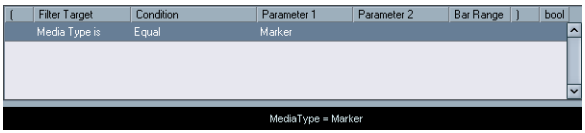
2. Open the pop-up menu in the Parameter 1 column and select the desired option.
When the Filter Target is set to Media type, the pop-up menu lists the available media types. The following table lists what will be found:

Media Type	Description
Audio	If no container type is specified, this finds audio events, audio parts and audio tracks.
MIDI	If no container type is specified, this finds MIDI parts and MIDI tracks.
Automation	If no container type is specified, this finds automation events and automation tracks.
Marker	If no container type is specified, this finds marker events and marker tracks.
Transpose	If no container type is specified, this finds transpose events and transpose tracks.
Arranger	If no container type is specified, this finds Arranger events and Arranger tracks.

3. Open the pop-up menu in the Condition column and select the desired condition.
For media types, the following options are available:

Condition	Description
Equal	…finds the Media Type set up in the Parameter 1 column.
All Types	…finds all Media Types.

If, e.g. you have set up the Project Logical Editor like this…



…the Project Logical Editor will find all Marker events and tracks in the project.

Searching for Container types

1. Select Container Type in the Filter Target pop-up menu.
This allows you to find parts, events or tracks.

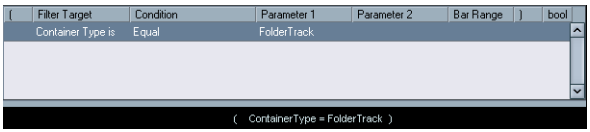
2. Open the pop-up menu in the Parameter 1 column and select the desired option.
When the Filter Target is set to Container type, the pop-up menu lists the available container types. The following table lists what will be found:

Container Type	Description
Folder Track	This finds all folder tracks, included FX Channel and Group Channel folders.
Track	This finds all kinds of tracks.
Part	This finds audio, MIDI and Instrument parts. Folder parts will not be found.
Event	This finds automation points, markers, audio events, arranger events and transpose events.

3. Open the pop-up menu in the Condition column and select the desired condition.
For container types, the following options are available:

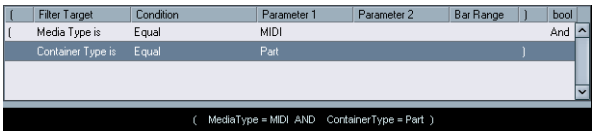
Condition	Description
Equal	…finds the Container Type set up in the Parameter 1 column.
All Types	…finds all Container Types.

If, e.g. you have set up the Project Logical Editor like this…



…the Project Logical Editor will find all Folder tracks in the project.

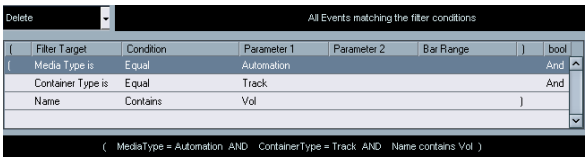
This Filter Target is very powerful in combination with the Media type Filter Target:



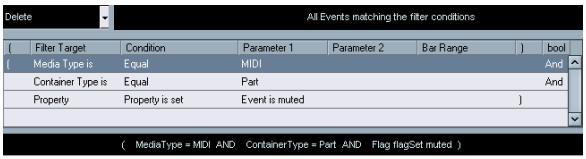
Here, the Project Logical Editor will find all MIDI and Instrument parts in the project.

Combining Media type and Container type

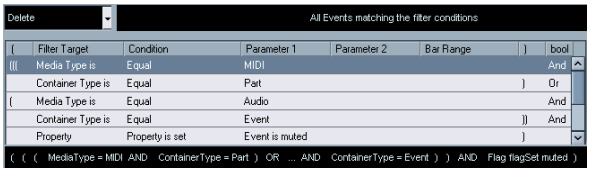
The combination of the Filter Targets Media type and Container represents a vesatile tool for logical operations:



Here, the Project Logical Editor will find all Automation tracks (not events) in the project whose name contains vol.



Here, the Project Logical Editor will find all MIDI and Instrument parts (not tracks) in the project that are muted.



Here, the Project Logical Editor will find all MIDI and Instrument parts (not tracks) or all audio events (not parts or tracks) in the project that are muted.

Searching for Names

1. Select Name on the Filter Target pop-up menu.

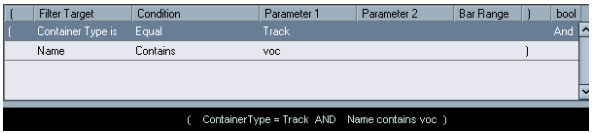
2. Enter the desired name, or a part of a name in the Parameter 1 column.

3. Open the pop-up menu in the Condition column and select the desired condition.

For names, the following options are available:

Condition	Description
Equal	…is the exact same string as set up in the Parameter 1 column.
Contains	…contains the set string.

If, e.g. you have set up the Project Logical Editor like this…



…the Project Logical Editor will find all tracks in the project whose name contains “voc”.

⇨ To take most advantage of this feature, we recommend you to use a standard nomenclature in your projects (Drums, Perc, Voc, etc.).

Searching for elements at certain positions

1. Select Position in the Filter Target pop-up menu.

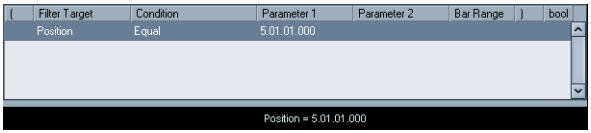
This allows you to find elements starting at certain positions, either relative to the start of the project or within each bar.

2. Open the pop-up menu in the Condition column and select the desired condition.

For positions, the following options are available:

Condition	Description
Equal	…has the exact same value as set up in the Parameter 1 column.
Unequal	…has any value other than the one set up in the Parameter 1 column.
Bigger	…has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	…has a value that is the same as or higher than the one set up in the Parameter 1 column.
Less	…has a value lower than the one set up in the Parameter 1 column.
Less or Equal	…has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	…has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	…has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.
Inside Bar Range	…is within the “zone” set up in the Bar Range column, in each bar within the current selection.
Outside Bar Range	…is outside the “zone” set up in the Bar Range column, in each bar within the current selection.
Before Cursor	…is before the song Project position.
Beyond Cursor	…is after the song Project position.
Inside Track Loop	…is inside the set track loop (see “The independent track loop function” on page 293).
Inside Cycle	…is inside the set cycle.
Exactly matching Cycle	…exactly matches the set cycle.

- If you select any condition other than the Range, Bar Range, Cursor, Loop or Cycle options, you set up a specific position (in bars, beats, sixteenth notes and ticks) in the Parameter 1 column. Note that the position for Bar Range is measured in ticks related to the start of the bar.



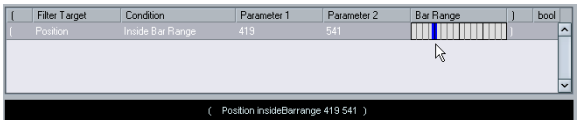
Here, the Logical Editor will find all elements at the position 5.1.1. in the project.

- If you select Inside Range or Outside Range in the Condition column, you set the start position of the range in the Parameter 1 column and the end position in the Parameter 2 column.

The Project Logical Editor will then find all elements inside or outside this position range.

- If you select one of the Bar Range options in the Condition column, the Bar Range column will show a graphic bar display. You specify the range within the bar by clicking and dragging in the bar display (the specified Bar Range is indicated in blue).

The Project Logical Editor will then find all elements starting inside or outside this Bar Range, in all bars (within the current selection).



Here, the Project Logical Editor will find elements starting around the second beat in each bar.

Searching for elements of certain lengths

1. Select Length in the Filter Target pop-up menu.

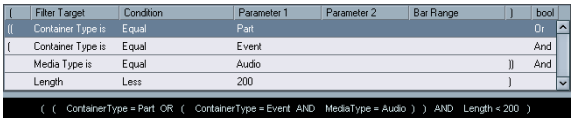
This allows you to find elements of a certain length only. The Length parameter is interpreted via the time base setting of the tracks, i.e. in ticks (musical) or ms (time), except for audio parts or events: these are always measured in samples.

2. Open the pop-up menu in the Condition column and select the desired condition.

For lengths, the following options are available:

Condition	Description
Equal	…has the exact same value as set up in the Parameter 1 column.
Unequal	…has any value other than the one set up in the Parameter 1 column.
Bigger	…has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	…has a value that is the same as or higher than the one set up in the Parameter 1 column.
Less	…has a value lower than the one set up in the Parameter 1 column.
Less or Equal	…has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	…has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	…has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.

If you select any condition other than the Range options, you set up a specific position in the Parameter 1 column.



Here, the Project Logical Editor will find all audio parts and events in the project with a length smaller than 200 samples.

Searching for properties

1. Select Property on the Filter Target pop-up menu.

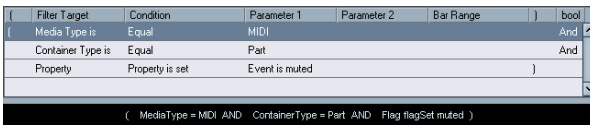
2. Open the pop-up menu in the Condition column and select the desired condition.

When the Property option is selected, the Condition column has two options: “Property is set” and “Property is not set”.

3. Open the pop-up menu in the Parameter 1 column and select the desired option.

This sets which property will be searched. The options are “muted” and “selected”.

Two examples:



Here, the Project Logical Editor will find all muted MIDI and Instrument parts.

Here, the Project Logical Editor will find all elements that are selected but not muted.

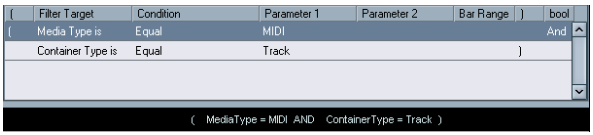
Combining multiple condition lines

As described above, you can add condition lines by clicking the Add Line button to the right of the list. The result of combining condition lines depends on the boolean And/Or operators and the brackets.

The bool column

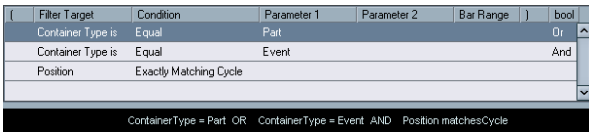
By clicking in the “bool” column to the right in the list, you can select a boolean operator: “And” or “Or”. A boolean operator separates two condition lines and determines the result in the following way:

⇨ If two condition lines are separated by a boolean And, both conditions must be fulfilled for an element to be found.



The Project Logical Editor will only find MIDI Tracks.

⇨ If two condition lines are separated by a boolean Or, one of the conditions (or both) must be fulfilled for an element to be found.



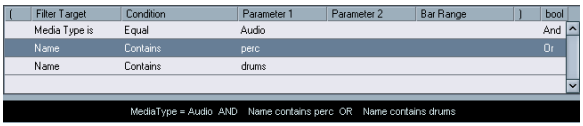
The Project Logical Editor will find all parts or events that match exactly the cycle.

⚠ When you add a new condition line, the boolean setting defaults to And. Therefore, if all you want to do is set up two or more conditions that all must be met for an element to be found, you don’t have to think about the boolean column – just add the required lines and make the usual filter settings.

Using brackets

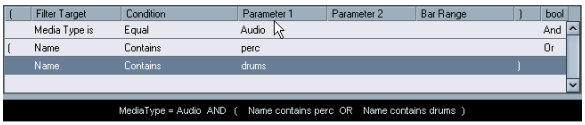
The bracket (parenthesis) columns let you enclose two or more condition lines, dividing the conditional expression into smaller units. This is only relevant when you have three or more condition lines and want to use the boolean Or operator. This is how it works:

⇨ Without brackets, the conditional expressions are evaluated according to their order in the list.



Here, the Project Logical Editor will find all audio parts and events whose name contains perc and all Audio parts and events whose name contains drums, as well as other parts and events (e.g. MIDI parts) whose name contains drums.

Maybe you wanted to find all Audio parts and events that either had the name perc or the name drums (but no other parts or events named drums)? Then you need to add some brackets:



Here, all audio parts or events will be found whose name contains perc or drums. The rule behind this is:

⇨ Expressions within brackets are evaluated first.

If there are several layers of brackets, these are evaluated “from the inside out”, starting with the innermost brackets.

You add brackets by clicking in the bracket columns and selecting an option. Up to triple brackets can be selected.

Editing filter conditions as text

You can also edit filter conditions as text. This works just like in the Logical Editor for MIDI, see “Editing filter conditions as text” on page 394.

Selecting a function

The pop-up menu in the top left corner of the Project Logical Editor is where you select the function – the basic type of editing to be performed. When you select an option from the pop-up menu, the field to the right displays a comment, making it easier to see what the function does.

The available options are:

Delete

Deletes all elements found by the Project Logical Editor.

⇨ When you delete automation tracks and undo this operation by selecting Undo from the Edit menu, the automation tracks will be restored, but the tracks will be closed.

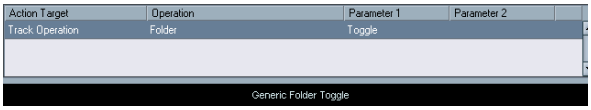
Transform

Changes one or several aspects of the found elements. You set up exactly what should be changed in the action list, see below.

Select

This will simply select all found elements, highlighting them for further work in the Project window.

Specifying actions



The lower list in the Project Logical Editor window is the action list. This is where you specify any changes that should be made to the found elements, relevant for the function type Transform.

You can perform two different kinds of actions: track-based actions (such as Track Operation, Name) and event-based actions (such as Position, Length, Name). There are also actions that only take effect on automation data (Trim).

The handling of the action list is similar to the filter condition list, but without the brackets and booleans. You simply add lines by clicking the Add Line button to the right, and fill out the columns as required. To remove a superfluous action line, select it and click the Delete Line button.

Action Target

This is where you select the property that should be changed. The Operations determine what to do with the Action Target. Below, all available operations are listed:

Position

Adjusting this value will move the elements:

Operation	Description
Add	Adds the value specified in the Parameter 1 column to the Position.
Subtract	Subtracts the value specified in the Parameter 1 column from the Position.
Multiply by	Multiplies the Position value with the value specified in the Parameter 1 column.
Divide by	Divides the Position value by the value specified in the Parameter 1 column.
Round by	This “rounds” the Position value using the value specified in the Parameter 1 column. In other words, the Position value is changed to the closest value that can be divided by the Parameter 1 value. For example, if the Position value is 17 and Parameter 1 is 5, the result of rounding will be 15 (the closest value that can be divided by 5). Another word for this type of operation would be “quantizing”, and it’s actually possible to use it for this, by specifying a quantize value with Parameter 1 (in ticks, with 480 ticks per quarter note).

Operation	Description
Set Relative Random Values between	This will add a random value to the current Position value. The added random value will be within the range specified with Parameter 1 and 2. Note that these can be set to negative values. For example, if you set Parameter 1 to -20 and Parameter 2 to +20, the original Position value will get a random variation, never exceeding ±20.
Set to fixed value	This sets the Position to the value specified in the Parameter 1 column.

Length

Lets you resize the elements. This parameter is interpreted via the time base setting of the tracks, i.e. in ticks (musical) or ms (time):

Operation	Description
Add	Adds the value specified in the Parameter 1 column to the Length.
Subtract	Subtracts the value specified in the Parameter 1 column from the Length.
Multiply by	Multiplies the Length value with the value specified in the Parameter 1 column.
Divide by	Divides the Length value by the value specified in the Parameter 1 column.
Round by	This “rounds” the Length value using the value specified in the Parameter 1 column. In other words, the Length value is changed to the closest value that can be divided by the Parameter 1 value.
Set to fixed value	This sets the Length to the value specified in the Parameter 1 column.
Set Random Values between	This will add a random value to the current length. The added random value will be within the range specified with Parameter 1 and 2.

Track Operation

This lets you change the track status.

Operation	Description
Folder	Opens, closes or toggles folders.
Record	Enables, disables or toggles the record enable status.
Monitor	Enables, disables or toggles the monitor status.
Solo	Enables, disables or toggles the solo status.
Mute	Enables, disables or toggles the mute status.

Name

This lets you rename the found elements.

Operation	Description
Replace	Replaces names by the string specified under Parameter 1.
Append	Names will be appended with the string specified under Parameter 1.
Prepend	The name will be prepended with the string specified under Parameter 1.
Generate Name	The name will be replaced by the string specified under Parameter 1 followed by the number set with Parameter 2. The number will be increased by 1 for every found element.
Replace Search String	You can specify a search string under Parameter 1 that should be replaced by the string specified under Parameter 2.

Trim

This Action Target is used for automation only and lets you trim the found elements.

Operation	Description
Multiply by	Multiplies the Trim value with the value specified in the Parameter 1 column.
Divide by	Divides the Trim value by the value specified in the Parameter 1 column.

Applying the defined actions

Once you have set up filter conditions, selected a function and set the required actions (or loaded a preset), you apply the actions defined with the Project Logical Editor by clicking the Do It button.

Project Logical Editor operations can be undone just like any other editing.

Working with presets

The Presets section in the bottom right section of the window allows you to load, store and manage Project Logical Editor presets. A preset contains all settings in the window, which means you can simply load a preset and click Do It.

⇨ To load a preset, select it from the Presets menu.

Storing your own settings as a preset

If you have made Project Logical Editor settings that you want to use again, you can store them as a preset:

1. You can enter some explanatory text in the Comment field.
An extra description of the preset can be useful, especially if the settings are complex.

2. Click the Store button in the Presets section.
A dialog for specifying a name for the new preset is displayed.

3. Enter a name for the preset and click OK.
The preset is stored.

⇨ To remove a preset, load it and click the Remove button.

Organizing and sharing presets

The Project Logical Editor presets are stored within the application folder in the Presets\Logical Edit Project subfolder (see also “Where are the settings stored?” on page 514). While these files cannot be edited manually, you can reorganize them (e.g. putting them in subfolders) like any files.

This also makes it easy to share presets with other Nuendo users, by transferring the individual preset files.

⇨ The list of presets is read each time the Project Logical Editor is opened.

Setting up key commands for your presets

If you have stored Project Logical Editor presets, you can set up key commands for them:

1. Pull down the File menu and select “Key Commands…”.
The Key Commands dialog appears.

2. Use the list in the Commands column to navigate to the category “Process Logical Project Preset” and click the plus-sign to display the items in the folder.

3. In the list, select the item to which you wish to assign a key command, click in the “Type in Key” field and enter a new key command.

4. Click the Assign button above the field.
The new key command appears in the Keys List.

5. Click OK to exit the dialog.

For more information on Key Commands, see the chapter “Key commands” on page 517.

30

Working with System Exclusive messages

Introduction

SysEx (System Exclusive) messages are model-specific messages for setting various parameters of a MIDI device. This makes it possible to address device parameters that would not be available via normal MIDI syntax.

Every major MIDI manufacturer has its own SysEx identity code. SysEx messages are typically used for transmitting patch data, i.e. the numbers that make up the settings of one or more sounds in a MIDI instrument.

Nuendo allows you to record and manipulate SysEx data in various ways. This chapter points to various features that help you manage and create SysEx data.

(To learn about the possibilities of the MIDI Device Manager for controlling your device, please refer to the separate PDF document “MIDI Devices”.)

Bulk dumps

Recording a bulk dump in Nuendo

In any programmable device, the settings are stored as numbers in computer memory. Change those numbers, and you will change the settings.

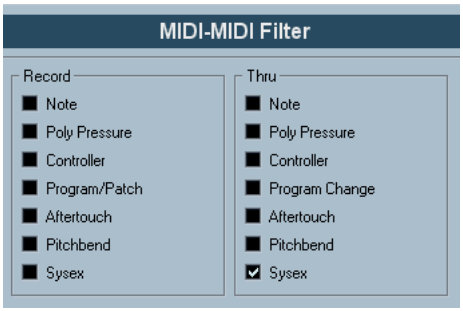
Normally, MIDI devices allow you to dump (transmit) all or some settings in the device's memory in the form of MIDI SysEx messages. A dump is therefore (among other things) a way of making backup copies of the settings of your instrument: sending such a dump back to the MIDI device will restore the settings.

If your instrument allows the dumping of a few or all of its settings via MIDI by activating some function on the front panel, this dump will probably be recordable in Nuendo.

1. Open the Preferences dialog from the File menu (on the Mac, this is located on the Nuendo menu) and select the MIDI–MIDI Filter page.

This allows you to govern which MIDI event types should be recorded and/or thru-put.

2. Make sure that recording of Sysex data is not filtered, by unchecking the Sysex checkbox in the Record section. The Sysex checkbox in the Thru section can be left as it is (by default activated).

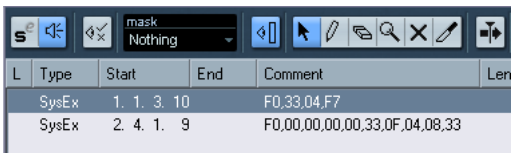


This way, SysEx messages will be recorded but not echoed back out to the instrument (which may lead to unpredictable results).

3. Activate recording on a MIDI track and initiate the dump from the front panel of the instrument.

4. When done recording, select the new part and open the List Editor from the MIDI menu.

This allows you to check that the SysEx dump was recorded – there should be one or several SysEx events in the part/event list.



⚠ If your MIDI instrument doesn’t offer a way to initiate a dump “by itself”, you have to send a Dump Request message from Nuendo to start the dump. In that case, use the MIDI SysEx Editor (see “Editing System Exclusive messages” on page 413) to insert the specific Dump Request message (see the instrument’s documentation) at the beginning of a MIDI track. When you activate recording, the Dump Request message will be played back (sent to the instrument), the dump will start and be recorded as above.

Transmitting a bulk dump back to a device

1. Make sure the MIDI track with the System Exclusive data is routed to the device.
You may want to check your device's documentation to find details about which MIDI channel should be used, etc.

2. Solo the track.
This might not be necessary, but it is a good safety measure.

3. Make sure the device is set up to receive SysEx messages (often, receiving SysEx is turned off by default).

4. If necessary, put the device in "Standby to Receive System Exclusive" mode.

5. Play back the data.

Some advice

- Don't transmit more data than you need. If all you want is a single program, don't send them all, it will only make it harder to find the one you want. Usually, you can specify exactly what you want to send.
- If you want the sequencer to dump the pertinent sounds to your instrument each time you load a project, put the SysEx data in a silent "count-in" before the project itself starts.
- If the dump is very short (for instance, a single sound) you can put it in the middle of the project to re-program a device on the fly. However, you can achieve the same effect by using Program Change. This is definitely preferable, since less MIDI data is sent and recorded. Some devices may be set up to dump the settings for a sound as soon as you select it on the front panel.
- If you create parts with useful "SysEx dumps", you can put these on a special muted track. When you want to use one of them, drag it to an empty unmuted track and play it back from there.
- Do not transmit several SysEx dumps to several instruments at the same time.
- Make a note of the current device ID setting of the instrument. If you change this, the instrument may refuse to load the dump later.

Recording System Exclusive parameter changes

Often you can use SysEx to remotely change individual settings in a device, e.g. open a filter, select a waveform, change the decay of the reverb etc. Many devices are also capable of transmitting changes made on the front panel as SysEx messages. These can be recorded in Nuendo, and thus incorporated into a regular MIDI recording.

Here's how it works: let's say you open up a filter while playing some notes. In that case, you will record both the notes and the SysEx messages generated when you opened of the filter. When you play it back, the sound changes exactly like it did when you recorded it.

1. Open the Preferences dialog from the File menu, select the MIDI–MIDI Filter page and make sure that SysEx is recorded, i.e. the Sysex checkbox in the Record section is deactivated.

2. Make sure the instrument is actually set to transmit changes of front panel controls as SysEx messages.

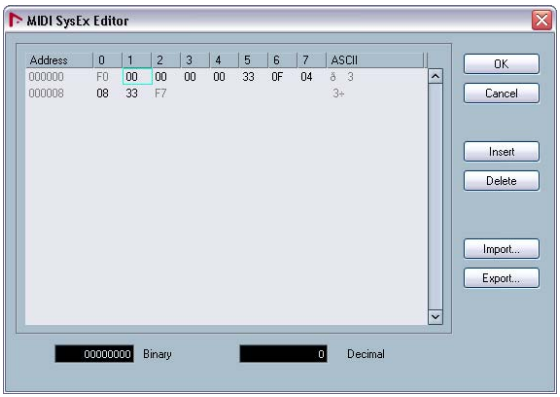
3. Record normally.
When you're done, you can check that the events were recorded properly in the List Editor.

Editing System Exclusive messages

While SysEx events are shown in the List Editor/Project Browser, their entire content is not (only the beginning of the message is displayed in the Comment column for the event). Also, you cannot edit the event (other than moving it) as you can with other event types in the List Editor.

Instead, you have to use the MIDI SysEx Editor for this.

- To open the MIDI SysEx Editor for an event, click in the Comments column for the event in the List Editor/Project Browser.



The display shows the entire message on one or several lines. SysEx messages always begin with F0 and end with F7 with a number of arbitrary bytes in between. If the message contains more bytes than fit on one line, it continues on the next. The Address indication to the left helps you find out on which position in the message a certain value resides.

You can edit all values except for the first (F0) and last one (F7).

Selecting and viewing values

To select a value, either click on it or use the cursor keys. The selected byte is displayed in various formats:

- In the main display, values are shown in hexadecimal format.
- To the right of this, values are shown in ASCII format.
- At the bottom of the dialog, the selected value is shown in binary and decimal formats.

Editing a value

The selected value can be edited directly in the main display or in the decimal and binary displays. Just click on it and type in the desired value as usual.

Adding and deleting bytes

Using the Insert and Delete buttons or their corresponding computer keyboard keys, you can add and delete bytes from the message. Inserted data will appear before the selection.

To delete the complete SysEx message, select it in the List Editor and press [Delete] or [Backspace].

Importing and exporting data

The Import and Export buttons allow you to get SysEx data from disk and to export the edited data to a file. The file has to be in “MIDI SysEx” (.SYX) binary format. Only the first dump in a .SYX file will be loaded.

This format should not be confused with MIDI files, which have the extension .MID.

31

Working with the Tempo track

Background

For each track in Nuendo that can make use of this function, you can specify whether it should be time-based or tempo-based (see “Switching between musical and linear time base” on page 40). For tempo-based tracks, the tempo can either be fixed through the whole project (this is called “Fixed tempo mode”) or follow the Tempo track (this is called “Tempo track mode”), which may contain tempo changes.

- To switch between Fixed tempo mode and Tempo track mode, use the Tempo button on the Transport panel:

When the Tempo button is lit (and the text “Track” is shown), the tempo follows the Tempo track; when it is deactivated (and the text “Fixed” is shown), the Fixed tempo is used (see “Setting the Fixed tempo” on page 419). You can also switch tempo mode in the Tempo Track Editor (see below).

In Tempo track mode, the tempo cannot be changed on the Transport panel, i.e. the tempo information here is for display purposes only.

The Tempo track also contains time signature events. These are always active, regardless of whether Fixed tempo mode or Tempo track mode is selected.

A note about tempo-based audio tracks

For tempo-based tracks, the start time position of audio events depends on the current tempo setting. However, it is important to realize that the actual audio (“within” the events) will play back as recorded, regardless of any tempo changes you make. Therefore, it’s good practice to make the proper tempo and time signature settings before you start recording tempo-based audio.

⇨ To make an already recorded audio track follow the tempo changes, you can use the Sample Editor, see “The Sample Editor” on page 258.
How well this works depends on the character of the audio recordings, since the Hitpoint detection feature works best with fairly rhythmical material.

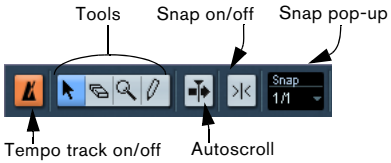
⇨ To adapt the tempo track to time-based material, you can use the Time Warp tool, see “The Time Warp tool” on page 422.
This allows you to adjust the tempo track so that tempo-based material (e.g. positions in music) coincides with time-based material (e.g. positions in narration, video, etc.).

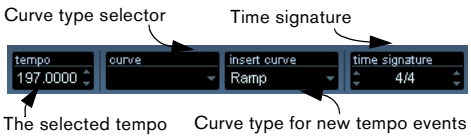
The Tempo Track Editor – Overview

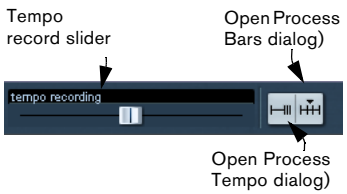
To make changes to the actual Tempo track, you need to open the Tempo Track Editor by selecting “Tempo Track” on the Project menu.

The toolbar

The toolbar contains various tools and settings. The tempo and time signature displays to the right allow you to view and edit the value of the selected tempo curve point or time signature event, much like the info line in other editors.

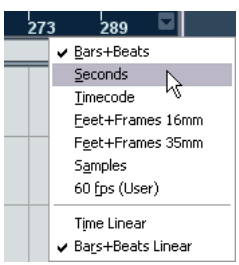






The ruler

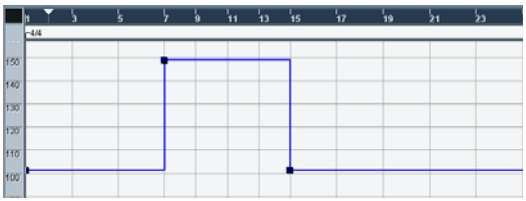
The ruler in the Tempo Track Editor shows the timeline. As in other windows, you can select a display format by clicking on the arrow button to the right of the ruler and selecting an option from the pop-up menu that appears.



The two additional items at the bottom of the menu have the following functionality:

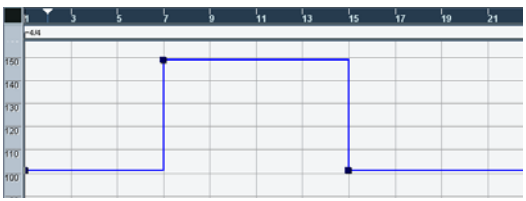
- If “Time Linear” is selected, the ruler, time signature area and tempo curve display will be linear in relation to the timeline.

  This means that if the ruler shows bars and beats, the distance between the bar lines will vary depending on the tempo.



- If “Bars+Beats Linear” is selected, the ruler, time signature area and tempo curve display will be linear in relation to beats.

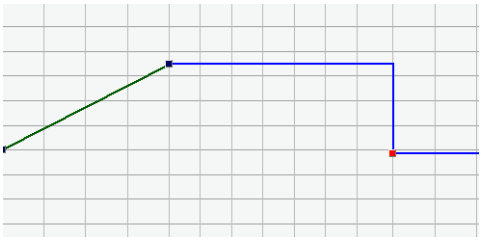
  If the ruler shows bars and beats, the distance between beats will be constant.



The time signature area

The area below the ruler contains time signature events.

The tempo curve display



The main display shows the tempo curve (or, if Fixed tempo mode is selected, the Fixed tempo – see “Setting the Fixed tempo” on page 419). To the left of the display is a tempo scale to help you quickly locate the desired tempo.

- Note that the vertical “grid lines” correspond to the display format selected for the ruler.

Operations

Zooming

Changing the magnification is done using any of the following methods:

- By using the zoom sliders in the lower right corner of the window.
- By using the Magnifying Glass tool.

This works according to the standard procedures.

- By using the Zoom submenu on the Edit menu.

The options on the menu work as in other windows.

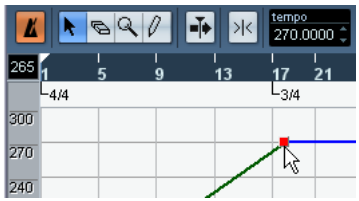
Editing the tempo curve

⚠ This section assumes that you are working in Tempo track mode, i.e. the Tempo button must be activated on the Transport panel.

Adding tempo curve points

1. Use the “insert curve” pop-up menu in the toolbar to select whether you want the tempo to change gradually from the previous curve point to the new one (“Ramp”) or change instantly to the new value (“Jump”).
2. Select the Pencil tool.
3. Click at the desired time position in the tempo curve display, and keep the mouse button pressed.

If Snap is activated on the toolbar, this determines at which time positions you can insert tempo curve points, see “Snap” on page 421.

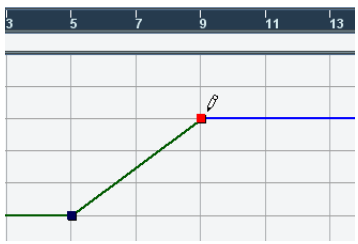


When you click, the tempo display in the toolbar shows the tempo value.

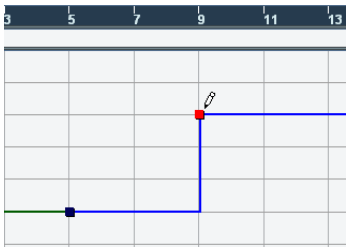
4. Drag the curve point to the desired tempo value (indicated in the tempo display), and release the mouse button.

The tempo curve point is inserted. The result depends on whether you selected “Ramp” or “Jump” in step 1 above:

Insert curve set to “Ramp”:



Insert curve set to “Jump”:



- You can also just click and draw a tempo curve with the Pencil tool, so that curve points are inserted while you draw.

For this, the “Ramp” Insert Curve mode is useful.

- Instead of using the Pencil tool, you can press [Alt]/[Option] and use the Arrow tool.
This will only insert a single point (i.e. you cannot draw a curve with the Arrow tool).

⚠ You can also have tempo values automatically inserted by the Beat Calculator, see "The Beat Calculator" on page 421.

Selecting tempo curve points

Selecting curve points is done using any of the following methods:

- Use the Arrow tool.
The standard selection techniques apply.

- Use the Select submenu on the Edit menu.
The options are:

Option	Description
All	Selects all curve points on the Tempo track.
None	Deselects all curve points.
In Loop	Selects all curve points between the left and right locator.
From Start to Cursor	Selects all points to the left of the project cursor.
From Cursor to End	Selects all points to the right of the project cursor.

- You can also use the left and right arrow keys on the computer keyboard to go from one curve point to the next.
If you press [Shift] and use the arrow keys, the current selection will be kept, allowing you to select several points.

Editing tempo curve points

Curve points can be edited in the following ways:

- By clicking and dragging horizontally and/or vertically.
If several points are selected, all of them are moved. If Snap is activated on the toolbar, this determines to which time positions you can move curve points, see "Snap" on page 421.

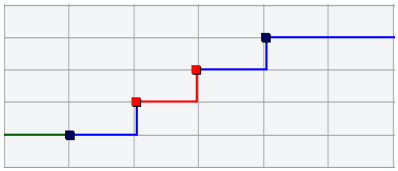
- By adjusting the tempo value in the tempo display on the toolbar.
For this to work, a single tempo curve point must be selected.

⚠ Dragging tempo curve points with a time-based display format (any other format than "Bars+Beats") may lead to confusing results. This is because moving a point will change the relationship between tempo and time. For example, let's say you move a tempo point to the right and drop it on a certain time position. When you release the mouse button, the mapping between tempo and time will be adjusted (since you have changed the tempo curve). As a result, the moved point will appear at another position. For this reason, we recommend that you use the Bars+Beats display format when editing tempo curves.

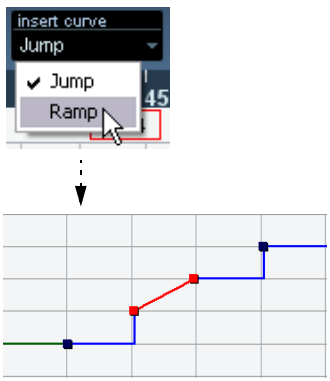
Adjusting the curve type

You can change the curve type of a tempo curve segment at any time, using the following method:

1. Select all curve points within the segment you want to edit.



2. Pull down the Curve pop-up menu on the toolbar and select "Jump" or "Ramp".
The curve sections between the selected points are adjusted.



Removing tempo curve points

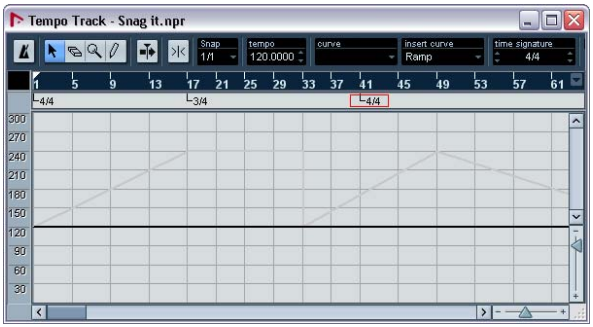
To remove a curve point, either click on it with the Eraser tool or select it and press [Backspace]. The first tempo curve point cannot be removed.

Recording tempo changes

The tempo record slider on the toolbar allows you to record tempo changes “on the fly”: simply start playback and use the slider to raise or lower the tempo at the desired positions. Useful for creating natural sounding ritardandos, etc.

Setting the Fixed tempo

When the Tempo track button is deactivated, the Tempo track curve is grayed out (but still visible). Since the Fixed tempo is constant throughout the whole project, there are no tempo curve points. Instead, the Fixed tempo is displayed as a horizontal black line in the tempo curve display.



There are three ways to set the tempo in Fixed mode:

- Drag the tempo line up or down with the Arrow tool.
- Adjust the value numerically in the tempo display on the toolbar.
- On the Transport panel, in Fixed tempo mode, click on the Tempo value to select it, enter a new value and press [Enter].

Adding and editing time signature events

- To add a time signature event, click in the time signature area with the Pencil tool.
  This adds a default 4/4 time signature event at the closest bar position. You can also do this by pressing [Alt]/[Option] and clicking with the Arrow tool.
- To edit the value of a time signature event, select it and adjust the value in the signature display on the toolbar.
  Note that there are two controls for the signature display; the left one adjusts the numerator and the right one adjusts the denominator.
- You can move a time signature event by clicking and dragging it with the Arrow tool.
  Again, note that time signature events can only be positioned at the start of bars.
- To remove a time signature, either click on it with the Eraser tool or select it and press [Backspace].
  The first time signature event cannot be removed.

Exporting and importing Tempo tracks

You can export the current tempo track for use in other projects by selecting “Tempo Track” from the “Export” submenu on the File menu. This allows you to save the tempo track information (including time signature events) as a special xml file (file extension “.smt”).

To import a saved tempo track, select “Tempo Track” from the Import submenu on the File menu. Note that this replaces all tempo track data in the current project (although the operation can be undone if needed).

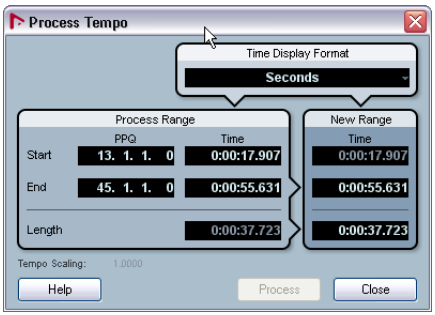
Process Tempo

Process Tempo allows you to define a specific length or end time for a set range, and the Tempo track will automatically set a tempo that will fit the range in the specified time.

It works as follows:

1. Open the Tempo Track Editor and specify a region or range that you wish to process by setting the left and right locators.

2. Click on the Process Tempo button on the Tempo Track toolbar.
The Process Tempo dialog appears.



3. In the Process Range fields, the specified range is shown, in Bars and Beats (PPQ) and in a time format, which can be selected from the Time Display Format pop-up.
The range defined in step 1 will already be set, but you can edit the range by adjusting the values in the Process Range fields if you wish.

Now you can either specify a new range length or a new range end time. What to choose depends on whether the range should have a specific length or whether it should end at a specific time position.

4. Enter the desired End or Length in the corresponding fields of the New Range section.
You can select a time format for the new range in the Time Display Format pop-up.

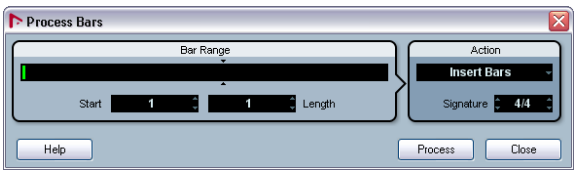
5. Click Process.
Now the tempo track is automatically adjusted, and the range will have the specified duration.

The Process Bars dialog

The Process Bars dialog, which can be opened from the Tempo Track Editor, uses the global “Insert Silence” and “Delete Time” functions from the Edit menu – Range submenu, but uses a musical “bars+beats-based” environment for calculating the necessary ranges (or parameters). It also ensures that the time signatures stay “in sync” after these operations. This allows for a much more intuitive approach when inserting, deleting or replacing “time” while working with a project set to the Bars+Beats time type.

The Process Bars dialog is opened by clicking on the respective button on the Tempo Track toolbar (next to the Process Tempo button).

Click this button…



… to open the Process Bars dialog.

The dialog contains the following elements:

Option	Description
Bar Range	The Bar Range display gives you a graphical overview of the position of the bar range within the project as well as its length. You can change the setting here by dragging the green rectangle; however this is accomplished much easier by using the Start and Length value fields (see below). The small arrow pair in this section mark the length of the current project. The area to the right marks the bar range that can be added (500 bars max.).
Bar Range – Start	This is where you specify the desired start position for the bar range. Click on the small arrows to raise/lower the value by one step or click directly in the value field and enter the desired number manually.
Bar Range – Length	This is where you specify the desired length of the bar range. Click on the small arrows to raise/lower the value by one step or click directly in the value field and enter the desired number manually.
Action – Insert Bars	When you select this action, clicking the Process button will insert the specified number of empty bars with the set time signature at the desired start position in the project.

Option	Description
Action – Delete Bars	When you select this action, clicking the Process button will delete the specified number of bars beginning at the set start position.
Action – Reinterpret Bars	When you select this action, clicking the Process button will reinterpret the bar range to fit the specified time signature. This is very special in the sense that both bars+beats positions of the notes and the tempo are being changed to fit the new time signature, but the playback of the notes will stay just the same. If you want to reinterpret e.g. a bar with the time signature 3/4 so that it gets the time signature 4/4, quarter notes will become half note triplets. If you reinterpret a bar with the time signature 4/4 to attain 3/4, you will get quadruplets.
Action – Replace Bars	When you select this action, clicking the Process button will cause the time signature of the specified bar range to be replaced by the one you specify in this dialog.
Action – Signature	This lets you specify the desired time signature for the action you select in the Action pop-up menu (except for the Delete Bars action).
Process	Click this button to apply your changes to the desired bar range.
Close	Clicking this button closes the Process Bars dialog. Please note that you have to click the Process button first to apply your settings. Clicking this button without clicking on “Process” first will close the dialog without applying your settings.

Options and settings

Snap

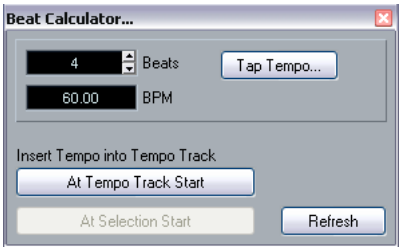
You activate or deactivate Snap by clicking the Snap icon on the toolbar. The behavior of the function depends on the display format selected for the ruler:

- If “Bars+Beats” is selected, tempo curve points will snap to the set resolution on the Snap pop-up.
  If this is set to 1/1, curve points will snap to the start of bars.
- If any other display format is selected, tempo curve points will snap to the vertical grid lines in the tempo curve display.
  The spacing of the grid lines depends on the horizontal magnification.
- Time signature events can only be positioned at the start of bars, regardless of whether Snap is activated or not.

Autoscroll

When this option is activated, the tempo curve display will scroll during playback, keeping the project cursor visible.

The Beat Calculator



The Beat Calculator is a tool for calculating the tempo of freely recorded audio or MIDI material. It also allows you to set the tempo by tapping.

Calculating the tempo of a recording

1. In the Project window, make a selection that covers an exact number of beats of the recording.
2. Select “Beat Calculator…” from the Project menu.
   The Beat Calculator window appears.
3. Enter the number of beats that the selection encompasses in the Beats field.
   The corresponding tempo is calculated and displayed in the BPM field.

- If you need to adjust the selection, you can go back to the Project window, leaving the Beat Calculator open.
  To re-calculate the tempo after adjusting the selection, click Refresh.

4. If you like, you can insert the calculated tempo into the Tempo track by clicking one of the buttons in the lower left corner of the Beat Calculator window.
   Clicking “At Tempo Track Start” will adjust the first tempo curve point, while “At Selection Start” will add a new tempo curve point at the selection’s start position, using the “Jump” curve type (see “Adding tempo curve points” on page 417).

⚠ If Fixed tempo mode is selected when you insert the calculated tempo, the Fixed tempo will be adjusted, regardless of which button you click.

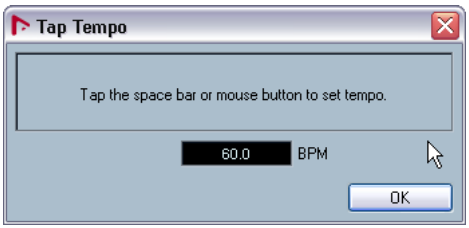
Using Tap Tempo

The Tap Tempo function allows you to specify a tempo by tapping:

1. Open the Beat Calculator.

2. If you want to tap the tempo to some recorded material, activate playback.

3. Click the Tap Tempo button.
The Tap Tempo window appears.



4. Tap the tempo on the computer keyboard's space bar or with the mouse button.
The tempo display will update the calculated tempo between each tap.

5. When you stop tapping, the program calculates the average timing of the taps and displays it.

6. Click OK to close the Tap Tempo dialog.
The tapped tempo is now shown in the Beat Calculator's BPM display. If you like, you can insert it into the Tempo track as described above.

Merge Tempo From Tapping

This function allows you to create a complete tempo track based on your tapping. Typically, you would use this if you have an audio file with no tempo mapping and want to be able to add sequenced material afterwards, etc.

1. Create an empty time-based MIDI track and, while playing back your audio material, tap the new tempo on your MIDI keyboard and record the created notes onto the new MIDI track.
Note that you must create note events – pedal events cannot be used for this function.

2. Play back the audio and check that the timing of the MIDI notes corresponds to that of the audio.
If necessary, edit the MIDI notes in an editor.

3. Select the part (or the individual notes in an editor) that you want to use for the calculation.

4. Select "Merge Tempo From Tapping" from the Functions submenu on the MIDI menu.
A dialog opens.

5. In the dialog, specify what type of note (1/2, 1/4 etc.) you tapped during the recording.
If you activate the "Begin at Bar Start" option, the first note will automatically start at the beginning of a bar when calculating the new tempo curve.

6. Click OK.
The project's tempo is adjusted to the tapped notes.

7. Open the Project menu and select "Tempo Track" to check that the new tempo information is reflected in the tempo curve.

⇨ Another way of creating a tempo map for freely recorded audio would be to use the Time Warp tool, see below.

The Time Warp tool

The Time Warp tool lets you adjust the Tempo track so that "musical time-based" material (positions related to the tempo) matches "linear time-based" material (positions in time). Some typical applications:

- When you have recorded music (audio or MIDI) without tempo reference or metronome click, the Time Warp tool can be used for creating a tempo map that fits the recording (allowing you to rearrange or add sequenced material).
- When you are creating music for a movie and want to match certain positions in the video with certain positions in the music.

The Time Warp tool makes use of the fact that tracks can be based on time positions (linear time base) or positions related to tempo (musical time base), see "Switching between musical and linear time base" on page 40 for a description of these modes.

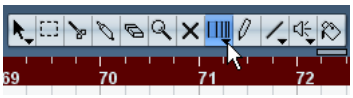
Basic procedure

You use the Time Warp tool to drag a musical position (a position in bars+beats format) to a certain position in time. This can be done in the Project window or in editor windows, as described below. Here is the general procedure:

1. Make sure Tempo track mode is selected.

You cannot use the Time Warp tool in Fixed tempo mode.

2. Select the Time Warp tool.



Bars+Beats format is automatically selected for the ruler in the active window, and the ruler is shown in brown.

3. Click in the window at a musical position and drag it so that it matches a position in the material you are editing – e.g. the start of an event, a certain “hit” within an audio event, a frame in a video clip, etc.

When you click with the Time Warp tool, it snaps to the grid in the window.

Dragging the start of bar 3 to the start of the audio event.

While you are dragging, the track(s) you are editing are temporarily switched to linear time base. This means that the contents of the tracks remain at the same time positions regardless of the tempo (there is an exception to this in the Project window, see below).

4. When you release the mouse button, the musical position you clicked on matches the time position you dragged it to.

This is because the Time Warp tool changed the last tempo event on the Tempo track (and/or added new ones, depending on window and usage), thereby scaling the tempo track to fit.

Rules

- When you use the Time Warp tool, the tempo value of the last tempo event (before the click position) is adjusted.
- If later tempo events exist, a new tempo event will be created at the click position. This way, the later tempo event(s) will not be moved.
- If you press [Shift] and use the Time Warp tool, a new tempo event is created at the click position.

  [Shift] is the default modifier for this – you can adjust this in the Preferences (Editing–Tool Modifiers page).
- If you use the Time Warp tool in an editor, a tempo event will be created at the start of the edited part or event. Only the currently edited track will be affected – but note that events to the right of the edited events or parts (on the edited track) will be affected as well.
- If you have made a selection range (in the Project window, Audio Part Editor or Sample Editor) and use the Time Warp tool within that range, the tempo changes will be confined to that range.

  This means tempo events will be inserted at the start and end of the selection range, if needed – useful if you need to adjust the tempo within a certain area but want all material outside that range to stay in place.
- When you click with the Time Warp tool, it snaps to the tempo grid in the window.
- When you drag the tempo grid to a new position, it can be magnetic to events in the window.

  In the Project window, this requires that Snap is activated and “Events” is selected on the Snap pop-up menu – the grid will then snap to the start and end of events or parts, and to markers. In the Sample Editor, this requires that Snap to Zero Crossings is activated – the grid will then snap to hitpoints (if any). In the MIDI editors, this requires that Snap is activated – the grid will then snap to the start and end of notes.
- The function will create tempo values up to 300 bpm.

Viewing and adjusting tempo events

When you select the Time Warp tool, the ruler of the active window is shown in brown. Existing tempo events are shown in the ruler as “flags” with the tempo values displayed.

This helps you see what’s going on, but you can also use this for editing the tempo track:

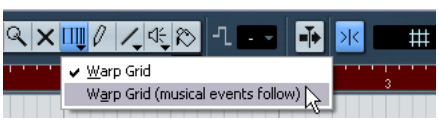
- If you press the create/erase modifier key (by default [Shift]) and click on a tempo event in the ruler, it is deleted.
- You can click on a tempo event in the ruler and drag to move it.
  This automatically edits the tempo value in the event so that elements to the right keep their positions.
- If you press [Alt]/[Option] and move (or delete) a tempo event in the ruler, the tempo value is not adjusted – this means elements to the right will be moved.
  This is the default modifier key for this – you can adjust this in the Preferences (Editing–Tool Modifiers page).

Using the Time Warp tool in the Project window

In the Project window, there are two modes for the Time Warp tool:

- In the default mode, all tracks are temporarily switched to linear time base when you use the tool. This means that all tracks will keep their absolute time positions when you adjust the tempo track.
- In the “musical events follow” mode, no tracks are switched to linear time base. This means that all tracks that are not set to linear time base will follow the changes you make to the tempo track.

You select the Time Warp mode by selecting the tool, clicking on the tool icon and selecting from the pop-up menu that appears.



Matching a musical score to video

Here’s an example of how to use the Time Warp tool in “musical events follow” mode. Let’s say you are creating the music for a film. You have a video track, an audio track with a commentary and some audio and/or MIDI tracks with your music. Now you want to match the position of a musical cue to a position in a video film. The musical cue is located in bar 33. There are no tempo changes in the project (yet).

1. Make sure tempo track mode is selected in the Transport panel.
2. Now you need to locate the position in the video. If you don’t need very high precision, you can simply locate it looking at the thumbnails on the video track – otherwise you can pinpoint the exact position and add a marker to the Marker track (that you can snap to later on).
   You can also make a note of the exact position and add an extra ruler track set to show the time code.
3. Make sure the correct tracks are set to linear time base or musical time base, respectively.
   In our example, we want the video track and the audio track with a commentary voice-over to be linear time-based (as well as the marker track, if you are using one). All other tracks should be set to musical time base. You change this by clicking the time base button in the Track list or Inspector.

Musical time base selected.

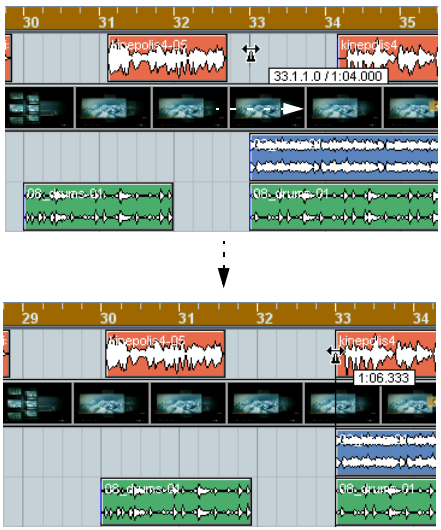
Linear time base selected.

4. Set up the Grid Type pop-up menu as desired.
   When you click with the Time Warp tool, it snaps to the selected grid. In this case, you will find the musical cue at the start of bar 33, so we can set the grid to “Bar”.

▪ Note that this affects the snapping to the ruler (tempo grid) when you click! In addition, the tool can be “magnetic” to events in the Project window when you drag – for this, you need to activate Snap and select “Events” on the Snap pop-up menu.
In our example, this would be useful if you created a marker at the desired position in the video – when you drag the grid (see below), it will snap to the marker.

5. Select the Time Warp tool and select the “musical events follow” mode.

6. Click in the event display at the start of bar 33 and drag to the desired position in the video.
As mentioned above, this can mean dragging to a position indicated by the thumbnails on the video track, to a marker on the Marker track or to a time position on an additional ruler track.



When you drag, the ruler is scaled – and the music tracks will follow.

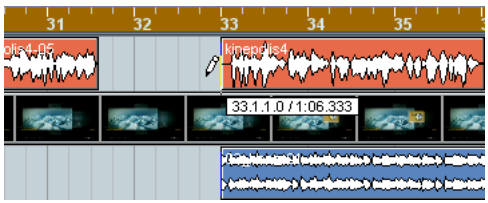
7. Release the mouse button.
If you look in the ruler at the beginning of the project, you will see that the first (and only) tempo event has been adjusted.

8. Try playing back.
The musical cue should now happen at the correct position in the video.

OK, let’s say you need to match another cue to another position later on in the video. If you simply repeat this procedure, you will find that the first cue gets out of sync – since you are still changing the first (and only) tempo event on the Tempo track!

You need to create a “lock point” – a tempo event at the first cue position:

9. Press [Shift] and click with the Time Warp tool in the event display at the cue position.
In our case this is bar 33.



As you can see, a tempo event (with the same value as the first one) is added at that position.

10. Now match the second musical cue to the correct video position by dragging the musical position to the desired time position as before.
The new tempo event is edited – the first tempo event is unaffected and the original cue is still matched.

▪ If you know you are going to match several cues this way, you should make it a habit to press [Shift] each time you use the Time Warp tool to match positions.
This adds a new tempo event – that way, you don’t have to add tempo events afterwards as in step 9 above.

About snapping

If Snap is activated in the Project window and “Events” is selected on the Snap pop-up menu, the Time Warp tool will be magnetic to events when you drag the tempo grid. This makes it easier to snap a tempo position to a marker, the start or end of an audio event, etc.

Using the Time Warp tool in an audio editor

Using the Time Warp tool in the Sample Editor or Audio Part Editor is different from using it in the Project window, in the following ways:

- When you use the Time Warp tool, a tempo event is automatically inserted at the beginning of the edited event or part – this tempo event will be adjusted when you warp the tempo grid with the tool. This means that material before the edited events won't be affected.
- Only the default mode for the Time Warp tool is available. So when you use the tool, the edited track is temporarily switched to linear time base.

Making a tempo map for a "free" recording

The following example shows how to use the Time Warp tool in the Sample Editor to create a tempo map matching freely recorded music. Let's say you have recorded a drummer, playing without a metronome – this typically means the tempo varies ever so slightly. To be able to add sequenced material and easily rearrange the recorded audio, you want the tempo in Nuendo to match the recorded drum track:

1. If necessary, move the recorded event to its desired start position.
Move it so that the first downbeat ("one") happens on the start of the desired bar – zoom in if needed.

2. Open the drum recording in the Sample Editor and make sure Hitpoint mode isn't selected.
The Time Warp tool cannot be used in Hitpoint mode. However, if you have calculated hitpoints already, these will be visible when the Time Warp tool is selected (see below).

3. Set the zoom so that you can see the individual drum hits clearly.
To achieve this type of "visual" beat matching, it's important to have a fairly clean recording, such as the drum track in this example.

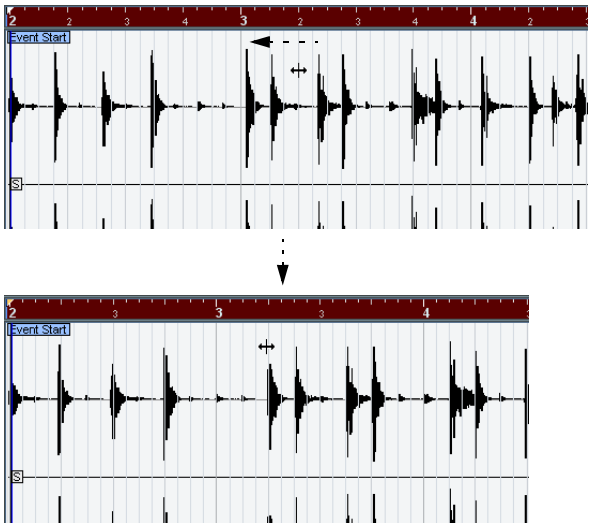
4. Select the Time Warp tool.

You have already matched the first downbeat with the start of a bar. However, if the recording starts before the first downbeat (with a fill, some silence, etc.), you want to "lock" the first downbeat so that it stays in position:

5. Press [Shift] and click in the event at the position of the first downbeat (the start of the bar).
When you press [Shift], the pointer turns into a pencil. Clicking adds a tempo event at the first downbeat – when you later adjust the tempo with the Time Warp tool, the first downbeat will stay in place. Note: if the event started exactly on the first downbeat (no audio before the "one"), you wouldn't need to do this. This is because a tempo event is automatically added at the start of the edited event.

6. Now, locate the start of the next bar in the ruler.

7. Click at that position in the event display and drag the position to the downbeat of the second bar in the recording.
When you click, the pointer will snap to the ruler grid.



You do not have to match the downbeats ("ones") – in this figure, beat "2" in the second bar is matched to the "two" in the recording's second bar (simply because the snare drum hits on the upbeats are easier to spot in the waveform image).

When you dragged the grid you changed the tempo value in the tempo event at the first downbeat. If the drummer held a fairly consistent tempo, the following bars should now match pretty well too.

8. Check the following bars and locate the first position where the audio drifts from the tempo.

Now, if you simply adjusted that beat in the tempo grid to match the beat in the recording, the tempo event at the first downbeat would be changed – this would ruin the match in the previous bars! We need to lock these by inserting a new tempo event.

9. Locate the last beat that is in sync.
This would be the beat just before the position where the audio and tempo drift apart.

10. Press [Shift] and click at that position to insert a tempo event there.
This locks this matched position. The material to the left will not be affected when you make adjustments further along.

11. Now match the tempo grid to the next (unmatched) beat by clicking and dragging with the Time Warp tool.
The tempo event you inserted in step 10 will be adjusted.

12. Work your way through the recording this way – when you find that the recording drifts from the tempo, repeat steps 9 to 11 above.

Now the Tempo track follows the recording and you can add sequenced material, rearrange the recording etc.

Matching to hitpoints

If you have calculated hitpoints for the audio event you are editing, these will be shown when the Time Warp tool is selected.

- The number of hitpoints shown depends on the Hitpoint Sensitivity slider setting you've made in Hitpoint mode.
- If you activate the Snap to Zero Crossing button on the toolbar, the Time Warp tool will snap to hitpoints when you drag the tempo grid.
- You can use the Create Markers from Hitpoints function (on the Hitpoints submenu of the Audio menu) to create markers at the hitpoint positions. This can be useful when using the Time Warp tool in the Project window, as the tool will be magnetic to markers (if Snap to Events is activated on the toolbar).

Using the Time Warp tool in a MIDI editor

This is very similar to using the tool in an audio editor:

- When you use the Time Warp tool, a tempo event is automatically inserted at the beginning of the edited part – this tempo event will be adjusted when you warp the tempo grid with the tool. Material before the edited part won't be affected.
- Only the default mode for the Time Warp tool is available. So when you use the tool, the edited MIDI track is temporarily switched to linear time base.
- The rulers in the MIDI editors can be set to "Time Linear" or "Bars+Beats Linear" mode (see "The ruler" on page 367) – the Time Warp tool requires Time Linear mode. If necessary, the ruler mode will be switched when you select the Time Warp tool.
- If Snap is activated on the toolbar in the MIDI editor, the tool will snap to the start and end of MIDI notes when you drag the tempo grid.

Typically, you would use the Time Warp tool in a MIDI editor to match the Nuendo tempo to freely recorded MIDI material (much like the audio example above).

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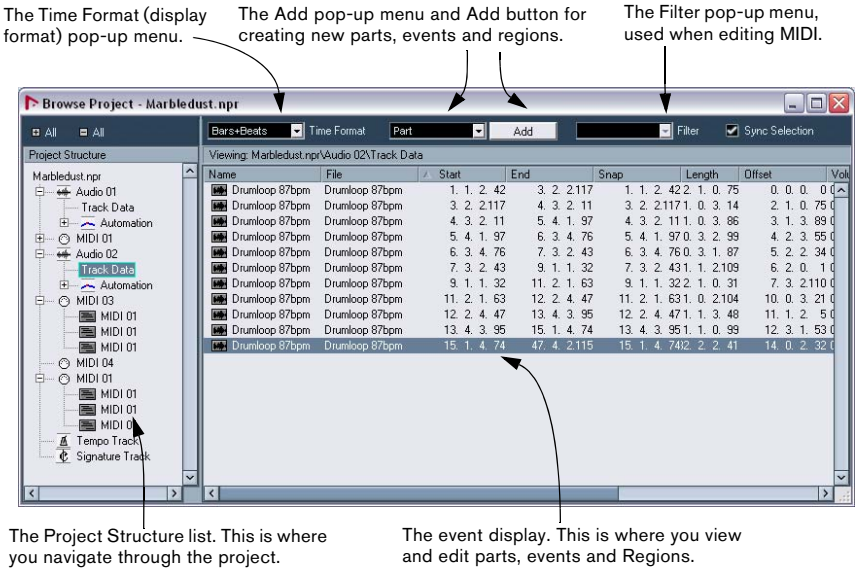
The Project Browser

Window Overview



While the Project window and the editors display events and other data graphically, the Project Browser window provides a list based representation of the project. This allows you to view and edit all events on all tracks by using regular value editing in a list.

Opening the Project Browser

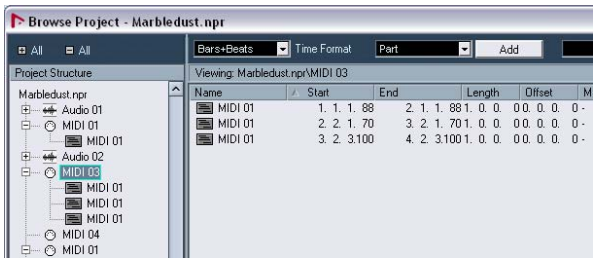
You open the Project Browser by selecting “Browser” from the Project menu. The Browser window can be open while you are working in other windows; any changes made in the Project window or an editor are immediately reflected in the Project Browser and vice versa.

Navigating in the Browser

You use the Project Browser much like you use the Windows Explorer and Mac OS X Finder for browsing folders on your hard disk:

- Click on an item in the Project Structure list to select it for viewing.

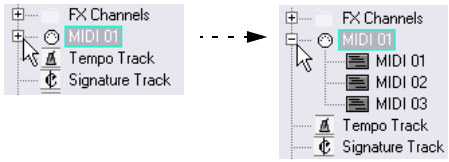
The contents of the item are shown in the event display.



In this figure, the parts on a MIDI track are displayed.

- Items with hierarchical substructures can be folded out by clicking the plus symbols or the “closed folder” symbols in the Project Structure list.

When the substructure of an item is revealed, a minus symbol or an “open folder” symbol is shown instead – click this to hide the substructure.



- To reveal or hide all substructures in the Project Structure list, use the buttons “(+) All” and “(–) All” above the list.

- The actual editing is done in the event display, using regular value editing techniques.

There is one exception: You can rename items in the Project Structure list by clicking on their names and typing.

Customizing the view

You can drag the divider between the Project Structure list and the event display to make one of them wider and the other narrower. Furthermore, the event display can be customized in the following ways:

- You can change the order of the columns by dragging the column headings to the left or right.
- You can resize columns by dragging the dividers between the column headings.
- To select a display format for all position and length values, use the Time Format pop-up menu.
- You can sort events in the display by columns, by clicking the column heading.

For example, if you want to sort events by their start positions, click that column heading. An arrow appears in the column heading, indicating that events are sorted by that column. The direction of the arrow indicates whether the events are sorted in ascending or descending order. To change the direction, click the column heading again.

Importing files via the MediaBay

As the Project Browser is just another view of the project, you can import audio, video and MIDI files into the project via the MediaBay. For this, select the file in the MediaBay and drag and drop it into the Project Browser.

⇨ You can only import into existing tracks. This means, for example, that a video track has to exist in the Project window prior to importing a video file in the Project Browser.

For more information about the MediaBay, see "The MediaBay" on page 314.

About the Sync Selection option

If the "Sync Selection" checkbox is activated (in the top right corner of the Project Browser), selecting an event in the Project window automatically selects it in the Project Browser, and vice versa. This makes it easy to locate events in the two windows.

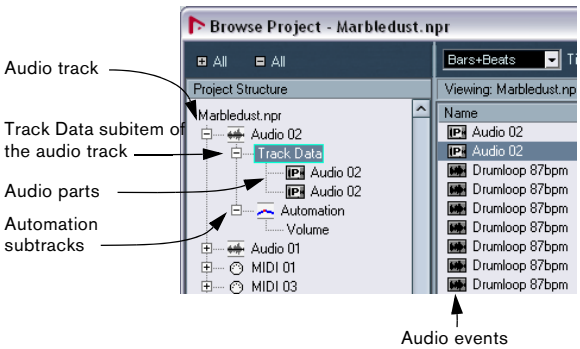
Editing tracks

Editing audio tracks

Audio tracks can have two "subitems": Track Data and Automation.

- The Automation item corresponds to the Automation subtrack in the Project window, and contains the track's automation events (see "Editing Automation tracks" on page 432).
- The Track Data item corresponds to the actual audio track in the Project window. It contains audio events and/or audio parts, which in turn can contain audio events.

Note that if you have not performed any automation or opened an automation subtrack, the Browser will only contain the audio data.



The following parameters are available for the different items:

The list columns for audio events:

Parameter	Description
Name	Allows you to enter a descriptive comment for the event. Double-clicking on the waveform image beside it opens the Sample Editor for the event.
File	The name of the audio file referenced by the event's audio clip.
Start	The start position of the event. If the event belongs to an audio part, you cannot move it outside the part.
End	The end position of the event.
Snap	The absolute position of the event's snap point. Note that adjusting this value will not change the position of the snap point within the event – instead it is another way of moving the event!
Length	The length of the event.

Parameter	Description
Offset	This determines “where in the audio clip” the event starts. Adjusting this value is the same as sliding the contents of the event in the Project window (see “Sliding the contents of an event or part” on page 49). You can only specify positive Offset values, since the event cannot start before the start of the clip. Likewise, it cannot end after the end of the clip. If the event already plays the whole clip, the Offset cannot be adjusted at all.
Volume	The volume of the event, as set with the Volume handle or on the info line in the Project Window.
Fade In Fade Out	The length of the fade-in and fade-out areas respectively. If you use these settings to add a fade (where there previously was none), a linear fade will be created. If you adjust the length of an existing fade, the previous fade shape will be maintained.
Mute	Click in this column to mute or unmute the event.
Image	Displays a waveform image of the event inside a gray box corresponding to the clip. The image is scaled according to the width of the column.

The list columns for audio parts:

Parameter	Description
Name	The name of the part. Double-clicking on the part symbol beside it opens the Audio Part Editor for the part.
Start	The start position of the part. Editing this value is the same as moving the part in the Project window.
End	The end position of the part. Editing this value is the same as resizing the part in the Project window.
Length	The length of the part. Editing this value is the same as resizing the part in the Project window.
Offset	This adjusts the start position of the events within the part. Adjusting this value is the same as sliding the contents of the part in the Project window (see “Sliding the contents of an event or part” on page 49). Setting a positive Offset value is the same as sliding the contents to the left, while a negative Offset corresponds to sliding the contents to the right.
Mute	Click in this column to mute or unmute the part.

Creating audio parts

When the “Audio” item of an audio track is selected in the Project Structure list, you can create empty audio parts on the track by clicking the Add button on the toolbar. This will insert a part between the left and right locator.

Editing MIDI tracks

Just like audio tracks, MIDI tracks can have two “sub-items”: Track Data and Automation.

- The Track Data item corresponds to the actual MIDI track in the Project window and can contain MIDI parts (which in turn can contain MIDI events).
- The Automation item corresponds to the automation subtrack in the Project window, and contains the track’s automation events (see “Editing Automation tracks” on page 432).

Note that if you have not performed any automation or opened an automation subtrack, the Browser will only contain the MIDI data.

When editing the Track Data, the following parameters are available:

The list columns for MIDI events:

Parameter	Description
Type	The type of MIDI event. This cannot be changed.
Start	The position of the event. Editing this value is the same as moving the event.
End	This is only used for note events, allowing you to view and edit the end position of a note (thereby resizing it).
Length	This is only used for note events. It shows the length of the note – changing this resizes the note and automatically changes the End value as well.
Data 1	The property of this value depends on the type of MIDI event: For notes, this is the note number (pitch). This is displayed and edited as a note name and an octave number, with the values ranging between C-2 and G8. For Controller events, this is the type of Controller, displayed in words. Note that you can edit this by entering a number – the corresponding Controller type is automatically displayed. For Pitch Bend events, this is the fine adjustment of the bend amount. For Poly Pressure events, this is the note number (pitch). For other event types, this is the value of the event.
Data 2	The property of this value depends on the type of MIDI event: For notes, this is the note-on velocity. For Controller events, this is the value of the event. For Pitch Bend events, this is the coarse bend amount. For Poly Pressure events, this is the amount of pressure. For other event types, this is not used.
Channel	The event’s MIDI Channel. See “Notes” on page 81.
Comment	This column is used for some event types only, providing an additional comment about the event.

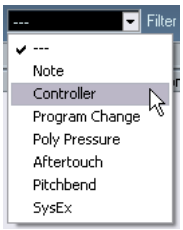
The list columns for MIDI parts:

Parameter	Description
Name	The name of the part.
Start	The start position of the part. Editing this value is the same as moving the part.
End	The end position of the part. Changing this is the same as resizing the part (and will automatically affect the Length value as well).
Length	The length of the part. Changing this resizes the part and automatically changes the End value.
Offset	This adjusts the start position of the events within the part. Adjusting this value is the same as sliding the contents of the part in the Project window (see "Sliding the contents of an event or part" on page 49). Setting a positive Offset value is the same as sliding the contents to the left, while a negative Offset corresponds to sliding the contents to the right.
Mute	Click in this column to mute or unmute the part.

⇨ For SysEx (system exclusive) events, you can only edit the position (Start) in the list.
However, clicking the Comment column opens the SysEx Editor, in which you can perform detailed editing of system exclusive events. For a description of this, see "Working with System Exclusive messages" on page 410.

Filtering MIDI events

When you are editing MIDI in the Project Browser, the large number of different MIDI events displayed can make it hard to find your way. To remedy this, the Filter pop-up menu allows you to select a single event type for display.



When this option is selected, only Program Change events will be shown in the event display. To show all event types, select the top item ("---") from the menu.

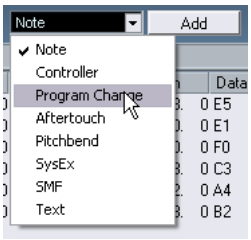
Creating MIDI parts

When a MIDI track is selected in the Project Structure list, you can create empty MIDI parts on the track by clicking the Add button. This will insert a part between the left and right locator.

Creating MIDI events

You can use the Project Browser to create new MIDI events:

1. Select a MIDI part in the Project Structure list.
2. Move the project cursor to the desired position for the new event.
3. Use the Add pop-up above the event display to select which type of MIDI event to add.

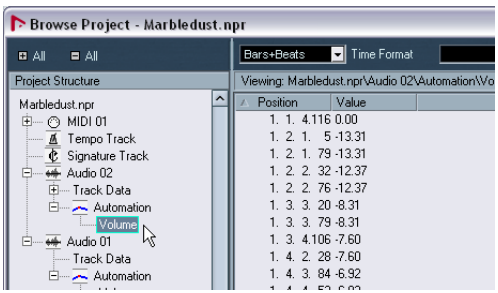


4. Click the Add button.

An event of the selected type is added to the part, at the project cursor position. If the cursor is outside the selected part, the event is added at the beginning of the part.

Editing Automation tracks

All kinds of Nuendo automation (the automation subtracks for MIDI, instrument, audio, group and FX channel tracks or the individual automation tracks for VST Instruments, ReWire channels or Input/Output busses) are handled in the same way in the Project Browser. Each Automation item in the Project Structure list will have a number of sub-entries, one for each automated parameter. Selecting one of these parameters in the Project Structure list shows its automation events in the list:



You can use the two columns in the list to edit the position of the events and their values.

Editing the Video track

When the Video track is selected in the Project Structure list, the event display lists the video events on the track, with the following parameters:

Column	Description
Name	The name of the video clip that the event refers to.
Start	The start position of the event. Editing this value is the same as moving the event.
End	The end position of the event. Editing this value is the same as resizing the event, and will automatically change the Length value as well.
Length	The length of the event. Editing this value is the same as resizing the event, and will automatically change the End value as well.
Offset	This determines "where in the video clip" the event starts. Note that the event cannot start before the start of the clip, or end after the end of the clip. Thus, if the event already plays the whole video clip, the Offset cannot be adjusted at all.

Editing the Marker track

Marker events have the following parameters:

Column	Description
Name	The name of the marker. This can be edited for all markers except the left and right locator.
Start	The position of "regular" markers or the start position of cycle markers.
End	The end positions of cycle markers. Editing this value is the same as resizing the cycle marker, and will automatically change the Length value as well.
Length	The length of cycle markers. Editing this value is the same as resizing the marker, and will automatically change the End value as well.
ID	The number of the marker. For regular (non-cycle) markers, this corresponds to the key commands used for navigating to the markers. For example, if a marker has ID 3, pressing [Shift]+[3] on the computer keyboard will move the song position to that marker. By editing these values, you can assign the most important markers to key commands. Note that you cannot edit the "L" and "R" marker IDs (left and right locator) or assign IDs 1 and 2 to markers (since these are reserved for the locators).

When the Marker track is selected, you can insert markers by selecting "Marker" or "Cycle Marker" from the Add pop-up menu and clicking the Add button. Regular markers will be added at the current project cursor position while cycle markers will be added between the current left and right locator positions.

Editing the Tempo track

When the Tempo track is selected in the Project Structure list, the event display shows the events on the Tempo track, with the following parameters:

Parameter	Description
Position	The position of the Tempo event. You cannot move the first event on the Tempo track.
Tempo	The tempo value of the event.
Type	This indicates whether the tempo should jump to the value of the event ("Jump" type) or whether it should change gradually from the previous Tempo event, creating a ramp ("Ramp" type). See "Editing the tempo curve" on page 417.

You can add new Tempo events by clicking the Add button. This creates a jump-type event with the value 120 bpm at the project cursor position. Make sure that there is no other tempo event at the current cursor position.

Editing Time Signatures

When "Signature track" is selected in the Project Structure list, the event display shows the Time Signature events in the project:

Parameter	Description
Position	The position of the event. Note that you cannot move the first Time Signature event.
Signature	The value (time signature) of the event.

You can add new Time Signature events by clicking the Add button. This creates a 4/4 event, at the beginning of the bar closest to the project cursor position. Make sure that there is no other time signature event at the current cursor position.

Deleting Events

The procedure for deleting Events is the same for all different track types:

1. Click on an event (or a part) in the Event display to select it.

2. Select Delete from the Edit menu or press [Delete] or [Backspace].

⚠ Note that you cannot delete the first Tempo event or the first Time Signature event.

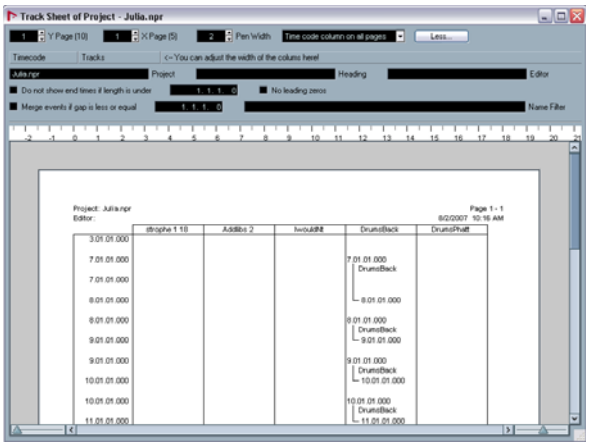
33

The Track Sheet

Overview

The Track Sheet provides a text-form “flow-chart” representation of the Project. It lists all audio (and video) tracks and their contents, and can easily be printed out.

To open the Track Sheet window, select “Track Sheet” from the Project menu.



The actual Track Sheet is displayed in the lower part of the window. It contains the following items:

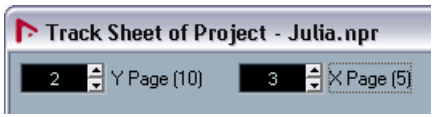
- The leftmost time column contains a list of time positions in the display format selected in the Project Setup dialog.
  The time positions relate to start and end times of audio or video events or parts on the tracks.
- The following columns display the tracks in the order they appear in the Track list.
  Only audio and video tracks are shown.
- The events are listed in their corresponding track columns in the order they appear (starting at the top).
- For each event, the start and end times are shown, with a vertical line binding the two together.

Viewing the pages in the Track Sheet

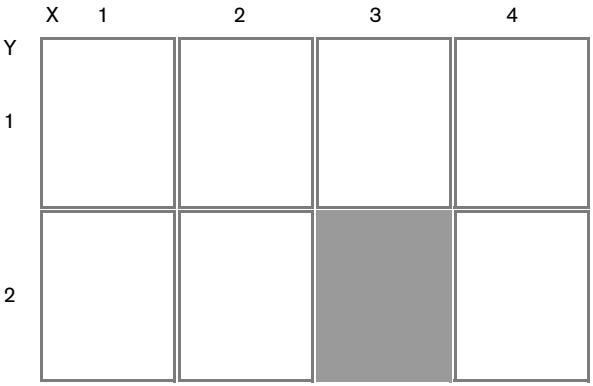
If your project is large (i.e. there are many tracks and/or many events) or if you are working with a large scale factor (see below), the resulting Track Sheet may have more than one page.

The more tracks you have, the larger the number of pages next to each other (horizontally). The more events you have, the larger the number of pages below each other.

To select which page should be visible in the Track Sheet window, you use the “Y Page” and “X Page” fields in the upper left part of the Track Sheet window. You could think of the Track Sheet as divided into rows and columns, with “Y Page” determining which row should be viewed and “X Page” determining the column. The numbers in parenthesis show the total number of rows and columns, respectively.



In this case, the page in row 2 and column 3 is shown:



- The size and proportions of the Track Sheet pages are set with the Page Setup dialog, see “Printing the Track Sheet” on page 436.

Adjusting the view

The two sliders at the bottom of the Track Sheet window have the following functionality:

- The slider in the lower left corner is the scale slider.

Use this to adjust the actual size of the Track Sheet contents (including the font sizes). This will also affect the number of tracks and events shown on each page.

- The slider in the lower right corner governs the display zoom.

This affects how much of the Track Sheet is shown in the Track Sheet window – the printout is not affected.

You can also adjust the width of the columns by dragging the edges of the "Timecode" and "Tracks" fields at the top of the window – this resizes the corresponding columns in the Track Sheet.

Resizing the track columns. If the Timecode and Tracks fields are hidden, click the "More" button.

Additional settings

- The "Pen Width" determines the thickness of the vertical lines that bind together the start and end times for events and parts.

- If the Track Sheet is more than one page wide, you can use the "Timecode Column" pop-up menu to determine whether the time column should appear only on the first page, on each new page, or not at all.

The following settings can be shown or hidden by clicking the "More/Less" button.

Setting	Description
Project	By default, this is the name of the current project, but you can adjust this if you like. The project name will be shown in the top left corner of each Track Sheet page.
Editor	The editor name you enter will be shown below the project name in the Track Sheet.
Heading	Allows you to enter a heading (shown centered at the top of each Track Sheet page).
Do not show end times if length is under...	If this checkbox is ticked, the Track Sheet will not display the end times of Events shorter than the time specified in the field to the right. This is useful if you have many short events, like spot effects, where only the start time is of any relevance.
No leading zeroes	By default, the time positions of events will be listed in a syntax with "leading zeroes". E.g. if the display format is seconds, hours and minutes will be listed as "01", "02" etc. If this is activated, the time column will not display the leading zeroes.
Merge events if gap is less or equal...	If events on a track are lined up end to end – i.e. there is no gap between them – they will be considered as a single event in the Track Sheet. By defining a value in this box, you can specify how large a gap between events has to be for them to be considered as separate events. If gaps between events are smaller than or equal to the value you specify, they will be listed as a single event. Otherwise they will be listed as separate events.
Name Filter	This allows you to filter out certain event names of your choice so that they are not displayed in the Track Sheet. Click in the text field and type in the name(s) – to enter several names, separate each with a semi-colon (;). Partial names are OK, so if you e.g. want to filter out the event name "Crossfade", you could just write "Cross". However, this would filter out other events starting with the word cross as well – e.g. "Crosstalk" would also be filtered out.

Printing the Track Sheet

Printing is done using the standard procedures:

1. Make sure the correct page size and page orientation is selected in the Page Setup dialog on the File menu.

You may also want to make additional printer settings, following the standard Windows/Mac procedures.

2. Select "Print..." from the File menu.

Make the desired printer settings in the dialog that appears, and click OK. The Track Sheet is printed.

34

Export Audio Mixdown

Introduction

The Export Audio Mixdown function in Nuendo allows you to mix down audio from the program to a file on your hard disk, in a number of formats. You can choose to mix down one of the following:

- An output bus.

For example, if you have set up a stereo mix with tracks routed to a stereo output bus, mixing down that output bus would give you a mixdown file containing the whole mix. Similarly, you can mix down a complete surround bus, either to a single multi-channel file or to one file per surround channel (by activating the split channels option).

- The channel for an audio track.

This will mix down the channel for the track, complete with insert effects, EQ, etc. This can be useful for turning a number of events into a single file, or if you are using CPU-intensive insert effects – by exporting the track and re-importing it into the project you can turn off the insert effect, saving processor power.

- Any kind of audio channel in the mixer.

This includes VST Instrument channels, effect return channels (FX Channel tracks), Group channels and ReWire channels. There are many uses for this – for example, you can mix down an effect return track or turn individual ReWire channels into audio files.

Notes

- The Export Audio Mixdown function mixes down the area between the left and right locators.
- When you mix down, you get what you hear – mutes, mixer settings and insert effects are taken into account.

Note though that you will only include the sound of the bus or channel you select for mixdown.

- MIDI tracks are not included in the mixdown!

To make a complete mixdown containing both MIDI and audio, you first need to record all your MIDI music to audio tracks (by connecting the outputs of your MIDI instruments to your audio inputs and recording, as with any other sound source).

- A single instrument track can be directly exported as an audio mixdown.
- You can also export selected tracks – this is a different function that doesn't create an audio mixdown.

Rather, this is a way to transfer complete tracks (including clips and events) from one project to another. See "Importing audio" on page 491.

Mixing down to an audio file

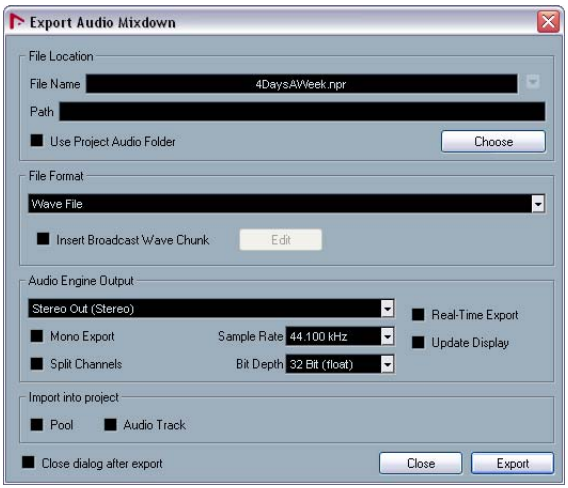
1. Set up the left and right locators to encompass the area that you want to mix down.

2. Set up your tracks, so that they play back the way you want.

This includes muting unwanted tracks or parts, making manual mixer settings and/or activating the R (Read) automation buttons for some or all mixer channels.

3. Pull down the File menu and select "Audio Mixdown…" from the Export submenu.

The Export Audio Mixdown dialog appears.



The available settings and options differ depending on the selected file format (see "The available file formats" on page 439).

4. In the File Location section at the top you can specify a name and path for the mixdown file.

Note that there are a number of options:

- Click the Options/Functions button to the right of the File Name field to open a pop-up menu.
- Select an entry from the Recent Paths sub-menu to reuse a path specified for a previous export.
- Select "Set File Name to Project Name" to use the project name for the export file.
- Enable the "Auto Update File Name" option (so that a check mark is displayed before it) to add a number to the specified file name everytime you click the Export button.

- Activate the option “Use Project Audio Folder” to specify a path. This saves the mixdown file in the Project Audio folder.

5. Select a file format with the File Format pop-up menu.

6. Select the bus or channel you want to mix down with the Outputs pop-up menu in the “Audio Engine Output” section.
This lists all output busses and channels in the active project.

7. Activate the Split Channels option if you want to export all channels as mono files, or “Mono Export” if you want to export all channels as a single mono file.

8. Make additional settings for the file to be created.
This includes selecting sample rate, bit depth, etc. The available options depend on the selected file format – see “The available file formats” on page 439.

9. If you want to automatically import the resulting audio file back into Nuendo, activate the checkboxes in the “Import into project” section.
If you activate the “Pool” checkbox, a clip referring to the file will appear in the Pool. Activating the “Audio Track” checkbox as well, will create an audio event that plays the clip, and place it on a new audio track, starting at the left locator.

⇨ The Import options are only available if you have selected an uncompressed file format.

10. If you activate Real-Time Export, the export will happen in real time, i.e. the process will take the same time as regular playback.
Some VST plug-ins require this in order to have enough time to update correctly during the mixdown – consult the plug-in manufacturers if uncertain.

- When Real-Time Export is activated, the exported audio will be played back via the Control Room.
The fader below the Real-Time Export checkbox allows you to adjust the Control Room volume. Note that if the Control Room is deactivated, the Audition Volume slider will not be available.

11. If you activate Update Display, the meters will be updated during the export process.
This allows you to check for clipping, for example.

12. Click Export.

A dialog with a progress bar is displayed while the audio file is created. If you change your mind during the file creation, you can click the Abort button to abort the operation.

- If the option “Close dialog after export” is activated, the dialog will be closed, otherwise it will be left open.
- If you have activated any of the “Import into project” options, the file will be imported back into the project.
When playing back the re-imported file in Nuendo, remember to mute the original tracks so that you really hear the correct file.

About the Import options dialog

When you activate any of the options in the Import section, the Import Options dialog will open. For a detailed description of the options in this dialog see “Import Medium…” on page 306.

The available file formats

The following pages describe the different export file formats, as well as their options and settings.

AIFF files

AIFF stands for Audio Interchange File Format, a standard defined by Apple Inc. AIFF files have the extension “.aif” and are used on most computer platforms.

For AIFF files the following options are available:

Option	Description
File Name (File Location section)	In this field you can enter a name for the mixdown file.
Path (File Location section)	Here you can specify a path where you want the mixdown to be saved.
Use Project Audio Folder (File Location section)	If you activate this options the mixdown file is saved in the Project Audio folder, as opposed to the specified path.
File Format pop-up menu (File Format section)	From this pop-up menu you can select the file format for the export, in this case “AIFF File”.

Option	Description
Insert Broadcast Wave Chunk (File Format section)	This allows you to include information about the date and time of creation, a timecode position (allowing you to insert exported audio at the correct position in other projects, etc.) along with author, description and reference text strings in the exported file. Some applications may not be able to handle files with embedded info – if you get problems using the file in another application, turn off the option and re-export.
Edit button (File Format section)	By clicking this button the “Broadcast Wave Chunk” dialog opens where you can enter additional information that will be embedded in the exported files. Note that in the Preferences (Record–Audio–Broadcast Wave page) you can enter default text strings for author, description and reference that will automatically be displayed in the “Broadcast Wave Chunk” dialog.
Outputs pop-up menu (Audio Engine Output section)	This menu lists all output busses and channels in the active project. Simply select the bus or channel you want to mix down.
Mono Export (Audio Engine Output section)	If you activate this option, the exported audio is mixed down to mono.
Split Channels (Audio Engine Output section)	Activate this option if you want to export all channels as mono files.
Real-Time Export (Audio Engine Output section)	If you activate this option, the export will happen in real time, i.e. the process will take the same time as regular playback. Some VST plug-ins require this in order to have enough time to update correctly during the mixdown – consult the plug-in manufacturers if uncertain. When Real-Time Export is activated, the exported audio will be played back via the Control Room.
Update Display (Audio Engine Output section)	If you activate this option, the meters will be updated during the export process. This allows you to check for clipping, for example.
Sample Rate (Audio Engine Output section)	This setting determines the frequency range of the exported audio – the lower the sample rate, the lower the highest audible frequency in the audio. In most cases, you should select the sample rate set for the project, since a lower sample rate will degrade the audio quality (mainly reducing the high frequency content) and a higher sample rate will only increase the file size, without adding to audio quality. Also consider the future usage of the file – if you e.g. plan to import the file into another application, you should select a sample rate supported by that application. If you are making a mixdown for CD burning, you should select 44.100 kHz, since this is the sample rate used on audio CDs.
Bit Depth (Audio Engine Output section)	Allows you to select 8, 16, 24 bit or 32 bit (float) files. If the file is an “intermediate mixdown” that you plan to re-import and continue working on in Nuendo, we recommend that you select the 32 bit (float) option. 32 bit (float) is a very high resolution (the same resolution as used internally for audio processing in Nuendo), and the audio files will be twice the size of 16 bit files. If you are making a mixdown for CD burning, you should use the 16 bit option, as CD audio is always 16 bit. In this case, we recommend that you activate the UV-22HR dithering plug-in (see the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4” for details). This reduces the effects of quantization noise and artifacts from being introduced when converting the audio down to 16 bit. 8 bit resolution should only be used if required, since it will result in limited audio quality. 8 bit audio may be suitable in some multimedia applications, etc.
Audition Volume fader (Audio Engine Output section)	The fader below the Real-Time Export checkbox allows you to adjust the Control Room volume. Note that this fader is only available if the Control Room is activated.
Pool (Import into project section)	Activate this option if you want to import the resulting audio file automatically back into the Pool. A clip referring to the file will appear in the Pool. If this option is activated, the Import Options dialog appears on export. For a description of the available settings, see “Import Medium…” on page 306.
Audio Track (Import into project section)	If you activate this option, an audio event that plays the clip will be created and placed on a new audio track, starting at the left locator. If this option is activated, the Import Options dialog appears on export. For a description of the available settings, see “Import Medium…” on page 306.
Close dialog after export	If this option is activated, the dialog will be closed after the export, otherwise it will be left open.

AIFC files

AIFC stands for Audio Interchange File Format Compressed, a standard defined by Apple Inc. These files support compression ratios as high as 6:1 and contain tags in the header. AIFC files have the extension “.aifc” and are used on most computer platforms.

AIFC files support the same options as AIFF files.

Wave files

Wave files have the extension “.wav” and are the most common file format on the PC platform.

Wave files support the same options as AIFF files.

Wave64 files

Wave64 is a proprietary format developed by Sonic Foundry Inc. In terms of audio quality, Wave64 files are identical to standard wave files, but in the file headers Wave64 files use 64-bit values for addressing where wave files use 32-bit values. The consequence of this is that Wave64 files can be considerably larger than standard Wave files. Wave64 is therefore a good file format choice for really long recordings (file sizes over 2GB), e.g. live surround recordings. Wave64 files have the extension ".w64".

Wave64 files support the same options as AIFF files.

Broadcast Wave files

Concerning audio, Broadcast Wave files are the same as regular Wave or Wave64 files, but without compression. To create a Broadcast Wave file, select either Wave or Wave64 as the file format and activate the Insert Broadcast Wave Chunk option. Click Edit if you wish to edit the chunk information, otherwise the defaults as specified in the Preferences (Record–Audio–Broadcast Wave page) will be used. Broadcast Wave files have the extension ".wav".

Broadcast Wave files support the same options as AIFF files.

MPEG 1 Layer 3 files

MPEG 1 Layer 3 files have the extension ".mp3". By use of advanced audio compression algorithms, mp3 files can be made very small, maintaining good audio quality.

For MPEG 1 Layer 3 files the following options are available:

Option	Description
File Name (File Location section)	In this field you can enter a name for the mixdown file.
Path (File Location section)	Here you can specify a path where you want the mixdown to be saved.
Use Project Audio Folder (File Location section)	If you activate this option, the mixdown file is saved in the Project Audio folder, as opposed to the specified path.
File Format pop-up menu (File Format section)	From this pop-up menu you can select the file format for the export.
Bit Rate fader (File Format section)	By moving this fader, you can select a bit rate for the mp3 file. As a rule, the higher the bit rate, the better the audio quality and the larger the file. For stereo audio, 128kBit/s is often considered to result in "good" audio quality.
Sample Rate pop-up (File Format section)	In this pop-up menu you can select a Sample Rate for the mp3 file.
Insert ID3 Tag option (File Format section)	This allows you to include ID3 Tag information in the exported file.
Edit ID3 Tag button (File Format section)	When you click this, the ID3 Tag dialog opens, in which you can enter information about the file. This additional information will be embedded as text strings in the file, and can be displayed by some mp3 playback applications.
Outputs pop-up menu (Audio Engine Output section)	This menu lists all output busses and channels in the active project. Simply select the bus or channel you want to mix down.
Mono Export (Audio Engine Output section)	If you activate this option, the exported audio is mixed down to mono.
Split Channels (Audio Engine Output section)	Activate this option if you want to export all channels as mono files.
Real-Time Export (Audio Engine Output section)	If you activate this option, the export will happen in real time, i.e. the process will take the same time as regular playback. Some VST plug-ins require this in order to have enough time to update correctly during the mixdown – consult the plug-in manufacturers if uncertain. When Real-Time Export is activated, the exported audio will be played back via the Control Room.
Update Display (Audio Engine Output section)	If you activate this option, the meters will be updated during the export process. This allows you to check for clipping, for example.
Audition Volume fader (Audio Engine Output section)	The fader below the Real-Time Export checkbox allows you to adjust the Control Room volume. Note that this fader is available only if the Control Room is activated.
Close dialog after export	If this option is activated, the dialog will be closed after the export, otherwise it will be left open.

Ogg Vorbis files

Ogg Vorbis is an open source, patent-free audio encoding and streaming technology, offering compressed audio files (extension ".ogg") of small size, but with comparatively high audio quality.

For Ogg Vorbis files the following options are available:

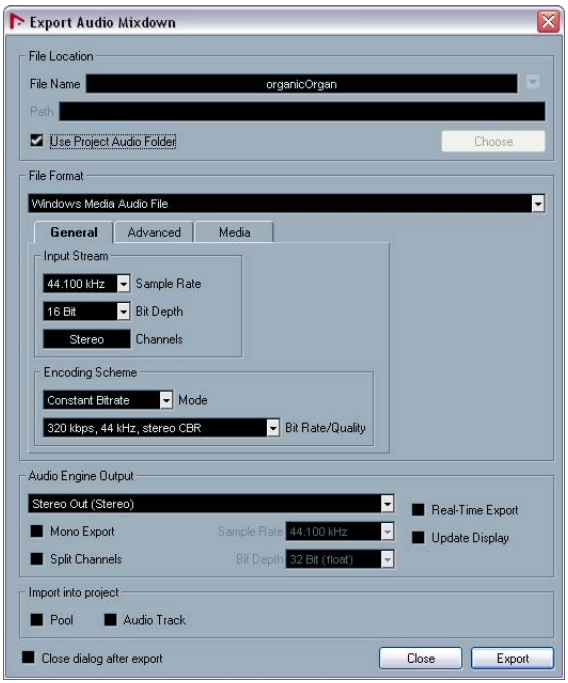
Option	Description
File Name (File Location section)	In this field you can enter a name for the mixdown file.
Path (File Location section)	Here you can specify a path where you want the mixdown to be saved.
Use Project Audio Folder (File Location section)	If you activate this option, the mixdown file is saved in the Project Audio folder, as opposed to the specified path.
File Format pop-up menu (File Format section)	From this pop-up menu you can select the file format for the export.
Quality fader (File Format section)	The Ogg Vorbis encoder uses variable bit rate encoding, and the Quality setting determines between which limits the bit rate will vary. Generally speaking, the higher the Quality setting, the higher the sound quality but also the larger the files.
Outputs pop-up menu (Audio Engine Output section)	This menu lists all output busses and channels in the active project. Simply select the bus or channel you want to mix down.
Mono Export (Audio Engine Output section)	If you activate this option, the exported audio is mixed down to mono.
Split Channels (Audio Engine Output section)	Activate this option if you want to export all channels as mono files.
Real-Time Export (Audio Engine Output section)	If you activate this option, the export will happen in real time, i.e. the process will take the same time as regular playback. Some VST plug-ins require this in order to have enough time to update correctly during the mixdown – consult the plug-in manufacturers if uncertain. When Real-Time Export is activated, the exported audio will be played back via the Control Room.
Update Display (Audio Engine Output section)	If you activate this option, the meters will be updated during the export process. This allows you to check for clipping, for example.
Audition Volume fader (Audio Engine Output section)	The fader below the Real-Time Export checkbox allows you to adjust the Control Room volume. Note that this fader is available only if the Control Room is activated.
Close dialog after export	If this option is activated, the dialog will be closed after the export, otherwise it will be left open.

Other file formats

Steinberg also offers optional Dolby Digital (AC3) and DTS encoders for export directly to AC3 or DTS format. Please go to www.steinberg.net for more information.

Windows Media Audio Pro files (Windows only)

This is a continuation of the Windows Media Audio format developed by Microsoft Inc. Due to the advanced audio codecs and lossless compression used, WMA Pro files can be decreased in size with no loss of audio quality. Furthermore, WMA Pro features the possibility of mixing down to 5.1 surround sound. The files have the extension ".wma".



Exporting a WMA mixdown

⇨ Depending on the chosen output, not all options may be shown.

The following options are available:

General tab

In the Input Stream section, you set the sample rate (44.1, 48 or 96 kHz) and the bit resolution (16 bit or 24 bit) of the encoded file. These should be set to match the sample rate and bit resolution of the source material. If no value matches that of your source material, use the closest available value that is higher than the actual value. E.g. if you're using 20 bit source material, set the bit resolution to 24 bit rather than 16 bit.

⇨ The setting in the Channels field depends on the chosen output and cannot be changed manually.

The settings in the Encoding Scheme section are used for defining the desired output from the encoder, e.g. whether it should be a stereo file or a 5.1 surround file. Make settings appropriate for the intended use of the file. If the file will be downloaded or streamed on the Internet, you might not want too high bit rates, for example. See below for descriptions of the options.

- Mode

The WMA Pro encoder can use either a constant bit rate or a variable bit rate for encoding to 5.1 surround, or it can use lossless encoding for encoding to stereo. The options on this menu are as follows:

Mode	Description
Constant Bitrate	This will encode to a 5.1 surround file with a constant bit rate (set in the Bit Rate/Channels menu, see below). Constant bit rate is preferably used if you want to limit the size of the final file. The size of a file encoded with a constant bit rate is always the bit rate times the duration of the file.
Variable Bitrate	Encodes to a 5.1 surround file with a variable bit rate, according to a quality scale (the desired quality is set in the Bit Rate/Channels menu, see below). When you encode with variable bit rates, the bit rate fluctuates depending on the character and intricacy of the material being encoded. The more complex passages in the source material, the higher the bit rate – and the larger the final file.
Lossless	Encodes to a stereo file with lossless compression.

- Bit Rate/Quality

This menu allows you to set the desired bit rate. The available bit rate settings vary depending on the selected mode and/or output channels (see above). If the Mode "Variable Bitrate with Quality" is used (see above), the menu allows you to select from various levels of desired quality, with 10 being the lowest and 100 the highest. Generally, the higher the bitrate or quality you select, the larger the final file will be. The menu also shows the channel format (5.1 or stereo).

Advanced tab

- Dynamic Range Control

These controls allow you to define the dynamic range of the encoded file. The dynamic range is the difference in dB between the average loudness and the peak audio level (the loudest sounds) of the audio. These settings affect how the audio is reproduced if the file is played on a Windows XP computer with a player from the Windows Media series, and the user activates the special "Quiet Mode" feature of the player to control the dynamic range.

The dynamic range is automatically calculated during the encoding process, but you can specify it manually as well.

If you want to manually specify the dynamic range, first put a checkmark in the box to the left by clicking in it, and then enter the desired dB values in the Peak and Average fields. You can enter any value between 0 and -90 dB. Note, however, that it is usually not recommended to change the Average value, since it affects the overall volume level of the audio and therefore can affect the audio quality adversely.

The Quiet Mode in a Windows Media player can be set to one of three settings. Below, these settings are listed together with an explanation of how the Dynamic Range settings affect them:

- Off: If Quiet Mode is off, the dynamic range settings that were automatically calculated during the encoding will be used.
- Little Difference: If this is selected and you have not manually changed the dynamic range settings, the peak level will be limited to 6 dB above the average level during playback. If you have manually specified the dynamic range, the peak level will be limited to the mean value between the peak and average values you specified.
- Medium Difference: If this is selected and you have not manually changed the dynamic range settings, the peak level will be limited to 12 dB above the average level. If you have changed the dynamic range, the peak level will be limited to the peak value you specified.

- Surround Reduction Coefficients

Here you can specify which amount of volume reduction, if any, should be applied to the different channels in a surround encoding. These settings affect how the audio is reproduced on a system incapable of playing back the file in surround, in which case the surround channels of the file will be combined into two channels and played back in stereo instead.

The default values will normally produce satisfactory results, but you can change the values manually if you wish. You can enter any value between 0 and -144 dB for the surround channels, the center channel, the left and right channels and the LFE channel respectively.

Media tab

In these fields you can enter a number of text strings with information about the file – title, author, copyright information and a description of its contents. This information will then be embedded in the file header and can be displayed by some Windows Media Audio playback applications.

⇨ For more information about surround sound and encoding, see the chapter “Surround sound” on page 202.

35

Synchronization

Background

What is synchronization?

Synchronization is said to exist when you make two pieces of equipment agree on time or tempo and position info. You can establish synchronization between Nuendo and a number of other types of devices, including tape recorders and video decks, but also MIDI devices that “play back”, such as other sequencers, drum machines, “workstation sequencers” etc.

When you set up a synchronization system, you must decide which unit is the master. All other devices are then slaved to this unit, which means they will adjust their playback speed to the master’s.

⚠ For a description of the VST System Link feature (with which you can synchronize separate computers running Nuendo or Cubase for example), see “Working with VST System Link” on page 460.

Nuendo as slave

When a synchronization signal is coming in to Nuendo from another device, this device is the master and Nuendo is the slave. Nuendo will adjust its playback to the other device.

Nuendo as master

When you set up Nuendo to transmit synchronization information to other devices, Nuendo is the master and the other devices are the slaves; they will adjust their playback to Nuendo.

Nuendo – both master and slave

Nuendo is a very capable synchronization device. It can operate as both a master and a slave at the same time. For example, Nuendo might be slaved to a tape recorder transmitting timecode, while at the same time transmitting MIDI Clock to a drum machine, acting as a master for that.

Synchronization signals

Basically there are three types of synchronization signals for audio: timecode, MIDI clock and word clock.

Timecode (SMPTE, EBU, MTC, VITC etc.)

Timecode appears in a number of guises. No matter which “format” it has, it always supplies a “clock on the wall” type of synchronization, that is, a synchronization related to hours, minutes, seconds and two smaller units called “frames” and “subframes”.

- LTC (SMPTE, EBU) is the audio version of timecode. This means that it can be recorded on the audio track of an audio or video recorder.
- VITC is the video format timecode, i.e. it is stored in the actual video image.
- MTC is the MIDI version of timecode, transmitted via MIDI cables.
- ADAT sync (Alesis) is only used with the ASIO Positioning Protocol, see “About the ASIO Positioning Protocol (APP)” on page 452.
- Sony 9-pin is a standard that uses serial (RS-422) communication. Sony 9-Pin contains timecode as well as machine control messages (see “Setting up Sony 9-Pin” on page 457).

For the ASIO Positioning Protocol, other high precision timecode formats may also be supported.

Format recommendations for timecode – without ASIO Positioning Protocol

- When synchronizing your system to external timecode, via a synchronizer, the most common timecode format is MTC. Contrary to some reports you might have heard, MTC delivers good precision for external sync. This is due to the fact that the operating system can “time stamp” incoming MIDI messages, which increases precision.
- Sony 9-Pin is not recommended for external sync and should only be used when no other option is available. However, you might of course use 9-Pin for machine control, see “Sony 9-Pin” on page 455.

Format recommendations for timecode – with ASIO Positioning Protocol

- LTC and VITC are the formats with the highest precision and are recommended when available.
- MTC is the next best option and probably the most common choice, since few audio hardware solutions have built-in LTC or VITC readers. However, LTC and VITC offer even higher precision when available.
- The choice with the least precision is Sony 9-Pin.

MIDI Clock

MIDI Clock is a tempo-based type of synchronization signals, i.e. it is related to the number of "beats per minute". MIDI Clock signals are suitable for synchronizing two devices that agree on tempo, such as for example Nuendo and a drum machine.

⚠ MIDI Clock is not suitable as a master sync source for an application like Nuendo. Therefore Nuendo will transmit MIDI Clock signals to other devices, but it will not receive MIDI Clock.

Word Clock

Word clock is basically a replacement for the sample rate clock in for example an audio card. Word clock hence runs at the same rate as the sample rate in the audio, 44.1kHz, 48kHz etc.

Word clock does not contain any position information, it is only a "simple" signal for clocking the audio at its sample rate.

Word clock comes in many formats, analog on coaxial cable, digital as part of an S/PDIF, AES/EBU or ADAT audio signal, etc.

Synchronizing the transport vs. synchronizing audio

How timing is handled in a non-synchronized system

Let's first look at the situation where Nuendo is not synchronized to any external source:

Any digital playback system has an internal clock that ultimately affects the playback speed and stability, and PC audio hardware is no exception. This clock is extremely stable.

When Nuendo is playing back with no external synchronization, all playback is internally synchronized to the internal digital audio clock.

Synchronizing Nuendo's playback

Let's assume now that we use external timecode synchronization with Nuendo. For example, we might synchronize playback to a tape recorder.

Timecode coming from an analog tape recorder will always vary slightly in speed. Different timecode generators and different tape recorders will also supply timecode with slight differences in speed. In addition, the shuttling of tape mechanisms due to overdubs and re-recordings can cause the physical tape to wear and stretch, which affects the speed of the timecode.

If you use a synchronizer that generates word clock and set up Nuendo to sync to incoming timecode, it will vary its overall playback speed to compensate for such fluctuations in the speed of the timecode – that's the whole purpose of synchronization.

What happens with the digital audio?

The fact that Nuendo's playback is synchronized to the timecode does not affect the playback of the digital audio. It still relies on the perfectly stable, built-in clock in the audio hardware.

As might be expected, problems will appear when the perfectly stable digital audio gets related to the slightly varying speed of a system synchronized to timecode.

The playback timing of each event will not be in total accordance with the tape or the MIDI playback, since the playback speed of the audio is determined by the digital audio hardware's built-in clock.

Resolving to word clock

The solution to this problem is to use one external clock for all components in the system. One master clock is used to derive whatever type of clock signal each component in the system needs. For example, something called a house clock can be used to generate sample rate clocks for the digital audio hardware and timecode for Nuendo. This ensures that all components in the system use the same reference source for their timing.

Synchronizing digital audio to external clocks running at sample rate is often called “resolving” or “synchronizing to word clock”.

If you aim to perform synchronization to external signals, we strongly recommend that you obtain proper synchronization equipment. This encompasses:

- An audio card that can be slaved to external word clock.
- A synchronizer that can read timecode (and possibly house clock) and generate the required sync signals from that, such as the Steinberg TimeLock Pro.

or...

- An audio system with complete built-in synchronization possibilities, preferably supporting the ASIO Positioning Protocol, see “About the ASIO Positioning Protocol (APP)” on page 452.

Using timecode without word clock

Of course, it is possible to set up a synchronization system where you lock Nuendo to timecode without using word clock. However, please note that the timing of audio vs. MIDI cannot be guaranteed and that fluctuations in speed in the incoming timecode will not affect the playback of audio events. This means that synchronizing to timecode may work in the following situations:

- When the timecode was originally generated by the audio card itself.

- When the source providing the timecode is extremely stable (such as a digital video system, a digital tape recorder or another computer).

- When you remain synchronized to that same stable source throughout the entire process, both while recording and playing back audio.

Making basic settings and connections

Setting the Frame Rate

The frame rate is the number of frames per second in a film or on a video tape. Just as there is always sixty seconds to a minute, there is always a certain number of frames to each second. However, the frame rate used varies with the type of media (film or video), which country the video tape has been produced in, and other circumstances.

In the Project Setup dialog are two settings for frame rates:

- The Frame Rate pop-up is automatically adjusted to the frame rate of the incoming timecode.
There is an exception to this when you are synchronizing Nuendo to MIDI Timecode: If you have selected 29.97 fps or 30 dfps as Frame Rate in Nuendo, this selection will be kept, since these frame rates are not included in the MTC format.

The following frame rates are available:

Frame Rate	Description
24 fps	The traditional frame rate of 35mm film.
25 fps	The frame rate used for all video and audio in Europe (EBU).
29.97 fps	Straight 29.97 frames per second.
30 fps	Straight 30 frames per second. This is often used in the United States for audio only work.
29.97 dfps	“Drop frame” code running at 29.97 frames per second, most often used in the United States of America for work with color video.
30 dfps	Very rarely used.
23.976 fps	Frame rate used for HDTV.
24.976 fps	Frame rate used for HDTV.
59.94 fps	Frame rate used for HDTV.
60 fps	Frame rate used for HDTV.

- The Display Format pop-up contains a number of formats that when selected work as the “master” setting for the display format used in the various windows’ rulers and position displays.
The item “60 fps (user)” on this menu represents a user definable frame rate. To make editing with frame accuracy correspond to the actual frame rate in an external sync source, you need to set this frame rate to the same value as the Frame Rate pop-up.

Proceed as follows:

1. Open the Preferences dialog (accessed from the File menu under Windows or the Nuendo menu on the Mac) and select the Transport page.

2. Enter the desired frame rate under “User Definable Framerate”.
Either type the desired value directly or use the arrow buttons to increase/decrease the value. You can enter any value between 2-200.

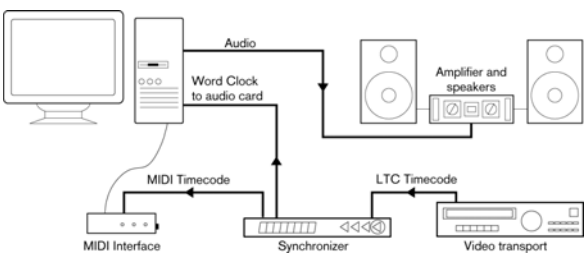
3. When you’re done, click OK to close the dialog and save the settings.

The Frame Rate you specified will now be the one used when you select the “User” option on the Display Format pop-up.

Making connections

The following connections are required for external sync via a synchronizer, including resolving of the audio card. For details on audio card and synchronizer settings and connections, see the manuals for these devices.

- Route the master clock signal (LTC, VITC, etc.) to an input on the synchronizer.
- Connect the word clock output on the synchronizer to a word clock input on the audio card.
- Connect the MIDI Timecode (MTC) or 9-Pin output on the synchronizer to the corresponding input on the computer.
- Set up the synchronizer and make sure the frame rate settings are in accordance with the master clock.



A typical synchronization setup.

Synchronization settings

In the following sections, you will find a description of how to set up your system for the different timecode sources:

Internal Timecode

In this mode, Nuendo is the master. When working with MMC (see “MIDI Machine Control (MMC)” on page 454), the external device gives the start and stop signals, but is synchronized by Nuendo.

Use the “MIDI Timecode Destinations” and “MIDI Clock Destinations” sections to specify which devices should be slaved to Nuendo.

Synchronizing other Equipment to Nuendo

You may have other MIDI devices that you want to synchronize to Nuendo. There are two types of synchronization that Nuendo can transmit: MIDI Clock and MIDI Timecode.

Transmitting MIDI Clock

If you transmit MIDI Clock to a device supporting this type of synchronization signal, the other device will follow Nuendo’s tempo. The tempo setting in the other device is of no relevance. Instead, it plays at the same tempo as Nuendo. If the device also reacts to Song Position Pointers (which Nuendo transmits) it will follow when you wind, rewind and locate using the Nuendo Transport panel.

⇨ MIDI Clock transport commands include “Start”, “Stop” and “Continue”. However, some MIDI equipment (e.g. some drum machines) do not recognize the “Continue” command. If this is the case with your equipment, activate the option “Always Send Start Message” in the Project Synchronization Setup dialog (for the MIDI Clock Destinations).
When this is activated, only the Start command is used.

▪ Activate “MIDI Clock Follows Project Position” if you want the other device to follow when you loop, jump and locate during playback.
When this is activated, the sent MIDI Clock signals will follow the sequencer time and tempo position at all times.

⚠ Please note that some external devices may not react smoothly to these repositioning messages. Especially when working with some older devices, it may take some time for them to synchronize accurately to the project time.

Transmitting MIDI Timecode

If you transmit MIDI Timecode to a device supporting this type of synchronization signal, the device will synchronize time-wise to Nuendo, that is, the time displays on Nuendo’s Transport panel and on the other device will agree. When you wind and locate Nuendo and then activate playback, the other device will follow from the same position (if it has this capability and is set up for it!).

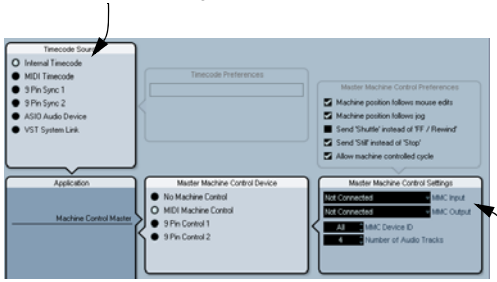
⇨ If you want to be able to loop, jump and locate during playback in Nuendo and have the other device follow, activate “MIDI Timecode Follows Project Time”.
When this is activated, the sent MIDI Timecode will follow the sequencer time position at all times.

Setting Up

1. Connect the desired MIDI Outputs from Nuendo to the device(s) that you plan to synchronize.

2. Open the Project Synchronization Setup dialog from the Transport menu.

Timecode Source settings

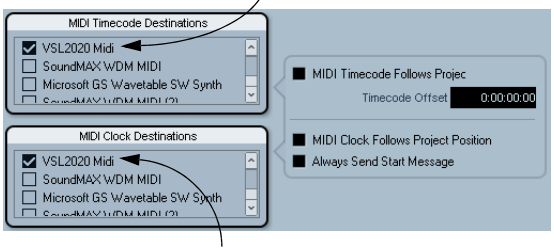


Input and Output for MIDI Machine Control messages.

3. Activate the sync outputs by using the corresponding checkboxes.
You can output any combination of MIDI Timecode and MIDI Clock to any combination of outputs (however, you probably don’t want to send MTC and MIDI Clock to the same output).

⚠ Some MIDI interfaces will automatically send MIDI Clock to all MIDI outputs, regardless of the MIDI Clock Port selection in Nuendo. If this is the case, you should only select one MIDI Clock Port (consult the documentation of the MIDI Interface if in doubt).

MIDI Timecode transmitted to this output.



MIDI Clock transmitted to this output.

4. Set the other device(s) to their “external synchronization” mode (or some other mode with a similar name) and activate playback on them if necessary.

5. Activate playback in Nuendo, and the other device(s) will follow.

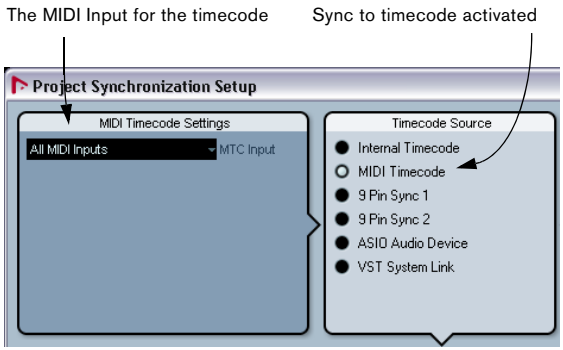
MIDI Timecode and 9 Pin Sync

In these modes, Nuendo is the slave and the timecode is sent by the MIDI Timecode Source specified in the corresponding section.

Setting up Nuendo for external sync to timecode

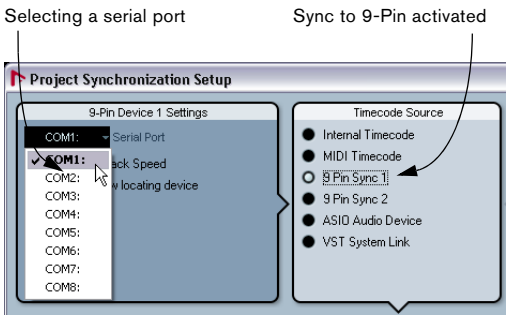
1. In the Project Synchronization Setup dialog, set the Timecode Source to MIDI Timecode or one of the 9-Pin options.

2. For MIDI Timecode, use the MTC Input pop-up menu in the MIDI Timecode Settings section to select an input for the timecode.



Sync settings for MIDI Timecode.

3. For Sony 9-pin timecode, select a port from the Serial Port pop-up menu. See “Setting up Sony 9-Pin” on page 457 for more on connecting 9-pin devices to your computer.



4. Close the Project Synchronization Setup dialog and open the Project Setup dialog from the Project menu.

5. Use the Start value to set which frame on the external device (e.g. a video tape) should correspond to the beginning of the project.

Most video projects have a program start time of 01:00:00:00 for convenience. It is recommended in most cases to have a project start time of 00:59:00:00 to allow for synchronizer lockup times, test tones, timing beeps and so forth.

- You can also set this with the function “Set Timecode at Cursor” on the Project menu.

This is useful if you know that a certain position in your project would coincide with a certain timecode position in the external device. Move the project cursor to the desired position, select “Set Timecode at Cursor” and specify the corresponding timecode position in the dialog that appears – the Start value is adjusted accordingly.

6. In the dialog that appears, you are asked if you want to keep the project content at its timecode positions. Select “No”.

This will make all events and parts keep their positions relative to the project start.

7. Close the Project Setup dialog.

8. On the Transport panel, activate the Sync button (or select “Use External Sync” from the Transport menu).

9. Start the tape (or video, or other master device) that contains the timecode. Nuendo starts playing when it receives timecode with a position “higher” than, or equal to, the project Start frame.

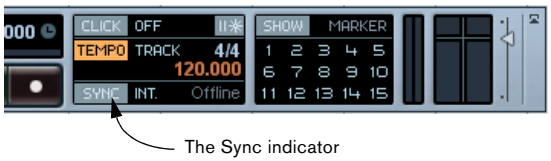
You can wind the device that sends the timecode to any position and start from there.

⚠ When the master device with the timecode is stopped, you can use the Nuendo transport controls as you normally do, when it is not synchronized.

You should also look into the Sync Options, see “Timecode Preferences” on page 454.

The Sync indicator

On the Transport panel, you can check the status of incoming timecode by observing the sync indicator.



- If you have selected MIDI Timecode as Timecode Source and MIDI Machine Control as Machine Control Option, the sync indicator switches between “Offline” (not waiting for sync), “Idle” (ready for sync but no signal is coming in), and “Lock xx” (where xx is indicating the frame rate of the incoming signal).

- If you have selected one of the 9-pin options as Machine Control Option, the following applies:

- When the Sync button is activated for the first time, the Sync indicator displays the name of the machine.
- When Nuendo is ready for synchronization, but no signal is coming in, the Sync indicator reads “Stopped”.
- When the Start button is pressed, the Sync indicator reads “Waiting”.
- When Nuendo is locked to timecode (when correct timecode was detected and the sequencer is running), “Locked” is displayed.
- While shuttling, the Sync indicator displays “Shuttle”.
- When you are rewinding, the Sync indicator reads “REW”.
- During Fast Forward, “FF” is displayed.
- If a communication error occurred, the indicator reads “Timeout”.
- If the external device is not in Remote mode, the indicator reads “Local”.
- If you are using an external tape machine and no tape has been inserted, the Sync indicator reads “No Tape”.
- While positioning on the external machine, the Sync indicator reads “Locate”.
- While using the Auto Edit function, “Auto Edit” is displayed.

ASIO Audio Device

⚠ This option is only available if your hardware is compatible with the ASIO Positioning Protocol.

In this mode, Nuendo is the slave and the synchronization signal can be received from another device connected to a digital interface of the audio hardware.

About the ASIO Positioning Protocol (APP)

⚠ ASIO Positioning Protocol requires audio hardware with specific ASIO drivers.

The ASIO Positioning Protocol is a technology that expands on the type of sync described above and makes sample-accurate positioning possible.

When transferring audio digitally between devices, it is important that synchronization using word clock and timecode is completely correlated. If not, the audio will not be recorded at the exact intended (sample-accurate) position, which can cause various types of problems, such as inaccurately positioned audio material, clicks and pops etc.

A typical situation is when transferring material from a digital multi-track tape recorder to Nuendo (for editing) and then back again. If you do not have sample-accurate synchronization set up, you cannot be sure that the material will appear in its exact original position, when transferred back to the tape recorder.

In order to take advantage of the ASIO Positioning Protocol, your audio hardware must be suitably equipped and the functionality must be included in the ASIO driver for the hardware.

An example of a system for doing sample-accurate transfers, would be transferring audio tracks from an Alesis ADAT to Nuendo. Here the ADAT will be the sync master (though it doesn’t necessarily have to be). It provides both the digital audio (with an inherent word clock) and position information (timecode) via its ADAT sync protocol. The master clock is generated by the ADAT itself.

Hardware and software requirements for APP

- Your computer audio hardware (in the example above, this would be an ADAT card in your computer) must support all the functionality required for the ASIO Positioning Protocol. That is, it must be able to read the digital audio and the corresponding position information from the external device.
- There must be an ASIO 2.0 driver for the audio hardware.
- For resolving to external timecode, the audio hardware must have an integrated timecode reader/generator.
- For information about which audio hardware models currently support APP, see the Steinberg web site (www.steinberg.net).

⚠ The ASIO Positioning Protocol exploits the specific advantage of having an audio card that has an integrated timecode reader. With such a card and the ASIO Positioning Protocol, you can achieve constant sample-accurate synchronization between the audio source and Nuendo.

Setting up the audio card for external synchronization

1. Open the Device Setup dialog from the Devices menu and, on the VST Audio System page, select the name of your audio interface.

2. Click the Control Panel button to open the card's proprietary setup dialog.

If this card is accessed via a special ASIO driver (as opposed to MME or Direct X), this dialog is provided by the card, not by Nuendo. Hence the settings vary with the card brand and model.

3. Adjust the settings as recommended by the card manufacturer, then close the dialog.

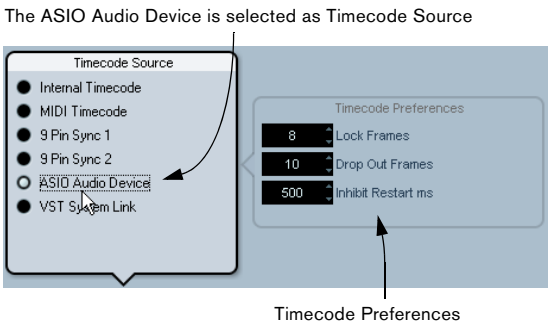
The dialog may also contain various diagnostic tools that allow you to verify for example whether word clock is arriving correctly.

4. From the Clock Source pop-up, select the input to which you routed the word clock signal.

This pop-up may not be used if you selected an input in the Control Panel dialog instead.

You can now set up the synchronization:

1. Open the Project Synchronization Setup dialog and set the Timecode Source to "ASIO Audio Device".



2. Make the desired settings in the dialog.

For information on the different sections, click the Help button in the dialog.

3. Close the Project Synchronization Setup dialog.

4. Open the Project Setup dialog from the Project menu and use the Start value to set which frame on the external device (e.g. a video tape) should correspond to the beginning of the project.

- You can also set this with the function "Set Timecode at Cursor" on the Project menu.

This is useful if you know that a certain position in your project coincides with a certain timecode position in the external device. Move the project cursor to the desired position, select "Set Timecode at Cursor" and specify the corresponding timecode position in the dialog that appears – the Start value is adjusted accordingly.

5. A message appears, asking you whether you want to keep the project content at its timecode positions. Select "No".

This will make all events and parts keep their positions relative to the project start.

6. Close the Project Setup dialog.

7. On the Transport panel, activate the Sync button (or select "Use External Sync" from the Transport menu).

8. Start the tape (or video, or other master device) that contains the timecode. Nuendo starts playing when it receives timecode with a position “higher” than, or equal to, the project Start frame.

You can wind the device that sends the timecode to any position and start from there.

⚠ When the master device with the timecode is stopped, you can use the Nuendo transport controls as you normally do, when it is not synchronized.

You should also take a look at the Timecode Preferences, see “Timecode Preferences” on page 454.

The Sync indicator

On the Transport panel you can check the status of incoming timecode by observing the sync indicator. It switches between “Offline” (not waiting for sync), “Idle” (ready for sync but no signal is coming in), and “Lock xx” (where xx indicates the frame rate of the incoming signal).

Timecode Preferences

The following timecode preferences are available in the Project Synchronization Setup dialog:

Lock Frames

Using this field you can set how many frames of “correct” timecode Nuendo should receive before attempting to “lock” (synchronize) to incoming timecode. If you have an external tape transport with a very short start-up time, you could try lowering this number to make lock-up even faster than it already is.

Drop Out Frames

On an analog tape with timecode, dropouts may occur. If a drop-out is very long, Nuendo may (temporarily) stop. In the Drop Out Frames field you can set how long a drop-out (in frames) should be tolerated until Nuendo decides that the tape isn’t good enough to synchronize to. If you have a very stable timecode source, you may lower this number to make Nuendo stop more swiftly after the tape recorder has been stopped.

Inhibit Restart

Some synchronizers will still transmit MIDI Time Code for a short period after an external tape machine has been stopped. These extra frames of timecode can sometimes cause Nuendo to restart suddenly. Inhibit Restart allows you to control the amount of time in milliseconds that Nuendo will wait to restart (ignoring incoming MTC) once it has stopped.

Machine Control

Nuendo can control external tape transports and similar devices via MIDI Machine Control or Sony 9-Pin. This allows you to operate an external tape transport from Nuendo’s Transport panel. That is, Nuendo can make the tape recorder locate to a certain position, start, stop, rewind etc.

About sync and machine control

Controlling tape transports is a two-way process:

- Nuendo sends out machine control commands to the tape recorder, asking it to locate to a certain position and activate playback etc.
- The tape recorder locates to the requested position, starts and delivers timecode back to Nuendo, to which Nuendo is synchronized.

Even though it appears as if Nuendo is controlling the tape recorder completely, it is important to remember that in this setup, Nuendo is still being synchronized to the external tape transport, not vice versa.

Also note that the two processes of sync and machine control are completely separated, in terms of protocols used. You can for example synchronize to MTC while sending out transport commands via MMC.

MIDI Machine Control (MMC)

This is a standard MIDI protocol for controlling tape transports. There are a number of tape recorders and hard disk recording systems on the market that support this protocol. Nuendo allows you to control the transport of an external MMC device and arm tracks for recording.

Sony 9-Pin

This is a standard protocol established by Sony, for controlling audio and video tape transports. It is implemented via regular serial port communication (RS-422). The correct cabling varies between computer platforms and models. Please refer to "Connecting a Sony 9-pin compatible device" on page 456 to find out more about the correct setup for your computer.

- If your Sony 9-pin device supports RS-232, you need a "null modem cable".
- The Sony 9-pin device most likely needs to be switched from local control to remote control in order to be controlled by Nuendo. If the device is not set to the correct mode, Nuendo will inform you. Most video decks have a switch on the front panel for this.
- Normally you should not lock Nuendo to timecode from the Sony 9-Pin device. There is timecode information in the 9-pin signal but it is primarily used for locating and shuttling. It is erratic and not stable enough to use as a timing or speed reference. Timecode should be read from either an LTC source or VITC source on a video tape machine.
- Nuendo implements Start, Stop, Record, Fast-Forward, Rewind, Shuttle, Nudge and Locate commands for 9-Pin devices, along with some special features - see "Audio Layback for 9-Pin Devices" on page 458.

Setting up Machine Control

Machine Control commands can be sent using one of two different protocols: MIDI Machine Control (MMC) or Sony 9-Pin. The setup procedures are slightly different for the two formats:

MIDI Machine Control

1. Set up and test basic timecode synchronization, as described earlier in this chapter.

2. Connect a MIDI Out on your MIDI interface to MIDI In on the tape recorder (or similar device).
If you have not already done so (when setting up for MIDI Timecode), also connect a MIDI cable from the MIDI Output on the tape recorder to a MIDI In on the computer.

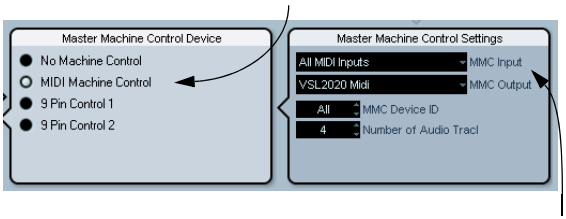
3. Make sure you have timecode recorded on the tape recorder, and that it is set up to use MMC.

4. Open the Project Synchronization Setup dialog on the Transport menu in Nuendo.

5. In the Master Machine Control section, select "MIDI Machine Control".

6. In the Master Machine Control Settings section, select the correct MMC Inputs and Outputs from the respective pop-up menus.

MIDI Machine Control selected



MIDI ports selected for MMC

7. Make sure that the MMC Device ID corresponds to the ID of the controlled device.
If more that one machine is connected or if you do not know the Device ID, this can be set to "All", the "Broadcast" device ID.

8. Set the "Number of Audio Tracks" setting to the number of tracks on the external tape recorder.

9. Open the Preferences dialog from the File menu (on the Mac, this is located on the Nuendo menu), select the MIDI Filter section and make sure Sysex is activated in the Thru section.
This is necessary since MMC uses two-way communication (the tape recorder "replies" to the MMC messages it receives from Nuendo). By filtering out Sysex Thru, you ensure that these MMC System Exclusive replies are not echoed back to the tape recorder.

10. Close the Preferences dialog and open the Project Setup dialog from the Project menu.

11. As when synchronizing without using transport control, use the Start value to specify which frame on the tape should correspond to the beginning of the project.

12. Close the Project Setup dialog.

13. Pull down the Devices menu and select MMC Master.
The MIDI Machine Control master transport panel appears.

It is now possible to control the external tape recorder independently or together with Nuendo:

- If you activate the Online button on the MMC Master panel you can use the transport buttons on the panel to control the transport of the device.

- You can also use the buttons to the left on the MMC Master panel to arm tape tracks for recording.
The number of record arm buttons depends on the "Number of Audio Tracks" setting in the Master Machine Control Settings section of the Project Synchronization Setup dialog.

- The "A1, A2, TC, VD" items refer to additional tracks usually found on video tape recorders.
Refer to the manual of your VTR device to see if these tracks are supported.

- If you activate the Sync button on the Transport panel, the MMC Master transport buttons (or the buttons on the main Transport panel) will control the external tape recorder and Nuendo in sync.

14. On the Transport panel, activate the Sync button.

15. Try to Stop, Fast Forward and Rewind from Nuendo and activate Play from different positions in the project.
The tape transport should follow.

- To turn off the synchronization between the tape recorder and Nuendo, simply deactivate Sync on the Transport panel.

Nuendo as MMC slave

This is set up in the MIDI Machine Control Slave section. Simply specify the MIDI ports and the MMC Device ID.

Some mixers support the MMC-Master protocol for controlling external devices, including Tascam DM-24, Yamaha DM2000 and SSL. This means that Nuendo can be used as a "recorder", where track arming and transport commands can be sent from the master device. In addition, some digital audio workstations (DAWs) can only operate in MMC-Master mode.

Connecting a Sony 9-pin compatible device

On Windows computers

The serial port (9-pin D-SUB connector) of your computer is used to establish communication with your Sony 9-pin compatible device (VTR, DAT, Multitrack etc.). However, PCs provide an RS-232 signal at the serial port, not the RS-422 signal expected by Sony 9-pin devices. External RS-232 to RS-422 converters are available from various manufacturers at your local dealer or can be purchased via the internet. If you are planning to cover distances exceeding a few meters please make sure that this adapter also balances the signal.

On Macintosh computers

The serial port of your computer is used to establish communication with your Sony 9-pin compatible device. As newer Macintosh computers do not provide serial ports, you have to install extra serial ports on these Macintosh computers using one of the following methods.

- Stealth Serial Port.

This is a very common device used to provide a serial port on Macintosh computers lacking this kind of connectivity. This card can be bought in Macintosh stores or via the internet. It is inserted in the modem slot inside your Macintosh and is recognized by the operating system as a serial port. The signal present at the 9-pin D-SUB connector is already RS-422 but you need to adapt between the 8-pin Mini DIN connector of the Stealth Card and the 9-pin D-SUB connector found on your Sony 9-pin device using an appropriate cable.

- USB to serial adapter.

These USB devices are used to provide a serial port on Macintosh computers lacking this kind of connectivity. Such devices are available from various manufacturers at your local dealer or can be purchased via the internet. Make sure to install the driver of the device properly so the operating system can register the device as a serial port. The Keyspan USB to serial converter USA-19W has been used in this capacity with much success.

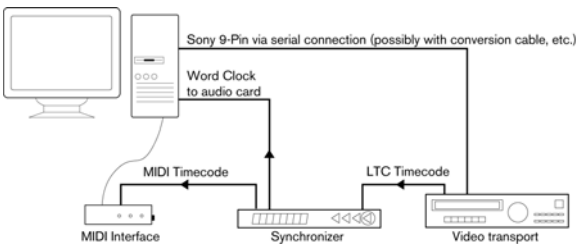
Depending on the kind of product you are using, the electrical signal available at the 9-pin D-SUB connector of the adapter can be either RS-422 or RS-232. Refer to the technical specification of the adapter used to find out more. If an RS-232 signal is used, you must convert this to the RS-422 signal expected by your Sony 9-pin device.

External RS-232 to RS-422 converters are available from various manufacturers at your local dealer or can be purchased via the internet. If you are planning to cover distances exceeding a few meters please make sure that this adapter also balances the signal.

Setting up Sony 9-Pin

1. Set up and test basic timecode synchronization, as described earlier in this chapter.

2. Connect an unused serial port (COM port) on the computer to the external tape transport.
As mentioned earlier, you may need a RS-232 to RS-422 converter or conversion cable.

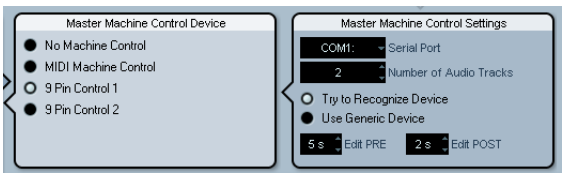


A typical Sony 9-Pin setup.

- Note that you can have two separate 9-Pin devices connected to the computer when using Nuendo!

3. Make sure you have timecode recorded on the tape recorder, and that it is set up to utilize Sony 9-Pin.

4. In the Project Synchronization Setup dialog, select either 9 Pin Control 1 or 2 in the Master Machine Control Device section.



5. In the Master Machine Control settings section, use the Serial Port pop-up menu to select the correct serial (COM) port.
By selecting different ports for the two 9-Pin Devices, you can separate two different external tape recorders, video systems, etc. The other options in this dialog are described on the following pages.

6. Set the number of audio tracks available on the 9-pin device by clicking on the arrows in the respective field or by entering a number directly. There can be up to 48 audio tracks for each 9-pin device.
You will be able to remotely arm each audio track for recording from the 9-pin control window. This is very handy when working in a large facility that utilizes a common machine room where all the tape machines are located.

In the 9-Pin Device Settings section (to the left of the Timecode Source section), you will find two additional options for each 9-pin device:

- "Control Playback Speed".

This option instructs Nuendo to attempt to control the playback speed of the 9-pin device in order to keep it in sync with Nuendo's internal clock. This should be a last resort option as it is very difficult to achieve acceptable results. Use this if there is no other way to lock to timecode coming from the 9-pin device other than through the 9-pin connection.

- "Display Follows Locating Device".

This is a very useful option for tape-based machines that take a certain amount of time to locate to new positions. When this option is activated and sync is enabled, the project cursor in Nuendo will reflect the position of the 9-pin machine's transport as it locates to different positions. For instance, if you place the cursor several minutes ahead of the current tape position, Nuendo can immediately locate there but the tape machine will take several seconds to arrive at the same position. During that time, the cursor will move with the tape machine, giving the user visual feedback as to its location. This is necessary in larger facilities that have a central machine room where the tape machine is located. Since the Nuendo system is in another room, the user will not know when the tape machine has located to the correct position.

7. Click OK to apply your changes and close the Project Synchronization Setup dialog.

8. Open the Project Setup dialog from the Project menu.

9. As when synchronizing without using transport control, use the Start value to specify which frame on the tape should correspond to the beginning of the project.

10. Close the Project Setup dialog.

11. Pull down the Devices menu and select “9-Pin Device 1” or “9-Pin Device 2”.

The corresponding 9-Pin Device control panel appears. This has a separate set of transport buttons, for controlling the transport in the 9-pin device. There’s also a separate Online button, above the transport controls.

The 9-pin control panel. Most professional video tape machines have four audio tracks and if they are digital, use a 48k sampling rate. Tracks 1 and 2 are record enabled.

It’s now possible to control the transport and track arming of the 9-pin device independently or together with Nuendo:

- If you activate the Online button on the 9-Pin Device control panel you can use the transport buttons on the panel to control the transport in the device.
- If you activate the Sync button on Nuendo’s Transport panel, the 9-Pin Device transport buttons (or the buttons on the main Transport panel) will control the 9-pin device and Nuendo in sync.
- When using Sony 9-Pin it is possible to advance the external transport frame by frame by using the Nudge Position buttons on the Transport panel. You can assign a keyboard shortcut for this as well.
- Whenever you want to turn off the synchronization between the tape recorder and Nuendo, simply deactivate Sync on the Transport panel.

Preferences

There are several Master Machine Control Preferences available for 9-pin control in the Project Synchronization Setup dialog. They are as follows:

- “Machine position follows mouse edits”.

When this option is activated and the transport in Nuendo is set to “Edit Mode,” the 9-pin device will track the edits you make with the mouse in the project window. Actions such as adjusting event boundaries, moving fade handles and even selecting events will cause the 9-pin machine to follow the mouse position as you make the edit. This emulates the response of a video file playing in Nuendo under Edit Mode.

- “Machine position follows jog”.

When this option is activated, Nuendo will send Locate commands to the 9-pin device when you use the jog wheel on the Transport panel, allowing you to see each frame of video as you scroll through the tape. When it is deactivated, the positioning of the device takes place when the jog wheel has been released.

- “Send Shuttle instead of FF/Rewind”.

When the fast forward and rewind buttons are pressed on the Transport panel, Nuendo can send either fast forward and rewind commands to the 9-pin device or send shuttle commands. Each 9-pin device will react differently to these commands so some experimentation will be necessary. Tape machines will most likely respond best to fast forward and rewind commands. This option is deactivated by default.

- “Send Still instead of Stop”.

Many video tape machines will not display an image when in stop mode as the tape is typically retracted from the playback heads in this mode. Using a still or pause command instead will allow most video tape machines to display the current frame of video while paused. Many video tape machines have internal settings that affect this as well, allowing images to be displayed in stop mode.

- “Allow machine controlled cycle”.

Nuendo can behave in two ways when in cycle mode and using machine control. When this option is not activated, Nuendo will begin the cycle normally from the left locator. But when it gets to the right locator, Nuendo will go back to the left locator to start the cycle again while the tape machine (or other external transport) will continue on until stop is pressed. When this option is activated, once Nuendo reaches the right locator, playback will stop on both the machine and in Nuendo. Both will locate back to the left locator and begin playback automatically. This will continue until stop is pressed. Also, if there are pre and post roll values activated in the Transport panel, Nuendo will include these in the cycle, playing past the right locator by the post-roll amount and then locating to a point before the left locator by the pre-roll amount and playing from there. The tape machine will follow all of this in sync.

Audio Layback for 9-Pin Devices

Nuendo has some special features for working with 9-Pin devices (typically video decks). These allow you to transfer audio to the 9-Pin device by recording it from Nuendo, manually or automatically. A typical application would be audio layback – if you have edited audio for a video in Nuendo and want to transfer the audio back to the audio track(s) in the video deck, at the correct positions.

⚠ This assumes that Machine Control of the 9-Pin device has been set up, and that the proper audio connections have been made for recording audio from Nuendo to the 9-Pin device.

1. Open the Project Synchronization Setup dialog and select the 9-Pin device (1 or 2) in the Master Machine Control Device section.

2. Make sure the “Number of Audio Tracks” value is correct.
This should be set to the number of audio tracks in the 9-Pin device. The maximum number of audio tracks supported is 48.

⇨ If you have activated “Try to Recognize Device” and the 9-Pin Device model is known to Nuendo, the number of audio tracks is automatically set to the correct value.

3. Close the Project Synchronization Setup dialog.

4. Select “9-Pin Device 1” (or 2, depending on your connections and setup) from the Devices menu.
The control panel for the 9-Pin Device appears.

The numbered buttons to the left correspond to the set number of audio tracks.

5. Make sure the Online button is activated.

6. To record enable an audio track in the 9-Pin device (which is connected to Nuendo via a suitable device), click the corresponding numbered button in the panel.
The button lights up, indicating that the corresponding audio track is record enabled.

7. Set the locators in Nuendo to encompass the audio section you want to transfer.

8. Click the Auto Edit button in the 9-Pin device panel.
This is the button to the right of the transport controls.

- If the Auto Edit function is supported by the 9-Pin device, the device will automatically go to a position just before the left locator, start playback, activate recording at the left locator and punch out at the right locator.
Assuming you have connected the proper outputs from Nuendo to the correct inputs of the tape machine, the audio section will be played back in Nuendo and recorded on the audio tracks of the 9-Pin device.

- If the Auto Edit function is not supported by the 9-Pin device, you have to activate recording “manually”.
Use the 9-Pin device control panel transport (or the main Transport panel) to rewind to a position before the left locator, activate automatic punch-in and punch-out and start playback. If no Nuendo tracks are record enabled, recording will only be performed by the 9-Pin device.

⚠ Please consult the documentation for the 9-Pin device for information about whether the Auto Edit function is supported or not.

Setting Preroll and Postroll for Auto Edit

For the Auto Edit function provided on 9-Pin device panels you can set individual preroll and postroll values. This is done in the Master Machine Control section Settings in the Project Synchronization Setup dialog.

1. Open the Project Synchronization Setup dialog and select the 9-Pin Device in the Master Machine Control Device section.

2. In the Master Machine Control Settings section to the right, click on the Edit PRE/POST up/down arrow buttons to set a new value for the preroll and/or postroll for the auto edit function.
You can also click directly in the value field and enter the desired pre/postroll value manually.

Working with VST System Link

VST System Link is a network system for digital audio that allows you to have several computers working together in one large system. Unlike conventional networks it does not require Ethernet cards, hubs, or CAT-5 cables; instead it uses the kind of digital audio hardware and cables you probably already possess in your studio.

VST System Link has been designed to be simple to set up and operate, yet give enormous flexibility and performance gains in use. It is capable of linking computers in a "ring" network (the System Link signal is passed from one machine to the next, and eventually returns to the first machine). VST System Link can send its networking signal over any type of digital audio cable, including S/PDIF, ADAT, TDIF, or AES, as long as each computer in the system is equipped with a suitable ASIO compatible audio interface.

Linking up two or more computers gives you vast possibilities:

- Dedicate one computer to running VST instruments while recording audio tracks on another.
- If you need lots of audio tracks, you may simply add tracks on another computer.
- You could have one computer serve as a "virtual effect rack", running CPU-intensive send effect plug-ins only.
- Since you can use VST System Link to connect different VST System Link applications on different platforms, you can take advantage of effect plug-ins and VST instruments that are specific to certain programs or platforms.

Preparations

Requirements

The following equipment is required for VST System Link operation:

- Two or more computers.

These can be of the same type or use different operating systems – it doesn't matter. For example, you can link an Intel-based PC to an Apple Macintosh without problems.

- Each computer must have audio hardware with specific ASIO drivers, installed and working.
- The audio hardware must have digital inputs and outputs.

Of course, to be able to connect the computers, the digital connections must be compatible (i.e. the same digital formats and connection types must be available).

- At least one digital audio cable for each computer in the network.
- A VST System Link host application installed on each computer.

Any VST System Link applications can connect to each other.

Additionally, we recommend that you use a KVM switchbox:

Using a KVM switchbox

If you want to set up a multi-computer network, or even a small network in a limited space, it's a good idea to invest in a KVM (Keyboard, Video, Mouse) switchbox. With one of these you can use the same keyboard, monitor, and mouse to control each computer in the system, and switch between computers very rapidly. KVM switchboxes are not too expensive, and very easy to set up and operate. If you decide not to go this route, the network will function just the same, but you may end up doing a lot of jumping from one machine to the other while setting up!

Making connections

Below, we assume that you are connecting two computers. Should you have more than two computers, it's still best to start with two and add the others one by one once the system is working – this makes troubleshooting easier if you run into problems. For two computers, you will need two digital audio cables, one in each direction:

1. Connect a digital audio cable from the digital output of computer 1 to the digital input of computer 2.

2. Connect the other cable from the digital output of computer 2 into the digital input of computer 1.

- If a card has more than one set of inputs and outputs, choose whichever one that suits you – for simplicity usually the first set is best.

Synchronization

Before you proceed, you need to make sure that the clock signals on your ASIO cards are synchronized correctly. This is essential when cabling any kind of digital audio system, not just VST System Link.

⚠ All digital audio cables by definition always carry a clock signal as well as audio signals, so you don't have to use a special Word Clock input and output for this (although you may find that you get a slightly more stable audio system if you do, especially when using multiple computers).

The Clock Mode or Sync Mode is set up in the ASIO control panel of the audio hardware. Proceed as follows:

1. Pull down the Devices menu and open the Device Setup dialog.

2. On the VST Audio System page, select your audio interface from the "ASIO Driver" pop-up menu.
In the Devices List, the name of the audio interface is displayed below the VST Audio System entry.

3. Select your audio interface in the Devices list to the left.

4. Click the Control Panel button.
The ASIO control panel appears.

5. Open the ASIO control panel on the other computer as well.
If you are using another VST System Link host application on that computer, check its documentation for details on how to open the ASIO control panel.

6. Now, you need to make sure that one audio card (and only one!) is set to be the Clock Master, and all the other cards are set to listen for the clock signal coming from the Clock Master i.e. they must be Clock Slaves.
The naming and procedure for this differs depending on the audio hardware – consult its documentation if required. If you are using Steinberg Nuendo ASIO hardware, all cards default to the "AutoSync" setting – in this case you must set one of the cards (and only one) to "Master" in the Clock Mode section of the control panel.

- Typically, the ASIO control panel for an audio card contains some indication of whether the card receives a proper sync signal or not, and the sample rate of that signal.
This is a good indication that you have connected the cards and set up clock sync properly. Check your audio hardware's documentation for details.

⚠ It's very important that one and only one card is the clock master, otherwise the network cannot function correctly. Once you have set this up, all the other cards in the network will take their clock signal from this card automatically.

The only exception to this procedure is if you are using an external clock – which could be from a digital mixing desk or special Word Clock synchronizer for example. If so, you must leave all your ASIO cards in Clock Slave or AutoSync mode, and make sure that each of them is listening for the signal coming from the synchronizer, usually passed through your ADAT cables or Word Clock connectors in a daisy chain fashion.

VST System Link and latency

The general definition of latency is the amount of time it takes any system to respond to whatever messages are sent to it. For example, if your system's latency is high and you play VST instruments in real time, you will get a noticeable delay between when you press a key and when you hear the sound of the VST instrument. Nowadays, most ASIO-compatible audio cards are capable of operating with very low latencies. Also, all VST applications are designed to compensate for latency during playback, making the playback timing tight.

However, the latency time of a VST System Link network is the total latency of all the ASIO cards in the system added together. Therefore it's extra important to minimize the latency times for each computer in the network.

⇨ The latency does *not* affect the synchronization – it's always perfectly in time. But it can affect the time it takes to send and receive MIDI and audio signals, or make the system seem sluggish.

To adjust the latency of a system, you adjust the size of the buffers in the ASIO control panel – the lower the buffer size, the lower the latency. It's best to keep to fairly low latencies (buffer sizes) if your system can handle it – about 12 ms or less is usually a good idea.

Setting up your software

Now it's time to set up your programs. The procedures below describe how to set things up in Nuendo; if you are using another program on the other computer, please refer to its documentation.

Setting the sample rate

The projects in both programs must be set to use the same sample rate. Select "Project Setup…" from the Project menu and make sure the sample rate is the same in both systems.

Streaming digital audio between applications

1. Create input and output busses in both applications and route these to the digital inputs and outputs.
The number and configuration of the busses depends on your audio hardware and on your needs. If you have a system with eight digital i/o channels (such as an ADAT connection), you could create several stereo or mono busses or a surround bus together with a stereo bus, or any combination you need. The important thing is that you should have the same configuration in both applications – if you have four stereo output busses on computer 1, you want four stereo input busses on computer 2, etc.

2. Set things up so that computer 1 plays back some audio.
You could for example import an audio file and play this back in Cycle mode.

3. In the Inspector or mixer, make sure the playing audio channel is routed to one of the digital output busses you set up.

4. In computer 2, open the mixer and locate the corresponding digital input bus.
The audio being played back should now "appear" in the program running on computer 2. You should see the input bus level meters moving.

5. Reverse this procedure so that computer 2 plays back and computer 1 "listens".

Now you have verified that the digital connection works as it should.

⇨ From this point on in this chapter, we refer to the busses connected to the digital inputs and outputs as "VST System Link busses".

Settings for the audio hardware

When you send VST System Link data between computers, it is important that the digital information isn't changed in any way between the programs. Therefore, you should open the control panel (or additional application) for your audio hardware and make sure that the following conditions are met:

- If there are additional "format settings" for the digital ports that you use for VST System Link data, make sure these are turned off.
  For example, if you are using an S/PDIF connection for VST System Link, make sure that "Professional format", Emphasis and Dithering are turned off.
- If your audio hardware has a mixer application allowing you to adjust the levels of digital inputs and outputs, make sure that this mixer is disabled or that the levels for the VST System Link channels are set to (± 0dB).
- Similarly, make sure no other forms of DSP (pan, effects, etc.) are applied to the VST System Link signal.

Notes for Hammerfall DSP users

If you are using RME Audio Hammerfall DSP audio hardware, the Totalmix function allows for extremely complex signal routing and mixing in the audio hardware. This can in some situations lead to "signal loops" in which case the VST System Link won't work. If you want to make absolutely sure this won't cause any problems, select the default or "plain" preset for the Totalmix function.

Activating VST System Link

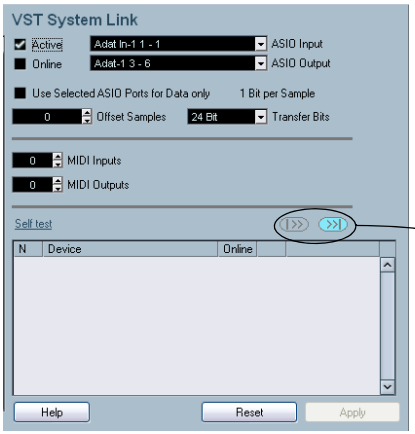
Before you proceed you need to make sure that VST System Link is set as Timecode Source in the Synchronization dialog and that the desired Sync options are activated, see “Timecode Preferences” on page 454.

After setting up the inputs and outputs, you now need to define which input/output should carry the actual VST System Link information.

The System Link networking signal is carried on only one bit of one channel. This means that if you have an ADAT based system which normally carries eight channels of 24-bit audio, once you activate VST System Link you will have seven channels of 24-bit audio and one channel of 23-bit audio (the least significant bit of this last channel will be used for networking). In practice this makes no discernible difference to the audio quality, since you will still have around 138dB headroom on this channel.

To set things up, open the VST System Link panel:

1. Open the Device Setup dialog on the Devices menu.
2. Select VST System Link in the Devices list to the left.



3. Use the ASIO Input and ASIO Output pop-up menus to define which channel should be the networking channel (and thus become a 23-bit audio channel, in our example).
Quite often you will be able to leave these pop-ups the way they are.
4. Click the Active checkbox at the top of the panel.
5. Repeat the steps above for every computer on the network.

As the computers are made active, you should see the small Transmitting and Receiving indicators flashing on each active computer, and the name of each computer should appear in the list at the bottom of the pane. Each computer is assigned a random number – don't worry about this, it's just so the network knows internally which one is which.

- You can double-click on the name in bold (which is the name of the computer you're currently working on) and set it to whatever other name you wish.
This name will appear in the System Link window of every computer on the network.

⇨ If you don't see the name of each computer appearing once you have made it active, you may have to check your settings.
Go through the procedure above again and make sure that all ASIO cards are listening to the digital clock signals correctly, and that each computer has the correct inputs and outputs assigned to the System Link network.

Putting the network online

After each computer's name you will see whether it is online or not. When a computer is online, it will receive transport and timecode signals, and its sequencer application can be started and stopped by remote control. If it is offline, it can only be started from its own keyboard – it is effectively an independent machine, although it is still on the network.

⇨ Note that any computer can control any and all of the others – VST System Link is a peer-to-peer network and there is no absolute “master” computer.
However, most users do like to think of one machine as the master (in a one person/two computer network, this would be the machine you actually sit behind most of the time).

For now, let's put all computers online:

1. Activate the Online checkbox in the VST System Link panel for all computers.
2. Check that the system is working by pressing Play on one computer – all computers should start almost instantly and play perfectly in time, with sample-accurate precision.

- The Offset Samples setting allows you to adjust whether one machine will play back slightly ahead or behind the rest. This is normally not needed, but occasionally with some hardware you may find that the lock is a few samples out. In that case you can adjust the lock with the Offset value. For now, leave it set to 0 – it will most likely be what you want.

- The Transfer Bits setting allows you to specify whether you want to transfer 24 or 16 bits. This allows you to use older audio cards which do not support transfer of 24 bits.

VST System Link sends and understands all transport commands, so you can play, stop, fast forward, rewind etc. the entire network from one computer without a problem – try it! If you jump to a locator point on one machine, all other machines will also instantly jump to that locator point. You can even scrub on one computer and have the video and audio on another computer actually scrub right along with you.

⚠ Make sure that all computers have their tempos set to the same value, otherwise your synchronization will be seriously skewed.

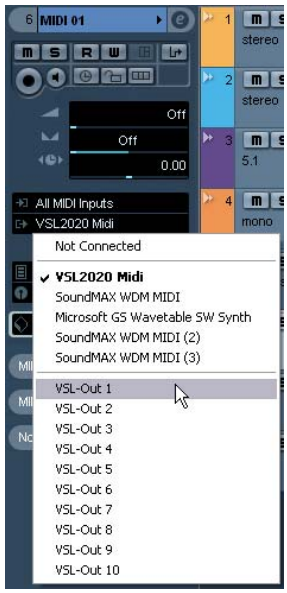
Using MIDI

As well as supplying transport and sync control, VST System Link also supplies up to 16 MIDI ports, each with 16 channels. You set this up as follows:

1. Use the MIDI Inputs and Outputs value boxes to specify the number of MIDI ports you need.
The default value is 0 MIDI In and 0 MIDI Out ports.

2. Create a MIDI track in the Project window and open the Inspector (top section).

3. If you now pull down the Input or Output Routing pop-up menus, you will find the specified System Link ports added to the list of MIDI Inputs and Outputs.



This allows you to route MIDI tracks to VST instruments running on another computer, as described in the application examples (see "Using one computer for VST instruments" on page 466).

The "Active ASIO Ports for Data only" setting

If you are sending huge amounts of MIDI data at once, there is a small possibility that you might run out of bandwidth on your VST System Link network. This will manifest itself by notes "choking" or timing becoming erratic.

If this happens, you can devote more bandwidth to MIDI by activating "Active ASIO Ports for Data only" in the VST System Link Setup panel. When this is activated, the VST System Link information will be sent on the entire channel instead of just one bit, more than enough for all the MIDI you could ever hope to use. The downside is that you can no longer use this ASIO channel for audio transfer (do not connect it to a speaker!), thus leaving you only 7 channels of audio in our ADAT cable example. Depending on how you work this might be a reasonable compromise.

Hearing the network audio

If you are using an external mixing desk, hearing your audio really isn't an issue – just plug the outputs of each computer into the desired channels on the external mixing desk, press Play on one of the computers, and you're good to go.

However, many people prefer to mix internally inside the computer and just use a desk for monitoring (or maybe not use any external mixer at all). In this case you'll need to select one computer to be your “main mix computer” and send the audio from your other computers into this.

In the following example, we assume you are using two computers, with computer 1 as your main mix computer and computer 2 running two additional stereo audio tracks, an FX channel track with a reverb plug-in and a VST instrument plug-in with stereo outputs.

1. First you want to set things up so that you can listen to the audio playback from computer 1.
In other words, you need an unused set of outputs, e.g. an analog stereo output, connected to your monitoring equipment.

2. Go to computer 2 and route each of the two audio tracks to a separate output bus.
These should be busses connected to the digital outputs – let's call them Bus 1 and 2.

3. Route the FX channel track to another VST System Link bus (Bus 3).

4. Route the VST instrument channel to yet another bus (Bus 4).

5. Go back to computer 1 and check the corresponding four VST System Link input busses.
If you start playback on computer 2, the audio should “appear” on the input busses on computer 1. However, to mix these audio sources you need actual mixer channels:

6. Add four new stereo audio tracks on computer 1 and route these to the output bus you use for listening, e.g. to the analog stereo outputs.

7. For each of the audio tracks, select one of the four input busses.
Now, each computer 2 bus is routed to a separate audio channel on computer 1.

8. Activate monitoring for the four tracks.

If you now start playback, the audio from computer 2 will be sent “live” to the new tracks on computer 1, allowing you to hear them together with any tracks you play back on computer 1.

For more information about Monitoring, see “About monitoring” on page 17.

Adding more tracks

OK, but if you have more audio tracks than you have VST System Link busses (physical outputs)? Then you just use the computer 2 mixer as a submixer: Route several audio channels to the same output bus and adjust the output bus level if needed.

Note also that if your audio cards have multiple sets of input and output connections you can link up e.g. multiple ADAT cables and send audio via any of the busses on any of the cables.

Internal mixing and latency

One problem with mixing inside the computer is the latency issue we mentioned earlier. The VST engine always compensates for record latencies, but if you are monitoring through computer 1 you will hear a processing delay while you listen to signals coming from your other computers (not on your recording!). If your audio card in computer 1 supports ASIO Direct Monitoring you should definitely turn this on – you'll find the setting in the VST Audio System Device Setup panel (see “ASIO Direct Monitoring” on page 72). Most modern ASIO cards support this function. If yours doesn't you may want to change the Offset value in the VST System Link Setup panel to compensate for any latency issues.

Setting up a larger network

This is not much more difficult than a two computer network. The main thing to remember is that VST System Link is a daisy chain system. In other words, the output of computer 1 goes to the input of computer 2, the output of computer 2 goes to the input of computer 3, and so on around the chain. The output of the last computer in the chain must always go back into the input of computer 1, to complete the ring.

Once you've done this, the transmission of all the transport, sync, and MIDI information to the whole network is handled pretty much automatically. However, where you may run into confusion in a large network is in the transmission of audio signals back to a central mix computer.

If you have lots of hardware inputs and outputs on your ASIO cards you don't need to send audio via the chain at all, but can transmit it directly to the master mix computer via one or more of its other hardware Inputs. For example, if you have a Nuendo Digiset interface or 9652 card on computer 1 you could use ADAT cable 1 for networking, ADAT cable 2 as a direct audio input from computer 2, and ADAT cable 3 as a direct audio input from computer 3.

You can also transmit audio via the ring system if you don't have enough hardware I/Os for direct audio transmission. For example, in a four computer scenario you could send audio from computer 2 into a channel in the mixer in computer 3, and from there to a channel in the mixer in computer 4, and from there back to the master mixer in computer 1. This can certainly be tricky to set up, so generally it is recommended that if you want to set up a complex network, you should make sure to use ASIO cards with at least three separate digital I/Os.

Application examples

Using one computer for VST instruments

In this example, one computer will be used as main record and playback machine, and another computer as a virtual synth rack.

1. Record a MIDI track into computer 1.

2. Once you have finished recording, route the MIDI output of that track to System Link MIDI port 1.

3. Now go to computer 2, open up the VST Instrument rack and assign an instrument to the first slot in the rack.

4. Route the VST Instrument channel to the desired output bus.
If you are using computer 1 as your main mixing computer, this would be one of the VST System Link output busses, connected to computer 1.

5. Create a new MIDI track in the Project window of computer 2, and assign the MIDI output of the track to the VST Instrument you created.

6. Assign the MIDI input of the track to be VST System Link port 1.
Now, the MIDI track on computer 1 is routed to the MIDI track on computer 2, which in turn is routed to the VST Instrument.

7. Now activate monitoring for the MIDI track on computer 2, so that it will listen and respond to any MIDI commands coming in.
In Nuendo, you would click the monitor button in the Track list or Inspector.

8. Press play on computer 1.
It will now send the MIDI information on the track to the VST Instrument loaded on computer 2.

Even with a slow computer you should be able to stack a whole bunch of extra VST Instruments this way, expanding your sound palette considerably. Don't forget that VST System Link MIDI is also sample-accurate, and thus has much tighter timing than any hardware MIDI interface ever invented!

Creating a virtual effect rack

The effect sends for an audio channel in Nuendo can either be routed to an FX channel track or to any activated Group or output bus. This allows you to use a separate computer as a "virtual effect rack", by setting things up in the following way:

1. Go to computer 2 (the machine you will use as effect rack) and add a new stereo audio track.
You cannot use an FX channel track in this case, since the track must have an audio input.

2. Add the desired effect as an insert effect for the track.
Let's say you add a high-quality reverb plug-in.

3. In the Inspector, select one of the VST System Link busses as input for the audio track.
You want to use a separate System Link bus, which will only be used for this purpose.

4. Route the channel to the desired output bus.
If you are using computer 1 as your main mixing computer, this would be one of the VST System Link output busses, connected to computer 1.

5. Activate monitoring for the track.

6. Now, go back to computer 1 and select a track to which you want to add some reverb.

7. Bring up the effect sends for the track, in the Inspector or the mixer.

8. Pull down the send routing pop-up menu for one of the sends, and select the VST System Link bus assigned to the reverb in step 3.

9. Use the send slider to adjust the amount of effect as usual.

The signal will be sent to the track on computer 2 and processed through its insert effect, without using any processor power on computer 1.

You can repeat the steps above to add more effects to the "virtual effect rack". The number of effects available this way is only limited by the number of ports used in the VST System Link connection (and of course by the performance of computer 2, but given that it won't have to handle any recording or playback, you should be able to use quite a lot of effects).

Getting extra audio tracks

All computers on a VST System Link network are locked with sample-accuracy. Therefore, if you find that the hard drive on one computer isn't fast enough to run as many audio tracks as you need, you can record new tracks on one of the other computers instead. This would create a "virtual RAID system", with several disks all operating together. All tracks will remain locked together just as tightly as if they were all running on the same machine. This means that you effectively have an unlimited track count! Need another 100 tracks? Just add another computer.

Dedicated Video Playback

Playback of high-resolution video can be taxing on a system's CPU. By dedicating one computer for video playback via System Link, you can free up resources on your main CPU for audio and MIDI processing. Since all transport commands will respond on the System Link computers, scrubbing video is possible even when it is coming from another computer. Spotting sound effects to picture in Edit Mode will work the same way as it does on one computer. This is a viable and economic alternative to dedicated hard disk video systems like the Doremi V1.

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Video

Background

Nuendo plays back video films in a number of formats. Under Windows, video playback can be done using the playback engines DirectShow, DirectX Video or QuickTime.
Under Mac OS X, QuickTime is always used as playback engine.

There are several ways to play back video:

- Without any special hardware.

While this will be fine in many situations it does put a limit on the size of the internal video window as well as the quality of the image.

- Using FireWire (Mac OS X only).

Using a FireWire port, you can play back video on an external monitor using a DV-to-analog converter or a DV camera.
This is valid for DV video and QuickTime is used for playback. This can reduce the CPU load since the external device is decoding the DV video stream.

- Using Graphics cards (Windows only).

Multi-head graphics cards which support overlay functionality can be used to display the video picture on an external monitor. As of this writing, the following manufacturers have working solutions available: nVIDIA and Matrox.

- Using Video cards.

Video cards can also be used to display the video on an external monitor. Please note that this utilizes some of the CPU to process the video data. As of this writing, e.g. the "Decklink" card (Blackmagic) can be used.

Before you start

When working on a project involving a video file, there are several points to bear in mind:

The playback engine is used not only for playback of the video file, but also to provide file information in Nuendo. To make sure that you have chosen the right player for a particular type of video file, check the file information displayed in Nuendo (e.g. in the Import Video dialog or the Pool) prior to trying to import or playing back the file.

When this information reads "0x0 pixel", "0.000 s" and "0 Frames", the video file is either corrupt, or the format is not supported by the codecs available to the selected video playback engine. You will either have to change the video playback engine, or install the required codec.

⚠ Trying to import or play back a file not supported by the selected video player will lead to unpredictable results – if no information on the number of frames, the length and the pixel resolution is available (e.g. in the Import Video dialog), you cannot import/play this file properly with this particular video player.

⇨ As a general rule, Nuendo should be able to use a certain video file, if the native video player on your system (Windows Media Player on the PC or QuickTime Player on the Mac) can play this file.

⇨ You can expect most Windows hardware to work with DirectShow and DirectX Video.
On a Windows system, the DirectShow and DirectX Video players are provided by the operating system, you don't have to install any additional software. Make sure you are using the latest version of DirectX software available from the Microsoft web site.

⇨ For the QuickTime playback method to be available, you must have QuickTime 7.1 installed on your computer.
If you don't have QuickTime, or if a version lower than 7.1 is installed, QuickTime playback will not be available in Nuendo. There is a freeware version (a QuickTime installer is included on the Nuendo DVD if required, or you can download it from www.quicktime.com) and a "pro" version, which offers additional video cutting options. The player engine is the same in both versions, so for mere playback in Nuendo there is no need to purchase the "pro" version.

⚠ Under Mac OS X, there is only one standard player option. The QuickTime playback engine is always used, supporting the formats AVI, MPEG, QuickTime and DV. If your system has a FireWire port, there is also a FireWire option – see "Playing back a video file via FireWire (Mac OS X only)" on page 473.

Selecting the video playback engine (Windows only)

When using Nuendo on a Windows system, you can select the playback engine in the Device Setup dialog (Video Player page).

Which playback engine to select depends largely on which type of video system you are using, as well as on the file format and codec of the video files you want to work with.

- When you have changed the video playback engine, make sure to remove any previously imported video file from the Pool, and re-import it.

A note on editing

Nuendo allows you to cut, copy, paste and trim video events, i.e. your video track may contain more than one video event. Make sure that these video files are of the same file format and resolution in order for them to play properly.

⇨ Windows only: When using the DirectShow video playback engine, you may find that only the first event on the video track is played back correctly. In such a case make sure that the video track contains no more than one video event. When you need to edit your video files (i.e. cut, copy, paste or trim video events), it is therefore recommended to use the DirectX Video player.

⇨ Windows only: If you find that you are unable to edit a video file copied from a CD, this might be due to the fact that files copied from CD are write-protected by default. Right-click the file, and deactivate the “Read-Only” option in the File Properties dialog.

When you have a video file in a format not supported by Nuendo, use an external application to convert it to a format that Nuendo can import.

Operations

Importing a video file

Video files are imported in the same manner as audio files.

- By using the File menu (Import Video File).
- By using drag and drop from the Windows Explorer, the Mac OS Finder, the Pool or the Media Bay.
- By importing to the Pool first and then dragging to the Project window (see the chapter “The Pool” on page 296 for details).

Note:

- To be able to play back the video, you must add a video track (by using the Add Track submenu on the Project menu or Quick menu). You can only have one video track in each project.
- You can have multiple video files on the track but all files must be of the same size and compression format.
- You may trim video files in the project window as needed, adjusting the event boundaries as you would for an audio event.
- The Import dialog has an option for extracting the audio from a video file (see “Extracting audio from a video file” on page 472) and for generating a thumbnail cache file for the video file, see below.

Video import preferences

In the Preferences dialog (Editing–Video page), there are two options that affect the import of video files:

- Extract Audio on Import Video File

When this is activated, the audio will automatically be extracted and imported into the project when you import a video file. This way, the audio will also be included when you insert a video e.g. by using drag and drop. When you import video files by using the File menu, you can activate this option separately for each imported video file on the Import dialog.

- Generate Thumbnail Cache on Import Video File

When this is activated, a thumbnail cache file will be created automatically when you import a video file. This is handy, as a cache file will also be created when you import a video file using drag and drop. When you import video files by using the File menu, you can activate this option separately for each imported video file on the Import dialog, see below.

About Thumbnail Cache files

⇨ To display video thumbnails in the Project window, the option “Show Video Thumbnails” has to be activated in the Preferences dialog (Event Display–Video page).

When working with video in Nuendo, video files are displayed as events/clips on the video track with thumbnails representing the frames in the film. These are calculated in real time, i.e. they have to be redrawn during scrolling or moving. As this consumes quite a lot of processor power, reaction sometimes may be sluggish. To remedy this, you can generate a thumbnail cache file.

The cache file is used in situations where the processor load is very high and the correct redrawing or real-time calculation might use system resources necessary for editing or processing. When the cache file is used and you zoom in on the thumbnails, you will see that they are in a lower resolution, i.e. the pictures are not as clean as when they are calculated. When the processes that rely heavily on the computer CPU are finished, the frames will be automatically recalculated, i.e. the program automatically switches between real-time calculation of the pictures and using the cache file.

The generated thumbnail cache file will be stored in the same folder as the video file and will get the name of the file with the suffix “.videocache”.

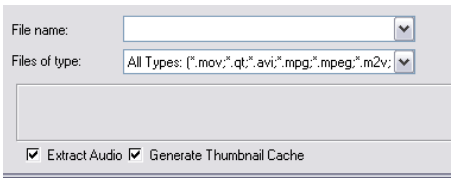
Generating thumbnail cache files during video import

Thumbnail cache files can be created when a video file is imported into the project.

Proceed as follows:

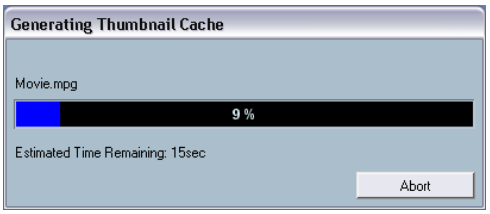
1. On the File menu, open the Import submenu and select “Import Video File…”.
A file dialog is opened.

2. Locate and select the desired video file, activate “Generate Thumbnail Cache” in the lower part of the dialog and klick “Open”.



The Generate Thumbnail Cache option in the Import Video dialog.

A window will be displayed, showing you the progress and the estimated time for the process.



The thumbnail cache file is created.

After the cache file is created, the window will be closed and the video clip is inserted as usual. When you now start video playback and perform processor consuming operations, the thumbnail file is used to display the video frames in the Project window. When enough processor power is available, the “real” calculated thumbnail frames are displayed again.

⇨ To automatically create thumbnail cache files for all imported video files, activate “Generate Thumbnail Cache on Import Video File” in the Preferences dialog (Editing–Video page).

Generating thumbnail cache files from within the Pool

When you have video files without thumbnail cache files (e.g. if you did not create a thumbnail cache file during import or if you are working with an older project), you always have the possibility to generate the thumbnail cache file at a later stage. This is done from within the Pool.

Proceed as follows:

1. Open the Pool window and locate the video file you want to create a thumbnail cache file for.

2. Right-click on the file to open the context menu and select “Generate Thumbnail Cache”, or select “Generate Thumbnail Cache” from the Media menu.
Just as when creating the file during import, the status window opens (see above).

After the file is created, the window will be closed and the thumbnail cache file is used when necessary, i.e. under high load.

⚠ Please note that the cache file will not be automatically updated if a video file is edited. Whenever you change a video file (e.g. in a video editing application), you need to create a new thumbnail cache file manually, as described above. (To refresh the "real" thumbnails of an edited video file, resize the video track so that they are calculated again.)

Adopting the Video Frame rate

When using video files within Nuendo, it is important to set the project's frame rate to that of the imported video. This ensures that the time displayed in the SMPTE readout of Nuendo corresponds to the actual frames in the video.

1. Pull down the Project menu and select "Project Setup…" (or press [Shift]+S) to open the Project Setup dialog.

2. If a video file has been placed on a video track in the Project window, a button now appears in the frame rate section of the Project Setup dialog called "Get From Video." This will automatically detect the frame rate of the video file and apply that setting to the project.

⚠ The frame rate setting will change to that of the video file and the project start time will be altered to reflect the change in frame rate if needed. For example, when switching the project frame rate from 30fps to 29.97fps, the start time will be changed so that all the events currently in the project will remain at the same positions in relation to realtime. If you want the project start time to remain the same, you must manually change it back after clicking the "Get From Video" button.

Extracting audio from a video file

If a video file contains audio, it can be extracted. Regardless of the audio format in the actual file, the imported audio file will always be in the format (Sample Rate and Record Format) that is specified for the Project in the Project Setup dialog.

There are three ways to extract audio from a video file:

- By activating "Extract audio" in the Import Video dialog.

This will add the audio to the currently active audio track. The new audio event will start at the same time as the video event, so that they are in sync with each other.

- By using "Import Audio from Video File" from the File menu.

This is just as above, but no video clip is created, only an audio event (starting at the project cursor position on the selected track).

- By activating "Extract Audio on Import Video File" in the Preferences dialog (Editing–Video page).

This will automatically extract the corresponding audio from a video file during import. This is also true if you import files using drag and drop.

- By using Extract Audio from Video File on the Media menu.

This creates an audio clip in the Pool, but doesn't add any events to the Project window.

⚠ These functions are not available for mpeg video files.

Playing back a video file

Video files are displayed as events/clips on the video track, with thumbnails representing the frames in the film – if "Show Video Thumbnails" is activated in the Preferences dialog (Event Display–Video page).

A video event on a video track.

In the Track list and Inspector, you will find the following options:

Button	Description
Lock	When this is activated, the video event will be locked, see "Locking events" on page 50.
Show Frame Numbers	When this is activated, each thumbnail is shown with the corresponding video frame number.
Snap Thumbnails	When this is activated, the individual thumbnail images will be positioned exactly at their respective start time position. Also, no more than one thumbnail per frame will be shown, even if you zoom in a lot.
Mute Video	When this is activated, video playback will be stopped, but playback of any other events in the project will continue (to decrease the processor load). You may have to use the Track Controls Settings dialog to make this button visible in the Track list.

To view the video on the computer screen (as opposed to on an external monitor, see below), proceed as follows:

- Under Mac OS, first make sure that “Onscreen Window” is selected in the Video Output section in the Device Setup dialog (Video Player page).

- Pull down the Devices menu and select Video (or use a key command – by default [F8]).
A video window appears. In Stop mode, this displays the video frame at the project cursor position.

Playback of the video is performed together with all other audio and MIDI material, using the Transport panel.

Video quality in QuickTime

- When you are using QuickTime as video playback engine, you can activate high quality mode, by selecting “High Quality” on the Video window context menu, or by activating “Use high-quality video settings when available” in the Device Setup dialog–Video Player page (in the Video Properties section for QuickTime).
If the QuickTime video was recorded with the corresponding quality settings, this will make the video display sharper and smoother.
Note that this will also lead to increased processor load.

Setting the Window size

If you are playing back video in a window on your computer screen, you may want to adjust the size.

- For the QuickTime and DirectX player, you can drag the borders, just like resizing other windows.
You can also right-click in the video window to open the context menu and select one of the Size options.

- For the DirectShow video player (Windows), open the Device Setup dialog from the Devices menu, click Video Player in the Devices list and use the buttons in the Video Properties section to select a size.

Playing back video in full screen mode

When viewing video on the computer screen, you can choose to let the video occupy the whole screen during playback or in Stop mode:

- For DirectShow video, right-click in the video window to switch to full screen. Right-click again to exit full screen.

- For DirectX and QuickTime, right-click in the Video window to open the context menu and select “Full Screen Mode”. Right-click again or press [Esc] on your computer keyboard to exit full screen mode.

Disabling Video Playback

In the Track list and Inspector of a video track, there is a Mute button. (Note that this can be hidden for the Track list, see “Customizing track controls” on page 507.) When you mute a video track, the video will not play and the CPU resources it used will be freed up for other purposes. When performing complex editing tasks that do not require watching the video, temporarily muting the video track can help speed up performance of Nuendo by reducing the strain on the CPU.

Playing back a video file via FireWire (Mac OS X only)

For Apple computers equipped with a FireWire port, you can easily use this to connect to external video hardware, as OS X has built-in video support for the most common formats (NTSC/PAL/DVCPRO). FireWire is capable of high data-transfer speed and is the most common standard for communicating with video-related peripheral equipment.

- To play back a video file via hardware connected to the FireWire port, select “FireWire” on the Outputs pop-up menu of the Device Setup dialog (Video Player page).
When FireWire is selected as output, a number of format options appear on the Format pop-up, allowing you to select between various video formats and resolutions.

- Adjust the Frame Offset value to compensate for DV processing delays in the external device.
Due to delays while processing DV video through the FireWire port, the video image will be behind or later than the corresponding audio in Nuendo. By using the Frame Offset parameter, you can compensate for this effect. Each hardware setup could have different processing delays so you must experiment to determine what value is appropriate. Usually, 7 frames is a good starting point. All values for the frame offset are positive and indicate how many frames the video will be delivered earlier in order to compensate for the processing time.

⇨ Note that there is a difference in the frame offset in stop versus playback. The frame offset is defeated in stop and scrub modes so that you can see the correct frame of video since the processing delays are not an issue in these modes. It is only used during playback when processing delays are noticeable.

Playing back a video file using graphics cards (Windows only)

Multi-head graphics cards which support overlay functionality can be used to display the video picture on an external TV or computer monitor in full screen mode. As of this writing, the manufacturers nVIDIA and Matrox have working solutions available. Check the card's documentation for information on how it handles video output and how to set it up for multi-monitor display.

Playing back a video file using video cards

Video cards can also be used to display the video on an external TV or computer monitor. As of this writing, e.g. the "Decklink" card (Blackmagic) can be used. For further information, check the documentation of the video card.

Video playback preferences

In the Preferences dialog (Event Display–Video page), there are two options for video playback:

- Show Video Thumbnails.
When this is activated, thumbnail frames of the video contents are shown in the track.

- Video Cache Size.
This determines how much memory is available for video thumbnails. If you have long video clips and/or work with a large zoom factor (so that many frames are shown in the thumbnails), you may have to raise this value.

Replacing the audio in a video file

Nuendo has a special function for replacing the audio in a video file:

1. Pull down the File menu and select "Replace Audio in Video File".

2. In the file dialog that appears, locate and select the video file on your hard disk, and click Open.
A new file dialog appears.

3. Locate and select the audio file that you want to insert into the video file, and click Open.
The audio is added to the video file, replacing its current audio track (if any).

- By combining the functions "Extract Audio", "Export Audio Mixdown" and "Replace Audio in Video File", you can create a complete audio track for a video file.

Project window and Browser editing operations

Video clips are played back by events just as audio clips are. You can use all the basic editing operation on video events, just as with audio events. The following operations are not possible on the video track:

- Drawing, Gluing, Muting and Scrubbing.

- The video track has no editor and does not make use of parts.

Pool operations

For information about operations on video clips in the Pool, see the chapter "The Pool" on page 296.

The Edit Mode

Video playback follows the Nuendo transport, so that the video frame at the current project cursor position is shown, during playback and in Stop mode (e.g. if you move the project cursor manually or use fast forward/rewind). Nuendo has a special Edit Mode that makes use of this fact, allowing you to edit audio while getting continuous visual feedback on the video display:

- If you activate "Edit Mode" on the Transport menu, the project cursor will automatically follow when you make selections or perform editing operations (such as moving, resizing, adjusting fades, etc.).
Since the video automatically follows the project cursor, you will instantly get a visual feedback when you edit! This makes it very easy to e.g. move an audio event to a certain spot in the video.

- To avoid obscuring the view, the project cursor will be hidden from the event display in Stop mode if Edit Mode is activated.
However, it will still be shown in the ruler.

Listed below are three examples of how you can use Nuendo's Edit Mode for matching audio and MIDI to video.

Adjusting the position of the audio event

1. If required, set the snap point in the audio event so that it identifies a significant point in the audio recording.
This would be the position in the audio that you want to match to a certain position in the video. If you don't set the snap point, the start of the audio event will be used instead.

2. Activate Edit Mode on the Transport menu.

3. Select the audio event.
The project cursor position is automatically moved to the position of the snap point.

4. While watching the video display, move the audio event towards the correct position.
Since the project cursor automatically follows the snap point position and the video automatically follows the project cursor, you just need to move the event until the desired video frame is displayed!

Adjusting the length of the audio event

If you have a video section and an audio event for it, that doesn't quite fit, you can use time stretch to change the length of the audio:

1. Use the method described above to position the start of the audio event at the correct position according to the video.

2. In Edit Mode, select the Range Selection tool and double-click in the audio event.
This creates a selection range that spans the whole audio event.

3. Click the right edge of the selection range and drag to adjust it to the desired length.
While you are dragging, the project cursor position follows the right edge of the range, allowing you to pinpoint the desired end position in the video.

4. Use "Locators to Selection" (on the Transport menu) to set the locators to the selection range you just made.

5. With the Arrow tool, select the audio clip to be stretched.

6. On the Audio menu–Process submenu, select "Time Stretch".

7. Click the "Use Locators" button.
The time stretch ratio is set up so that the audio event will fit the locator range.

⚠ Make sure you don't exceed the 75% to 125% limit!

8. Make the desired settings and click Process.
The audio is stretched or compressed to fit the range.

Creating fades

If you want the audio to fade in, reaching full volume at a certain position in the video, and fade out at another position, here is a quick way of achieving this:

⚠ This assumes that the audio event is already positioned and sized correctly according to the video.

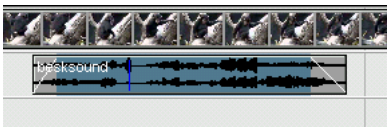
1. In Edit Mode, select the Range Selection tool.

2. Make a selection range in the audio event, roughly covering the section that should be played at full volume.

3. Click and drag the edges of the selection range so that they exactly correspond to the end of the fade-in and the start of the fade-out, respectively.
While you are dragging, the project cursor position follows the edge of the range, allowing you to pinpoint the desired fade-in and fade-out position in the video.

4. Pull down the Audio menu and select "Adjust Fades to Range".
The fade-in and fade-out handles of the audio events are automatically adjusted.

⇨ When using the Fades handles of an audio event in Edit Mode, the cursor will follow their position as well, allowing you to adjust fades to picture in this manner.



Working with film transfers

Frame rates

Since Nuendo has been created from the ground up as a total media production system, it must be capable of working with all different types of video and film frame rates.

Standard frame rates

There are several frame rate standards in use today. They are as follows:

- 23.98 frames per second (23.98 fps) used for cinema film to NTSC transfer.
- 24 frames per second (24 fps) used for cinema film cameras.
- 25 frames per second (25 fps) used for PAL/SECAM video signals.
- 29.97 frames per second (29.97 fps) used for NTSC video signals.
- 30 frames per second (30 fps) historically used for black and white NTSC video signals. This frame rate is often used in:
  1) Music recording as a reference for synchronizing audio recorders and MIDI sequencing devices.
  2) Most field recorders also use 30 fps SMPTE during film shoots at 24 fps so that after a 2-3 pull-down is performed for NTSC video transfer, the frame rate becomes 29.97 fps.

Film transfers

When working with film projects, video post-production editors typically transfer the film footage to video for use with computer video editing systems. Once the film has been edited, it can be transferred back to film for presentation in theaters or may remain in video format for television broadcast and release on videotape or DVD.

Pull-up and Pull-down

When film footage is transferred to video, the frame rate must be converted from 24 fps to either 25 fps (PAL/SECAM) or 29.97 fps (NTSC). This process introduces a slight speed change as a result of the mathematical relationships between the different frame rates.

The film to NTSC conversion is done as 2-3 pull-down and the film is running at 23.98 fps to maintain the exact 2-to-3 relationship. (Result: The film is running ~0.1% slower in NTSC TV.)

The audio recorded along with the film must also have these speed changes applied to it in order to remain in sync with the picture once it has been transferred to video. Sometimes the speed change is applied at the same time as the film transfer and is recorded directly on the videotape. This allows the video editor to hear the audio along with the transferred video while editing.

These speed changes also result in pitch changes. Other artifacts can also be added to the audio since direct digital transfers from the field recorder to the videotape are not possible since either sample rate conversion or an analog transfer must be used as a result of the speed change.

Most audio engineers therefore prefer to use the original source material when working with film audio. Once the original audio has been digitally transferred into Nuendo, the speed change must be compensated for in order to have the audio stay in sync with the video. Nuendo has the flexibility to apply these speed changes to either the audio or video independently to compensate for the speed change.

When a specific speed change has been applied to either audio or video, it is called a “pull-down” or “pull-up” depending on the direction of speed change. The specific amount and direction of speed change depends on the type of transfer the film underwent. Transfers to PAL/SECAM and NTSC each require a different speed change in order to keep the audio in sync. These speed changes arise during the Telecine process.

The Telecine process

A telecine machine is the device used to transfer film to videotape. It transfers images from each frame of film to frames of video in a very specific way. Having a clear understanding of this process will help alleviate the confusion surrounding pull-up and pull-down sample rates and keeping film audio in sync.

Film frames vs. video fields

One of the first things that needs to be understood is how video signals are formatted in general. Each frame or single image of a video signal is composed of two video "fields", each containing half of the image. The first field contains all the odd horizontal lines of resolution and the second field contains the even horizontal lines of the image. This is called "interlacing" and is needed to minimize the flicker effect that would result if the image was presented all at once.

Since the film frame is a single, complete image (like a 35mm photograph), there are no fields involved. The telecine machine must transfer part of the film image to one field and then the rest to another field of video. This may sound simple at first but as you will see, it can become quite complex.

Transferring film to PAL/SECAM video

Film transfers to PAL/SECAM video are relatively straightforward. Film runs at 24 fps and PAL video runs at 25 fps. If you speed up film by roughly 4% (or 4.16̄%, to be precise), it will be running at 25 fps. So, film transfers to PAL video result in a 4% "pull-up" in speed. The audio must also be pulled up by 4% in order to remain in sync with the video.

When properly done, the first frame of film will be transferred to both fields of the first frame of video and so on. All that is needed is the 4% increase in speed for this to be a one-to-one transfer.

⚠ The only downside to PAL transfers is that a 4% increase in the speed will result in a 4% increase in the pitch as well! This could affect the perception of a character's delivery of a line or the timbre of sound effects or musical tonalities. If the final project is to remain in the video format, pitch-correcting this anomaly might be desired.

If the project is going to be returning to film for the final presentation, the audio can be slowed back down to normal speed when transferring back to film in order to preserve the fidelity and performance values of the original material.

⚠ Transferring film to PAL/SECAM video requires a 4% pull-up in speed for both the picture and sound elements.

Transferring film to NTSC video

Transferring film at 24 fps to NTSC video at 29.97 fps presents a few more difficulties than the PAL transfer. Simply speeding up film to 29.97 fps would cause both the visual and audio elements to become too fast and high-pitched to be usable. There is no neat mathematical relationship between 24 fps and 29.97 fps. Another method was devised called the 2-3 Pull-down.

What is 2-3 Pull-down?

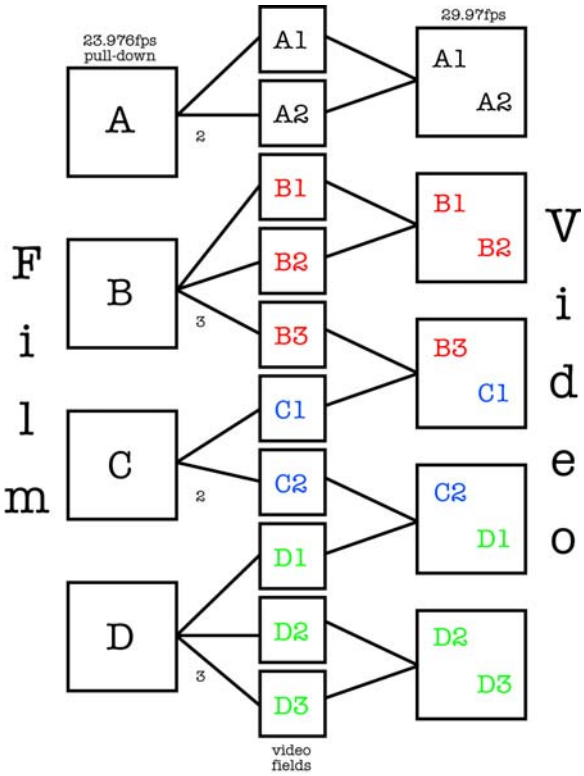
The 2-3 pull-down is a combination of speed change and frame-to-field-counting that results in a smooth transfer to NTSC video without any unwanted or noticeable pitch changes in the audio. Here are the steps involved during the process:

1. The film speed is slowed or "pulled" down to 23.976 fps (-0.1%).
At this speed there is a mathematical relationship between 23.976 and 29.97.

2. The first frame of film is transferred to the first two fields of video.

3. The second frame of film is transferred to three fields of video, the two fields of the second video frame and just the first field of the third video frame.
This is where the "2-3" part of the name comes from. Each alternating frame of film is transferred to two fields of video then three fields of video and so on.

4. The third film frame is transferred to the second field of video frame three and the first field of video frame four.



This is a block diagram of the 2-3 pull-down process. Notice that 4 frames of film are transferred to 5 frames of video using the 2-3 field technique.

5. The remaining film frames are transferred in this manner, alternating between 2 and 3 fields of video, until the end of the transfer.

After four frames of film have been transferred this way, an even five video frames will be created. Over the course of one second, 24 frames of film and 30 frames of video will have gone by. Since they are running at -0.1%, the actual frame rate is 29.97 video frames per second, the NTSC standard.

It is important to have a clear understanding of 2-3 pull-down in order to make accurate decisions regarding audio pull-down and video pull-up when working with NTSC film transfers in Nuendo. Film speed is faster than NTSC video speed.

When the audio is pulled down, it allows production audio (DAT tapes or files from a field recorder) from a film shoot to play in sync with NTSC video. Even though 29.97 fps is a faster frame rate than 24 fps (film speed), the video is running -0.1% slower than the original film due to the 2-3 transfer process and hence the need to slow the audio down a bit.

⚠ Many video editors working with NTSC video refer to 30 fps as “film speed” as opposed to 24 fps. The reason for this is if you speed NTSC video (29.97 fps) up by 0.1%, you are running at the same speed as the original film at 24 fps. Conversations regarding this can often get very confusing. Make sure you have a clear understanding of the material you are working with when dealing with film transfers and frame rates. It will avoid many mistakes and save time in the long run.

Compensating for film transfers to video

When working with film transfers to video, it is necessary to compensate for the change in speed that results from the telecine process. With Nuendo, there are two basic ways this can be done. The first is by adjusting the playback speed of the audio to match the speed of the video. The second is to adjust the speed of the video file to match the original speed of the film and production audio in Nuendo.

Adjusting audio playback speed

When adjusting audio playback speed to match the video, there are two scenarios based on the two video formats that film is transferred to, NTSC and PAL/SECAM. Since the telecine process for each video format results in different speed changes, there are two types of playback adjustments possible. For NTSC, the speed change is down -0.1%. For PAL/SECAM, the change is up +4.1667%.

Audio pull-down -0.1% (NTSC)

When working on a film project that has been transferred to NTSC video, most audio engineers prefer to use the original source tapes from the film shoot in order to retain the highest quality and fidelity. Audio that has been transferred to the videotape during the film transfer has suffered a generation loss and speed change.

Since the video is running -0.1% slower than the original film, the audio must also be slowed down by the same amount as the film in order to remain in sync.

To slow down audio playback in Nuendo, an external sample clock source will be needed to "pull" the clock speed down by 0.1%.

Your audio card must be set to external sync and connected to the clock device via Word Clock, VST System Link or some other clocking method for this to work.

Since the video and audio playback speeds are independent in Nuendo, the video will remain at the same speed while the audio is slowed down (pulled down). This will ensure that the production audio and film transfer will remain in sync.

You may receive an OMF, AES 31 or OpenTL file that contains audio from the original source tapes conformed to the edited video or you may have to record the source tapes into Nuendo yourself. Either way, you have audio in Nuendo that is edited to the picture but will not stay in sync with the video unless you pull down the sample rate.

⚠ When you are running at a non-standard sample rate (47.952 kHz = 48 kHz pull-down), digital transfers into Nuendo from external equipment must be made with the external equipment locked to the same sample clock as your audio card. Most devices are capable of a 0.1% change in sample rate and will function normally.

⚠ Any audio mixdowns that are exported from Nuendo when the sample clock is pulled down, will play back in other applications and devices faster since that sample clock will be running at the standard 48 kHz.

The idea is that when you have completed the audio mix for your film project, the video will be sped back up to film speed for the final transfer back to film and your audio mix can then be played at the standard 48 kHz sample rate (no pull-down) and will remain in sync with the picture.

Using this method preserves the quality of the original audio recording made during filming and allows for a digital mixdown transfer at film speed without any generation loss or sample rate conversion.

Audio Pull-up +4.1667% (PAL/SECAM)

Audio pull-up (+4.1667%) is the same concept applied to PAL/SECAM video transfers. Since the film is sped up by 4.1667% during transfer, audio in Nuendo must be running at +4.1667% speed in order to remain in sync with the video during editing and mixing.

In this case, the external clock must be set to +4% varispeed.

⚠ Devices such as the Rosendahl Nanosync are capable of varispeed and have presets for the 4.1667% necessary with PAL film transfers and the -0.1% for NTSC.

Once the project is complete, Nuendo's sample clock can be returned to normal (48 kHz) for the final mixdown at film speed. Once again, this allows for a digital transfer of the final master at the correct speed for theatrical presentation.

Non-standard audio pulls

It is also possible to use pulled sample rates that do not fit one of the above scenarios. These sample rates would only need to be used in exceptional circumstances when an error has occurred elsewhere in the process of making a film. These settings could be used to correct for sync errors made at another studio or problems with video editing systems. Just about anything is possible.

- -4% Pull-down

If a film project was transferred to PAL/SECAM video and the audio editing and mixing was performed at video speed (48 kHz) without using audio pull-up, the final mix would be running at video speed not film speed. In this case a -4% pull-down could be used to correct this and get the audio running at film speed again. The downside to this is that the final transfer to film would have to either be analog or through a sample rate converter in order to be recorded with the film.

- +0.1% Pull-up

This pull-up is not normally used except in situations similar to the one described above but for NTSC video. It could be used to correct the speed of a project finished at video speed (without pull-down) prior to transferring it to film. Since film is moving 0.1% faster than NTSC video, the audio mix could be sped up to film speed using +0.1% pull-up for the transfer.

- Other pull-up/pull-down options

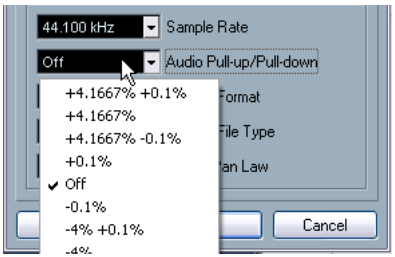
There may be other scenarios where non-standard pull-ups and pull-downs can be used to correct mistakes. Nuendo provides further pull-up/pull-down options for such situations in the Project Setup dialog and the respective section in the Project Synchronization dialog (see below).

⚠ All the examples used here are with 48 kHz as the standard sample rate for the film and video industry. However, it is possible to accomplish the same tasks using 44.1 kHz, 88.2 kHz, 96 kHz (this is double the standard sample rate and commonly used for higher fidelity), 176.4 kHz and 192 kHz, provided you have an external clock device capable of pulling these higher sample rates.

Timeline adjustments when using pull-ups or pull-downs

When the audio clock of your audio card is being slowed down or sped up from an external clock source, Nuendo has no idea that it is running slower or faster than normal. The time displays (minutes:seconds, timecode) will become inaccurate since they are based on a sample count, not the independent clock source.

Nuendo provides an adjustment of the timeline to compensate for these changes. This setting is found in the Project Setup dialog:



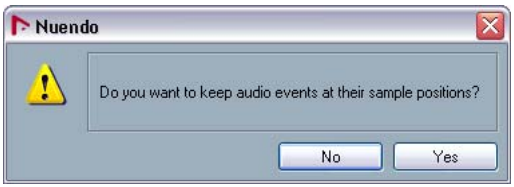
The Pull-up/Pull-down pop-up menu in the Project Setup dialog.

Whenever you apply an audio pull to Nuendo from an external clock, you should also set this menu to the appropriate choice. This allows Nuendo to recalculate the sample count to reflect the adjusted sample rate.

For example, if the setting is switched from no pull-down to -0.1% pull-down, events in the timeline will appear longer since the sample rate has been slowed down. The event display will show the accurate length of events relative to timecode, minutes and seconds. The project setup info line at the bottom of the Nuendo Track list will also indicate whether pull-up or pull-down is applied to this project.

Moving events

When you change the setting in the Pull-up/Pull-down pop-up menu and there are events already in the timeline, Nuendo prompts you to choose whether or not to keep the original sample start times or not.



- Selecting “No” allows events to follow the timecode and minutes:seconds clock change and remain at their SMPTE start times.
- Selecting “Yes” forces Nuendo to leave events at the same sample start time regardless of the clock speed change.

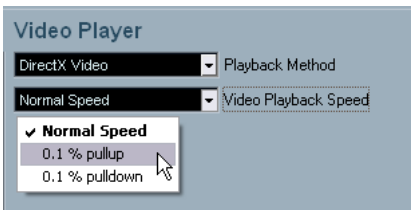
Video Pull-up and Pull-down

Nuendo also provides a method to adjust for film transfers by speeding up or slowing down playback of the video files in your project. Depending on the situation, it can be helpful to make the video file playback at film speed and not adjust the audio playback at all.

Adjusting the video playback speed back to film reverses the process used when adjusting audio playback speed. For NTSC video, the video playback speed must be adjusted up +0.1% back to film speed.

⚠ Nuendo does not offer a video pull-down for PAL/SECAM since the -4% speed change necessary exceeds the video player’s capacity for varispeed.

Altering the video playback speed is done in the Device Setup dialog (Video Player page). You have two options: 0.1% pull-up and 0.1% pull-down.



Video +0.1% pull-up for NTSC

Since NTSC video is running -0.1% slower than the original film, pulling the video speed back up by +0.1%, returns it to original film speed. With the video now running at the correct film speed, audio originally recorded at 48 kHz on the film shoot will remain in sync with the video. Additionally, the final mix can be digitally transferred back to film at 48 kHz without the need for an analog copy or sample rate conversion.

Video -0.1% pull-down (non-standard)

Pulling the video speed down for a NTSC video is a non-standard procedure and would not happen under normal circumstances. It is possible to pull down a video file that is running at 24 fps -0.1% so it matches with material running at NTSC video speed. The resulting frame rate is 23.976 fps.

⇨ Speeding up or slowing down the video speed is only possible if the video is running through a “computer graphics card”. If a professional genlocked video card is used, the video playback speed is derived from the genlock input.

What is 23.976 fps used for?

The world of digital video formats is ever changing and the results are new developments for every media professional involved in movies, television, corporate video and more. With the advent of HD cameras that are capable of recording at several different frame rates internally, the options available to cinematographers have become staggering.

Since the look of film running at 24 fps is unique, many HD productions are filmed at 24 fps to mimic the look of film on video. Since the speed change from 24 fps to 29.97 fps NTSC is such an odd one (requiring the 0.1% pull-down), designers of these cameras have developed a method of recording that allows the camera to record like film but also output a NTSC video signal at the same time without any speed change. They record at 23.976 fps which translates to 24 fps pulled down -0.1%.

⇨ Many of the high-end professional HD cameras allow you to record at 23.976 fps, 25 fps, 29.97 fps, 30 fps, 59.94 and even 60 fps.

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ReWire

Introduction

ReWire and ReWire2 are special protocols for streaming audio between two computer applications. Developed by Propellerhead Software and Steinberg, ReWire provides the following possibilities and features:

- Real-time streaming of up to 64 separate audio channels (256 with ReWire2), at full bandwidth, from the "synthesizer application" into the "mixer application".
  In this case, the "mixer application" is of course Nuendo. An example of a "synthesizer application" is Propellerhead Software's Reason.
- Automatic, sample accurate synchronization between the audio in the two programs.
- The possibility to have the two programs share one audio card and take advantage of multiple outputs on that card.
- Linked transport controls that allow you to play, rewind, etc., either from Nuendo or from the synthesizer application (provided it has some kind of transport functionality).
- Automatic audio mixing functions of separate channels as required.
  In the case of Reason, for example, this allows you to have separate mixer channels for the different devices.
- Additionally, ReWire2 offers the possibility to route MIDI tracks in Nuendo to the other application, for full MIDI control.
  For each ReWire2 compatible device, a number of extra MIDI outputs will be made available in Nuendo. In the case of Reason, this allows you to route different MIDI tracks in Nuendo to different devices in Reason, having Nuendo serve as main MIDI sequencer.
- The overall load on your system is much reduced, compared to when using the programs together in the conventional way.

Launching and quitting

When using ReWire, the order in which you launch and quit the two programs is very important:

Launching for normal use with ReWire

1. First launch Nuendo.
2. Enable one or several ReWire channels in the ReWire Device dialog for the other application.
   This is described in detail in the section "Activating ReWire channels" on page 484.
3. Launch the other application.
   It may take slightly longer for the application to start when you are using ReWire.

Quitting a ReWire session

When you are finished, you also need to quit the applications in a special order:

1. First quit the synthesizer application.
2. Then quit Nuendo.

Launching both programs without using ReWire

We cannot think of any scenario, in which you would need to run Nuendo and the synthesizer application simultaneously on the same computer, without using ReWire, but you can:

1. First launch the synthesizer application.
2. Then launch Nuendo.

⇨ Please note that the two programs now compete for system resources such as audio cards, just as when running either with other, non-ReWire audio applications.

Activating ReWire channels

ReWire supports streaming of up to 64 separate audio channels, while ReWire2 supports 256 channels. The exact number of available ReWire channels depends on the synthesizer application. Using the ReWire Device panels in Nuendo, you can specify which of the available channels you want to use:

1. Pull down the Devices menu and select the menu item with the name of the ReWire application. All recognized ReWire compatible applications will be available on the menu.
The ReWire panel appears. This consists of a number of rows, one for each available ReWire channel.

The ReWire panel for Reason.

2. Click on the power buttons to the left to activate/deactivate the desired channels.
The buttons light up to indicate activated channels. Please note that the more ReWire channels you activate, the more processing power is required.

- For information about exactly what signal is carried on each channel, see the documentation of the synthesizer application.

3. If desired, double-click on the labels in the right column, and type in another name.
These labels will be used in the Nuendo mixer to identify the ReWire channels.

Using the transport and tempo controls

⚠ This is only relevant if the synthesizer application has some sort of built-in sequencer or similar.

Basic transport controls

When you run ReWire, the transports in the two programs are completely linked. It doesn't matter in which program you Play, Stop, Fast Forward or Rewind. However, recording (if applicable) is still completely separate in the two applications.

Loop settings

If there is a loop or cycle facility in the synthesizer application, that loop will be completely linked to the cycle in Nuendo. This means that you can move the start and end point for the loop or turn the loop on or off in either program, and this will be reflected in the other.

Tempo settings

As far as tempo goes, Nuendo is always the master. This means that both programs will run in the tempo set in Nuendo.

However, if you are not using the Tempo track in Nuendo, you can adjust the tempo in either program, and this will immediately be reflected in the other.

⚠ If you are using the Tempo track in Nuendo (i.e. the Tempo button is activated on the Transport panel), you should not adjust the tempo in the synthesizer application, since a tempo request from ReWire will automatically deactivate the Tempo track in Nuendo!

How the ReWire channels are handled in Nuendo

When you activate ReWire channels in the ReWire Device panels, they will become available as channel strips in the mixer. The ReWire channel strips have the following properties:

- ReWire channels appear to the right of the other audio and MIDI channel strips in the mixer.
- ReWire channels may be any combination of mono and stereo, depending on the synthesizer application.
- ReWire channels have the same functionality as regular audio channels.

  This means you can set volume and pan, add EQ, insert effects and sends and route the channel outputs to groups or busses (done in the Inspector. However, ReWire channels have no monitor buttons.
- All ReWire channel settings can be automated using the Read/Write buttons.

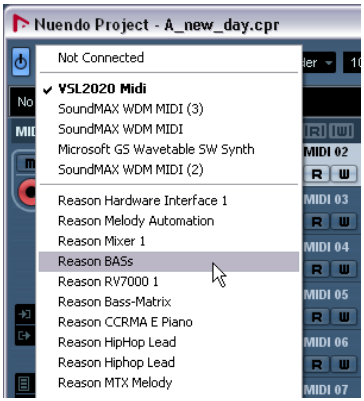
  When you write automation, channel automation tracks will automatically appear in the Project window. This allows you to view and edit the automation graphically, just as with VST Instrument channels, etc.
- You can mix down the audio from ReWire channels to a file on your hard disk with the Export Audio Mixdown function (see "Mixing down to an audio file" on page 438).

  You can export the output bus to which you have routed the ReWire channels. You can also export individual ReWire channels directly – "rendering" each ReWire channel to a separate audio file.

Routing MIDI via ReWire2

⚠ This feature is only available with ReWire2-compatible applications.

When using Nuendo with a ReWire2-compatible application, additional MIDI outputs will automatically appear on the MIDI Output pop-up menus for MIDI tracks. This allows you to play the synthesizer application via MIDI from Nuendo, using it as one or several separate MIDI sound sources.



The MIDI outputs for a Reason song. Here, each output goes directly to a device in the Reason rack.

- The number and configuration of MIDI outputs depends on the synthesizer application.

Considerations and limitations

Sample rates

Synthesizer applications may be limited to audio playback in certain sample rates. If Nuendo is set to a sample rate other than those, the synthesizer application will play back at the wrong pitch. Consult the documentation of the synthesizer application for details.

ASIO drivers

ReWire works well with ASIO drivers. By using the Nuendo bus system you can route sounds from the synthesizer application to various outputs on an ASIO compatible audio card.

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File handling

Working with Projects

New Project

The New Project command on the File menu allows you to create a new project, either empty or based on a template:

1. Select New Project from the File menu.
By default, this list is empty. How to create templates is described in the section (see "Save as Template" on page 488).

2. Select "Empty".
A file dialog opens, allowing you to specify a folder for the new project.

3. Select an existing project folder or click on Create and enter a name for a new one in the dialog that opens.
A new, untitled project is created.

Open

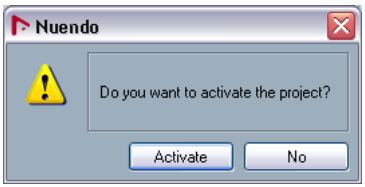
The Open command on the File menu is used for opening saved project files. Project files created with Nuendo (file extension ".npr"), Cubase (file extension ".cpr") and Sequel (extension ".steinberg-project") can be opened. Note that program-specific settings which cannot be applied in Nuendo will be ignored.

1. Select Open… from the File menu.
A file dialog opens, allowing you to select a project.

2. Click Open.
The project opens in the Project window.

- Several projects can be open at the same time.
This is extremely useful, if you want to copy parts or entire sections from one project to another.

3. If a project is already opened, opening another project brings up a warning.



- Click "No" to open the other project inactive.
This significantly reduces load times, especially for large projects.

- Click "Activate" to open and activate the new project.
The active project is indicated by the blue Activate button in the upper left corner of the Project window. To make another project active, simply click its Activate button.

An active project.

- You can also open project files by selecting an entry from the "Recent Projects" submenu on the File menu.
This submenu lists the projects you have recently worked with, with the most recent one at the top of the list.

- Projects can also automatically be opened when you launch Nuendo (see "Startup Options" on page 489).

- You can drag projects from the MediaBay into the Nuendo application window (not into an existing Project window) to open them.

About the "Pending Connections" dialogs

If you open a Nuendo project created on another setup (other audio hardware), the program tries to find matching audio inputs and outputs for the i/o busses (this is one of the reasons why you should use descriptive, generic names for your input and output ports – see "Preparations" on page 12).

If the program cannot resolve all audio/MIDI inputs and outputs used in the project, a Pending Connections dialog will open. This will allow you to manually re-route any ports specified in the project to ports available in your system.

Close

The Close command on the File menu closes the active window. If a Project window is active, selecting Close will close the corresponding project.

- If the project contains unsaved changes, you will be asked whether you want to save the project before closing it.
If you select "Don't Save" and have recorded or created new audio files since saving, you get the choice to delete or keep these.

Save and Save As

The commands Save and Save As allow you to save the active project as a project file (file extension ".npr"). The Save command stores the project under its current name and location, while Save As allows you to rename and/or relocate the file. If a project has not been saved yet or if it hasn't been changed since it was last saved, only Save As will be available.

⚠ Generally, we recommend that you save project files in their project folders, to keep the projects as manageable as possible.

A word about file extensions

Under Windows, file types are indicated by three letter file name extensions (such as *.npr for Nuendo project files).

Under Mac OS X, it is not necessary to use file name extensions, since the file types are stored internally in the files. However, if you want your Nuendo projects to be compatible with both platforms, you should make sure the option "Use File Extension in File Dialog" is activated in the Preferences (General page). When this is activated (default), the proper file name extension is automatically added when you save a file.

Save New Version

This function is only available as a key command, by default [Ctrl]/[Command]+[Alt]/[Option]+[S]. When you use this function, a new version of the project will be saved.

The new file will get the same name as the original project, but with an incremental number attached. For example, if your project is called "My Project", you will get new versions called "My Project-01", "My Project-02", and so on.

Save New Version is useful if you are experimenting with edits and arrangements and want to be able to go back to a previous version at any time. The newest versions are always listed on the Recent Projects submenu on the File menu for instant access.

Save as Template

This function allows you to save the current project as a template. When you create a new project, the available templates will be listed, allowing you to base the new project on a template.

Proceed as follows:

1. Set up a project.
2. Select "Save As Template…" from the File menu and save the project template under the desired name.

- Templates can contain clips and events just like regular projects.
  If this is not what you want, make sure to remove all clips from the Pool before you save the project as template.

Templates are always stored in the Templates folder.

On a Windows system, it is located at \Documents and Settings\<username>\Application data\Steinberg\Nuendo 4\templates. On a Mac system, it is located inside Users/<username>/Library/Preferences/Nuendo 4.

Setting up a default template

If you always want the same default project to open when you launch Nuendo, you can save a default template. Proceed as follows:

1. Set up a project.
2. Select "Save As Template…" from the File menu and save the project template with the name "default".
3. Open the Preferences dialog and select the General page.
4. Open the "On Startup" pop-up and select "Open 'Default' Template".

The next time you launch Nuendo, the default template will automatically be opened. For details on the other Startup options, see "Startup Options" on page 489.

Save Project to New Folder

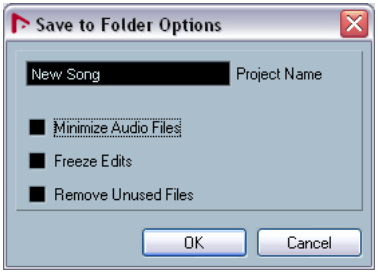
This function is very useful if you want to move or archive your project.

1. Select “Save Project to New Folder”.

A file dialog opens in which you can choose an existing, empty folder or create a new folder to save the project.

2. Click OK to confirm your choice.

The “Save to Folder Options” dialog opens with the following options:



Option	Description
Project Name	Enter a project name if you want to change it from the default (the current name of the project).
Minimize Audio Files	If this is activated, only the audio file portions that are actually used in the project will be included. This can significantly reduce the size of the project folder (if you are using small sections of large files), but it also means you cannot use other portions of the audio files if you continue working with the project in its new folder.
Freeze Edits	This will perform a Freeze Edits operation, making all processing and applied effects permanent to each clip in the Pool, see “Freeze Edits” on page 253.
Remove Unused Files	When this is activated, only files in the Pool that are actually used in the project will be stored in the new folder.

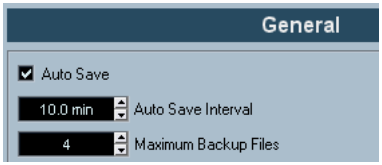
3. Make the desired settings.

4. Click OK.

The project is saved in the new folder. The original project is not affected. However, now you could e.g. delete the original project without losing your project data.

Startup Options

Auto Save



If you activate the Auto Save option in the Preferences (General page), Nuendo will automatically save backup copies of all open projects with unsaved changes.

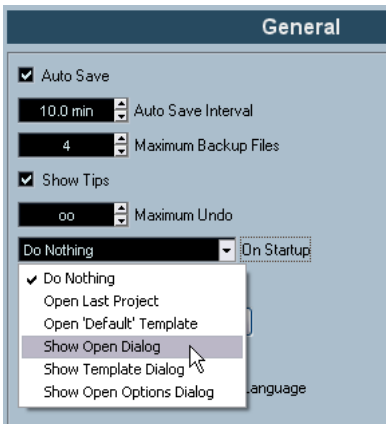
Backup copies of projects are named “<project name>-xx.bak”, where xx is an incremental number. Unsaved projects are backed up in a similar way as “UntitledX-xx.bak”, with X being the incremental number for unsaved projects. All backup files are saved in the project folder.

- Use the “Auto Save Interval” setting to specify the time intervals in which a backup copy will be created.
- Use the “Maximum Backup Files” option to specify how many backup files will be created with the Auto Save function.

When the maximum number of backup files is reached, the existing files will be overwritten (starting with the oldest file).

On Startup

The “On Startup” pop-up menu in the Preferences (General page) allows you to specify what should happen each time you launch Nuendo.



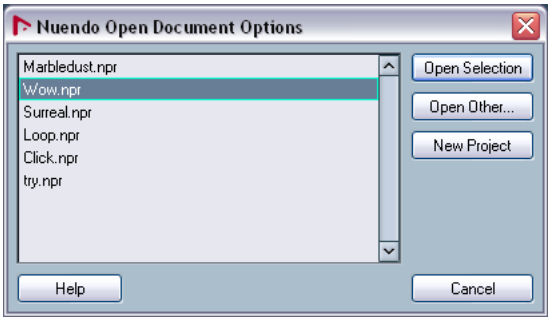
The following options are available:

Option	Description
Do Nothing	Nuendo launches without opening a project.
Open Last Project	The last saved project is opened on launch.
Open 'Default' Template	The default template is opened, see "Setting up a default template" on page 488.
Show Open Dialog	The Open dialog opens on launch, allowing you to manually locate and open the desired project.
Show Template Dialog	The Template dialog opens on launch, allowing you to create a new project from one of the templates.
Show Open Options Dialog	The Open Document Options dialog opens on launch, see below. It allows you to make a different choice each time you launch Nuendo.

Nuendo Open Document Options Dialog

This dialog will open in two cases:

- If you launch Nuendo with the option "Show Open Options Dialog" selected on the "On Startup" pop-up menu in the Preferences (General page).
- If you hold down [Ctrl]/[Command] while launching Nuendo.



The Open Document Options Dialog.

The dialog lists your recently used projects.

- To open a project, select it and click the "Open Selection" button.
- To open another project not listed here, click the "Open Other…" button.

A file dialog opens that allows you to look for the desired file on your disk.

- To create a new project, click the "New Project" button.

Working with libraries

A library is a stand-alone Pool that is not associated with a project file (for more information about Pools, see "The Pool" on page 296). You can use libraries to store sound effects, loops, video clips, etc., and transfer media from a library into a project by using drag and drop. The following library functions are available on the File menu:

New Library

Creates a new library. Just as when creating new projects, you will be asked to specify a project folder for the new library (in which media files will be stored). The library will show up as a separate Pool window in Nuendo.

Open Library

Opens a file dialog for opening a saved library file.

Save Library

Opens a file dialog for saving the library file (file extension ".npl").

Revert

If you select "Revert" from the File menu, you will be asked whether you really want to revert to the last saved version of the project. If you click "Revert", all changes you have made since saving will be discarded.

If you have recorded or created new audio files since saving, you will be asked whether you want to delete or keep these.

Importing audio

⇨ For exporting Audio, see the chapter “Export Audio Mixdown” on page 437.

⇨ For the option “Replace Audio in Video File”, see “Replacing the audio in a video file” on page 474.

Importing audio files

For information on audio file import preferences, please see “Audio file import options” on page 41. For information on import into the Pool and import options, see “Import Medium…” on page 306.

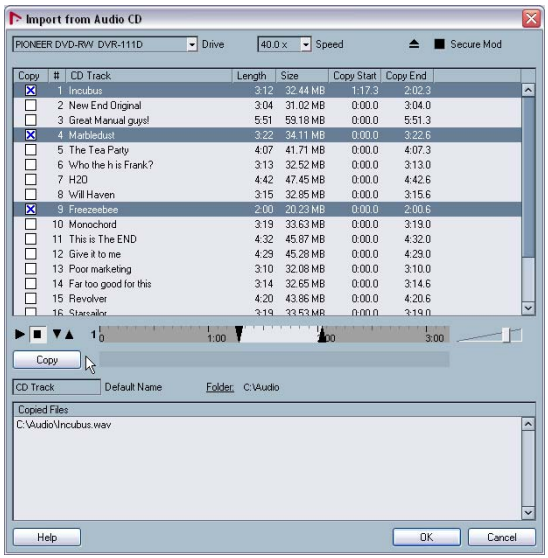
Importing audio CD tracks

You can import audio from audio CDs into Nuendo projects in two ways:

- To import the CD tracks directly into project tracks, choose the “Audio CD…” option from the Import submenu on the File menu.
  The imported audio CD track(s) will be inserted on the selected audio track(s) at the project cursor position.

- To import the CD tracks into the Pool, select “Import Audio CD” from the Media menu.
  This might be the preferred method if you want to import several CD tracks in one go. For more information, see “Importing audio CD tracks” on page 308.

Selecting one of the Import Audio CD menu items brings up the following dialog:



To import one or more tracks, proceed as follows:

1. If you have more than one CD drive, select the correct one from the Drives pop-up menu top left.
   On opening the CD, the program tries to retrieve the track names from CDDB (a CD database). If no connection to CDDB can be established or the CD track names are not found, you can manually change the generic track name in the Default Name field, see below.

2. Activate the “Secure Mode” option, if you want to use a Secure Read mode.
   Activate this if you encounter problems when trying to import an audio CD. Error checking and correction will be done during the process. Note that this mode will take more time.

3. In the Windows version, select the data transfer speed from the Speed pop-up menu.
   While you normally want to use the fastest possible speed, you may have to select a slower speed for flawless audio extraction.

4. Activate the Copy checkbox for every audio file you want to import.
   You can also select a copy section for every file, see below.

5. Click on Copy to generate a local copy of the audio file(s) or section(s).

The copied files are listed at the bottom of the dialog. By default, imported audio CD tracks will be stored as Wave files (Windows) or AIFF files (Mac) in the Audio folder of the current project. To change the folder, click Folder and select another one from the dialog. During copying, the button is labeled "Stop"; click it to stop the process.

6. Click OK to import the copied audio files into the project, or click Cancel to stop the import and discard the copied files.

- If you import more than one audio file into project tracks, a dialog opens in which you have to choose whether to insert the tracks on one track or on different ones.

The new track(s) are displayed in the Project window. New audio clips are created and added to the Pool.

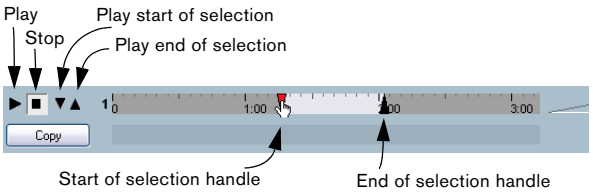
The columns in the "Import from Audio CD" dialog have the following functionality:

Column	Description
Copy	Activate the checkbox in this column for the track you want to copy/import. To activate more than one checkbox, click and drag over the checkboxes (or press [Ctrl]/[Command] or [Shift] and click).
#	Number of track.
CD Track	When you import an audio CD track, the file will be named according to the name in this column. The names are pulled automatically from CDDB, if possible. You can rename a track by clicking in the Track column and typing a new name. You can also apply a generic name to all audio CD tracks, if no name was available in CDDB.
Length	The length of the audio CD track in minutes and seconds.
Size	The file size of the audio CD track in MegaBytes.
Copy Start	You can copy a section of a track if you like. This indicates the start of the section to be copied in the track. By default, this is set to the start of the track (0.000) but you can adjust this on the copy selection ruler (see below).
Copy End	Indicates the end of the section to be copied in the track. By default, this is set to the end of the track but you can adjust this on the copy selection ruler (see below).

By default, the complete tracks are selected.

- If you want to copy and import a section of an audio CD track only, select the track in the list and specify the start and end of the selection to be copied by dragging the handles in the copy selection ruler.

Use the start and end audition buttons to fine tune the selection boundaries.



⇨ Note that you can import sections of several audio CD tracks by selecting them in turn and adjusting the selection. The start and end settings for each track will be displayed in the list.

- You can audition the selected audio CD track by clicking the Play button.

The track will be played back from selection start to selection end (or until you click the Stop button).

- The arrow up/down buttons allow you to audition the start and end of the selection only.

The arrow down button will play a short snippet beginning at the start of the selection, while the arrow up button will play a snippet starting just before the end of the selection.

- In case no connection to CDDB could be established or no CD track names were found, you can change the generic audio file name in the Default Name field.

The imported audio files be will be named accordingly, i.e. <default name> 01 etc.

⇨ Note that if there is a track name for a specific audio CD track in the list, the corresponding audio file will use that name instead.

- To open the CD drive, click on the Eject button at the top of the dialog.

Importing Audio from Video files

While you can automatically extract the audio when importing a video file (see "Extracting audio from a video file" on page 472), it is also possible to import the audio from a video file without importing the video itself:

1. Pull down the File menu and select "Audio from Video File…" from the Import submenu.

2. In the file dialog that opens, locate and select the video file and click Open.
The audio in the selected video file is extracted and converted to a Wave file in the project's Audio folder.

- A new audio clip is created and added to the Pool. In the Project Window, an event referencing the audio file will be inserted on the selected track at the project Cursor position. If no track was selected, a new track will be created.
This works just like when importing regular audio files.

⇨ For importing video files, see "Importing a video file" on page 470.

Importing ReCycle files

ReCycle by Propellerhead Software is a program designed especially for working with sampled loops. By "slicing" a loop and making separate samples of each beat, ReCycle makes it possible to match the tempo of a loop and edit the loop as if it was built of individual sounds. Nuendo can import two file types created by ReCycle:

- REX files (export file format of the first versions of ReCycle, extension ".rex").
- REX 2 files (file format of ReCycle 2.0 and later, extension ".rx2").

Proceed as follows:

1. Select an audio track and move the project cursor to where you want the imported file to start.
You probably want to import REX files to tempo based audio tracks, since this will allow you to change the tempo later on (having the imported REX file automatically adjust).

2. Select "Audio File…" from the Import submenu on the File menu.

3. Select REX files or REX 2 files with the file type pop-up menu in the file dialog.

4. Locate and select the file and click Open.
The file is imported and automatically adjusted to the current Nuendo tempo.

Unlike a regular audio file, the imported REX file will consist of several events, one for each "slice" in the loop. The events will automatically be placed in an audio part on the selected track and positioned so that the original internal timing of the loop is preserved.

5. If you now open the part in the Audio Part Editor, you can edit each slice separately by muting, moving and resizing events, adding effects and processing, etc.
You can also adjust the tempo and have the REX file automatically follow (provided that its track is tempo based).

⇨ You can achieve similar results by using Nuendo's own loop slicing features, see "Working with hitpoints and slices" on page 278.

Importing compressed audio files

Nuendo can import (and export, see "Mixing down to an audio file" on page 438) several common audio compression formats. The procedure is the same as when importing any non-compressed audio file, with one important thing to note:

- When you import a compressed audio file, Nuendo will create a copy of the file and convert this to Wave format (Windows) or AIFF format (Mac OS X) before importing it. The original compressed file will not be used in the project.

The imported file will be placed in the designated project Audio folder.

⚠ The resulting Wave/AIFF file will be several times larger than the original compressed file.

The following file types are supported:

MPEG audio files

MPEG, which stands for Moving Picture Experts Group, is the name of a family of standards used for coding audio-visual information (e. g. movies, video, music) in a digital compressed format.

Nuendo can read two types of audio MPEG files: MPEG Layer 2 (*.mp2) and MPEG Layer 3 (*.mp3). Currently, mp3 is the most common of these formats, while the mp2 format is mostly used in broadcast applications.

Ogg Vorbis files

Ogg Vorbis is a relatively new format that is open and patent-free and offers very small audio files maintaining comparatively high audio quality. Ogg Vorbis files have the extension ".ogg".

Windows Media Audio files (Windows only)

Windows Media Audio is an audio format developed by Microsoft Inc. Due to advanced audio compression algorithms, Windows Media Audio files can be made very small, maintaining good audio quality. The files have the extension ".wma".

Exporting and importing OMF files

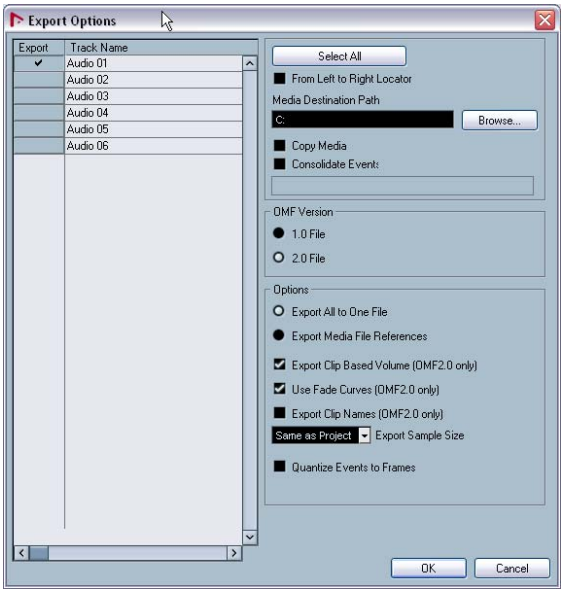
Open Media Framework Interchange (OMFI) is a platform independent file format intended for transfer of digital media between different applications. Nuendo can import and export OMF files (file extension ".omf"), allowing you to use Nuendo in conjunction with other audio and video applications.

Exporting OMF files

You can only export stereo files in OMF format.

1. Pull down the File menu and open the Export submenu.

2. On the submenu, select "OMF…".
The Export Options dialog opens:



3. Use the track list to the left to select which tracks should be included in the exported file.
To select all tracks, click the "Select All" button. Normally, the whole project is included – to export the range between the locators only, activate "From Left to Right Locator".

- When referencing media files (see below), you can set the referenced output path by entering it in the "Media Destination Path" field or by browsing the file dialog.
All file references will be set to this path. You can create references to media destinations that don't exist on the system you are currently working with, making it easy to prepare files for use in projects on another system or in a network environment.

4. If you want to create copies of all the media files, choose the "Copy Media" option.
By default, the copied audio files are placed in a sub-directory in the export destination folder. To specify a different location for the copied files, use the "Media Destination Path" field.

5. If you want to copy only the portions of audio files that are used in the project, select "Consolidate Events" option.
You can also define handle lengths in milliseconds to include audio outside each event boundary for fine tuning later. If you do not have any handles when consolidating audio files, you will not be able to adjust fades or edit points when the project is imported in another application.

6. Select "1.0 File" or "2.0 File", depending on which OMFI version is supported by the application in which you plan to import the file.

- Select whether you want to include all audio data in the OMF file (“Export All to One File”) or use references only (“Export Media File References”).
If you choose “Export All to One File”, the OMF file will be totally “self-contained”, but possibly very large. If you choose “Export Media File References”, the file will be small, but the referenced audio files must be available for the receiving application.

7. If you selected the “2.0 File” option above, you can choose whether to include the volume settings and fades for the events (as set up with the event volume and fade handles) as well as the clip names – to include these in the OMF file, activate “Export Clip Based Volume”, “Use Fade Curves” and/or “Export Clip Names”, respectively.

8. Specify a sample size (resolution) for the exported files (or use the current project settings).

9. If you activate “Quantize Events to Frames”, the event positions in the exported file will be moved to exact frames.

10. Click OK, and specify a name and location in the file dialog that opens.

The exported OMF file will contain (or reference) all audio files that are played in the project (including fade and edit files). It will not include unused audio files referenced in the Pool, or any MIDI data. Video files are not included.

Importing OMF files

1. Pull down the File menu and open the Import submenu.

2. On the submenu, select “OMF…”.

3. In the file dialog that opens, locate the OMF file and click Open.

- If there is already an open project, a dialog opens in which you can select whether a new project should be created for the file or not.
If you select “No”, the OMF file will be imported into the current project.

4. If you choose to create a new project, a file dialog opens in which you can select the project folder.
Select an existing project folder or create a new one by clicking on Create and entering a name in the dialog.

5. The Import options dialog opens, allowing you to choose a track for the import.
Activating the “Import all media” option allows you to import media that is not referenced by events.
Activating the “Import Clip Gain as Automation” option imports volume automation and envelopes of the Volume Automation Track of each track.

- If the OMF file contains Video Event information, you are asked whether you want to create Markers at the start position of the Video Events.
This allows you to manually import the video files, using the Markers as position references.

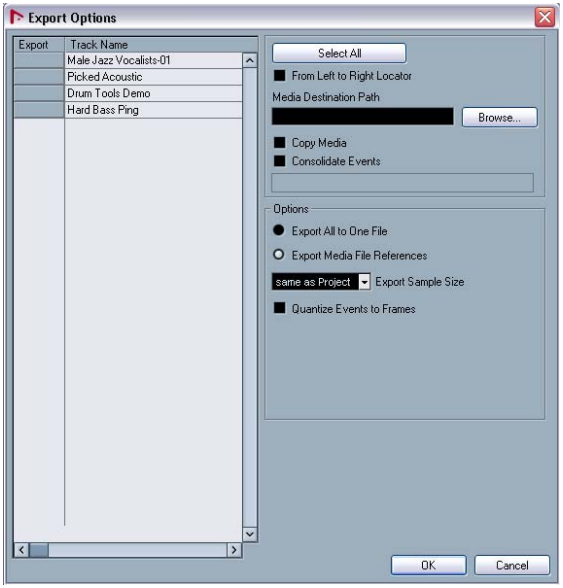
A new, untitled project is created (or tracks are added to the existing project), containing the Audio Events of the imported OMF file.

Exporting and importing AAF files

The Advanced Authoring Format (AAF) is a multimedia file format used to exchange digital media and meta data between different systems and applications across multiple platforms. Designed by the top media software companies, this format will help media creators by allowing them to exchange projects between applications without losing valuable meta data such as fades, automation and processing information.

Exporting AAF files

1. Select “AAF…” from the Export submenu on the File menu.



The Export Options dialog for AAF files.

2. You can choose which tracks will be exported from your project by clicking in the export column for each track name in the list.
A check mark will appear next to each track that will be exported. You may also click the "Select All" button to select every track in the project for export.

3. If you wish to only export the portion of project that is between the left and right locators, check the box marked "From Left to Right Locator."
If an event crosses over the left or right locator, it will be trimmed in the AAF file to the point of the locator. Only the portions of events that lie within the boundaries of the locators will be included in the exported file.

4. If you want to create copies of all the media files, choose the "Copy Media" option.
By default, the copied audio files are placed in a sub-directory in the export destination folder. To specify a different location for the copied files, use the Media Destination Path field.

5. If you want to copy only the portions of audio files that are used in the project, select the "Consolidate Events" option.
You can also define handle lengths in milliseconds to include audio outside each event boundary for fine-tuning later. If you do not have any handles when consolidating audio files, you will not be able to adjust fades or edit points when the project is imported in another application.

⇨ Even when selecting neither of the above two options, you can still enter a media destination path.
All file references will be set to this path. You can create references to media destinations that don't exist on the system you are currently working with, making it easy to prepare files for use in projects on another system or in an network environment.

6. In the Options section, you have the choice of exporting all data to one file or to create media references to files from within the AAF file.
Exporting only one file makes transfers simpler, but, at the time of writing of this manual, certain applications cannot handle single AAF files. Check with each software manufacturer for up-to-date information regarding AAF support in other applications.

7. You can specify the Sample Size by using the pop-up menu.
This defaults to keeping the same setting as the project.

8. You can quantize events to frame boundaries by activating the last option.
Quantizing events to frame boundaries is sometimes necessary when exporting projects to video workstations that limit the accuracy of edits to the frame. Any events that begin or end not on a frame boundary can exhibit odd behavior or be moved when imported into a workstation of this type.

Importing AAF files

1. Select "AAF…" from the Import submenu on the File menu.

2. Once you have selected a valid AAF file, Nuendo will ask you if you wish to create a new project. Choosing Yes will import tracks into a new project.

3. Select a directory or create one for the new project.
If you choose not to create a new project, the imported tracks will be added to the currently active project.

4. In the dialog that opens, select the tracks you wish to import by clicking in the Import column next to each track.
You can also click the Select All button to import all tracks in the AAF file.

5. Click OK.
The import process will begin. Depending on the size of the imported project and if the files are embedded or referenced, the import process may take a while.

Exporting and importing AES31 files

The AES31 standard is an open file interchange format, developed by the Audio Engineering Society as a means of overcoming format incompatibility issues between different audio hardware and software. It can be used for transferring projects via disk or network from one workstation to another, retaining time positions of events, fades, etc.

AES31 uses the widely used Microsoft FAT32 file system with Broadcast Wave as the default audio file format. This means that an AES31 file can be transferred to and used with any digital audio workstation that supports AES31, regardless of the type of hardware and software used, as long as the workstation can read the FAT32 file system and Broadcast Wave files (or regular wave files).

Exporting AES31 files

1. Select "AES31…" from the Export submenu on the File menu.

2. Select a name and location for the new file and click Save.
The exported file will contain all Audio Track data, including audio file references. If any of the audio events in your project has real-time fades (as set up with the fade handles for the events), these will automatically be converted to fade audio files and stored in a fades folder next to the AES31 file.

The following will not be included in the resulting AES file:

- Any mixer settings or automation made in Nuendo.
- MIDI Tracks.

The saved file will be an xml file (but with the extension ".adl", for audio decision list) – this means you can open it in any text editor to check file references etc.

Importing AES31 files

1. Select "AES31…" from the Import submenu on the File menu.

2. Navigate to the location of the AES31 file (extension ".adl"), select it and click Open.
You are prompted to select or create a project folder for the new project.

3. After specifying the name and location of the project folder, the new project opens containing all the audio tracks and events stored in the AES31 file.

Exporting and importing OpenTL files

OpenTL is a file exchange format originally developed for Tascam hard disk recording systems. OpenTL facilities also exist in a variety of DAWs, making Nuendo project transfer reliable and solid. For example, a common use of OpenTL is to convert hassle free between Nuendo and Pro Tools. If you import or export an OpenTL file to/from Nuendo, the resulting project will contain all audio files, edits, and track names made in the Tascam device or DAW, with all events positioned sample accurately on the time line.

OpenTL implementation in Tascam® MMR-8, MMP-16 and MX-2424

All three Tascam devices work with either two types of disk volume formats: FAT32 (Windows standard) or HFS+ (Mac OS standard). For proper Nuendo compatibility it is necessary that each and every MMR-8/MMP-16 be running OS v5.03 and MX-2424 v3.12. A number of crucial OpenTL updates only appear in these machine operating systems, and only this setup can assure reliable Nuendo exchange.

Audio file formats are volume type dependent: for FAT32 this is BWF (*.wav) and for HFS+ this is SDII. OpenTL files can only be transferred within file systems of the same format which means that it is not possible to import an OpenTL project exported from Mac (HFS+) into a Windows system (FAT32) or vice versa, unless you use a conversion utility (e.g. MM-EDL).

Nuendo for Windows supports OpenTL FAT32/BWF. Nuendo for Mac OS X supports OpenTL HFS+/SDII as well as FAT32/BWF. MMR-8, MMP-16, and MX-2424 support OpenTL projects sourcing or targeting Nuendo PC with up to 999 mono tracks.

Exporting OpenTL files

First, make sure all audio files (in the Pool) and tracks (in the Project window) in the project are in mono (split stereo tracks and stereo interleaved audio files to dual mono) and all 16-bit or all 24-bit. The OpenTL specification does not include support for 32-bit audio files. If the Pool contains 32-bit audio files, these will not be exported. Make sure all referenced audio files are located on the drive to which you want to export the OpenTL file.

⚠ When exporting OpenTL files on PC, do not change the DF or NDF frame notation after you have set the project start time. Make sure that all audio files in the Pool have the same sample rate, bit depth, and that all are set to Broadcast Wave file type.

1. Select "OpenTL…" from the Export submenu on the File menu.
In the dialog that opens, activate the "Copy Media" or the "Consolidate Events" option to guarantee that all audio is exported. Locate the target hotswap FAT32 disk, select the appropriate project folder and click Open.

2. Select a name and location for the new file and click Save.
The exported file will contain all audio track data, including file references, clip based volume automation, fade-in, fade-out, and crossfades.

3. Now you can mount the carrier in the Tascam device and load the project.

The following will not be included in the resulting OpenTL EDL file:

- Any real-time mixing, EQ, effects settings, breakpoint automation tracks
- MIDI tracks made in Nuendo

The following is a basic OpenTL specification description:

- Maximum number of mono tracks: 999
- Supported samplerates (Hz): 44056, 44100, 44144, 47952, 48000, 48048, 42294, 42336, 45938, 45983, 46034, 46080, 50000, 50050, 88200, 96000
- Bit depth: 16, 24
- Audio file types: BWF (Broadcast Wave format), WAVE (Standard Wave), SDII (Sound Designer II)
- Volume formats: FAT32, NTFS, HFS+
- Automation support: clip based volume, breakpoint volume and mute
- Fade support: fade in, fade out, and cross fade
- Frame rates (Fps): 24/24, 23.976/24, 24.975/25, 25/25, 29.97/DF, 29.97/NDF, 30/DF, 30/NDF

Importing OpenTL files

1. Select “OpenTL…” from the Import submenu on the File menu.

2. Navigate to the location of the OpenTL file, select it and click Open.

3. You are prompted to select or create a project folder for the new project.
After specifying the name and location of the project folder, the new project opens containing all the audio files stored in the OpenTL file and their associated edits. Save the imported file as a Nuendo project.

4. Open the Pool, and select “Prepare Archive…” from the Pool context menu.
This will copy any necessary external audio files into the local Nuendo project directory.

5. Select the Save option from the File menu.

Importing XSend projects from Liquid

For Liquid users, XSend provides a means to export a Liquid sequence directly to a Nuendo workstation either on the same machine, over a network or via portable media such as DVD-R.

The XSend options and features are available only if XSend is installed on your computer. You can either install XSend during the Nuendo installation process, or at a later point in time using the XSend installer supplied on the Nuendo program DVD. Also, make sure the XSend plug-in is activated in the Plug-in Information window.

Proceed as follows to import XSend files:

1. You must designate the XSend Incoming folder by selecting the XSend preferences from the Nuendo File menu.
A dialog opens, allowing you to browse your system to select a folder where exported Liquid projects will be stored.

2. Export the Liquid project to the Nuendo system.
This can be done directly over a network if the two systems are connected by one. No file sharing is needed. All file transfers are handled by XSend. Refer to the Liquid system’s documentation for more information on how to do this. You may also export the sequence to portable media such as DVD-R or CD-R discs for transfer when no network is available.

3. On the File menu–Import submenu, select “XSend…”.
Navigate to the exported Liquid sequence which will be an .XSD file type.

4. You will be asked if you wish to create a new project.
Choose Yes if you want to import the XSend sequence into a blank project. If you choose No, the imported sequence will be appended to the currently active project. The new audio tracks are displayed below the lowest track or channel in the project. In either case, both audio and video files can be included in the XSend sequence, providing a convenient means to receive entire projects from Liquid users.

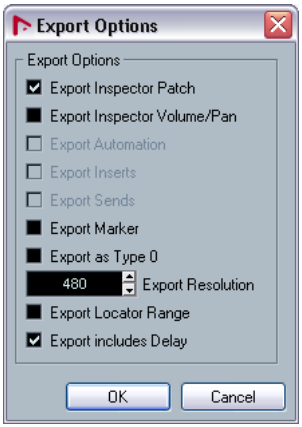
Exporting and importing standard MIDI files

Nuendo can import and export Standard MIDI Files, which makes it possible to transfer MIDI material to and from virtually any MIDI application on any platform. When you import and export MIDI files, you can also specify whether certain settings associated with the tracks should be included in the files (automation subtracks, volume and pan settings etc.).

Exporting MIDI files

To export your MIDI tracks as a Standard MIDI File, pull down the File menu and select “MIDI File…” from the Export submenu. A regular file dialog opens, allowing you to specify a location and name for the file.

When you have specified a location and a name for the file, click “Save”. The Export Options dialog opens, allowing you to specify a number of options for the file – what should be included in the file, its type and its resolution (see below for descriptions of the options).



The Export Options dialog.

You will also find these settings in the Preferences (MIDI–MIDI File page). If you set these up once and for all in the Preferences, you only need to click OK in the Export Options dialog to proceed.

The dialog contains the following options:

Option	Description
Export Inspector Patch	If this is activated, the MIDI patch settings in the Inspector – Bank Select and Program Select (used for selecting sounds in the connected MIDI instrument) are included as MIDI Bank Select and Program Change events in the MIDI file.
Export Inspector Volume/Pan	If this is activated, Volume and Pan settings made in the Inspector are included as MIDI Volume and Pan events in the MIDI file.
Export Automation	If this is activated, recorded automation (see “Introduction” on page 214) is converted to MIDI controller events and included in the MIDI file. This also includes automation recorded with the MIDIControl plug-in. This is described in the chapter “MIDI Effects” of the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo 4”.
Export Inserts	If this is activated and you are using any MIDI plug-ins as insert effects, the modifications to the original MIDI notes that occur as a result of the effect(s) will be included in the MIDI file. A MIDI delay, for example, will produce a number of repeats to a MIDI note by actually adding additional, “echoing” notes at rhythmic intervals – these notes will be included in the MIDI file if the option is activated.
Export Sends	If this is activated and you are using any MIDI plug-ins as send effects, the modifications to the original MIDI notes that occur as a result of the effect(s) will be included in the MIDI file.
Export Marker	If this is activated, any markers you have added (see “Using markers” on page 109) will be included in the MIDI file as Standard MIDI File Marker events.
Export as Type 0	If this is activated, the MIDI file will be of Type 0 (all data on a single track, but on different MIDI channels). If you don’t activate this option, the MIDI file will be of Type 1 (data on separate tracks). Which type to choose depends on what you want to do with the MIDI file (in which application or sequencer it should be used, etc.).
Export Resolution	You can specify a MIDI resolution between 24 – 960 for the MIDI file. The resolution is the number of pulses, or ticks, per quarter note (PPQ) and determines the precision with which you will be able to view and edit the MIDI data. The higher the resolution, the higher the precision. The resolution should be chosen depending on the application or sequencer with which the MIDI file should be used though, since certain applications and sequencers may not be able to handle certain resolutions.
Export Locator Range	If this is activated, only the range between the locators will be exported.
Export includes Delay	If this is activated, the delay of the MIDI track will be included in the MIDI file. For more information about the Delay option, see “Basic track settings” on page 344.

⇨ The MIDI file will include the Tempo track.

⇨ Inspector settings other than those specified in the Export options are not included in the MIDI file!

To include these, you need to convert the settings to “real” MIDI events and properties by using the Merge MIDI in Loop function for each track, see “Merge MIDI in Loop” on page 358.

Importing MIDI files

To import a MIDI file from disk, proceed as follows:

1. Select “MIDI File…” from the Import submenu on the File menu.

2. If there is already an open project, a dialog opens in which you can select whether a new project should be created for the file or not.

If you select “No”, the MIDI file will be imported into the current project.

3. Locate and select the MIDI file in the file dialog that opens and click Open.

- If you choose to create a new project, select the project folder.

Select an existing project folder or create a new by clicking on Create and entering a name in the dialog.

The MIDI file is imported. The result depends on the contents of the MIDI file and the Import Options settings in the Preferences (MIDI–MIDI File page). The Import Options are as follows:

Option	Description
Extract First Patch	If this is activated, the first Program Change and Bank Select events for each track are converted to Inspector settings for the track.
Extract First Volume/Pan	If this is activated, the first MIDI Volume and Pan events for each track are converted to Inspector settings for the track.
Import Controller as Automation Tracks	If this is activated, MIDI controller events in the MIDI file will be converted to automation data for the MIDI tracks.
Import to Left Locator	If this is activated, the imported MIDI file will be placed so that it starts at the position of the left locator – otherwise it will start at the beginning of the project. Note that if you choose to have a new project created automatically, the MIDI file will always start at the beginning of the project.
Import Marker	If this is activated, Standard MIDI File Markers in the file will be imported and converted to Nuendo markers.
Import dropped File as single Part	If this is activated and you drag and drop a MIDI file into the project, the whole file will be placed on a single track.
Ignore Mastertrack Events on Merge	If this is activated and you import a MIDI file into the current project, tempo track data in the MIDI file is ignored. The imported MIDI file will play according to the current Tempo track in the project.
Auto Dissolve Format 0	If this is activated and you import a MIDI file of type 0 into the project, the file will automatically be "dissolved": For each embedded MIDI channel in the file, a separate track will be inserted in the Project window. If this is deactivated, only one MIDI track will be created. This track will be set to MIDI Channel "Any", allowing all MIDI events to play back on their original channels. You can also use the "Dissolve Part" function on the MIDI menu to distribute the events onto different tracks with different MIDI Channels at a later stage.
Import to Instrument tracks	If this is activated and you drag a MIDI file into the project, an Instrument track will be created instead of a MIDI track. Furthermore, the program will load the corresponding track preset for the instrument track (based on the program change events included in the MIDI file).

- When you import a MIDI file into the project, the Tempo track will be adjusted according to the Tempo track in the MIDI file.
- It is also possible to import a MIDI file from disk by dragging and dropping it from the Windows Explorer or the Mac OS Finder into the Nuendo Project window. The Import Options apply as well.

Exporting and importing MIDI loops

Nuendo allows you to import MIDI loops (file extension ".midiloop") and to save instrument parts as MIDI loops. MIDI loops are handy, as they contain not only MIDI notes and controllers, but also the associated VST instrument and instrument track preset settings.

How to import and export MIDI loops is described in detail in the chapter "VST Instruments and Instrument tracks" on page 189.

Exporting and importing tracks

You can export Nuendo tracks (Audio, FX, Group, Instrument, MIDI and Video) as track archives for import into other Nuendo projects. All the information associated with the tracks will be exported (mixer channel settings, automation tracks, parts and events etc.). If you select the option "Copy" (see below), a separate "media" folder will be created, containing copies of all referenced audio files.

⇨ Project-specific settings (such as tempo) are not part of the exported track archives.

⇨ For creating track presets from tracks, see "Track Presets" on page 327.

Exporting tracks as track archive

1. Select the tracks you wish to export.
2. Pull down the File menu and open the Export submenu.
3. On the submenu, select "Selected Tracks…".
4. You are prompted to choose between two options:

- Click Copy to include copies of the media files in the export.

A file dialog opens in which you can choose an existing empty folder or create a new folder for saving the track archive (as *.xml file) and its media subfolder, which will contain any associated audio or video files.

- Click Reference to include merely a reference to the files in the export.

A file dialog opens in which you can choose an existing folder for saving the track archive (as single *.xml file).

5. Click OK to save the respective track archive type.

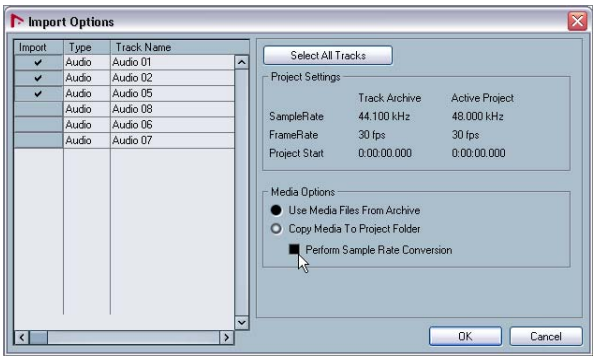
Importing tracks from a track archive

The Import Track Archive function lets you import tracks exported from another Nuendo project.

⇨ Note that the sample rates of the active project and the track archive have to match. If necessary, you have to convert the sample rate, see below.

1. Pull down the File menu and open the Import submenu.
2. On the submenu, select “Track Archive…”.
3. In the file dialog that opens, select the XML file and click Open.

The Import Options dialog opens.



In the Project Settings area, you can see a comparison between the settings of the track archive and the active project.

4. In the Import Options dialog, click on the Import column to the left to select the desired track(s) or click “Select all Tracks”.

A check mark is shown for all selected tracks.

5. Choose which media files to use:

- Select “Use Media Files From Archive” if you want to import the track without copying the media files into your project folder.
- Select “Copy Media To Project Folder” if you want to import the media files into your project folder.

For the option “Perform Sample Rate Conversion”, see below.

6. Click OK.

The tracks are imported, complete with all contents and settings.

Sample rate conversion on track archive import

A track archive may contain media files with a sample rate that is different from the sample rate of your currently active project. You can see the sample rate difference in the Project Settings area.

- To convert the sample rate of a track archive to the sample rate used in the active project on import, select the option “Copy Media To Project Folder” and then “Perform Sample Rate Conversion”.

⇨ Unconverted files with another sample rate than the one used in the project will play back at the wrong speed and pitch.

Other Import/Export functions

- For exporting and importing Tempo tracks, see “Exporting and importing Tempo tracks” on page 419.
- Nuendo mixmaps from older Nuendo versions can be imported into Nuendo. They will be converted into device panels. For information on device panels, see the separate PDF document “MIDI Devices”.

Cleanup

The Cleanup function on the File menu helps you to save hard disk space by locating and – if you like – deleting unused audio files in the project folders on your disk.

1. Select “Cleanup…” from the File menu.

If there are any open projects, an alert shows. Clicking “Close” closes all open projects and brings up the Cleanup dialog.

2. To restrict the Cleanup function to a certain folder only, click the “Search Folder” button and select the folder.

The default setting is that the Cleanup function is applied to all folders on all hard disks. You should only select a specific folder if you are certain it doesn’t contain audio files used in other projects (outside the folder), see below. You can reset the function to search all folders by opening the “Search Folder” dialog again and clicking “Cancel”.

3. Click the Start button.

Nuendo will now scan the selected folder (or all hard disks) for Nuendo project folders and check for audio and image files (in the Audio, Edits and Images subfolders) that are not used by any project. The found files are listed in the dialog.

4. When the scan is complete, you can select files by clicking in the list.

Use [Ctrl]/[Command]-click to select several files, and [Shift]-click to select a range of files. You can also click the Select All button to select all files in the list.

In the following situations, the Cleanup function will list files that are not unused:

- If you have moved or renamed files or folders (without updating the project files to use the new paths), there is no way for Nuendo to know that these files are used in a project.
- If you perform the Cleanup function on a folder in which there are audio files belonging to other projects (outside the folder), these files will be considered "".

- Also, make sure you don't delete any files used in other applications, or files that you generally want to keep!

However, you can always safely delete image files since these can be reconstructed by the program, if necessary.

5. Delete any files you don't want to keep by selecting them and clicking Delete.

6. Close the dialog by clicking the Close button.

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Customizing

Background

The user can customize the appearance and functionality of Nuendo in various ways.

User configurable items described in this chapter are:

- Workspaces

By storing different window combinations as workspaces, you can quickly switch between different working modes – see “Workspaces” on page 504.

- Setup dialogs

Several parts of the user interface (toolbars, Transport panel, Inspector, info lines and channel settings windows) provide a Setup dialog, where you can configure which items of the respective window area or panel are to be shown or hidden and where they should be located – see “The Setup dialogs” on page 506.

- Track list

The controls shown in the Track list can be set for each track type – see “Customizing track controls” on page 507.

- Configuration of main menu items

You can hide items not needed on the main menus – see “Configuring the main menu items” on page 509.

- Preferences presets

You can save and recall preference settings as preference presets – see “About preference presets” on page 510.

- Appearance

The general look of the program can be adjusted – see “Appearance” on page 511.

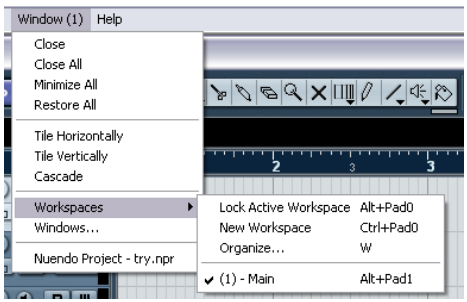
- Track and event colors

You can adjust which colors should be used – see “Applying track and event colors” on page 512.

This chapter also contains a section describing where your preferences and settings are stored (see “Where are the settings stored?” on page 514), to help you transfer your customized settings to another computer.

Workspaces

A configuration of Nuendo windows is called a “workspace”. A workspace stores the size, position and content of all windows, allowing you to quickly switch between different working modes via the menu or by using key commands. E.g., you may want as large a Project window as possible when you are editing, whereas you may want the Mixer and effect windows open during mixdown. Workspaces are listed and managed on the Workspaces submenu on the Windows menu.



Editing the active workspace

There is always one workspace active, even if you haven’t saved any. To make changes to the active workspace, you simply set up the windows as desired – including opening, closing, moving and sizing windows, and adjusting zoom and track height. The changes are automatically stored for the active workspace.

- To keep a workspace from being accidentally changed, select “Lock Active Workspace” from the Workspaces submenu.

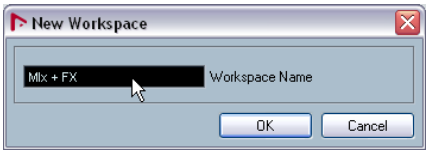
A locked workspace will keep its original window settings. You may change the current window layout on the screen, but the next time you select the workspace again, the originally stored layout will be recalled.

Creating a new workspace

1. Pull down the Window menu and open the Workspaces submenu.

2. Select “New Workspace”.

3. In the dialog that opens, enter a name for the workspace.



4. Click OK.
The workspace is stored and will appear on the submenu. It will now be the active workspace.

5. Set up the windows you want to include in the new workspace.
This may include opening, moving and sizing windows, and adjusting zoom and track height.

Activating a workspace

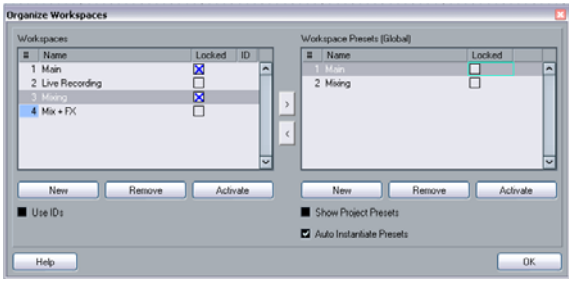
1. Pull down the Window menu and open the Workspaces submenu.

2. Select the workspace from the list on the submenu.
The windows are closed, opened, moved and/or resized according to the stored workspace.

- You can also activate any of nine workspaces using key commands.
This is set up under the Workspaces category in the Key Commands dialog.

Organizing workspaces and presets

If you select “Organize…” from the Workspaces submenu, the Organize Workspaces dialog opens:



The list to the left shows the workspaces in the active project, while the list to the right shows the workspace presets. While workspaces are stored with each project, workspace presets can be stored globally, allowing you to set up a number of workspaces for use in any project. Workspace presets store the position and size of the main windows only – project-specific windows are not included.

- In the Workspaces list to the left, you can rename workspaces (by double-clicking and typing) and lock or unlock them.

- The arrow buttons between the two lists allow you to copy the selected workspace to a workspace preset, or vice versa.

- The buttons below each list let you add, remove or activate workspaces or presets.
You can also activate a workspace or a preset by double-clicking in its number column.

- Normally, when you use key commands to activate workspaces, they relate to the order in the workspace list, e.g. the key command for “Workspace 1” selects the first workspace on the list and so on. However, if you activate the Use IDs checkbox, you can enter a number (1-9) in the ID column for each workspace.
This number will be used as reference when you are using key commands, so that the key command for “Workspace 1” recalls the workspace with ID 1.

- Workspace presets are saved with the project. By default the global presets are shown in the list to the right – to see the presets of other projects, activate the Show Project Presets checkbox.

- Activate the Auto Instantiate Presets checkbox to convert all global workspace presets automatically into workspaces when you create a new project or open a project.

- To close the dialog, click the OK button or use [Esc].

Note that you can continue working in other windows with the Organize Workspaces dialog open.

The Setup dialogs

You can customize the appearance of the following elements:

- transport panel
- info line
- channel settings window
- toolbars
- Inspector

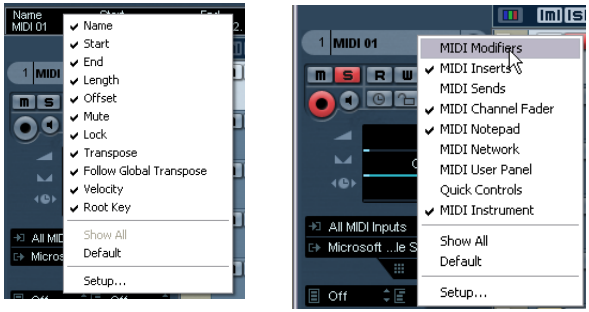
Customizing via the setup context menus

If you right-click the Transport panel, the toolbars, the info lines, or the Inspector, the respective setup context menu opens. For channel settings windows, these options are found in the dialog menu, on the Customize View submenu. On this menu, you can activate/deactivate elements as desired.

The following general options are available on the setup context menus:

- “Show All” makes all items visible.
- “Default” resets the interface to the default setting.
- “Setup…” opens the Setup dialog (see below).

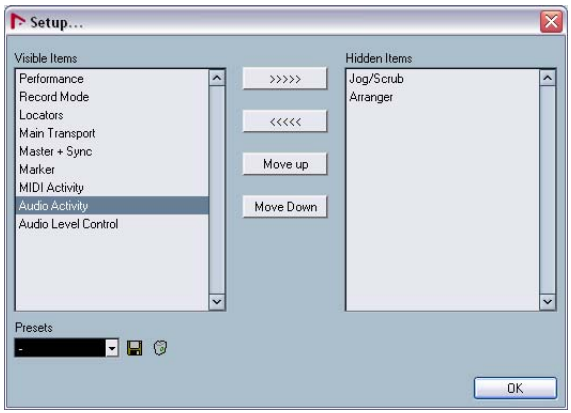
If presets are available, they can be selected on the lower half of the menu (e.g. “Status Fields Only” for the Transport panel).



The info line and Inspector setup context menus. In the Inspector setup context menu, the available options depend on the track type.

Customizing via the Setup dialog

If you select “Setup…” from the setup context menus, the Setup dialog opens. This allows you to specify which elements should be visible/hidden and to set the order of the elements. You can also save and recall setup presets in this dialog.



The Setup dialog, e.g. for the Transport panel.

The dialog is divided into two columns. The left column displays the currently visible items and the right column displays the currently hidden items.

- You can change the current show/hide status by selecting items in one column and then using the arrow buttons in the middle of the dialog to move them to the other column.

Changes are applied directly.

- By selecting items in the “Visible Items” column and using the Move Up and Move Down buttons, you can reorder the selected item(s).

Changes are applied directly. To undo all changes and revert back to the standard layout, select “Default” on the setup context menu.

A customized Transport panel.

- If you click the Save button (disk icon) in the Presets section, a dialog opens, allowing you to name the current configuration and to save it as a preset.
- To remove a preset, select it on the presets pop-up menu and click the trash icon.
- Saved configurations are available for selection from the Presets pop-up in the Setup dialog or directly from the setup context menu.

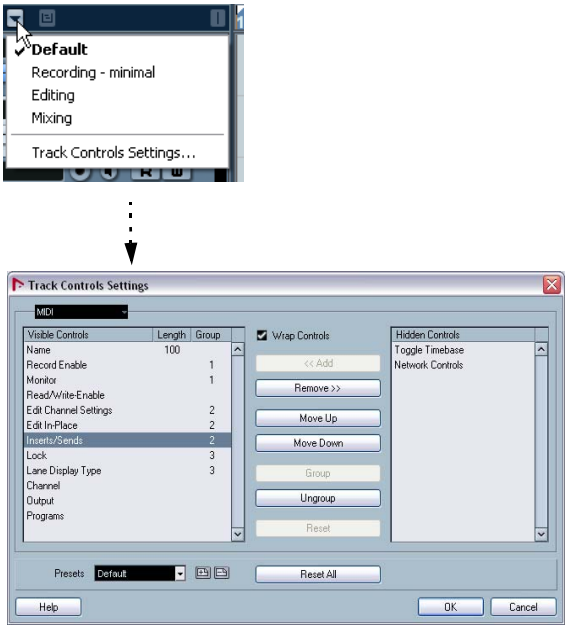
Customizing track controls

You can configure (separately for each track type) which track controls should be shown in the Track list. You can also specify the order of controls and group controls so that they are always shown adjacent to each other. This is done using the Track Controls Settings dialog.

Opening the Track Controls Settings dialog

There are two ways to open the dialog:

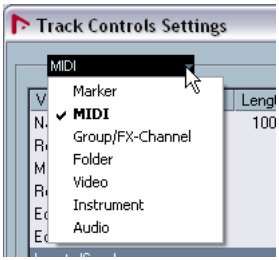
- Right-click a track in the Track list and select “Track Controls Settings” from the context menu.
- Click the arrow in the top left corner of the Track list and select “Track Controls Settings”.



Setting the track type

The settings made in the Track Controls Settings dialog apply to the selected track type (Marker, MIDI, Group/FX Channel, Folder, Video, Instrument, Audio). If you right-click an audio track to open the dialog, for example, the dialog automatically displays the settings for audio tracks. The selected track type is shown in the menu display in the top left corner of the dialog.

▪ To change the track type, click the arrow to the right in the menu display and select a track type from the pop-up menu that opens.
All settings made in the dialog will apply to all tracks (current and subsequent) of the selected type.



The track type pop-up at the upper left of the Track Controls Settings dialog.

⇨ Always make sure that you have selected the desired track type when editing the track controls!

Removing, adding and moving track controls

The dialog is divided into two columns. The left column displays controls currently visible on the Track list, and the right column displays the controls currently hidden.

▪ You can hide controls from the Track list by selecting them in the list to the left and clicking the Remove button. To show hidden elements, select them in the list to the right and click the Add button.
Click OK to apply the changes.

⇨ All controls can be removed except the Mute and Solo buttons.

▪ By selecting controls in the “Visible” column and using the Move Up and Move Down buttons, you can change the order of the selected control(s) on the Track list.
Click OK to apply the changes.

Grouping track controls

If you resize the Track list, the position of the controls will change dynamically to accommodate as many controls as possible in the available space (given that Wrap Controls is activated – see below). By grouping several track controls you ensure that they will always be positioned side by side in the Track list. To group controls, proceed as follows:

1. Make sure you have selected the desired track type.

2. Select at least two controls you wish to group in the Visible list.
You can only group controls that are adjacent to each other in the Visible list. To group controls that are currently not adjacent in the list, use the Move Up/Down buttons first.

3. Click Group.
A number is displayed in the Group column for the grouped controls. The first group created will have the number 1, the second 2 and so on.

4. Click OK.
The controls are now grouped.

▪ You can ungroup commands by using the Ungroup button. Please note that this will remove the selected element and the elements below it in the list from this group. To remove an entire group, select the first (topmost) element belonging to this group and click the Ungroup button.

About Wrap Controls

This is activated by default. Wrap Controls is allows the controls to be dynamically repositioned when resizing the Track list. That is, as many controls as can fit in any given space will be displayed depending on how you resize the Track list.

If you deactivate Wrap Controls, the positions of the controls will be fixed, regardless of the size of the Track list. In this mode, you may have to resize the tracks vertically (by dragging the dividers between them) to display all the controls.

About the Length column

The Length column in the Visible list allows you to set the maximum length for certain text fields, e.g. Name. To change the setting, click on the number in the Length column and type in a new value.

Resetting Track list settings

You have two possibilities to reset settings:

- Click Reset to restore all default track controls settings for the selected track type.
- Click Reset All to restore all default track controls settings for all track types.

Saving presets

You can save track controls settings as presets for later recall:

1. Click on the Save icon beside the Presets name field.
A dialog opens, allowing you to type in a name for the preset.
2. Click OK to save the settings as a preset.
Saved presets are available for selection from the Presets pop-up and from the pop-up at the top left corner of the Track list.

- To remove a preset, select it in the Track Controls Settings dialog and click the Delete icon beside the Presets name field.

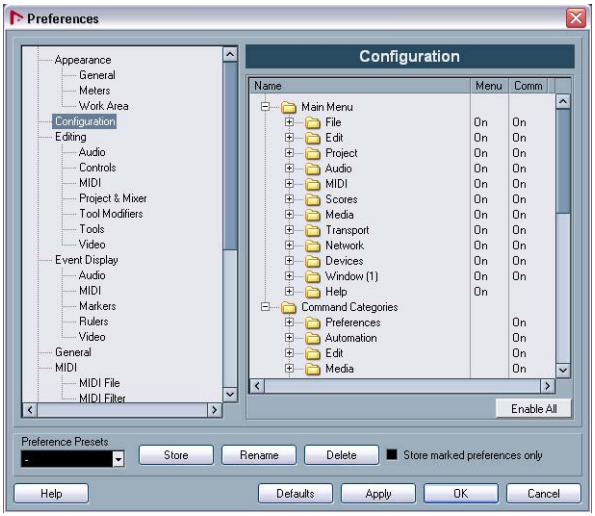
⇨ Nuendo comes with a number of track control settings presets available.

Configuring the main menu items

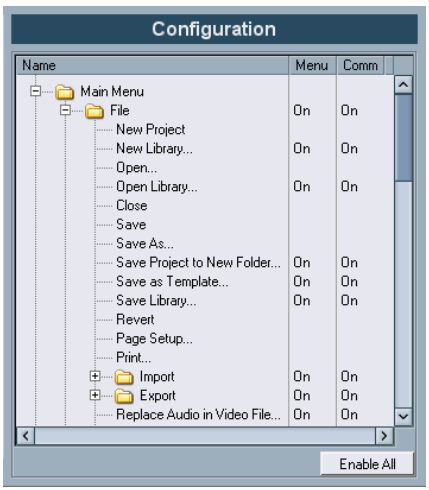
⚠ Configuring the main menus is a feature intended for experienced Nuendo users. Don't hide menus or menu items unless you are sure that you do not need them!

You can configure what items should be shown on the main menus and submenus, and even hide entire menus. By customizing the menus you can hide items relating to program functions you never use, to customize the program according to your needs. For example, if you never use the Networking features in Nuendo, you can hide the entire Network menu from view.

1. Open the Preferences dialog and select the Configuration page.
The Configuration page contains two parent folders; "Main Menu", which contains folders for all main menus, and "Command Categories" which contains folders for all Command categories. This section will only describe how to configure Main Menu items, not Command Categories, see "Turning Key Commands off" on page 519.



2. Click on the plus sign for a folder item, e.g. the File folder.
As you can see, all commands and submenus on the File menu are listed in the Name column.



- In the Menu, column you can decide which File menu items to hide from view, by clicking in the column beside the corresponding menu item you wish to hide.
If you click the "On" item in the Menu column for an item, it changes to "Off" and vice versa. All menu items set to "Off" will be hidden when you click Apply or OK.

- Certain essential menu items on the File and Edit menus cannot be hidden, such as Save, Open, Close, Undo/Redo etc.
For these items there is no entry in the Menu column.

- If you set a main menu folder (as opposed to a menu item) to Off in the Menu column, the entire menu will be hidden from view.
The exception to this is if the main menu folder contains non-removable menu items, in which case all hideable items on the menu will be set to Off, but the menu will still be visible.

- The Command column sets the key command On/Off status for the corresponding menu item.
If this is set to Off, any assigned key command for the item will be disabled (see "Turning Key Commands off" on page 519 for more information).

- You can save menu configurations as preference presets, either separately or together with other Preferences dialog settings – see below.

3. By using the above methods, you can customize all main menus to your liking.
To apply the changes without exiting the dialog click "Apply". Click OK to apply the changes and exit the dialog.

- To restore all menu items to their default setting (which is visibility and key commands on for all menus and menu items), click the Defaults button.
Note that the Defaults button only restores the settings on the currently selected page (the Configuration page in this case) to their default settings. If you have changed settings on another page of the Preferences dialog, these are not reset.

About preference presets

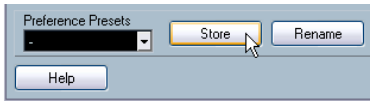
It is possible to save complete or partial preferences settings as presets. This lets you recall settings quickly and easily.

Saving a preference preset

When you have made your preferences settings, proceed as follows to save all settings as a preset:

1. Make sure that the "Store marked preferences only" option is not activated.
This is because this option is used for saving partial settings (see below), as opposed to complete settings.

2. Click the Store button in the lower left section of the Preferences dialog.



A dialog opens, allowing you to type in a name for the preset.

3. Click OK to save the preset.
Your saved settings will now be available from the Preference Presets pop-up for your future projects.

Loading a preference preset

To load a saved preference preset, proceed as follows:

1. Open the Preferences dialog from the File menu (Win)/Nuendo menu (Mac).

2. Select the saved preset from the Preference Presets pop-up.

3. Click OK to apply the saved preset settings and exit the Preferences dialog.

Saving partial preferences settings

It is also possible to save partial preferences settings. This is useful when you have made settings that only relate to a certain project or situation, for example. When you apply a saved partial preference preset, you only change the saved settings. All other preferences will be left unchanged.

When you have made your specific preferences settings, proceed as follows to save the partial settings as a preset:

1. Open the Preferences dialog.

2. Activate “Store marked preferences only”.
A new “Store” column is added in the Preferences page list.

3. Click in the Store column of the Preferences items you wish to save.
Note that if you activate a Preferences page that contains subpages, these will also be activated automatically. If this is not what you want, simply deactivated the subpages.

4. Click the Store button in the lower left section of the Preferences dialog.
A dialog opens, allowing you to type in a name for the preset. It is a good idea to choose a descriptive name for a partial preference preset, preferably relating to the saved settings (for example “Configuration” or “Editing-Controls”).

5. Click OK to save.
Your saved settings will now be available from the Preference Presets pop-up for your future projects.

Appearance

In the Preferences dialog, you will find a page called Appearance. It contains three sub-pages on which you will find the following settings:

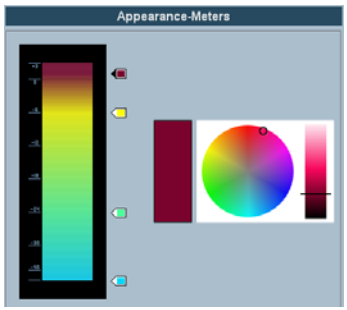
General

The three controls on the General page affect the appearance of the windows that surround the controls and workspaces in Nuendo.

- Saturation determines how rich the background colors are, from gray to blue.
- Contrast determines how bright or dark the background is in relation to controls and displays.
- Brightness lightens or darkens the background.

Meters

The coloring of meters in Nuendo can be controlled in sophisticated ways. Multiple colors can help to visually indicate what levels are being reached, e.g. in a channel of the VST Mixer. To do this, the meter on the Appearances–Meters page has color handles that allow you to define what color the meter will have at a given signal level.



The Appearances–Meters page in the Preferences dialog.

- The default setting has four color handles. Each color handle has a unique color that gradually shifts as the meter moves toward the next color handle.
You can click on any color handle and move its position in the meter scale. If you hold down [Shift] while moving the handle with the mouse, it will move ten times slower for more precise positioning. You may also nudge the color handle’s position with the Arrow Up/Down keys. Holding Shift while nudging will move the color handle ten times faster.

- You can add color handles by [Alt]/[Option]-clicking anywhere along the side of the meter scale. To remove a color handle, [Ctrl]/[Command]-click the handle.
By adding more color handles to the meter scale, you can define colors for more specific signal levels. Try adding two color handles very close to one another. You can make the meter color change more rapidly at a specific signal level this way.

- To change the color of a handle, select the handle by either clicking on it or by jumping to it with the Tab key (hold down [Shift] and press the Tab key to jump backwards). Then use the hue and brightness controls on the right side to alter the handle's color.
The currently selected color handle is indicated by a black triangle on its left side.

Work Area

The work areas in Nuendo are those places where the actual data are displayed such as the project window event display. In these areas, there are items such as vertical and horizontal grid lines that can be altered in intensity by the controls found on this page.

Applying track and event colors

You can use color scheming for easier overview of tracks and events in the Project window. Applying colors is divided into two areas; track and event colors.

- A track color is shown and can be edited in the Inspector, the Track list, and the corresponding channel in the Mixer. It is furthermore displayed in all parts and events for the track in the event display.
Track colors can be switched on and off globally.

- Event colors are shown for parts and events in the event display and are independent from the track colors.

⇨ An applied event color "overrides" the track color, if both are used.

The color palette can be customized, see "The Event Colors dialog" on page 514.

Track colors

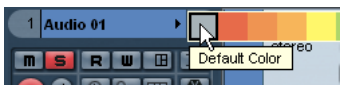
Applying track colors manually

To activate track colors, proceed as follows:

1. Click the Show/Hide Track Colors button at the top of the Track list.

This brings up the track color selector in the Inspector, the Track list and in the Mixer.

2. To bring up the color palette, click the track color selector.



Click the arrow in the track name title bar or…

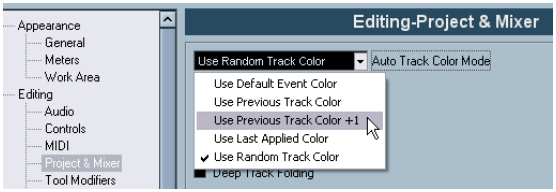
…click the color strip in the Track list.

In the Mixer, click the track color selector below the channel name.

3. Select a color from the color bar.
The track color is now reflected in the Inspector title palette and the Track list as well as in the Mixer and any parts and events on the selected track.

Applying track colors automatically

In the Preferences (Editing–Project & Mixer page), you can find the option “Auto Track Color Mode”.



This offers you several options for automatically assigning colors to tracks that are added to the project.

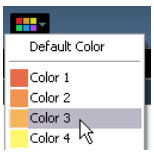
Option	Effect
Use Default Event Color	The default color (gray) is assigned.
Use Previous Track Color	Uses the color of the track above the new one (i.e. the track that is selected when you add a new track).
Use Previous Track Color +1	Uses the color next to the color of the track above the new one (+1 refers to the color number in the palette).
Use Last Applied Color	The last manually assigned color is used.
Use Random Track Color	Track colors are assigned randomly.

Coloring parts and events

There are two ways to color parts and events in the Project window:

Using the color selector

1. Select the desired parts or events.
2. Choose a color from the color selector in the toolbar.



Using the color tool

1. On the toolbar, select the color tool (the paint bucket icon).

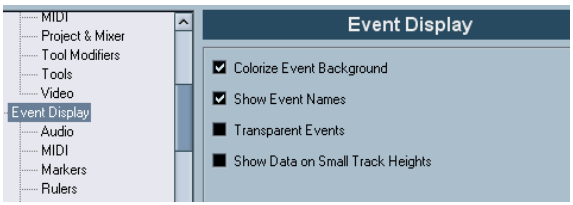
2. Click the small strip below it to bring up the color palette.
3. Select the desired color.
4. Click on a part/event to assign the color.

The color is applied to all selected parts/events and overrides the track color (if used).

- If you press [Ctrl]/[Command] and click on a part/event with the color tool, the color palette is displayed and you can choose the desired color for an event.
- If you press [Alt]/[Option], the color tool cursor becomes a pipette, which can be used to select a color by clicking on a part/event.

Customizing the event background

On the Event Display page in the Preferences, you can find the option “Colorize Event Background”.



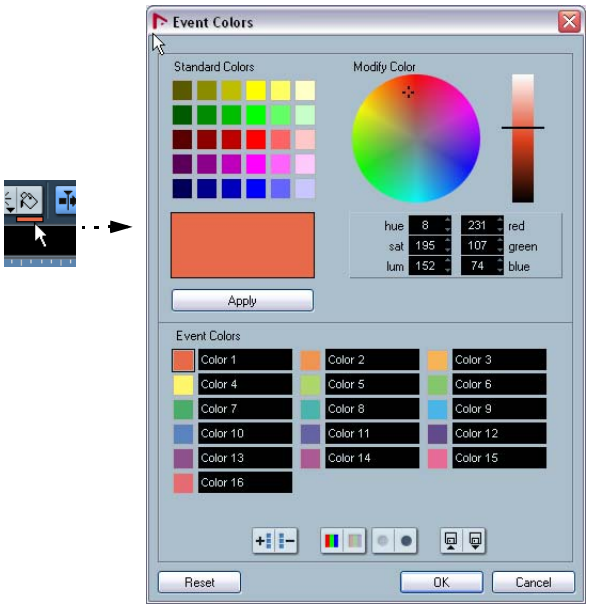
This option affects the display of events in the project window.

- When this is activated, the background of the events and parts in the event display will be shown in the selected color.
- When this is deactivated, the event “content”, i.e. MIDI events, audio waveforms, etc. will be displayed in the selected color and the event background will be displayed in gray.

The Event Colors dialog

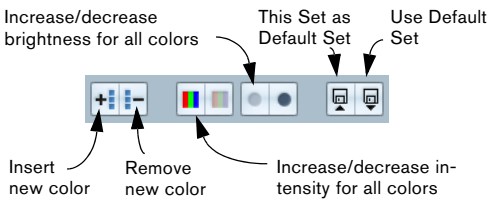
You can open the Event Colors dialog in two ways:

- Double-click the small strip below the color tool.



- Open the Color pop-up menu on the toolbar and select “Select Colors…”.

In the Event Colors dialog, you can fully customize the color palette, apart from the default color (gray).



To add new colors to the color palette, proceed as follows:

1. Click the Insert New Color button in the Event Colors section to add a new color.
A new color icon and color name are added to the Event Colors section.

2. Click the color field next to the name field to activate the new color for editing.

3. In the Standard Colors section, select the standard color. You can modify the selected color in the following way:
   - Drag the cursor to another point in the color circle.
   - Movethe handle in the color meter.
   - Enter the values for red, green and blue and hue, saturation and luminosity manually.

4. Click the Apply button in the Standard Colors section.
The color setting is applied to the selected color item.

You can edit every existing event color in the same way.

- To delete an event color item, select it and click the “Remove Selected Color” button in the Event Colors section.

- To increase or decrease the intensity and the brightness of all colors, use the corresponding buttons in the Event Colors section.

- To save the current set as default, click the button “This set as default set” in the Event Colors section. You can then click the button “Use default set” to the right to apply the saved default set.

- To return to the standard setting of the palette in Nuendo, click Reset.

Where are the settings stored?

As you have seen, there are a large number of ways in which you can customize Nuendo. While some of the settings you make are stored in each project, others are stored in separate preference files.

If you need to transfer your projects to another computer (e.g. in another studio), you can bring all your settings along by copying the desired preference files and installing them on the other computer.

⇨ It’s a good idea to make a backup copy of your preference files once you have set things up the way you want! This way, if another Nuendo user wants to use his or her personal settings when working on your computer, you can restore your own preferences afterwards.

- Under Windows, preference files are stored in the folder "\Documents and Settings\<user name>\Application Data\Steinberg\Nuendo 4\".
If you run the 64 bit version of Nuendo, this folder is called "Nuendo 64 bit". On the Start menu, you will find a shortcut to this folder for easy access.

- Under Mac OS X, preference files are stored in the folder "Library/Preferences/Nuendo 4/" under your home directory.
The full path would be: "/Users/<user name>/Library/Preferences/Nuendo 4/".

⇨ The RAMpresets.xml file, which contains various presets settings (see below), is saved when exiting the program.

⇨ Program functions (e.g. crossfade) or configurations (e.g. panels) not used in the project will not be stored.

Below, the available preferences files are listed. When files are not saved in the default preferences folder (see above), the complete path will be shown. When files are saved in a further subfolder of the default folder, the path will begin with the name of this folder:

Setting	Stored in
Edit modifier keys	Edit Modifiers.xml
Key commands	Key Commands.xml
Preferences dialog settings	Defaults.xml
Color setup	saved in the project
Default Color setup	Defaults.xml
Crossfade presets	Application folder\Presets\RAMPresets.xml
Control Room – Settings	\Presets\ControlRoomPresets.xml (pxml file)
Control Room – External Plug-ins	External Plugins.xml
Device setup files	Application folder\Device Maps as *.xml file
Drum maps (Nuendo Extension Kit only)	Application folder\DrumMaps as *.drm file
EQ presets	Application folder\Presets\VstEqPresets.pxml
Port Input/ Output settings	Port Setup.xml
Audio Inserts presets	\Presets\InsertsFolderPresets.pxml
MIDI Inserts presets	\Presets\MidiInsertsPresets as *.xml file
Installed MIDI devices	Midi Devices.bin
Key commands presets	\Presets\KeyCommands\<Preset Name>.xml
Logical Editor presets	\Presets\Logical Edit\<Preset Name>.xml
Project Logical Editor	\Presets\Logical Edit Project\<Preset Name>.xml
MediaBay settings	MediaDefaults.xml
MediaBay default settings	MediaFactoryDefaults.xml (these are applied on reset)
MediaBay – Scanned folders	scannedfolders.bin
MediaBay – Scanned disks	FileSysObserver.xml (When changing the file system these disks are automatically scanned by the MediaBay – Windows only.)
MediaBay database	mediabay.db
MediaBay Content	ContentManager.xml
MIDI FX presets	\Presets\<Plugin Name>\<Plugin Name>.xml
Mixer (or channel) settings	saved in the last active folder as *.vmx file (VST Mixer settings)
Mixer view preset	saved in project
Panel files	\Panels\<device name><unique combination of letters and numbers>.xml
Preferences Configuration	Configuration.xml
Patch name scripts	\Scripts\Patchnames\ as *.txt file
Preferences presets	\Presets\Configurations\<Preset Name>.xml
Quantize presets	\Presets\RAMPresets.xml
Score – Settings	Score Setting Window.xml
Score – Default font	Score Default Font.xml
Score – Custom Palettes	Score Custom Palettes.xml
Score – Guitar symbols	GuitarLib.xml
Score – Chord symbols	\Presets\ChordSymbols.xml
Staff Presets	\Presets\Staff Presets as *.xml file

Setting	Stored in
Note that the Score editor is only available for the Nuendo Expansion Kit.	
Snapshot file	\Presets\MIDI snapshot<device name><unique combination of letters and numbers> as *.xml file
Toolbar presets	\Presets\RAMPresets.xml
Track controls presets	\Presets\RAMPresets.xml
Track presets (user-defined, for all programs)	Win: \Documents and Settings\<user name>\Application Data\Steinberg\Track Presets Mac: Users/<user name>/Library/Application Support/Steinberg/Track Presets (with the subfolders \Audio, \Instrument, \Midi, \Multi) as *.trackpreset file
Transport panel presets	\Presets\RAMPresets.xml
Usage profile log	Usage Profile.xml (only saved if the corresponding option in the Preferences is activated)
User templates	templates\<Template Name>.npr
VST connections presets	\Presets\RAMPresets.xml
VST 3 plug-ins and instruments	VstPlugInfo.xml
VST 2 plug-ins and instruments	Vst2xPlugins.xml
VST3 presets (user-defined, for all programs)	Win: \Common files\VST3 Presets\<company>\<plug-in name> Mac: Users/<user name>/Library/Audio/Presets/<company>/<plug-in name> as *.vstpreset file
VST3 presets (public, for all programs)	Win: \Documents and Settings\VST3 Presets\<company>\<plug-in name> Mac: /Library/Audio/Presets/<company>/<plug-in name> as *.vstpreset file
Workspaces	saved in project
Workspace presets (global)	Window Layouts.xml
Zoom presets	\Presets\RAMPresets.xml
Networking	Network Manager.xml
Networking – Permissions	User Permissions.xml
Quick Control Settings	Quick Controls MIDI.xml

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Key commands

Introduction

Most of the main menus in Nuendo have key command shortcuts for certain items on the menus. In addition, there are numerous other Nuendo functions that can be performed via key commands. These are all default settings. If you want, you can customize existing key commands to your liking, and also add commands for menu items and functions currently not assigned any.

⚠ You can also assign tool modifier keys, i.e. keys that change the behavior of various tools when pressed. This is done in the Preferences dialog – see “Setting up tool modifier keys” on page 524.

How are key commands settings saved?

Every time you edit or add any key command assignment, this is stored as a global Nuendo preference – not as part of a project. Hence, if you edit or add a key command assignment, any subsequent projects that you create or open will use these modified settings. However, the default settings can be restored at any time by clicking the button “Reset All” in the Key Commands dialog.

In addition, you can save complete or partial key commands settings as a “key commands file”, which is stored separately and can be imported into any project. This way you can quickly and easily recall customized settings, when moving projects between different computers, for example. The settings are saved in a file on disk with the windows extension “.xml”.

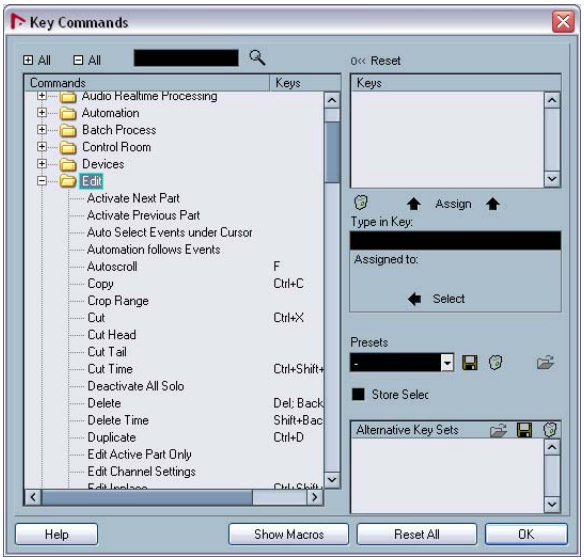
How to save key commands settings is described in the section “Saving complete key commands settings as presets” on page 521.

Setting up key commands

The following is a description of how you set up key commands and save them as presets for easy access.

Key commands settings are accessed and edited mainly in the Key Commands dialog. You can find some key command settings in the Preferences dialog as well, also addressed in this chapter.

Adding or modifying a key command



In the Key Commands dialog you will find all main menu items and a large number of other functions, arranged in a hierarchical way similar to the Windows Explorer and Mac OS Finder. The function categories are represented by a number of folders, each containing various menu items and functions. When you open a category folder by clicking the plus-sign beside it, the items and functions it contains are displayed with the currently assigned key commands.

To add a key command, proceed as follows:

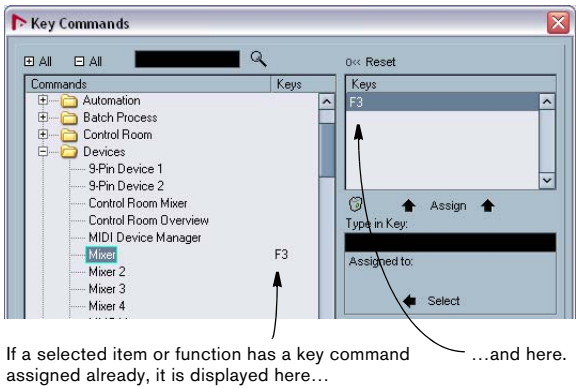
1. Pull down the File menu and select “Key Commands…”.
The Key Commands dialog appears.

2. Use the list in the Commands column to navigate to the desired category.

3. Click the plus-sign to open the category folder and display the items it contains.
Note that you can also click the “global” plus and minus-signs in the top left corner to open and close all category folders at once.

4. In the list, select the item to which you wish to assign a key command.

Already assigned key commands are shown in the Keys column as well as in the Keys section in the top right corner.



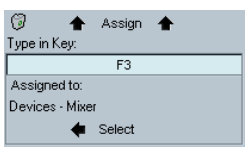
5. Alternatively, you can use the search function in the dialog to find the desired item.

For a description of how to use the search function, see "Searching for key commands" on page 520.

6. When you have found and selected the desired item, click in the "Type in Key" field and enter a new key command.

You can choose between any single key or a combination of one or several keys ([Alt]/[Option], [Ctrl]/[Command], [Shift]) plus any key. Just press the keys you want to use.

7. If the key command you entered is already assigned to another item or function, this is displayed below the "Type in Key" field.



If a key command already is assigned to another function, you can either ignore this and proceed to assign the key command to the new function instead, or you can select another key command.

8. Click the Assign button above the field.

The new key command appears in the Keys List.

⚠ If the key command you enter is already assigned to another function, you will get a warning message asking if you want to reassign the command to the new function instead, or cancel the operation.

Note that you can have several different key commands for the same function. So adding a key command to a function that already has another key command will not replace the key command previously defined for the function. If you wish to remove an assigned key command, see "Removing a key command" on page 520.

9. Click OK to exit the dialog.

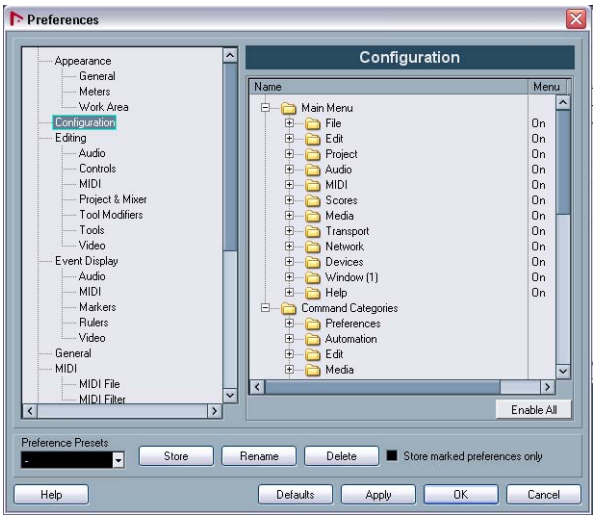
Turning Key Commands off

Nuendo also gives you the option of turning key commands off, meaning that even if a function has a key command assigned to it, you can disable the key command.

This is done in the Preferences dialog, in the following way:

1. Open the Preferences dialog from the File menu (under Mac OS X it is located on the Nuendo menu) and select the Configuration page.

As you can see, the Configuration page contains two main folders; "Main Menu" and "Command Categories".



- The "Main Menu" folder contains a number of subfolders, which in turn each contains items found on the main menus in Nuendo.
- The "Command Categories" folder also contains a number of subfolders, each of which contains a number of program functions not available on any of the main menus.

All the items and functions in the subfolders can have key commands assigned to them. The column to the right, labeled “Command”, allows you to set the On/Off status for the corresponding items. This indicates whether it should be possible to use assigned key commands for the items or not.

2. Click on the plus sign beside one of the main folders to open it and list the subfolders it contains.

3. Open the desired subfolder by clicking its plus sign, navigate to the item for which you want to disable the assigned key command, and select it.

4. Click in the “Command” column beside the item to set the status to “Off”.
Now it will not be possible to use any key command assigned to that menu item or function.

5. Repeat this for all items or functions for which you want to disable key commands.

⇨ Note that if you set an entire subfolder to “Off” in this way, all the items or functions it contains will automatically be set to “Off” as well.
If this is not what you want, you can reset separate items in the subfolder to “On”.

6. When you’re done, click OK to close the Preferences dialog and apply the changes.

Searching for key commands

If you want to know which key command is assigned to a certain function in the program, you can use the Search function in the Key Commands dialog:

1. Click in the search text field at the top left of the dialog and type in the function for which you want to know the key command.
This is a standard word search function, so you should type the command as it is spelled in the program. Partial words can be used; e.g., to search for all quantize related commands, type “Quantize”, “Quant”, etc.

2. Click the Search button (the magnifying glass icon).
The search is conducted and the first matching command is selected and displayed in the commands list below. The keys column and the keys list show the assigned key commands, if any.

3. To search for more commands containing the word(s) you entered, click the Search button again.

4. When you’re done, click OK to close the dialog.

Removing a key command

To remove a key command, proceed as follows:

1. If the key commands dialog isn’t already open, pull down the File menu and select “Key Commands…”.

2. Use the list of categories and commands to select the item or function for which you wish to remove a key command.
The key command for the item is shown in the Keys list and the Keys column.

3. Select the key command in the Keys list and click the Remove button (the trash icon).
You will get a prompt asking if you want to remove the key command or cancel the operation.

4. Click Remove to remove the selected key command.

5. Click OK to close the dialog.

Setting up macros

A macro is a combination of several functions or commands, to be performed in one go. For example, you could select all events on the selected audio track, remove DC offset, normalize the events and duplicate them, all with a single command.

Macros are set up in the Key Commands dialog as follows:

1. Click the Show Macros button.
The macro settings are shown in the lower part of the dialog. To hide these from view, click the button (now renamed to Hide Macros) again.

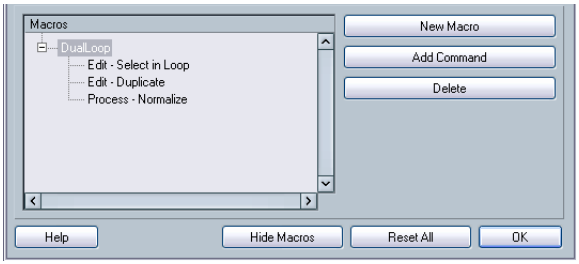
2. Click New Macro.
A new, unnamed macro appears in the Macros list. Name it by typing the desired name. You can rename a macro at any time by selecting it in the list and typing in a new name.

3. Make sure the macro is selected, and use the Categories and Commands in the upper half of the dialog to select the first command you want to include in the macro.

4. Click Add Command.
The selected command appears in the list of Commands in the Macros section.

5. Repeat the procedure to add more commands to the macro.

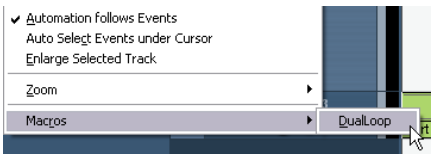
Note that commands are added after the currently selected command in the list. This allows you to insert commands “in the middle” of an existing macro.



A macro with three commands.

- To remove a command from the macro, select it in the Macros list and click Delete.
- Similarly, to remove an entire macro, select it in the Macros list and click Delete.

After you have closed the Key Commands dialog, all macros you have created appear at the bottom of the Edit menu in the Macros submenu, available for instant selection.



You can also assign key commands to macros. All macros you have created appear in the upper section of the Key Commands dialog under the Macros category – just select a macro and assign a key command as with any other function.

Saving complete key commands settings as presets

As mentioned above, any changes made to the key commands (and macros) are automatically stored as a Nuendo preference. However, it is also possible to store key commands settings separately. This way, you can store any number of different key command settings, complete or partial, as presets for instant recall.

Proceed as follows:

1. Set up the key commands and macros to your liking.

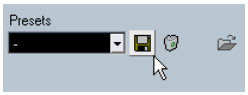
When setting up key commands, remember to click “Assign” to make the changes.

2. Make sure that “Store Selected Items Only” is not activated.

This option is for saving partial key commands settings only (see below).

3. Click the Save button next to the Presets pop-up menu.

A dialog appears, allowing you to type in a name for the preset.



4. Click OK to save the preset.

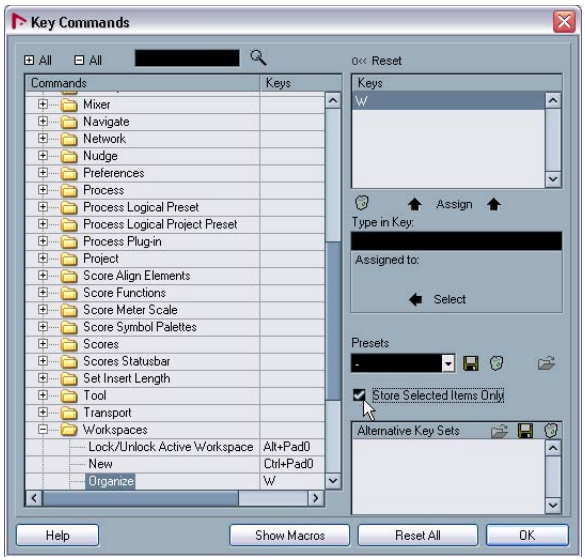
Your saved key commands settings will now be available in the Preset pop-up menu for your future projects.

Saving partial key commands settings

It is also possible to save partial key commands settings. This is useful for example if you have made settings that only relate to a specific project or settings that you wish to apply only in certain situations. When you apply a saved partial preset you only change the specific saved settings, while all other key commands settings will be left unchanged.

When you have set up the key commands and macros, proceed as follows to save the partial settings as a preset:

1. Activate the “Store Selected Items Only” option.
When this is activated, a new “Store” column appears in the Commands list.



2. Click in the Store column for the key commands items you wish to save.
Note that if you check an entire category folder (as opposed to separate commands) all commands it contains will automatically also be selected. If this is not what you want, deselect the commands you don’t want to include.

3. Click the Save button (the disk icon) next to the Presets pop-up menu.
A dialog appears, allowing you to type in a name for the Preset.

4. Click OK to save.
Your saved key commands settings will now be available from the Preset pop-up menu for your future projects.

Loading saved key command settings

To load a key command preset, simply select it from the Presets pop-up menu.

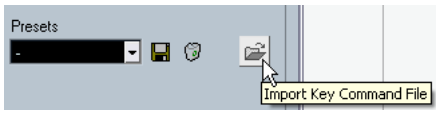
⇨ Note that this operation may replace existing key commands!
The key command settings you load will replace the current key command settings for the same functions (if any). If you have macros of the same name as those stored in the preset you load, these will be replaced too. If you want to be able to revert to your current settings again, make sure to save them first, as described above!

Loading saved key commands settings from earlier versions of Nuendo

If you have saved key commands settings with a previous version of Nuendo, it is possible to use them in Nuendo 4, by using the “Import Key Command File” function, which lets you load and apply saved key commands or macros:

1. Open the Key Commands dialog.

2. Click the “Import Key Command File” button to the right of the Presets pop-up menu.
A standard file dialog opens.



3. In the file dialog, use the “Files of type:” pop-up to specify if you want to import a key commands file (Windows file extension “.key”) or a macro commands file (extension “.mac”).
Key commands files included any macro settings and were saved with the file extension “.xml”. When you have imported an older file, you might want to save it as a preset (see “Saving complete key commands settings as presets” on page 521) to be able to access it from the Presets pop-up menu in the future.

4. Navigate to the file you want to import and click “Open”.
The file is imported.

5. Click OK to exit the Key Commands dialog and apply the imported settings.
The settings in the loaded key commands or macros file now replace the current settings.

About the “Reset” and “Reset All” functions

These two buttons in the Key Commands dialog will both restore the default settings. The following rules apply:

- “Reset” restores the default key command setting for the function selected in the Commands list.
- “Reset All” will restore the default key commands for all commands.

⚠ Note that the “Reset All” operation will cause any changes made to the default key commands to be lost! If you want to be able to revert to these settings again, make sure to save them first!

About the default key commands

As mentioned before, there are numerous default key commands. These are listed in the section “The default key commands” on page 524.

Using Alternative Key Sets

As an alternative to saving and loading key commands settings as previously described, you can set up and save “alternative key sets”. This allows you to switch between different key commands settings “on the fly” while you are working in the program, instead of having to go into the Key Commands dialog to change them.

About the preset Alternative Key Sets

By default, Nuendo contains two different key sets:

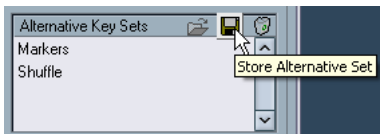
- “Markers” is actually not an alternative key set, but rather the default key set that you can switch back to at any time (see below).
- “Shuttle” is a specialized, alternative key set containing key commands settings for all of the Transport panel’s Shuttle controls.

You could edit and save these under the same names to replace them with your own settings should you so wish, but it is advised that you instead create additional key sets for your specific needs.

Saving an Alternative Key Set

Here’s how to create and save an Alternative Key Set:

1. Open the Key Commands dialog from the File menu.
2. Set up the key commands and macros the way you want them.
3. Decide whether you want to save complete or partial settings by activating/deactivating “Store Selected Items Only”.
4. Click the Store Alternative Set button (the disk icon) in the Alternative Key Sets section.
A dialog appears, allowing you to type in a name for the Preset.



5. Type in a name for the key set and click OK to save it.
The saved key set appears in the list of alternative key sets.

Editing an Alternative Key Set

To edit a saved key set, proceed as follows:

1. Select the key set in the list and click the “Open” button (the folder icon) in the Alternative Key Sets section.
The key set is now activated, and the key commands settings are changed accordingly.
2. Make the desired changes.
3. Click the Store Alternative Set button (the disk icon) in the Alternative Key Sets section.
The key set is saved with the updated settings.

Removing a saved Alternative Key Set

- To remove a saved key set, select it in the list and click the “Remove” button (the trash icon) in the Alternative Key Sets section.
A dialog appears asking if you want to remove the key set or cancel the operation.

Switching between Alternative Key Sets

You switch between different key sets in the program by using the key command assigned to the function “Toggle Alternate Key Commands”, located in the “File” subfolder in the Key Commands dialog.

The key command for this function is by default [F5], but you can of course change this to any key command that suits you best. See “Adding or modifying a key command” on page 518 for instructions on how to change key commands.

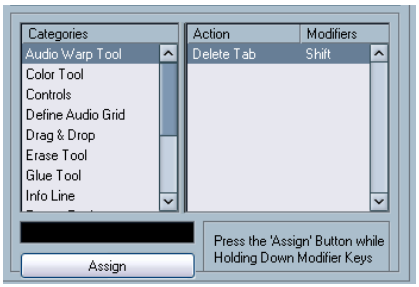
- When you press the key command for the function, a small pop-up appears, indicating which key set is currently loaded.
- Each time you press the key command, you switch to the next available alternative key set.

Setting up tool modifier keys

A tool modifier key is a key you can press to get an alternate function when using a tool. For example, clicking and dragging an event with the Arrow tool normally moves it – holding down a modifier key (by default [Alt]/[Option]) will copy it instead.

The default assignments for tool modifier keys can be found in the Preferences (Editing–Tool Modifiers page). Here, you can also edit them:

1. Open the Preferences dialog from the File menu (on the Mac, this is located on the Nuendo menu) and select the Editing–Tool Modifiers page.



2. Select an option in the Categories list, and locate the action for which you want to edit the modifier key.
For example, the “Copy” action mentioned above resides in the category “Drag & Drop”.

3. Select the action in the Action list.

4. Hold down the desired modifier key(s) and click the Assign button.
The current modifier key(s) for the action is replaced. If the modifier key(s) you pressed are already assigned to another tool, you will be asked whether you want to overwrite them. If you do, this will leave the other tool without any modifier key(s) assigned.

5. When you’re done, click OK to apply the changes and close the dialog.

The default key commands

Below, the default key commands are listed according to category.

- As described in the section “Key command conventions” on page 9, modifier keys are written as:
[Win modifier key]/[Mac modifier key].
For example, “[Ctrl]/[Command]+[N]” in the list below means “press [Ctrl] under Windows or [Command] under Mac OS X, then press [N]”.
- Note that it is possible to switch key commands for menu items and other functions on and off.
This is done in the Preferences dialog–Configuration page. If you disable a key command by switching it off, it will not be possible to invoke the corresponding menu item or function with the key command. See “Customizing” on page 503.

Audio category

Option	Key command
Adjust Fades to Range	[A]
Crossfade	[X]
Find Selected in Pool	[Ctrl]/[Command]+[F]

Automation category

Option	Key command
Toggle Read Enable All Tracks	[Alt]/[Option]+[R]
Toggle Write Enable All Tracks	[Alt]/[Option]+[W]

Devices category

Option	Key command
Mixer	[F3]
Video	[F8]
VST Connections	[F4]
VST Instruments	[F11]
VST Performance	[F12]

Edit category

Option	Key command
Autoscroll	[F]
Copy	[Ctrl]/[Command]+[C]
Cut	[Ctrl]/[Command]+[X]
Cut Time	[Ctrl]/[Command]+[Shift]+[X]
Delete	[Del] or [Backspace]
Delete Time	[Shift]+[Backspace]
Duplicate	[Ctrl]/[Command]+[D]
Edit In-place	[Ctrl]/[Command]+[Shift]+[I]
Group	[Ctrl]/[Command]+[G]
Insert Silence	[Ctrl]/[Command]+[Shift]+[E]
Left Selection Side to Cursor	[E]
Lock	[Ctrl]/[Command]+[Shift]+[L]
Move to Cursor	[Ctrl]/[Command]+[L]
Mute	[M]
Mute Events	[Shift]+[M]
Mute/Unmute Objects	[Alt]/[Option]+[M]
Open Default Editor	[Ctrl]/[Command]+[E]
Open Score Editor (Nuendo Expansion Kit only)	[Ctrl]/[Command]+[R]
Open/Close Editor	[Return]
Paste	[Ctrl]/[Command]+[V]
Paste at Origin	[Alt]/[Option]+[V]
Paste Time	[Ctrl]/[Command]+[Shift]+[V]
Record Enable	[R]
Redo	[Ctrl]/[Command]+[Shift]+[Z]
Repeat	[Ctrl]/[Command]+[K]
Right Selection Side to Cursor	[D]
Select All	[Ctrl]/[Command]+[A]
Select None	[Ctrl]/[Command]+[Shift]+[A]
Snap On/Off	[J]
Solo	[S]
Split At Cursor	[Alt]/[Option]+[X]
Split Range	[Shift]+[X]
Undo	[Ctrl]/[Command]+[Z]
Ungroup	[Ctrl]/[Command]+[U]
Unlock	[Ctrl]/[Command]+[Shift]+[U]
Unmute Events	[Shift]+[U]

Editors category

Option	Key command
Show/Hide Infoview	[Ctrl]/[Command]+[I]
Show/Hide Inspector	[Alt]/[Option]+[I]
Show/Hide Overview	[Alt]/[Option]+[O]

File category

Option	Key command
Close	[Ctrl]/[Command]+[W]
New	[Ctrl]/[Command]+[N]
Open	[Ctrl]/[Command]+[O]
Quit	[Ctrl]/[Command]+[Q]
Save	[Ctrl]/[Command]+[S]
Save As	[Ctrl]/[Command]+[Shift]+[S]
Save New Version	[Ctrl]/[Command]+[Alt]/[Option]+[S]
Toggle Alternate Key Commands	[#]

Media category

Option	Key command
Open MediaBay	[F5]
Open Loop Browser	[F6]
Open Sound Browser	[F7]

MIDI category

Option	Key command
Quantize	[Q]

Navigate category

Option	Key command
Add Down: Expand/Undo selection in the Project window to the bottom/ Move selected event in the Key Editor down 1 octave	[Shift]+[Down Arrow]
Add Left: Expand/Undo selection in the Project window/ Key Editor to the left	[Shift]+[Left Arrow]
Add Right: Expand/Undo selection in the Project window/ Key Editor to the right	[Shift]+[Right Arrow]
Add Up: Expand/Undo selection in the Project window to the top/ Move selected event in the Key Editor up one octave	[Shift]+[Up Arrow]
Down: Select next in the Project window/ Move selected event in the Key Editor one semitone down	[Down Arrow]
Left: Select next in the Project window/ Key Editor	[Left Arrow]
Right: Select next in the Project window/ Key Editor	[Right Arrow]
Up: Select next in the Project window/ Move selected event in the Key Editor one semitone up	[Up Arrow]
Bottom Select bottom track in the track list	[End]
Top: Select top track in the track list	[Home]

Nudge category

Option	Key command
End Left	[Alt]/[Option]+[Shift]+[Left Arrow]
End Right	[Alt]/[Option]+[Shift]+[Right Arrow]
Left	[Ctrl]/[Command]+[Left Arrow]
Right	[Ctrl]/[Command]+[Right Arrow]
Start Left	[Alt]/[Option]+[Left Arrow]
Start Right	[Alt]/[Option]+[Right Arrow]

Project category

Option	Key command
Open Browser	[Ctrl]/[Command]+[B]
Open Markers	[Ctrl]/[Command]+[M]
Open/Close Pool	[Ctrl]/[Command]+[P]
Open Tempo Track	[Ctrl]/[Command]+[T]
Setup	[Shift]+[S]
Show/Hide Track Colors	[Shift]+[C]

Score Functions category

Option	Key command
Insert Voice: Next	[Alt]/[Option]+Pad[+]
Insert Voice: Previous	[Alt]/[Option]+Pad[-]

Tool category

Option	Key command
Delete tool	[5]
Draw tool	[8]
Drumstick tool (Nuendo Expansion Kit only)	[0]
Glue tool	[4]
Mute tool	[7]
Next Tool	[F10]
Play tool	[9]
Previous Tool	[F9]
Range tool	[2]
Select tool	[1]
Split tool	[3]
Zoom tool	[6]

Transport category

Option	Key command
AutoPunch In	[I]
AutoPunch Out	[O]
Cycle	Pad [/]
Exchange time formats	[.]
Fast Forward	[Shift]+Pad [+]
Fast Rewind	[Shift]+Pad [-]
Forward	Pad [+]
Input Left Locator	[Shift]+[L]
Input Position	[Shift]+[P]
Input Right Locator	[Shift]+[R]
Input Tempo	[Shift]+[T]
Insert Marker	[Insert] (Win)
Locate Next Event	[N]
Locate Next Marker	[Shift]+[N]
Locate Previous Event	[B]
Locate Previous Marker	[Shift]+[B]
Locate Selection	[L]
Locators to Selection	[P]
Loop Selection	[Shift]+[G]
Metronome On	[C]
Nudge Down	[Ctrl]/[Command]+Pad [-]
Nudge Up	[Ctrl]/[Command]+Pad [+]
Panel (Transport panel)	[F2]
Play Selection Range	[Alt]/[Option]+[Space]
Recall Cycle Marker 1 to 9	[Shift]+Pad [1] to Pad [9]
Record	Pad [*]
Retrospective Record	[Shift]+Pad [*]
Return to Zero	Pad [.] or Pad [,]
Rewind	Pad [-]
Set Left Locator	[Ctrl]/[Command]+Pad [1]
Set Marker 1	[Ctrl]/[Command]+[1]
Set Marker 2	[Ctrl]/[Command]+[2]
Set Marker 3 to 9	[Ctrl]/[Command]+Pad [3] to [9] or [Ctrl]/[Command]+ [3] to [9]
Set Right Locator	[Ctrl]/[Command]+Pad [2]
Start	[Enter]
Start/Stop	[Space]
Stop	Pad [0]
To Left Locator	Pad [1]
To Marker 1	[Shift]+[1]
To Marker 2	[Shift]+[2]
To Marker 3 to 9	Pad [3] to [9] or [Shift]+[3] to [9]
To Right Locator	Pad [2]
Use External Sync	[T]

Workspace category

Option	Key command
Lock/Unlock Active Workspace	[Alt]/[Option]+Pad [0]
New	[Ctrl]/[Command]+Pad [0]
Organize	[W]
Workspace 1-9	[Alt]/[Option]+Pad [1-9]

Zoom category

Option	Key command
Zoom Full	[Shift]+[F]
Zoom In	[H]
Zoom In Tracks	[Alt]/[Option]+[Down Arrow]
Zoom Out	[G]
Zoom Out Tracks	[Alt]/[Option]+[Up Arrow] or [Ctrl]/[Command]+[Up Arrow]
Zoom to Event	[Shift]+[E]
Zoom to Selection	[Alt]/[Option]+[S]
Zoom Tracks Exclusive	[Z] or [Ctrl]/[Command]+ [Down Arrow]

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