NUENDO 3

MEDIA PRODUCTION SYSTEM

Mac | PC VERSION

steinberg

Manual by C. Bachmann, H. Bischoff, S. Pfeifer, C. Schomburg
Control Room Description by Ashley Shepherd

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Introduction

Welcome!

Welcome to Nuendo 3.2! This document lists and describes all features that have been added to or modified in the program since the original 3.0 version. To read more about a feature listed below, please click the respective green link.

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Working with 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 talkback 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. DAW software had not yet become fully integrated into a larger studio scenario until the advent of Nuendo's Control Room features.

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.

Control Room Features

Here is a list of features available for the Control Room Mixer:

- Support for up to four sets of monitors with various speaker configurations from mono all the way 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 enabling.
- 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 MixConvert for all speaker configurations.
- Individual speaker soloing for all speaker configurations.
- Multiple inserts on each Control Room channel for metering and surround decoding 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 dialog (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 will configure all the inputs and outputs for the Control Room Mixer.

Control Room Channels

There are five types of channels that you can create, each one 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 track 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 source audio source. Up to six External Inputs can be created with various configurations from mono all the way 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 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 VST Inputs and Outputs can share the same Device Ports.

A great deal of confusion can result if VST Outputs and Control Room Monitor channels share the same Device Ports. As a starting point, set all the VST Outputs to "Not Assigned" while the Control Room is setup. 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 VST Connections. 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. All available channels will be listed 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 the Talkback is mono only and the Phones are stereo only. Also, Studio channels can either be mono or stereo only.

The Studio Tab of the VST Connections window with all possible 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. 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. There are four available Studio channels. For example, if you have two available headphone amplifiers for performers to use, create two Studio channels, one for each headphone mix.

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.

External Inputs can share Device Ports with VST Inputs, allowing you to also record from those sources directly into Nuendo.

Talkback

Create a Talkback channel if you have a microphone in the control room available for communication with performers in the studio. The Talkback 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 VST 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 to 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 may simply press the Disable Control Room button found in 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 may also create presets for the Control Room configuration in the same manner as for VST Inputs and Outputs.

If you disable the Control Room, make sure that there are Device Ports assigned to the Main Mix in the VST Outputs tab. Otherwise, you will not hear any sound from the Main Mix.

VST Outputs - Main Mix

In order for the Control Room to function correctly, the Main Mix in the VST Outputs tab must be assigned to the set of outputs that actually contains your final mix signal. If you only have one VST Output Bus, it will be the Main Mix by default.

If you have more than one VST Output Bus defined, you can change which one is the Main Mix by right-clicking (Win) or [Ctrl]-clicking (Mac) on the name of the VST Output and selecting "Set "Out" as Main Mix". The Main Mix is marked by a small speaker icon to the left of its name.
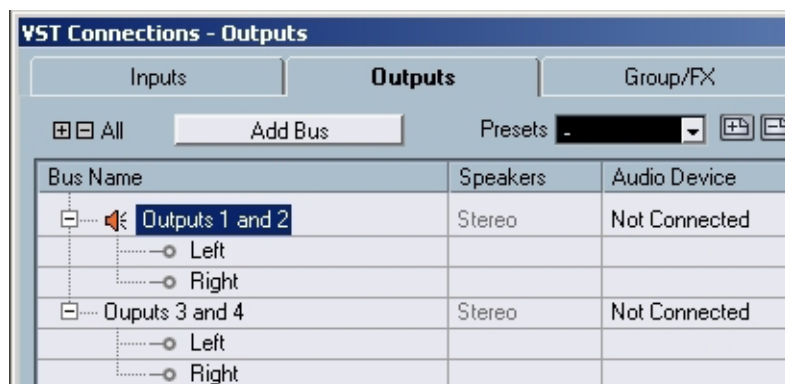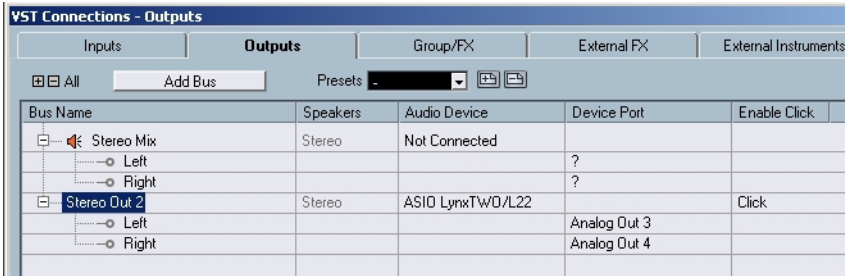

The VST Connections Output tab showing one bus as the Main Mix marked by the small speaker icon.

VST 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.

VST Output Click Enabling

There may be an occasion in which you want the click track of a ded-
icated VST Output always to be routed to it regardless of the Control
Room settings or if the Control Room is disabled. In these cases,
there is the option to enable the click output on specific VST Outputs
using the Enable Click column in the VST Connections window.

VST Connections - Outputs					
Inputs	**Outputs**	Group/FX	External FX	External Instruments	

Bus Name	Speakers	Audio Device	Device Port	Enable Click	
⊟ 🔊 Stereo Mix	Stereo	Not Connected			
—o Left			?		
—o Right			?		
⊟ Stereo Out 2	Stereo	ASIO LynxTWO/L22		Click	
—o Left			Analog Out 3		
—o Right			Analog Out 4		

The VST Output tab showing two stereo outputs, the Main Mix and a second output
that is click enabled.

**The click will only be heard in VST 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 VST 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 VST 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 over-
loads and possible damage to speaker equipment. Refer to the hard-
ware's 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. All possible channels are shown. Active ones are highlighted once they have been created in VST Connections. Channels that are greyed out have not been defined in VST Connections.

The Control Room Overview allows you to visually see the signal flow through the Control Room Mixer. All the routing functions of the Control Room Mixer are duplicated here in the Overview.
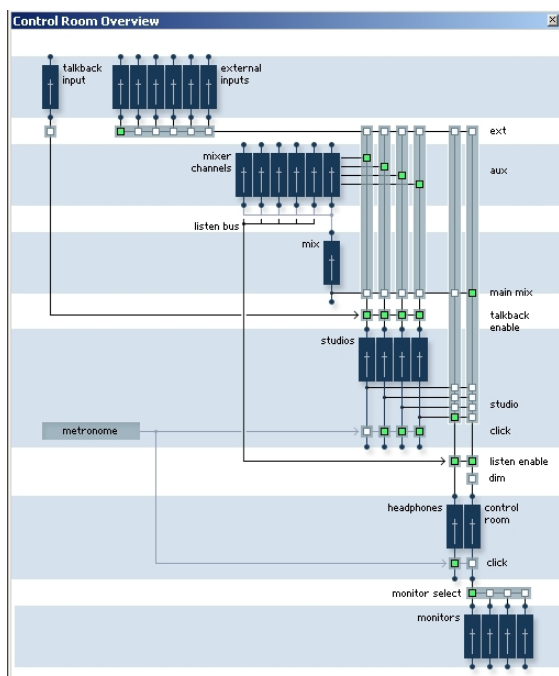
The Control Room Overview

Open the Control Room Mixer and the Control Room Overview windows side by side. As you operate the controls on 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. The default configuration is the minimal size.
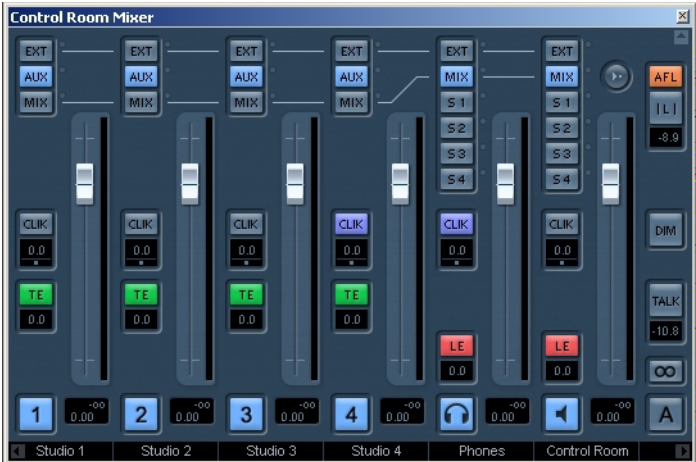
The Control Room Mixer in default configuration

Configuring the Control Room Mixer

In order to display more controls in the Mixer, the small tabs found 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 tab found at the upper right corner of the Mixer extends the Mixer vertically to display meters and inserts (Extended View). A second vertical expansion tab appears above the inserts and meter display. Extending the mixer using this tab exposes the Input Gain and Input Phase switch, channel configuration and name for each channel (Routing View).

These tabs work in the same manner as the Project Mixer vertical expansion tabs.

Right-clicking (Win) or [Ctrl]-clicking (Mac) anywhere on the Control Room Mixer brings up a contextual menu that allows you to resize the Mixer in the same way as the expansion tabs. Use the options in the Window sub-menu to show the Left and Right Strips along with the Extended and Routing Views.

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, uncheck the Show Meters option from the Mixer's contextual 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.
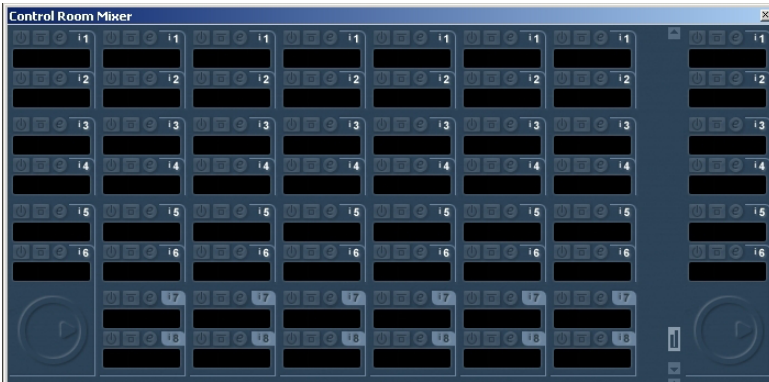
The Control Room Mixer's Extended View displaying channel inserts

If you do not wish to see full sized meters but still want some indication of signal activity, activate the option "Signal Presence Indicator" in the Preferences dialog (VST – Control Room page). They will be displayed next to the input selection buttons and will indicate signal presence for all inputs.
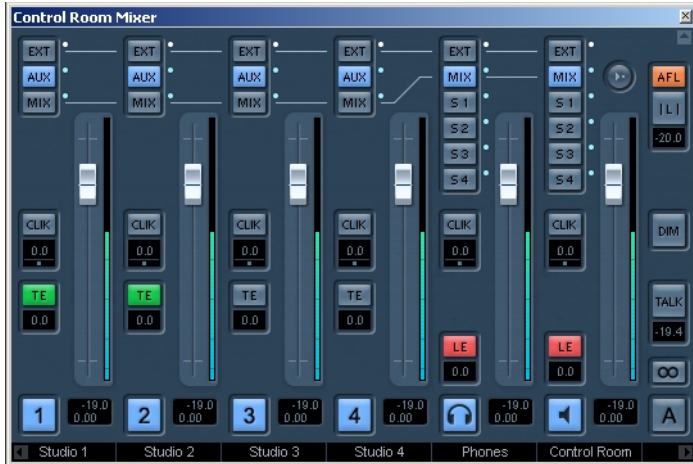
The Control Room Mixer with all Signal Presence indicators lit up

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 will display the inserts associated with that channel above in the Extended View.

The Talkback

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.

Monitors

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 expanded 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 down-mixing of multichannel sources are shown. There are four downmix presets. Some will automatically configure themselves for the sets of monitors you have defined. Each preset is adjustable by accessing MixConvert via the tab on the upper right corner of the downmix selection.

Access tab for MixConvert

The Edit Down-Mix tab

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 by clicking on the tab to open MixConvert.

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. Filling 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, Nuendo's 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 lists every control along with a brief description of what it does.
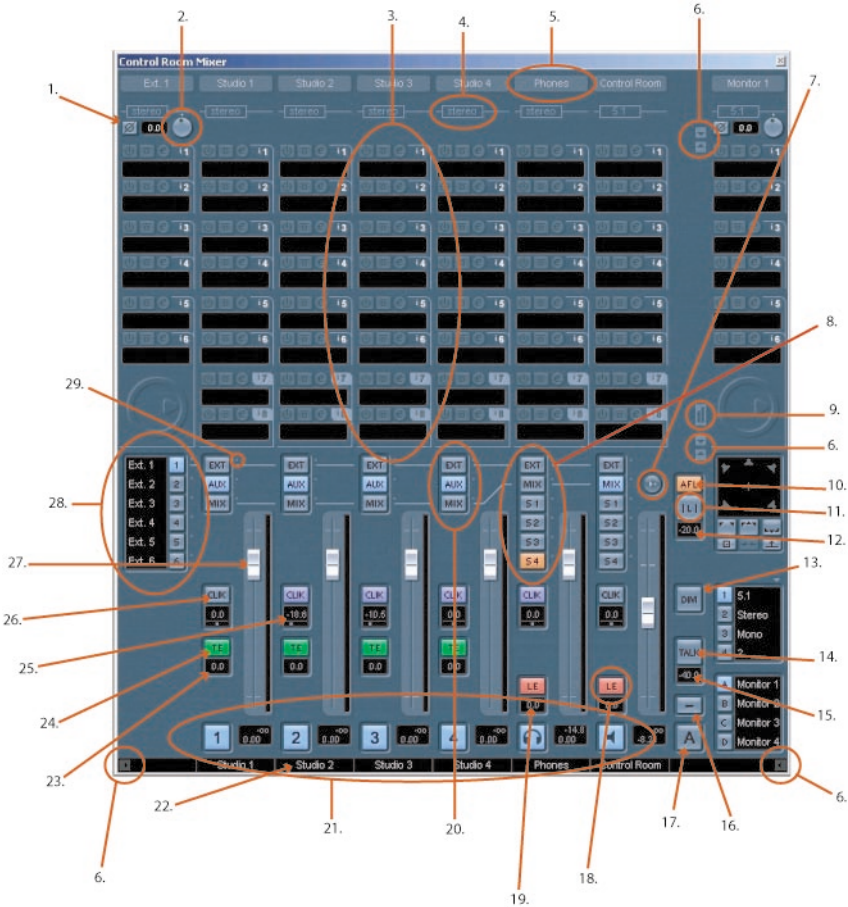
The completely expanded Control Room Mixer

1. Input Phase

Each External Input and Monitor speaker output has a 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 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 whether stereo, 5.1 etc…

5. Channel Labels

This displays the name of the channel as defined in VST Connections.

6. Expansion Tabs

There are four expansion tabs that open and close various portions of the Control Room Mixer. The default settings are with these portions closed.

7. Use Reference Level

When this button is on, the Control Room Level is set to a predetermined level for calibrated mixing environments such as film dubbing stages. Press [Alt]/[Option] and click on this button to set the Reference Level to the current Control Room level. This setting is also available in the Preferences dialog.

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. View Selector

This toggles the Expanded View area from the Meters to the Inserts.

10. Listen Bus AFL/PFL

This button determines whether the 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 allow 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 (default is -30dB). 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

This is the TALK button that turns 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 ensures that communication is clear and can be heard above the main mix. If the Talkback DIM level is set to 0dB, no change will occur in the Control Room channels.

16. Cycle Down-Mix Preset

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 Monitor 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 Studios 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 VST Connections.

23. Talkback Level

This popup fader controls the amount of Talkback signal fed to each Studio's output.

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 the Talkback Enable is off, the Talkback DIM setting has no effect on this output.

25. Metronome Mix

This level and pan controls 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. They 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 will be seen here as they were created in 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.
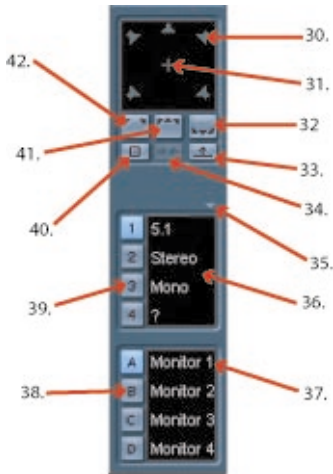
The Monitor controls from the Control Room Mixer

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 Speakers

This solos all rear channels.

33. Rears to Front

This button solos the rear channels and routes them to the front speakers.

34. Solo Speaker to Center

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. An "?" 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 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. Speaker Down-Mix Selection

These buttons select the Down-Mix preset for the current Monitor.

40. Speaker Solo Defeat

This buttons defeats all speaker solos, resetting them for normal playback.

41. Solo Front Speakers

This button solos all front speakers.

42. Solo LR Pair

This button solos the left and right channels.

The Main Mix and Control Room Channel

The channel configuration of the VST Output that is the Main Mix 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 VST Output to "Not Assigned". This eliminates many confusing errors and unpredictable behavior since VST 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 by themselves.
- 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 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 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 dialog (VST – Control Room page).
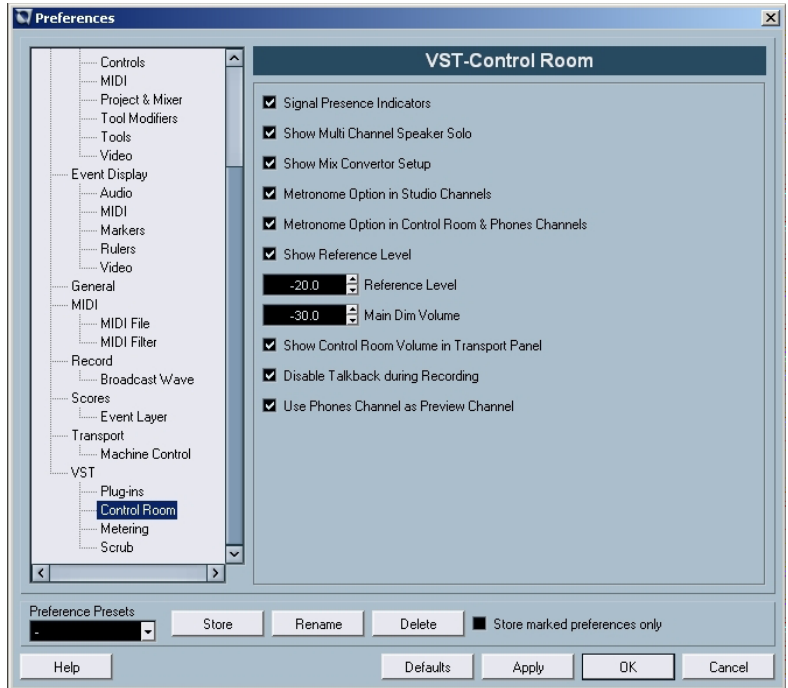
The Control Room Preferences

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.

- 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 checked, that fader controls the level of the Main Mix bus.

- Disable Talkback during Recording
  When checked, 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 checked, 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.

Studios and Studio Sends

The latest additions to Nuendo's Project Mixer and the Inspector are the Studio Sends. 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 VST Connections. Otherwise they remain greyed out. For every Studio defined in 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 display pulldown menu in each channel or by pressing the star icon found in the common panel of the extended 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.


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. In order to hear the Studio Sends mix in the Studio output, the input selector for each Studio must be set to "Aux".
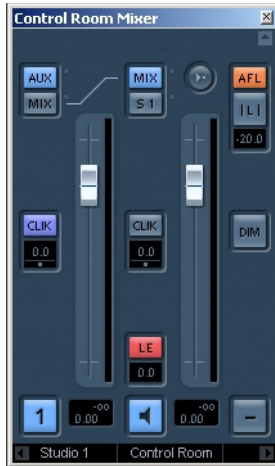
A Studio Channel in the Control Room Mixer with its input set to Aux.

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 Main Mixer

You can create a cue mix from the fader and pan levels already used in the main 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, follow these steps:

1. In the Project Mixer, select all the channels that you wish to copy settings from.
Only the selected channels will perform these operations. If no channels are selected, nothing will happen in the following steps.

2. In the Control Room Mixer, right-click (Win) or [Ctrl]-click (Mac) any-where in a Studio Channel's mixer strip and a contextual menu will ap-pear that has the Studio's name as a submenu.

This submenu contains all the Studio Send functions for that Studio. If you open the contextual menu outside of a Studio mixer strip, the submenu will be for All Studios.

The Control Room Mixer's contextual menu

3. Choose the "Use Current Mix Levels" to copy the fader levels on the selected tracks to the Studio Sends.

This options 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" 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" to activate the Sends on selected channels.

By default, Studio Sends are not enabled even when level and pan information is cop-ied 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. The problem arises when creating a "more me" mix 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, follow these steps to adjust their relative levels.

1. Select all the channels you wish to modify.
   Only selected channels are affected by the contextual menu commands.

2. Right-click (Win) or [Ctrl]-click (Mac) anywhere in the Studio mixer strip on the Control Room Mixer to open the contextual menu for that Studio.
   You may also use the contextual 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" from the Studio submenu.
   This will bring up a gain window with a checkbox that reads "Relative Mode". Make sure this is checked 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 popup 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 the each Studio Send level would have 3dB subtracted from it.

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.

The "Change Studio Sends Level" dialog

If you uncheck 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 VST Outputs

Each VST Output also has Studio Sends. Studio Sends from the Main Mix output can be used to instantly route the main mix to the Studio output. "More me" channels can also be routed via their Studio Sends to create fast cue mixes in a different fashion.

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 post-fader levels of -6dB, do the following:

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 (Win) or [Ctrl]-click (Mac) to open the contextual menu. In the Studio submenu, select the "Reset Studio Sends" command.

If you open the contextual menu in other areas of the Control Room Mixer besides the Studio mixer strips, the contextual menu commands will affect all Studios at the same time.

3. Selecting the "Reset Studio Sends" 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 use internal processing to accommodate their routing and processing. This means that audio going through the Control Room Mixer, including Studio Sends, will be subject to the latency of the host computer system.

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.

Working with the new features

Editing – General

New Preferences options
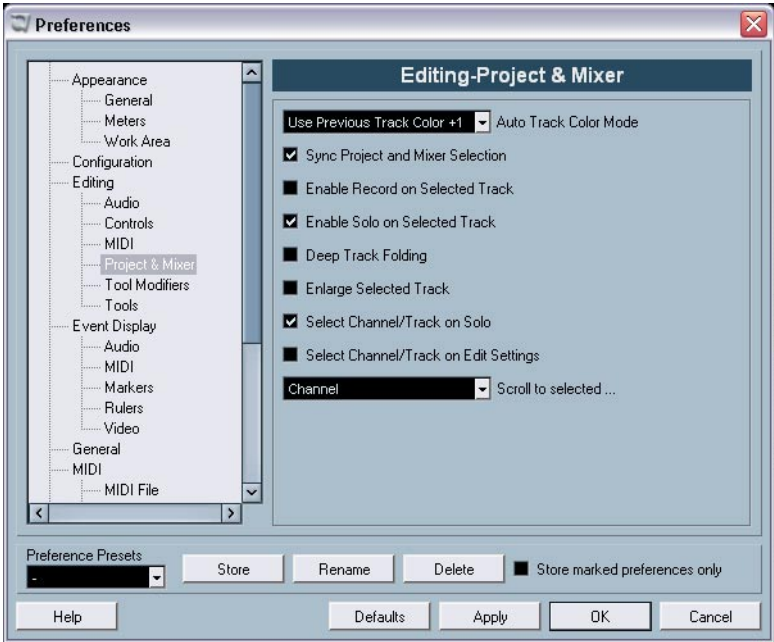
For Nuendo 3.1 several changes have been made to the Preferences dialog. A new subpage "Project & Mixer" has been added to the Editing page, the VST page has been further subdivided, etc. In the following sections, the changes are described separately for the different pages of the dialog.

Appearance

Appearance–Work Area

On this subpage, the Drum Editor option "Active Drum Line Intensity" has been added. This allows you to accentuate the display of the selected drum line.

Editing

On the main Editing page, the following options have been added:

- Use Up/Down Navigation Commands for selecting Tracks only
  By default, tracks are selected with the up/down arrow keys on the computer keyboard. These are however also used for selecting events which can lead to confusing results in some cases. Since track selection is a most vital operation in both editing and mixing, you now have the opportunity 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 however, 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.

- 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 (the respective button shows a note symbol). When you select "Time Linear", all new tracks will use linear time base (i.e. the button shows a clock symbol). The third option uses the primary time for-

mat 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.

Editing–Project & Mixer

This is a new subpage of the Preferences dialog with the following new options:

▪ Auto Track Color Mode
This offers you several options for automatically assigning colors to tracks that are added to the project.

▪ Sync Project and Mixer Selection
This is not a new feature, rather an old one with a new name. In previous versions, this was called "Mixer Selection follows Project". It has been renamed because the function really works both ways. For a description of the functionality (with the "old" name "Mixer Selection follows Project"), see the dialog help for the Preferences dialog or the chapter "The Mixer" in the Operation Manual.

▪ Deep Track Folding
When you activate this option, any folding settings you make (on the Project menu – Track Folding submenu) 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 sub-tracks open, all these audio tracks within the folder track will be folded in as well.

▪ Enlarge Selected Track
Activate this option to enter a mode where the selected track in the Project window will be enlarged. (You can adjust the size directly in the Track list if the default enlargement factor does not suit you.) When this option is activated and you select another track in the Track list, this is automatically enlarged and the previously selected track is displayed in its previous size again.
Please note that Enlarge Selected Track is also available on the Edit menu.

▪ Select Channel/Track on Solo
When you activate this option, a track in the Track list or a channel in the mixer automatically gets selected when the Solo button is activated.
Deactivating this option always keeps the current selection status, regardless of the Solo setting for the tracks.

▪ Select Channel/Track on Edit Setting
When you activate this option, a track in the Track list or a channel in the mixer automatically gets selected when you click the respective Edit button (e).
Deactivating this option always keeps the current track/channel selection.

- The "Scroll to selected…" pop-up menu
  The options in this pop-up menu work as follows:

- When you select "Track", the Track list display follows the display in the Mixer, i.e. when you select a channel in the mixer, the respective track is automatically displayed in the Track list as well. (However, this does not work the other way around in this mode.)
- When you select "Channel", selecting a track in the Track list automatically scrolls the mixer to display the respective channel strip. (Here too, this does not work vice versa.)
- When you select "Channel and Track", both Track list and Mixer are automatically scrolled to display the track or channel selected in the other.
- Selecting "Disabled" deactivates this scrolling behavior.

Editing–Tools

- Cross Hair Cursor options:
  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 slightly differently for the different tools.
- 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 using the event trim handles.
- When the Scissors tool is selected, the cross hair cursor appears as soon as you move the mouse over the event display.
- For the other tools, the cross hair cursor is not used.

General

On the General page, there is one new option:

- Maximum Backup Files
  This allows you to specify how many backup files will be created with the Autosave function. When the maximum number of backup files is reached, the existing files will be overwritten (starting with the oldest file).

MIDI

On the main MIDI page, the following options have been added:

- Insert Reset Events after Record
  This is a very handy function for MIDI recording. At the end of each re-
  corded 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 re-
  corded. This can be prevented by activating "Insert Reset Events after
  Record".

- Chase Events – Chase not limited to Part Boundaries
  In previous program versions, Chase was only performed on parts
  "touched" by the position cursor.
  When you activate this option, MIDI controllers are also chased out-
  side 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 e.g. positioning and soloing.
  When you deactivate this option, the MIDI controllers are only chased
  within the parts under the position cursor.

VST

The main VST page now has three further subpages. On the main
VST page, the following options have been added:

- Default Stereo Panner Mode
  This allows you to specify the default pan mode for inserted audio
  tracks (Stereo Balance Panner, Stereo Dual Panner or Stereo Com-
  bined Panner). For a description of these modes, see the chapter
  "The Mixer" in the Operation Manual.

- Activate dialog "Export Warnings as text file"
  When you open a project which contains e.g. missing plug-ins, a dialog
  opens listing these. When this dialog is closed, a message appears,
  asking whether you want to export these warnings as text file. This mes-
  sage can be deactivated, i.e. if you activate the "Do not show this mes-

sage again" checkbox, it will not be displayed in the future (when opening other projects with missing plug-ins etc.). To display this message again, and thus be able to export important warnings as text files, activate the option "Activate dialog 'Export Warnings as text file'".

• Warn on Processing Overloads
When you activate this option, a warning message will be displayed as soon as the CPU clip indicator (on the Transport panel) lights up during recording.

VST–Metering

• 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 (see the Operation Manual for details).

VST–Scrub

• CPU Saving Scrub Mode
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.

Key Commands

A wide range of new key commands has been added for various areas of the program. These can be assigned or modified as usual in the Key Commands dialog (this is described in detail in the Key Commands chapter in the Operation Manual).

There is now a separate Mixer section in the Key Commands dialog (see also page 85), allowing you to e.g. hide the different channel types, to save or load the Mixer settings, etc. In the Edit category, you can now define a key command for opening the Device panel for the selected track. Also, please note that the key command that was used to open the Pool window can now be used to close the Pool as well.

Track Folding
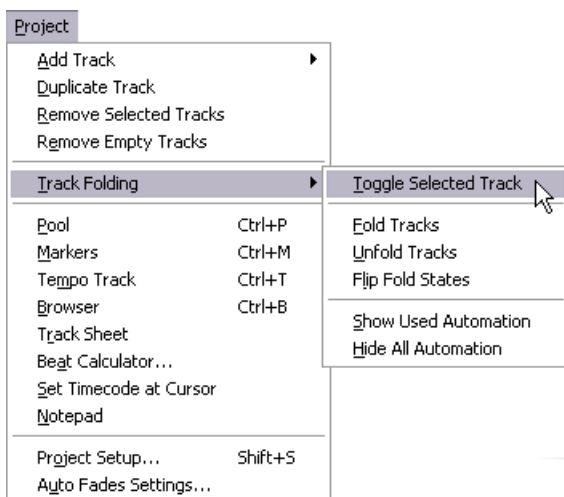
On the Project menu, the Track Folding submenu has been added, allowing you to quickly show, hide or invert what is displayed in the Project window event display. This allows e.g. for dividing the project into several parts (by creating several folder tracks for the different project elements) and showing/hiding their contents by selecting a menu function (or using a key command). 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 dialog, see page 52.

- 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 dialog, see page 52.

- 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).**

- **Note that there is a separate Deep Track Folding setting in the Preferences dialog (Editing – Project & Mixer page), which affects some of these menu items (see page 52).**

Gluing events/parts together

In version 3.1 of the program, the behavior of the Glue Tube tool has been modified. Below, you will find descriptions of what you can do with this tool.

Working with the Glue Tube tool

By using the Glue Tube tool, you can combine several audio or MIDI events/parts or even controller events in the Project window, the In-Place-Editor, the MIDI editors, etc. in the following ways:

Gluing one audio event/part to the next

Clicking on an audio event or part with the Glue Tube tool glues it to the next audio event on the track. The events do not have to touch one another. The result is a part containing the two events. The resulting part will get the name of the track:
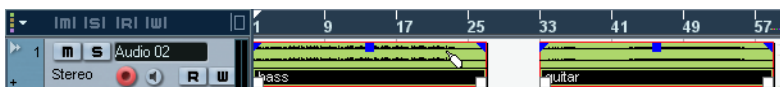
If you click on the "bass" event to glue it to the "guitar" event…
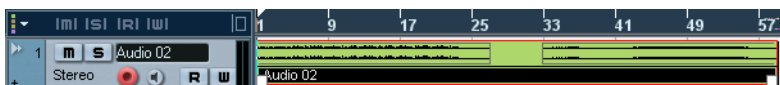
…a part with the name of the audio track will be created, containing the two events.

• 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.

Each audio event in the part will keep its own properties (event name, mute status, etc.).

Gluing one MIDI event/part to the next

Clicking on a MIDI part with the Glue Tube tool glues it to the next part on the track. The parts do not have to touch one another. The resulting part will get the name of the first part:

If the Parts overlap, they are merged in the overlapping area, i.e. no events are lost.

> The resulting long part will get the properties of the first part (the one on which you clicked). This includes part name, part mute status, etc.

• **You can also glue events within folders this way.**

Gluing several events in one go

You can also glue several selected events on one or on several tracks in one go. This means that you can select several pairs of events on different tracks, and click with the glue tool on one of them. All selected events on the same track will be glued together.

Click on one of the selected events with the Glue Tube tool…

…to glue the events on the same track together.

Gluing an event to all following events of a track in one go

If you hold down [Alt]/[Option] and click on an event with the Glue
Tube tool, this and all following events on that track will be glued to-
gether. You can also change the default key command for this in the
Preferences dialog (Editing–Tool Modifiers page).

Metronome settings

There is a new option called Use Time Signature at Record Start Time in the Precount Options section of the Metronome Setup dialog (which is accessed via the Transport menu).
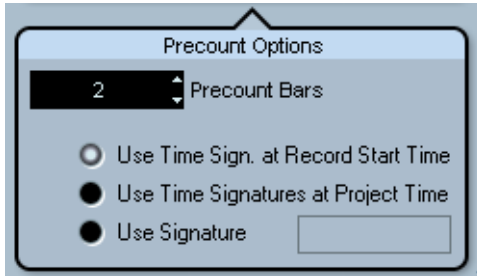
In the Precount Options section you can specify how long (i.e. for how many bars) a precount click should be audible before recording starts and which time signature this precount click should use.

There are three options regarding the time signature of the precount:

- When you select Use Time Signature at Project Time, the time signature of the Tempo track including all tempo changes is used.

- When you select Use Signature, you can set a separate time signature that is independent of the Tempo track.

- When you select Use Time Signature at Record Start Time, the precount will automatically use the time signature and tempo set at the position where recording will start.

Synchronization settings

There is a new option called "MIDI Clock Follows Project Position" in the MIDI Clock Destinations section of the Synchronization Setup dialog (which is accessed via the Transport menu).
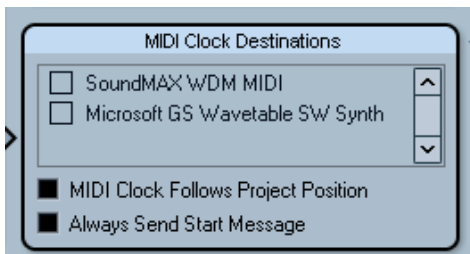
The MIDI Clock Destinations section in the Synchronization Setup dialog.

This option is similar to the "MIDI Timecode Follows Project Time" option in the MIDI Timecode Destinations section in the same dialog (see the Synchronization chapter in the Operation Manual), only that this is applicable for devices synchronized to MIDI Clock signals instead of MIDI Timecode signals.

▪ 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.

Duplicating tracks

On the Project menu, you will find the new "Duplicate track" command. When you select a track in the track list and choose this option, a copy of the selected track is created and inserted below the original track. You can also define a key command for this function.

Exporting selected tracks

Nuendo allows you to select individual tracks of a project and to export these as a track archive. When exporting, you now have the option to exclude the media files referenced by these tracks from the export, i.e. only file references and other track specific data are exported.

Importing Track Archives

Selecting individual tracks in an archive

When importing a track archive, you can select which of the tracks contained in this archive you wish to import. Proceed as follows:

1. Pull down the File menu and open the Import submenu.

2. On the submenu, select Track Archive.

3. In the file dialog that appears, locate the archive's xml file, select it and click "Open".
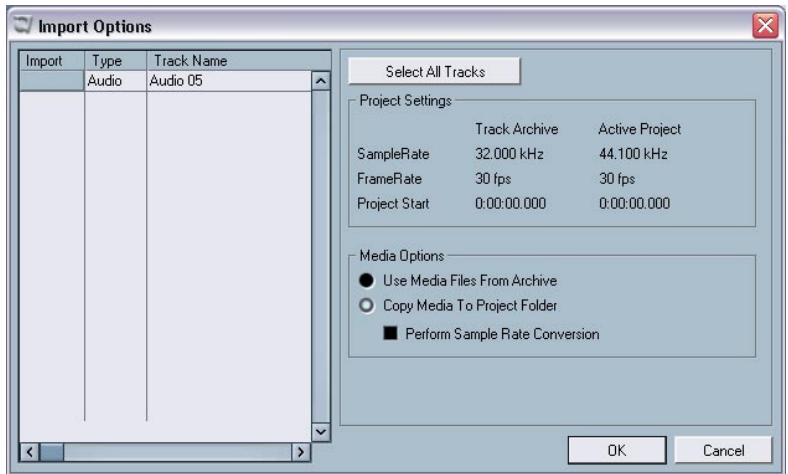
The Import Options dialog opens.
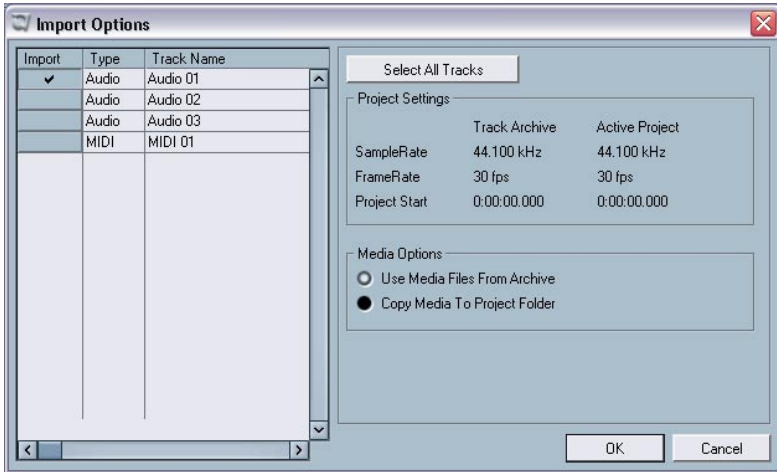
4. In the Import Options dialog, click in the Import column to the left to select the desired track(s).

A check mark is shown for all selected tracks.

Sample rate conversion when importing tracks

A track archive may contain media files with a sample rate that is different from the sample rate of your currently active project. When importing such a track archive, the Import Options dialog will show the different sample rates and an additional option in the Media Options section:

"Perform Sample Rate Conversion" is available in the Import Options dialog.

In the Media Options section of the Import Options dialog, select which operation to perform when importing the track(s):

- 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.

- When "Copy Media To Project Folder" is selected, the "Perform Sample Rate Conversion" option becomes available, allowing you to convert the imported media files to the sample rate used in the active project.

The Stereo Pan Law modes

In the Project Setup dialog there is a pop-up menu named "Stereo Pan Law", on which you can select a pan mode. These different pan modes provide gain compensation. This is necessary because without compensation, the gain of the sum of the left and right side will be higher (louder) if a channel is panned center than if it's panned left or right. This is described in the chapter "The mixer" in the Operation Manual.

- **You can now 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.**

Resizing tracks in the Track list

With the introduction of version 3.1 of the program, you have now the possibility to resize a track in the Track list without automatically selecting it. This is a handy feature when "Enlarge Selected Track" is activated (see page 52).

Normally, a track automatically gets selected when it is being resized in the Track list. With Enlarge Selected Track activated, it is therefore impossible to change the track size for a track permanently. As soon as you try to resize it, it gets selected and is automatically enlarged.

However, there might be situations where you want to change the size of one of the tracks permanently. If this is the case, proceed as follows:

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.

▪ The track height is adjusted, but the track is not automatically selected. This way you can change the "original" size of the track. When this track is selected (and Enlarge Selected Track is activated), it will be enlarged and when another track gets selected, the track will revert to the size you specified.

Inspector sub panels

Normally, when a MIDI track is routed to a VST instrument, a new sub panel (with the name of the instrument) is added to the inspector for the selected track.

This is now also the case in the following situations:

- When a MIDI track is routed to an external instrument or effect that has an associated MIDI Device. In this case, the new sub panel gets 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 an effect-plug-in assigned to a FX Channel track, a respective FX sub panel is added to the Inspector.
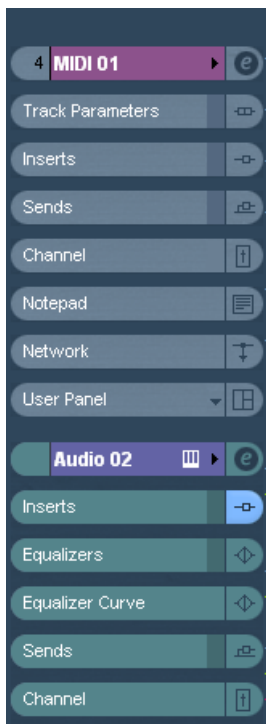
A MIDI track routed to an effect plug-in used as an insert effect on an audio track.

Editing – MIDI

Freezing track parameters

This 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 Track Parameters tab (i.e. Transpose, Velocity Shift, Velocity Compression and Length Compression).
- The settings on the Inserts tab. (If you are using an arpeggiator for example and want to convert the added notes into 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 – please note that the Volume setting is not taken into account.

Those settings usually do not change the MIDI events themselves, but rather work like a "filter", affecting the music on playback. However sometimes you may want to make these settings permanent, i.e. convert them to "real" MIDI events. For this, you can use the Freeze Track Parameter command on the MIDI menu. This works as follows:

1. Select the tracks whose settings should become permanent.

2. Pull down the MIDI menu and select "Freeze Track Parameter".
   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.

Dissolving parts
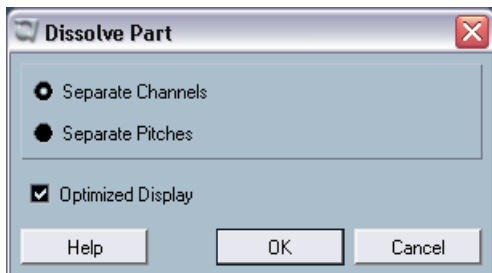
The option "Optimized Display" has been added to the Dissolve Part dialog. The Dissolve Part function still splits parts into separate channels or pitches (depending on your settings), but you can now automatically remove the silent (empty) areas of the resulting parts by activating the "Optimized Display" checkbox.

The Legato dialog
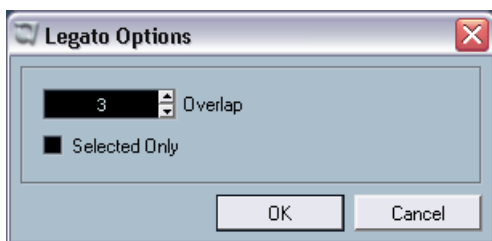
One new feature has been added to the Legato dialog. Previously, when the Legato function was applied, it lengthened the selected note so that it reached the following note (for a detailed description of this function, see the chapter "MIDI processing and quantizing" in the pdf document "Working with MIDI"). In version 3.1 of the program, the Legato Options dialog contains the checkbox "Selected Only". When you activate this 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).

Selecting notes of equal pitch (Edit menu)

On the Edit menu–Select submenu, you will find the options "Equal Pitch – all Octaves" and "Equal Pitch – same Octave". These are not new in this program version, but the functionality has been modified. Up until now, selecting one of these menu items selected all *following* notes of the same pitch, on all octaves or on the same octave, respectively. In version 3.1 of the program, this has changed. Now all notes in the part that have the same pitch as the selected note will be selected. This makes editing in the Key Editor (or in-place editing) much easier, as you do not have to scroll to the first note of the part with the desired pitch. Now, all notes of the same pitch on all positions within the part get selected, which is generally what you want when using this function.

To select all notes (of the same pitch) following the selected note, you can define an action in the Locical Editor. (For a description of the Logical Editor, please refer to the chapter "The Logical Editor, Transformer and Input Transformer" in the pdf document "Working with MIDI").

Extracting MIDI automation

On the MIDI menu–Functions submenu, the command "Extract MIDI Automation" has been added. This 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. From the Functions submenu on the MIDI menu, 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 (by clicking on the plus signs or by selecting "Show used Automation" from the context menu). 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 e.g. 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.

▪ **Note that to be able to hear the automation data, you have to activate the Read button for the respective automation track(s).**

External instruments/effects

Since the release of version 3 of Nuendo, the program supports the integration of external effect devices into the sequencer signal flow.

With Nuendo 3.1, you can also integrate external instruments, e.g. hardware synthesizers. You can use the External Instrument tab in the VST Connections window to define the necessary return ports and access the instruments through the VST Instruments window.

You may have projects created in Nuendo 3.0 that use an external effect as defined in the VST Connections dialog. When you open such a project in version Nuendo 3.1 for the first time, a message warning about a missing plug-in will be displayed. This is because the handling of external devices has been changed. See .

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. However, this automatic delay compensation results in added latency – if your audio hardware has a high latency to start with, this could be a problem.

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.

Once the external device is connected to the audio hardware of your computer, you must 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".
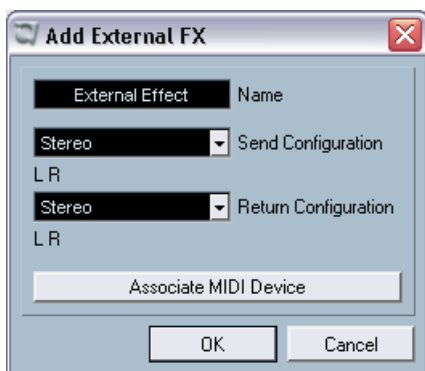
3. In the dialog that appears, enter a name for the external effect and specify the Send and Return configurations. If you want to set up a MIDI device corresponding to the external effect, click the Associate MIDI Device button.
Depending on the type of effect, you can specify mono, stereo or surround 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 chapter "MIDI devices" in the pdf document "Working with MIDI".

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 in the section "Connecting the external effect/instrument".

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 in the section "Connecting the external effect/instrument".

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.

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 (Win)/[Ctrl]-clicking (Mac) 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.

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 Plugins" 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".
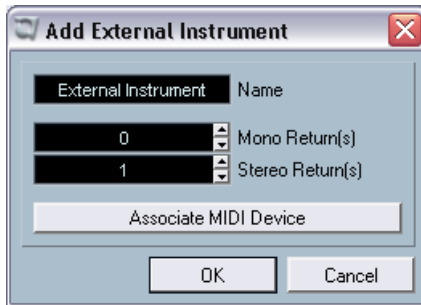
3. In the dialog that appears, enter a name for the external instrument and specify the number of required mono and/or stereo returns. If you want to set up a MIDI device corresponding to the external instrument, click the Associate MIDI Device button.
Depending on the type of instrument, a specific 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 chapter "MIDI devices" in the pdf document "Working with MIDI".

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.

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.

Setting	Description
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.
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.

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 chapter "MIDI devices" in the pdf document "Working with MIDI".
- 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 Instrument 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 whenever 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:
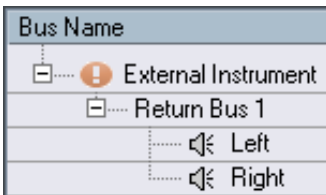
To reestablish the broken connection to the external device, simply right-click (Win) or [Ctrl]-click (Mac) the entry for the device in the Bus Name column and select "Connect External Effect". The icon is removed, and you can use the external device within your project as before.

Note that busses set up for external effects or external instruments are saved not with the current project, but "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 Operation Manual chapter "Audio effects" and the "VST Instruments" chapter in the separate PDF document "Working with MIDI".

When freezing external instruments or effects, you can adjust the respective tail value in the Freeze Channel Options dialog:
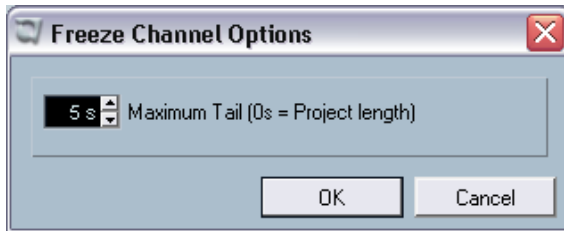
- Use the arrow buttons next to the Maximum Tail value field to set the desired Tail length, i.e. the range after the part boundary that should also be included for the freeze. You can also click directly in the value field and enter the desired value manually (the maximum value being 60 s).
- When Maximum Tail is set to 0s (default), the freezing will only take into account the data within the Part boundaries.

Mixer operations

Several changes have been made to the mixer, to facilitate editing, navigating, etc. A whole new Mixer category has been added in the Key Commands dialog for example, allowing you to create keyboard shortcuts for the mixer functions you often work with. Several new functions have been added to the mixer context menu, allowing you e.g. to specify which channels functions should be applied to. These new functions are described in the following sections.

The context menu functions
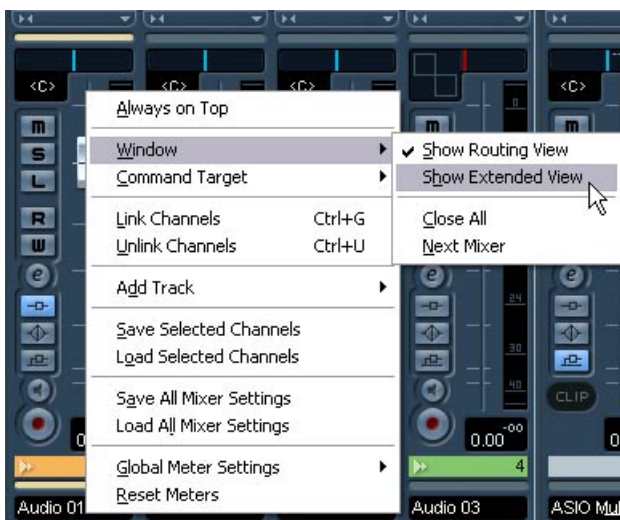
The context menu contains two new submenus:

The Window submenu

This submenu is 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).

The Command Target submenu

This submenu lets you specify which channels should be affected by the "commands" (basically all the functions that can be assigned key commands), e.g. what to display in the extended mixer pane, the width setting of the channel strips, etc. It contains the following options:

- All Channels
  Select this if you want your commands to affect all channels.

- Selected Only
  Select this option if you want your commands to affect the selected channels only.

- Exclude Inputs
  Select this if you do not want your commands to affect the input channels.

- Exclude Outputs
  Select this if you do not want your commands to affect the output channels.

About channel/track colors

The color settings of the tracks in the track list are now also reflected in the mixer channel strips.

You can also change the color setting directly in the mixer. Proceed as follows:

1. Make sure the Show Track Colors option is activated in the Track list.
   This is described in detail in the Customizing chapter in the Operation Manual.

2. Open the Mixer and click in the Color Selection section above the channel name for the desired channel strip.

3. Select the desired color from the color palette.

Click here…

…to open the color palette for the mixer channel strip.

▪ **If you change the color for a channel strip in the mixer, this color is automatically applied to the respective track in the Track list, and vice versa.**

Copying channel settings to/from several tracks in one go

In the previous program version, the channel settings could be copied for one channel and pasted into another channel. This behavior was a bit cumbersome if the same settings had to be applied to several channels, as they had to be applied to each channel separately. In version 3.1 of the program, it is now possible to apply the settings of one channel on several other channels in the mixer, or even to select several channels, copy their settings and apply them to the same number of other channels in one go.

Mixer key commands

The Key Commands dialog now contains a dedicated Mixer category, allowing you to create keyboard shortcuts for the mixer functions. For a detailed description of setting up and working with key commands, see the Key Commands chapter in the Operation Manual.
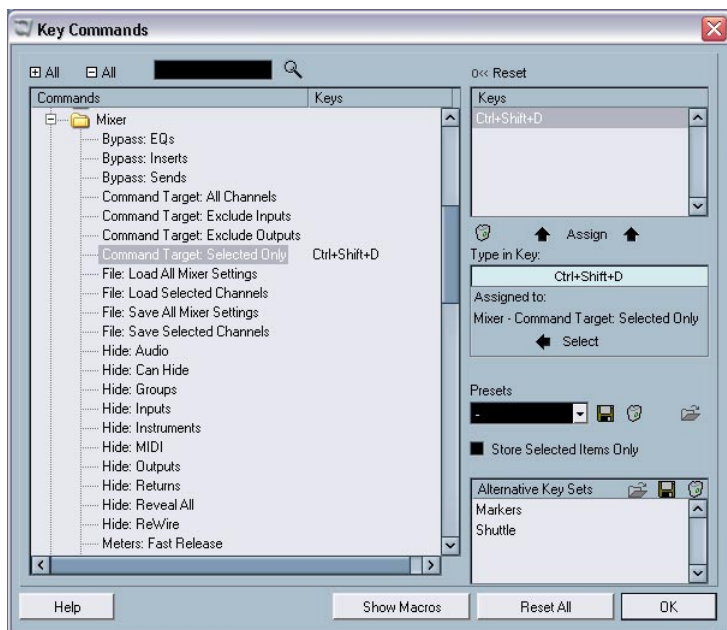
Panning Bypass

In version 3.1 of the program, it is now possible to 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 [Shift]+[Alt]/[Option]-click again.**

The Tempo Track

A very handy new feature can be found in the Tempo Track window: the Process Bars dialog. This dialog 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

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 on the Tempo Track toolbar…
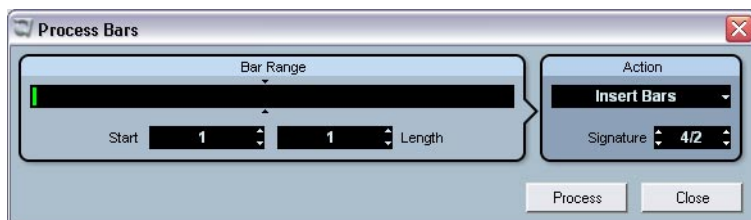
… to open the Process Bars dialog.

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.).

Option	Description
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.
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.

Pool Operations

The extended search functionality in the Pool

A number of new features have been added to the Search pane in the Pool window. When you click the Search button in the Pool toolbar, a lower Pool pane is displayed, allowing you to search for files on your hard disk or other media. This is described in detail in the chapter "The Pool" in the Operation Manual. The new program version allows for a more extensive search, including a range of additional search filters and the possibility to search for user attributes.

This works 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.

▪ By default, the search parameters available in the lower Pool pane are "Name" and "Location".
When you move the mouse pointer over the "Name" text to the right of the name field, an arrow is displayed to the right. Click on it to open a pop-up menu.

Move the mouse pointer over the "Name" text to the right of the name field…
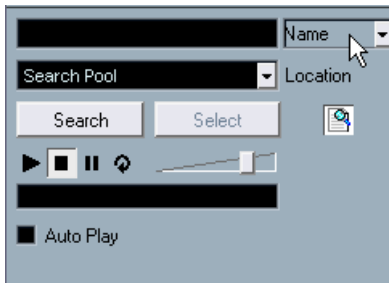
… to show the Extended Search pop-up menu.

3. When you click on "Name", the Extended Search pop-up menu opens.
This contains six options determining which settings will be displayed above the Location parameter (Name, Size, Bitsize, Channels, Sample Rate or Date) as well as all the user attributes you specified (in this example two: Vocals and Drum Loops, see below) and the Add Filter and Presets submenus.
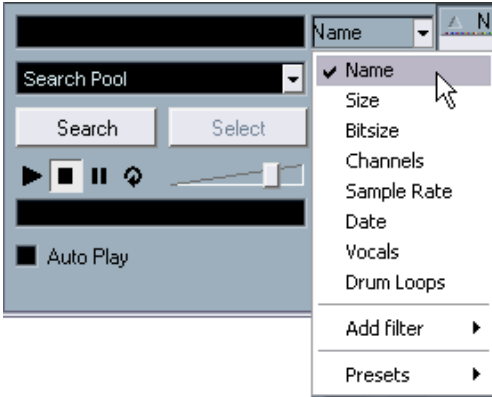
The pop-up menu with the extended search options.

4. 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.

5. 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.
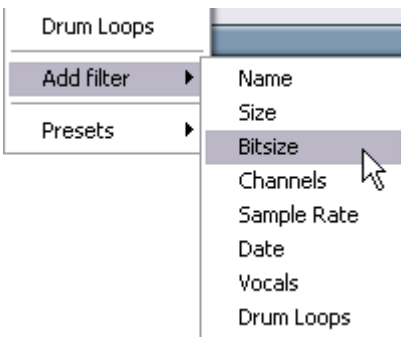
It is also possible to further refine the Search options by including your user attributes to the Search criteria:

▪ When user attributes have been defined, these will also appear on the pop-up menu (see above).

This is handy when you have a large number of audio files in the Pool. You can set up user attributes via the View/Attributes pop-up menu on the toolbar. These attributes will then get their own columns in the Pool. Each attribute can be defined as check box, text field or number. You can then specify the user attributes for each file, thus categorizing them further. (For a detailed description of user attributes, please refer to the chapter "The Pool" in the Operation Manual.) All the 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, most chaotic sound database.

Pool key commands

▪ It is now possible not only to open, but also to close the Pool window using a key command. By default, this is [Ctrl]/[Command]+[P], but you can change this as usual in the Key Commands dialog (Project page).

Video

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 (if the option "Show Video Thumbnails" is activated in the Preferences dialog). In the previous program versions, these were calculated in real time and had to be redrawn during e.g. scrolling or moving. As this does consume quite a lot of processor power, the reaction sometimes seemed sluggish. To remedy this, you now have the possibility to generate a thumbnail cache file which will be used in situations requiring a lot of processor power. This is a very handy new feature, allowing you to economize system performance during CPU intensive tasks.

Generating thumbnail cache files during video import

When you import a video file into Nuendo 3.1, you will find that the additional option "Generate Thumbnail Cache" is available on the Import dialog.
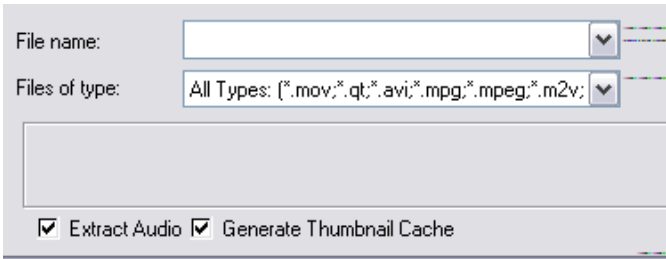
The Generate Thumbnail Cache option activated in the Import Video dialog.

When you activate "Generate Thumbnail Cache" in the Import video dialog and click "Open", a thumbnail cache file will be created before the file is inserted in the Project window. A window will be displayed showing you the progress and the estimated time for the process.
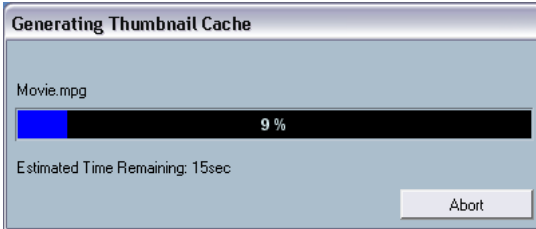
The thumbnail cache file is created.

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.

▪ **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 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, if you imported the file by drag & drop 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 (Win) or [Ctrl]-click (Mac) on the file to open the context menu and select "Generate Thumbnail Cache".
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 (see below).

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.

When exactly is the cache file used?

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 automatically be calculated again, i.e. the program switches automatically between real-time calculation of the pictures and the usage of the cache file.

The above paragraphs apply only if "Show Video Thumbnails" is activated in the Preferences dialog, i.e. if thumbnails are displayed in the Project window.

Score editor operations
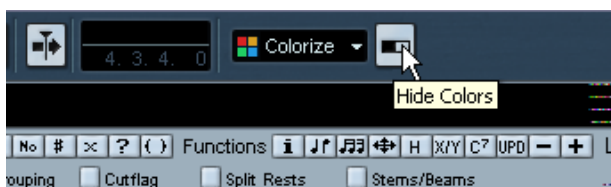
About the selection indicators

With version 3.1 of the program, the display of selected elements in the Score editor has changed. The following applies:

- Selected events are displayed in red.

- The active staff has blue lines and a blue rectangle to the left.
  Please note that you can use this blue rectangle to select, move or edit the active staff.

- A selected system (grand staff) is indicated by a red line regrouping the staves.

- The active staff in a selected system has violet lines.

Showing/Hiding the custom colors

If you have specified colors for notes (or other elements) in the score (see the separate pdf document "Score Layout and Printing"), the score coloring may become confusing as you might e.g. mistake colored notes for selected notes and vice versa. Therefore, you have now the possibility to hide (ignore) all color settings you specified for the score:

To hide the color settings you specified, simply click the "Hide Colors" button on the Score editor toolbar.

Click the "Hide Colors" button to hide all your color settings.

- **If the custom colors are hidden in the Score editor, only the selection indicator colors are used, as described above.**

- To display your color settings again, simply click the button again.

The Set Note Info dialog

The Set Note Info dialog now contains an option called "No Flag/
Beam". Activate this to hide the flags or beams of the selected note(s).
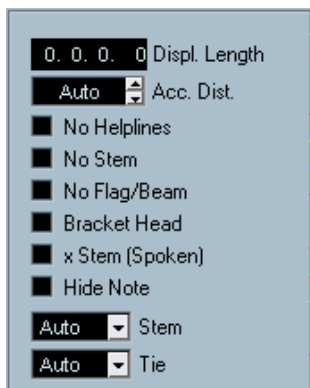
The No Flag/Beam option in the Set Note Info dialog.

Remote Control

Accessing user panel parameters via remote control devices

Nuendo allows you to control external MIDI devices through user device panels. When you have assigned project parameters to a device panel to be displayed in the Mixer (i.e. when creating the panel, you must select the Channel Strip Size option in the Add Panel dialog), you can now access these parameters through some of the remote control devices supported by Nuendo.

This feature is supported for the following devices:

▪ Steinberg Houston
▪ Mackie Control
▪ Mackie HUI
▪ Yamaha DM 2000
▪ CM Motormix
▪ SAC2K

For these remote control devices, an extra display page has been added in the Inserts section for the selected channel.

This page is called User and is displayed as the 9th insert page for audio channels and as the 5th insert page for MIDI channels. It allows you to control the parameters assigned to your user device panel from your remote control device.

Machine control

Auto Edit for Time Base 9-Pin devices

The Time Base 9-Pin control panel (which is opened when selecting Time Base 9-Pin from the Devices menu) provides an Auto Edit button to the right of the regular transport controls.
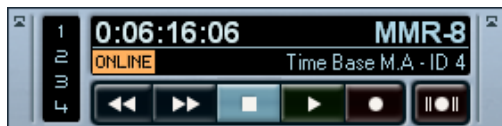
To use the Auto Edit function on the Time Base 9-Pin control panel, proceed as follows:

1. Make sure the Online button is activated.

2. To record enable an audio track in a 9-Pin device (e.g. a video recorder) that is connected to Nuendo via a Time Base device, click the corresponding numbered button on the panel.
   The button lights up, indicating that the corresponding audio track is record enabled.

3. Set the locators in Nuendo to encompass the audio section you want to transfer.

4. Click the Auto Edit button on the Time Base 9-Pin device panel.
   This is the button to the right of the transport controls.

   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.

Setting Preroll and Postroll for Auto Edit

For the Auto Edit function provided on the 9-Pin device panels and the Time Base 9-Pin device panel you can set individual preroll and postroll values. This is done in the Device Setup dialog.
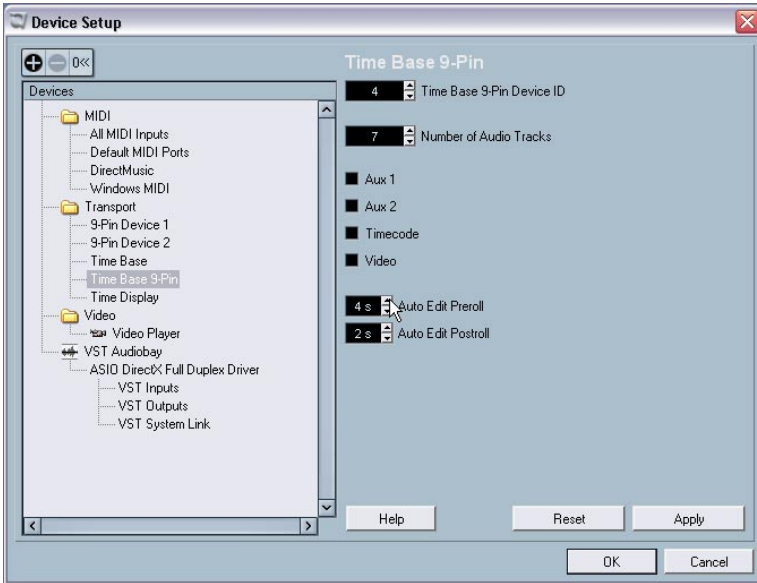

1. Open the Device Setup dialog and select the 9-Pin Device or Time Base 9-Pin entry from the Devices list.

2. Click on the up/down arrow buttons in the Auto Edit Preroll or Auto Edit Postroll fields 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.

Networking

The Shared Projects dialog

There are two new buttons in the Shared Projects dialog, called "Merge Active Project to Selected Network Project" and "Download Selected Tracks".

The "Merge Active Project to Selected Network Project" button
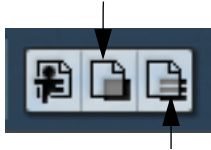
The "Download Selected Tracks" button

• When you click the "Merge Active Project to Selected Network Project" button, the currently active project will be merged with the selected Network project.
You will be asked whether you wish to download the shared project before merging. Clicking "No" allows you to simply commit your tracks without having to download all shared tracks. (Please stay connected until all others have received your tracks.)
When you click "Yes", this is like joining a project by clicking the Join Project button (see the "Networking" pdf document) except that you can join using your active project instead of having to create a new project locally.
Then, the Project Sharing and Permissions dialog for your local project will be displayed. When you are happy with all permission settings, click on Start Merge. This will join the Network project and download all available tracks. When the download is complete, you can commit your tracks.

• "Download Selected Tracks" enables you to select which tracks from which shared projects you want to download to your computer.
You will be asked whether you wish to create a new project. When you select No, the downloaded tracks will be added to your currently active project.
Please note that you cannot download tracks into a shared project.

About opening projects with network settings

When you are loading a project containing Network settings and the Network is deactivated in Nuendo, the following dialog appears:
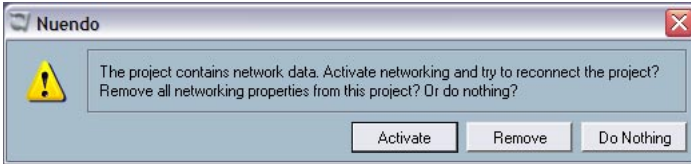

- Click "Activate" to activate the Network in Nuendo and try to reconnect the project.
- Click "Remove" to remove all Network settings.
  You can choose this when you do not want to work in the network any longer. Note that can also be handy if you have e.g. older projects with corrupt network settings and want to delete all the network objects and then start again.
- Click "Do Nothing" to open the project without changing any Network settings.

Reconnecting participants to the Master Network project

When several users have joined a Network project and this is unexpectedly disconnected from the network (i.e. it is not disconnected by e.g. deactivating the Network or by closing the project), these participants can be automatically reconnected. Proceed as follows:

1. Open the Master project again.
   The program automatically searches 10 seconds for the other users in the network. When users are found, the following dialog appears:
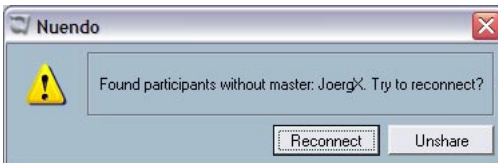
2. Select "Reconnect" if you want the other user(s) to be automatically reconnected.
   When you click the "Unshare" button, the project is unshared.

- For this to work, the Master project has to have been saved once. If the project was not saved before being unexpectedly disconnected, the settings are lost and the participants cannot be automatically reconnected.

- Please note that if you are unsure about the state of connection, it might be a good idea to unshare the project and to submit it as new Network project, in order to avoid conflicts (see also the description of the "Verify communication" function in the "Networking" pdf document).

About the Marker track

The Marker track is now included in the shared project, i.e. when sharing a project, other users can see the marker track and the marker information created for this project when selecting the Markers option in the Project menu. For the marker track you can also display the network control buttons in the track list.

The Transfer Status window

The Transfer Status window, which can be used to monitor the transfer of data to or from the network, now features Cancel buttons for each of the transfer operations. Use these buttons to stop any transfer operations.

General improvements

Recovery of audio recordings after system failure

Stability and reliability of Nuendo have further improved with the release of version 3.1.

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 3.1, 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 new 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 any other component of the computer, making it impossible to save or recover any of the data.

Warning: Please do not try to actively bring about such a situation to test this new feature. Although the internal program processes have been improved to cope with such situations, Steinberg cannot guarantee that other parts of the computer may not be damaged as a consequence.

About frame rates

In addition to the current frame rates, you can now select the frame rates 23.976, 24.976, 59.94 and 60 fps on the Frame Rate pop-up menu in the Project Setup dialog. These are used in the HDTV context.

Working with joysticks

When you have a joystick connected to your system, but do not want to use it with Nuendo, you can now deactivate it:

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

2. Select the device in the list to the left in the dialog.
   The corresponding settings are shown to the right.

3. You can now activate/deactivate the joystick by activating or deactivating the respective dialog option.

Working with film transfers

Background

Framerates

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 framerates.

Standard framerates

There are several framerate 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 framerate 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 framerate 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 framerate 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 framerates.

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 4.1$\overline{6}$%, 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, then 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.
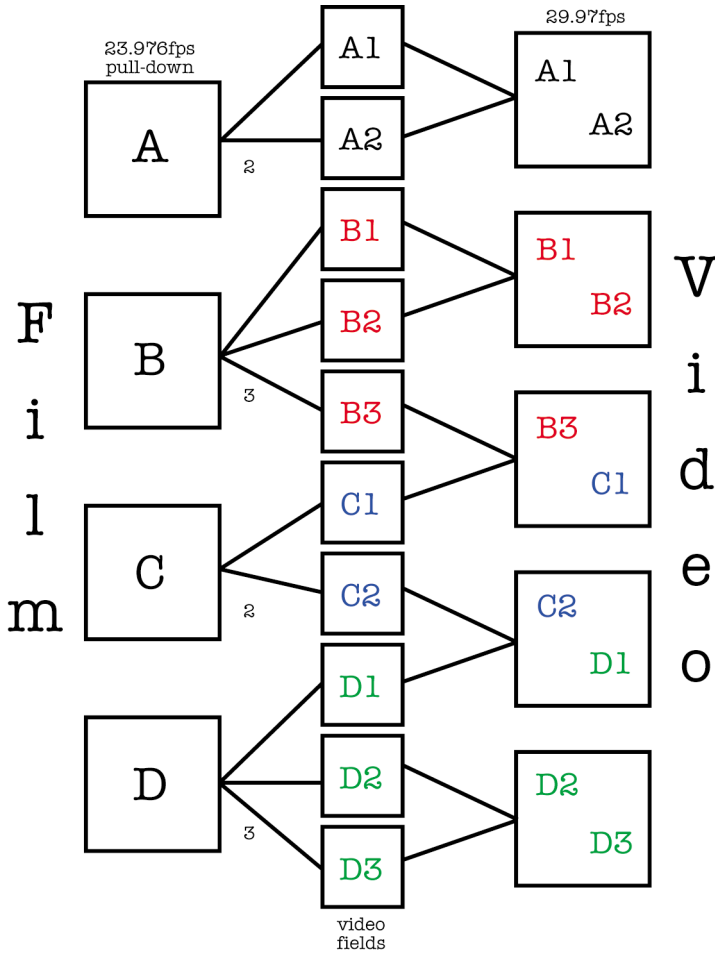
This is a block diagram of the 2-3 pull-down process. Notice that 4 frames of film are transferred to 5 frames of video using the 2-3 field technique.

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 framerate 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 framerate 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 framerates. 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 that 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 such as the Timebase (or any other capable clocking hardware) will be needed to "pull" the clock speed down by 0.1%. This is done by using the varispeed function in the Timebase.

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.

Please refer to the Timebase manual for more information on how to connect it to Nuendo, your audio card, video tape machines and other equipment in your studio. Varispeed operations are also covered in the TImebase manual.

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/SE-CAM 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 Timebase or other 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, then 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 (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:
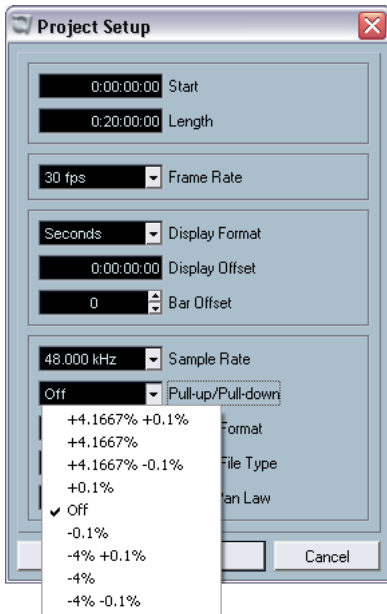
The Pull-up/Pull-down pop-up menu in the Project Setup dialog.

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 in the Project Setup dialog 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.
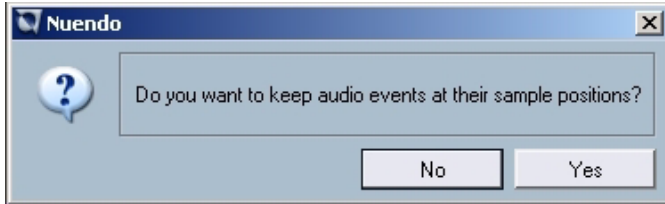
- Choosing "No" allows events to follow the timecode and minutes:seconds clock change and remain at their SMPTE start times.
- Choosing "Yes" forces Nuendo to leave events at the same sample start time regardless of the clock speed change.

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 vari-speed.

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.
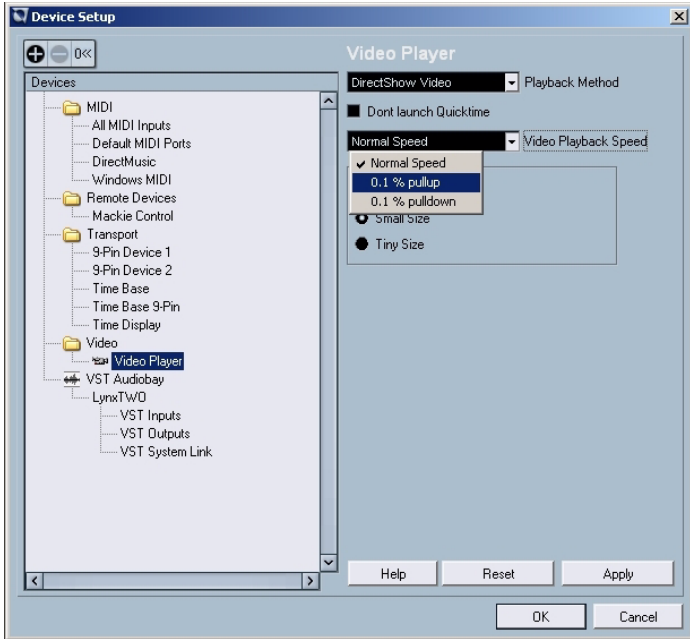
Video +0.1% pull-up for NTSC

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 framerate 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 framerates 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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