



# **AUDIO KONTROL 1**

**Operation Manual**

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Users Guide written by Nicolas Sidi.

Special thanks to the Beta Test Team, who were invaluable not just in tracking down bugs, but in making this a better product.



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# Table Of Contents

<b>1. Welcome to AUDIO KONTROL 1!</b> .....	<b>5</b>
<b>2. Safety Considerations</b> .....	<b>6</b>
<b>3. Parts of the Product</b> .....	<b>8</b>
3.1. Hardware .....	8
3.2. Software .....	13
<b>4. Setup</b> .....	<b>16</b>
4.1. Hardware .....	16
4.2. AUDIO KONTROL 1 Software Installation .....	20
4.3. Configuring Third-Party Software.....	23
<b>5. Quickstarts</b> .....	<b>25</b>
5.1. Playing XPRESS KEYBOARDS from a MIDI keyboard .....	25
5.2. Controlling TRAKTOR 3 LE.....	28
5.3. Playing a Guitar Riff with GUITAR COMBOS .....	33
5.4. Remote Controlling Winamp/iTunes.....	39
<b>6. Use Cases</b> .....	<b>41</b>
6.1. Recording Vocals .....	41
6.2. Controlling a Sequencer - Creating Assignments with Key Commands.....	46
6.3. Controlling a Synthesizer – Creating Assignments with MIDI Commands .....	51
<b>7. Software Reference</b> .....	<b>57</b>
7.1. The Driver .....	57
7.2. The Driver Control Panel.....	57
7.3. Remote Control Basic Concepts.....	59
7.4. The Mapping Application .....	65
7.5. Add-on Software.....	76
<b>8. Optimizing and Troubleshooting</b> .....	<b>76</b>
8.1. Hardware Troubleshooting.....	76
8.2. How to check if the driver is installed correctly? .....	77
8.3. How to use the remote control function? .....	79
8.4. How to avoid Ground Loops .....	80
8.5. How to Use AUDIO KONTROL 1 with a Laptop .....	81
<b>9. Appendix</b> .....	<b>84</b>
9.1. Technical Specifications and Block Diagram .....	84
9.2. MIDI CC Table.....	87
<b>Index</b> .....	<b>91</b>



# 1. Welcome to AUDIO KONTROL 1!

Thank you very much for choosing AUDIO KONTROL 1! Equipped with high end digital/analog converters, AUDIO KONTROL 1 combines versatile audio input and output slots that fit seamlessly into your setup. AUDIO KONTROL 1 also provides MIDI connection capacities as well as freely assignable controllers on the hardware's top panel: It is the tactile interface to your software.

AUDIO KONTROL 1 provides two inputs and four outputs that allow you to use the hardware flexibly within a variety of setups. For instance, you can connect a microphone and record a voice, and at the same time you can record a guitar or trigger virtual instruments with your MIDI keyboard. Alternatively you can use AUDIO KONTROL 1 to listen to two completely independent stereo signals, a feature that is needed for DJ applications such as Traktor DJ Studio 3.

The NATIVE INSTRUMENTS software that is included with AUDIO KONTROL 1 provides everything you need to start using your audio interface instantly. TRAKTOR 3 LE is a fully-featured digital DJ solution, the GUITAR COMBOS can be used immediately with your guitar or bass plugged into AUDIO KONTROL 1's instrument input and the XPRESS KEYBOARDS offer three outstanding synthesizers – all conveniently playable with your master keyboard.

Last but not least, AUDIO KONTROL 1 offers three buttons and a controller knob on the hardware's top panel. You can assign any key command or MIDI message to actions performed with these elements. This turns AUDIO KONTROL 1 into a versatile controller that allows you to touch your software, be it one of the included applications, your favorite sequencer, your graphics software or other media applications such as Winamp or iTunes. Setup files for popular programs ensure the use of these features is hassle-free.

This manual will help you use all the features of AUDIO KONTROL 1. It is divided into three parts:

- Chapters 3 and 4: The first part explains how to **setup** your AUDIO KONTROL 1 quickly. It describes the different parts of the product and guides you through the installation process.
- Chapters 5 and 6: The second part illustrates different **practical situations**, from the simplest setup to more complex configurations. This learning-by-doing approach will familiarize you with AUDIO KONTROL 1's concept.
- Chapters 7 and 8: The third part gives you a detailed **reference** about the software interface and its operation. Reading this section will give you a full understanding of this great tool. It also contains a section about optimization and troubleshooting.

## 2. Safety Considerations

### Warning

- Before using the AUDIO KONTROL 1 hardware, please read the manual and pay special attention to the instructions below.
- The AUDIO KONTROL 1 hardware contains no user-serviceable parts. Do not open it or attempt to disassemble or modify any internal hardware. If there appears to be a hardware malfunction, immediately stop using the controller and have it inspected by qualified service personnel.
- Do not expose the unit to rain, and do not use it near water or in damp or wet conditions. Also, never place anything on top of the controller, and be very careful that no objects or liquids of any kind enter the unit.
- This product, in combination with an amplifier, headphones or speakers, can produce sound levels capable of damaging your ears. Do not use it for long periods of time at high volume levels. If you experience any hearing problems or ringing in the ears, consult a hearing specialist immediately.
- The AUDIO KONTROL 1 hardware is powered by the USB bus. Operation can be guaranteed only as a single device with a USB2 controller or with a self-powered USB2 hub.

### Caution

- Before connecting the AUDIO KONTROL 1 hardware to other electronic components, turn off the power for all devices. Before powering your system up or down, set all volume levels to minimum. Gradually raise the volume controls while playing your instruments to set the desired listening level.
- Do not place the AUDIO KONTROL 1 hardware in an unstable position where it might accidentally fall to the ground.
- Before moving the AUDIO KONTROL 1 hardware, remove all connected cables.

- Never subject the unit to extreme temperatures (e.g., direct sunlight in an enclosed vehicle, or near a heat source), or high levels of vibration.
- Do not use excessive force on the buttons, knobs, switches or connectors.
- When cleaning the AUDIO KONTROL 1 hardware, use a soft, dry cloth. Do not use paint thinner, solvents, cleaning fluids, or chemically-impregnated wiping cloths.

### **Important Notes**

- Disclaimer: Native Instruments GmbH cannot be held responsible for damage or data loss caused by improper use of, or modification to, the AUDIO KONTROL 1 hardware or software. It is your responsibility to back up data you don't want to lose.
- Specifications subject to change: The information contained in this manual is believed to be correct at the time of printing. However, Native Instruments reserves the right to make changes to the specifications of software and hardware at any time without notice or obligation to update existing units.
- Nameplate location: The nameplate is located on the bottom of the AUDIO KONTROL 1 hardware. It lists the product's model name and other technical information. The serial number is also located on the bottom of the unit.
- Disposal notice: Should this product become damaged beyond repair, or for some other reason come to the end of its useful life, please observe all regulations of your country that relate to the disposal of electronic products.
- Copyright: © Native Instruments GmbH 2006. All rights reserved. This publication may not be reproduced in whole or in part, summarized, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means without the prior written permission of Native Instruments GmbH.
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## 3. Parts of the Product

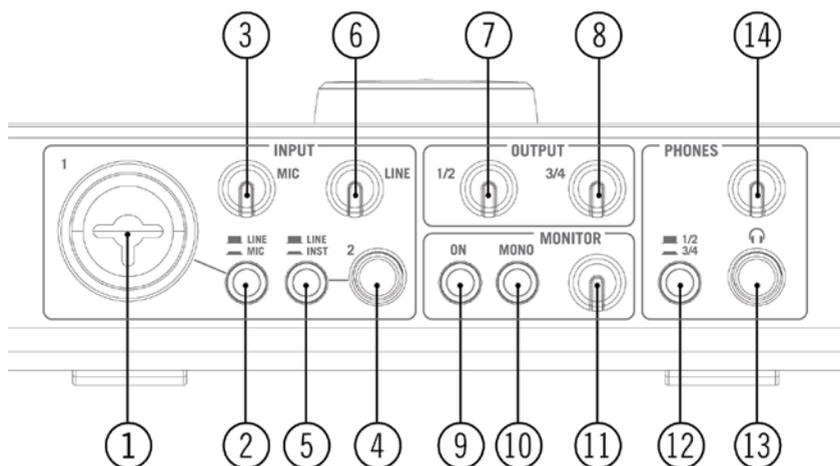
In this section, we will quickly describe what is contained in the hardware and software sections of AUDIO KONTROL 1. Please take a moment to read this carefully; it will give you the basic knowledge of how AUDIO KONTROL 1 works.

If you want to get started immediately, turn to section 4. There the setup of your AUDIO KONTROL 1 hardware and software is described in detail.

### 3.1. Hardware

#### 3.1.1. Front Panel

The AUDIO KONTROL 1 front panel provides you with the connections and controls that you will probably modify the most. These include the audio inputs and their controls, the main outputs' and monitor levels and the headphone output.



The AUDIO KONTROL 1 Front Panel.

#### 1: Combo Input Jack (Input 1)

This analog audio input accommodates either XLR or phone plugs. The XLR plug (mono balanced) allows you to connect a microphone, routing the signal through the mic preamp. The phone plug ( $\frac{1}{4}$ " jack, TRS mono balanced) allows you to connect a variety of other line level audio devices (mixer, MIDI sound module etc.).

Please note that, depending on which plug you use (XLR or phone jack); you have to select the appropriate signal level on the **Mic/Line Switch (2)**.

When using a condenser microphone, don't forget to activate the **Phantom Power Switch (18)**.

## **2: Input 1 Level Switch (Mic/Line)**

This switch allows you to select the type of signal you have plugged into Input 1.

If you connect a microphone (using an XLR plug), activate the switch (pushed in). The incoming signal is then routed to the mic preamp, and its gain can be adjusted via the **Mic Knob (3)**.

If you connect a line-level device (using a phone plug), deactivate the switch (pushed out). The incoming signal will then be routed to the line level circuitry and its gain can be adjusted via the **Line Knob (6)**.

## **3: Microphone Input Sensitivity Knob (Mic)**

This knob allows you to adjust the Input 1 gain if you connect a microphone (XLR plug). This knob controls the amplification level of the mic preamp.

If you connect a phone jack to Input 1, this knob will have no effect. The level of your signal can be adjusted via the **Line Knob (6)**.

## **4: Input Jack (Input 2)**

This analog audio input accepts phone plugs (¼" jack, TRS mono balanced). This input allows you to connect a variety of line-level audio devices (mixer, MIDI sound module, guitar etc.)

Please note that, depending on what kind of device you connect, you have to select the appropriate input impedance via the **Inst/Line Switch (5)**.

## **5: Input Impedance Switch (Inst/Line)**

This switch allows you to choose between high and low impedance for Input 2, depending on what kind of device you have plugged into this input.

If you connect a mixer, a hardware sampler, a MIDI expander or any other line-level audio device, select the usual low impedance (Line: switch pushed out).

If you connect a guitar or bass (for use with GUITAR COMBOS for instance; see section 5.3), select high impedance (Inst: switch pushed in).

## **6: Line/Instrument Input Sensitivity Knob (Line)**

This knob allows you to adjust the line/instrument input gain. This is relevant to the signal coming into Input 2, *but not exclusively*: on Input 1, if **Line** is

selected with the **Mic/Line Switch (2)** (and accordingly a phone jack is plugged into Input 1), this knob will control the level for the incoming signal of Input 1 as well.

The knob also controls the gain of Input 2 if it is set to high impedance, i.e. if the **Input Impedance Switch (5)** is active.

To sum up: the **Mic Knob (3)** only deals with a microphone signal coming into Input 1, and the **Line Knob** deals with all other signals coming into Inputs 1 and 2.

### **7, 8: Output Level Knobs (1/2 & 3/4)**

These knobs adjust the output volume for each pair of **Main Output Jacks** on the rear panel (17).

### **9: Monitor On/Off Switch (On)**

This switch turns the direct monitoring bus on/off. The direct monitoring bus allows you to listen directly to the input signals: the signal on this bus bypasses the AD and DA converters, the USB processor and the computer, so you can check what's coming into the AUDIO KONTROL 1. The monitor signal is mixed with the computer output on one of the two output pairs (or both if desired). The selection of the output pair receiving the monitor signal is made within the driver settings (see section 7.2), and not on the AUDIO KONTROL 1 hardware.

### **10: Monitor Mono/Stereo Switch (Mono)**

This switch, when activated (pushed in), merges the two inputs into one mono signal for monitoring. This can be useful, for example, if you're using only one input on your AUDIO KONTROL 1: you can then monitor this input signal both on the left and right channels.

### **11: Monitor Level Knob**

This knob adjusts the monitor volume when mixed with the computer's main output signal. Turned hard left, you will only hear the signal coming from the computer, i.e. the monitoring signal is muted. Turned hard right, you will hear the input signal at its original level; the computer's signal will preserve its level.

### **12: Headphone Output Selector Switch (1/2 – 3/4)**

This switch allows you to choose which output pair (1/2 or 3/4) from the **Main Output Jacks (17)** is sent to the headphone output.

### 13: Headphone Output Jack

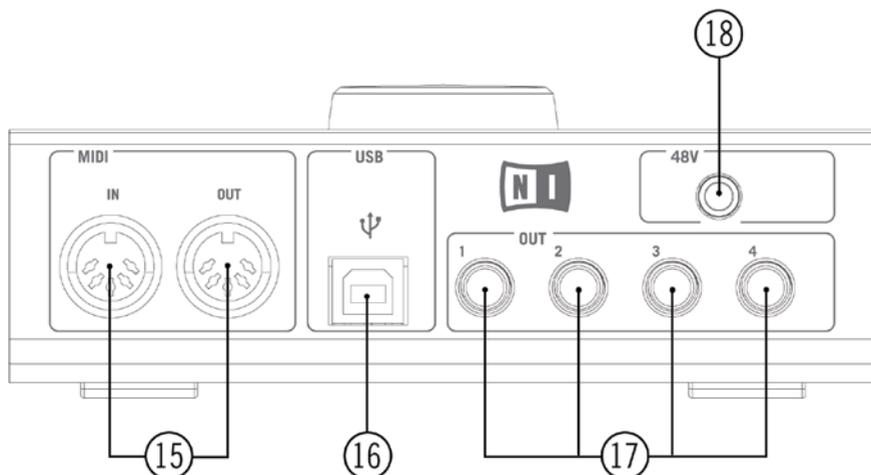
This analog audio output accommodates a headphone jack (¼" jack, TRS stereo). Connecting headphones has no effect on the main outputs.

### 14: Headphone Output Level Knob

This knob adjusts the volume of the headphone output.

## 3.1.2. Rear Panel

The AUDIO KONTROL 1 rear panel is equipped with the connections that you won't necessarily change for each new project. These include the main audio outputs, the MIDI input/output and the USB2 connection. It includes also the phantom power switch for the microphone input.



The AUDIO KONTROL 1 Rear Panel.

### 15: MIDI In/Out Connectors

These connectors allow you to connect MIDI devices to your computer and to send/receive MIDI messages.

### 16: USB2 Connector

Use this connector to connect the AUDIO KONTROL 1 to your computer.

### 17: Main Outputs Jacks (1 to 4)

These analog audio outputs accept phone plugs (¼" jack, TRS mono balanced). You can use them to send the output signals to an amplification system or other mix down device (desk, effects...)

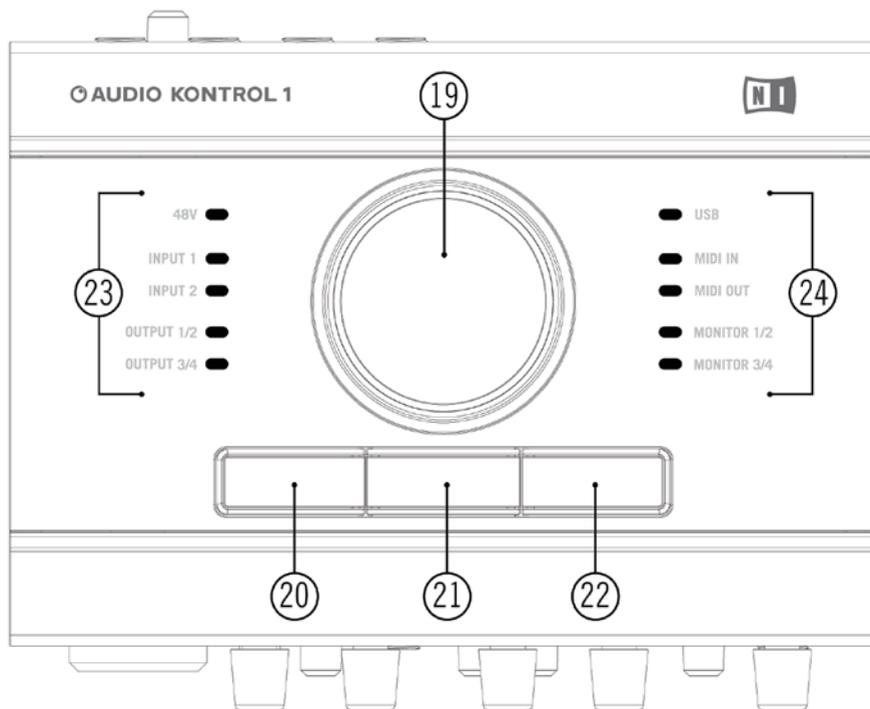
## 18: Phantom Power Switch (48V)

This switch has to be activated (pushed in) if you are using a microphone on Input 1 that requires a phantom power supply (e.g. a condenser microphone).

### 3.1.3. Top Panel

Whereas the front and rear panel deal with audio and MIDI signals, the AUDIO KONTROL 1 top panel is dedicated to the manual controls. It provides you with a set of four Controllers which act like a remote control for your computer applications. These Controllers are of two types: the Controller Knob and the Left, Middle and Right Buttons.

The top panel also provides a number of LEDs for monitoring the various activities of the box.



The AUDIO KONTROL 1 Top Panel.

### **19: Controller Knob, 20: Left Button, 21: Middle Button, 22: Right Button**

The use of these four Controllers will be extensively explained in the next sections. They are the core of the remote control of AUDIO KONTROL 1.

### **23, 24: Info LEDs**

These LEDs inform you about various aspects of AUDIO KONTROL 1.

- **48V:** indicates the state of the Phantom Power Switch (18).
- **Input 1:** indicates activity at the hardware's first audio input. It lights red if the signal is clipped. In this case you should decrease the Input 1 level.
- **Input 2:** indicates activity at the hardware's second audio input. It lights red if the signal is clipped. In this case you should decrease the Input 2 level.
- **Output 1/2:** indicates activity at the hardware's first audio output pair (**Main Output Jacks 1/2, 17**).
- **Output 2:** indicates activity at the hardware's second audio output pair (**Main Output Jacks 3/4, 17**).
- **USB:** indicates the USB connection state. If the connection is established it is steadily lit. It blinks while the components are initializing.
- **MIDI In:** indicates if there are MIDI messages being received at the hardware's **MIDI Input (15)**.
- **MIDI Out:** indicates if there are MIDI messages being sent from the hardware's **MIDI Output (15)**.
- **Monitor 1/2:** indicates if the direct monitoring signal is being sent to the first audio output pair (**Main Output Jacks 1/2, (17)**).
- **Monitor 3/4:** indicates if the direct monitoring signal is being sent to the second audio output pair (**Main Output Jacks 3/4, (17)**).

## **3.2. Software**

The software section of AUDIO KONTROL 1 is divided into two programs:

- The **Driver**, which handles communication between the AUDIO KONTROL 1 hardware and your computer.
- The **Mapping Application**, which waits for events at the hardware's top panel elements, reported by the driver, and maps them to software actions.

### **3.2.1. Driver**

The driver basically acts like any other driver supporting a device connected to your computer. It is an interface between your computer and the real world (in our case, the AUDIO KONTROL 1 hardware). The AUDIO KONTROL 1 driver handles different types of signals: audio signals are routed to your computer's corresponding audio driver (ASIO, Core Audio...), MIDI signals are routed to your music applications, and interactions at the hardware's top panel (also called "hardware events") are sent to the Mapping Application.

Some of the driver parameters can be edited via the Driver Control Panel. Please refer to section 7.2 for more info on how to edit the driver's parameters.

### **3.2.2. Mapping Application**

AUDIO KONTROL 1 lets you control your music applications (or, in fact, any other application) from the four Controllers on the hardware top panel. These Controllers are assigned to specific commands in your target application (for example a keyboard shortcut or a MIDI message).

The Mapping Application controls the mapping system, which handles the interactions with the four Controllers: the Controller Knob and the Left, Middle and Right Buttons. The mapping system defines the connections between hardware and software interactions.

Let's look at a quick example to understand the remote control signal flow in AUDIO KONTROL 1. When you turn the Controller Knob on the AUDIO KONTROL 1 top panel, the device sends an event through the USB2 connection to your computer. The driver receives this event, translates it and sends it to the Mapping Application. The Mapping Application then executes the software action corresponding to this event, for instance turning Winamp's volume up or down.

Each Button has a special mode called Modifier. In this mode, the Button plays the role of a "Shift" or "Ctrl" key: it does not carry out a specific action in the target software, but instead, when pressed, it modifies the action of the three other Controllers (the Controller Knob and the two other Buttons) in the target software. That way, it is possible to define different assignments for the same Controller, depending if another Button, set as modifier, is pressed or not. This creates different "Layers" in the mapping system: one Main Layer when no modifier is pressed, and three additional Layers, one for each Button (if it is set as a modifier). You will get more info on this in section 7.3.



### The Mapping Application (Display View).

The mapping system is fully customizable: with the Mapping Application, you can assign a wealth of actions to each Controller and even to combinations of them, thus deciding what has to be done in your music application, whatever you do on the hardware top panel.

A full set of assignments for the four Controllers is called a Page. The Mapping Application comes with many prepared Pages. These Pages are meant for the most common uses of the Controllers with NATIVE INSTRUMENTS products, major sequencers and other audio applications. You can then customize these Pages and create your own Pages from scratch to fit your needs.

For more info on customizing the Mapping Application, please refer to section 7.4. You will also find examples of using the Mapping Application in sections 5 and 6.

## 4. Setup

### 4.1. Hardware

This section quickly describes in a pictorial way some possible uses of AUDIO KONTROL 1 in various setups. We give here only general guidelines, the details to these situations can be found in the sections 5 and 6. Please also note that you can find detailed information about each part of the hardware within section 3.1 above.

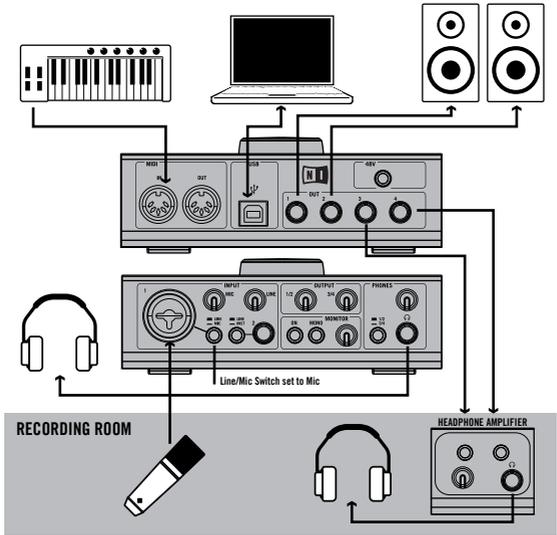
In all setups, please use balanced cables as the audio inputs and outputs of your AUDIO KONTROL 1 hardware are balanced, too.

---

Do not connect the AUDIO KONTROL 1 hardware to your computer until you have finished the software installation and driver setup (see below, section 4.2). The driver installer will ask you to connect the Controller at the proper time.

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### 4.1.1. Setup 1: Keyboard/Studio

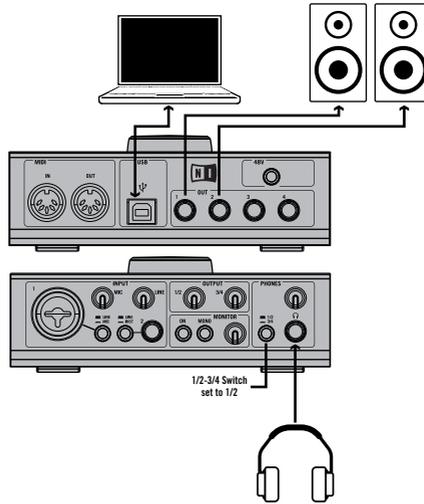


This setup shows you how to use AUDIO KONTROL 1 in a studio configuration. This features:

- All what is needed to record a voice, i.e. a microphone is used with Input 1, and there are two different signals for the control room (headphones, active speakers) and the recording room (headphones).
- A small MIDI setup, i.e. master keyboard is connected to the MIDI In port of AUDIO KONTROL 1.

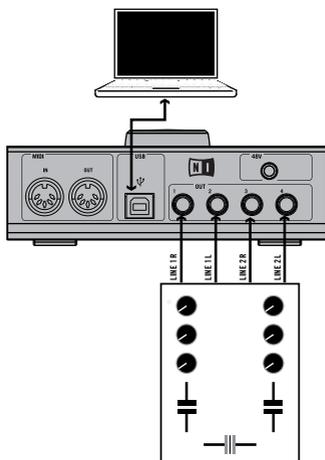
This setup serves as a basis for the Use Case of section 6.1, where it is explained in detail.

## 4.1.2. Setup 2: DJing (Internal Mixer)



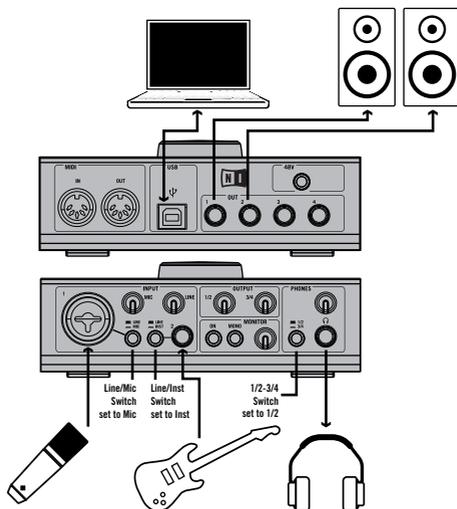
This setup can be used with the included NATIVE INSTRUMENTS product TRAKTOR 3 LE. It allows you to execute sophisticated mixes using only a computer, AUDIO KONTROL 1, a headphone and an amplification system. This setup is used in the Quickstart of section 5.2 where you will find detailed information.

### 4.1.3. Setup 3: DJing (External Mixer)



If you prefer to use your hardware mixer for DJing with your computer, this setup is for you. All connections between your mixer and other gear (headphones, amplification system...) are those of a standard DJ setup. The only difference is that your mixer gets its inputs from AUDIO KONTROL 1 instead of turntables. TRAKTOR 3 LE can also handle this setup. Please refer to the separate manual of TRAKTOR 3 LE for detailed information.

#### 4.1.4. Setup 4: Guitar/Bass



The AUDIO KONTROL 1 software bundle includes the great GUITAR COMBOS, putting a bunch of outstanding guitar combos into your computer. This setup shows you how to play them from your electric guitar. You can use a microphone at the same time. Therefore, the instrument is connected to Input 2 with the Line/Inst Switch set to Inst, and the microphone is connected to Input 1, setting the Mic/Line switch to Mic. This setup is explained in detail in the Quickstart of section 5.3.

## 4.2. AUDIO KONTROL 1 Software Installation

AUDIO KONTROL 1 is a tightly integrated system of software and hardware: Before using AUDIO KONTROL 1, the product's software must be installed, particularly the driver. You might also want to install the bundled software applications XPRESS KEYBOARDS, TRAKTOR 3 LE and GUITAR COMBOS.

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Do not connect the AUDIO KONTROL 1 hardware to your computer until you have finished the software installation and driver setup (see below). The driver installer will ask you to connect the Controller at the proper time.

---

To start the installation, insert the AUDIO KONTROL 1 CD into the optical drive. Open the Windows Explorer (the Finder on the Mac) and double-click the CD to see the files on the CD-ROM. Start the installation by double-clicking “AUDIO KONTROL 1 Setup” (by launching “AUDIO KONTROL 1 Installer” on Mac OS X).

This will start the installation program. It will ask which parts of the AUDIO KONTROL 1 software you want to install:

- AUDIO KONTROL 1 Driver
- AUDIO KONTROL 1 Mapping Application
- Service Center

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Make sure that you install the AUDIO KONTROL 1 Driver and the AUDIO KONTROL 1 Mapping Application when you install the product on your machine for the first time. Without them, AUDIO KONTROL 1 will not work correctly.

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If you choose to install only a selection of the possible packages, you can start the installer again at some other time to add the missing packages conveniently. Don't install one of the packages a second time if it is already present on your system: This might cause problems with your computer system's setup.

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The NI Service Center is required to activate those products via the internet. You can find detailed information about activation in the separate Setup Guide, placed within the Start menu entry of the Service Center (in the Service Center's application folder on Mac OS X) after installation. If you already installed the Service Center as part of another product by Native Instruments, a second installation is not necessary.

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After you confirmed your selection of packages by going to the next page of the installer, the software is being installed. This is done by several smaller installers that are triggered by the main setup program. During the installation you will be asked a series of questions regarding where certain components of the program should be placed. In most cases you can simply accept the default choices for each of these (unless you have some reason for changing them).

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The installation process of the AUDIO KONTROL 1 Driver will ask you to connect your hardware at some point. Please follow the given instructions closely. However, the installer will also ask you to restart the computer when the installation is finished to make the settings become effective. Don't do this until all installation processes you selected have been finished completely!

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After the installation of all selected packages is completed and the computer has been re-booted you can start using AUDIO KONTROL 1 by connecting it to your audio environment. However, there are five steps that are recommended to do before you begin to make music:

- Continue reading this manual. It explains how you can benefit from all features of AUDIO KONTROL 1.
- Check the settings of the AUDIO KONTROL 1 Driver. The detailed description of the **Driver Control Panel** can be found in section 7.2. Once the driver is installed, you can access the settings as follows:
  - Within the **Mapping Application**, click on the **Driver Button** at the top right of the window.
  - From the Mac OS X operating system, adjust the audio settings within the Mac's System Preferences.
  - From the Windows operating system, use the "Control Panel" link within the Start menu created during the driver installation.
- Configure the bundled software by Native Instruments to use AUDIO KONTROL 1 as audio and MIDI interface. This is described in the separate Setup Guide installed with the Service Center. You can also refer to the quickstarts of this manual (found in section 5) for a fast approach.
- Configure any third-party software you intend to use with AUDIO KONTROL 1, e.g. your operating system, your sequencer, or programs like Winamp and iTunes. Refer to the documentation of that software for detailed information on how to set it up correctly. The following section will also give you a fast introduction.

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**Important:** You can install the additional software bundle by using the separate installers on the installation disc.

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## 4.3. Configuring Third-Party Software

### 4.3.1. The MIDI ports of AUDIO KONTROL 1

AUDIO KONTROL 1 contains one MIDI input port and one MIDI output port on the hardware side. However, when you configure your software applications to interact with the AUDIO KONTROL 1 hardware, you will note that the driver offers a second MIDI input/output pair.

The first MIDI pair can be used to access the hardware ports. Activate them if you want to control your software with external MIDI gear (e.g. a master keyboard) or if you want to send MIDI messages to any other hardware.

The second pair is obviously not present at the hardware. Instead, it is used by the Mapping Application to send MIDI messages to your applications. Only if your application uses this second pair of MIDI ports, the Mapping Application will be able to control it via MIDI.

Of course, you can combine both ports, i.e. your application can use the external MIDI input and the virtual input at the same time.

### 4.3.2. Using AUDIO KONTROL 1 as the default audio interface in Windows XP

To use AUDIO KONTROL 1 as your default audio interface under Windows XP, do the following:

- Open Start > Control Panel > Sounds and Audio Devices.
- Click the Audio tab.
- In the Sound playback, Sound recording and MIDI music playback sections, click the Default device menu and select AUDIO KONTROL 1 Out 1, AUDIO KONTROL 1 In 1 and AUDIO KONTROL 1 MIDI Out 1 respectively.
- Click OK to close the Sounds and Audio Devices dialog.

### 4.3.3. Using AUDIO KONTROL 1 as the default audio interface in Mac OS X

To use AUDIO KONTROL 1 as your default audio interface under Mac OS X, do the following:

- From the Apple menu, select System Preferences, and in the panel that opens, click Sound.
- Click the Sound Effects tab and choose AUDIO KONTROL 1 in the Play alerts and sound effects through menu.
- Click the Output tab, and choose AUDIO KONTROL 1 in the Choose a device for sound output list.

- Click the Input tab, and choose AUDIO KONTROL 1 in the Choose a device for sound input list.

#### **4.3.4. Configuring Cubase with AUDIO KONTROL 1 (ASIO)**

To configure Cubase SX/SL with AUDIO KONTROL 1, do the following:

- From the Devices menu, select Device Setup. The Device Setup dialog pops up.
- In the Devices list, on the left, click VST Audiobay.
- Select the AUDIO KONTROL 1 driver from the Master ASIO Driver menu.

The procedure is similar in all applications that use ASIO to connect to your audio interface. For detailed explanations, please refer to the respective operation manual.

#### **4.3.5. Configuring Logic with AUDIO KONTROL 1 (CoreAudio)**

To configure Logic 7 Pro with AUDIO KONTROL 1, do the following:

- From the Audio menu, select Audio Hardware & Drivers. The Preferences dialog automatically shows the Audio/Drivers/CoreAudio tab.
- Select the AUDIO KONTROL 1 driver from the Driver menu.

The procedure is similar in all applications that use CoreAudio to connect to your audio interface. For detailed explanations, please refer to the respective operation manual.

## 5. Quickstarts

In this section, we will assume that you already have AUDIO KONTROL 1 set-up and running successfully. That notably means that the Mapping Application has already started up, as it should be automatically loaded when the system starts. If this is not the case, please refer to section 4.2 for more information. You should also have already installed the software bundle included in AUDIO KONTROL 1. Once again, if not, please refer to section 4.2.

We also assume that you have already carefully read section 3.1, which describes and explains every socket and control found on the AUDIO KONTROL 1 hardware.

We will present here four different scenarios that demonstrate what AUDIO KONTROL 1 can do. These situations represent small setups, allowing you to get to work quickly, and will teach you the basics of working with AUDIO KONTROL 1. The first three scenarios make use of the great products included in the AUDIO KONTROL 1 package, so you don't need any third-party music software. Within a few steps, you will be able to start making noise!

For more complex setups and advanced uses of AUDIO KONTROL 1, please read the following section 6.

### 5.1. Playing XPRESS KEYBOARDS from a MIDI keyboard

The first scenario is quite simple. It only deals with playing a software instrument from a MIDI keyboard and listening to the result on your PA. This task is maybe one of the most common in the computer musician's world, and we will show here how to do it right away via the AUDIO KONTROL 1 audio interface and one of the included products by NATIVE INSTRUMENTS. If you're already used to doing this, you can go directly to the next scenario. But it's always worth reading it: it will help you in getting more and more familiar with AUDIO KONTROL 1.

We have to do two things: first, we're going to set up the incoming MIDI signal flow; then, we're going to set up the outgoing audio signal flow.

#### 5.1.1. MIDI Connections

Let's first connect your MIDI keyboard to AUDIO KONTROL 1. Connect the MIDI output of your MIDI master keyboard into the AUDIO KONTROL 1 **MIDI In** Connector. When you press a key on your master keyboard, you should see the LED light up on the AUDIO KONTROL 1 hardware top panel, following your actions on the keyboard.

We now have to choose our instrument. AUDIO KONTROL 1 comes with NATIVE INSTRUMENTS' XPRESS KEYBOARDS software bundle. This bundle includes the XPRESS version of three software instruments from NATIVE INSTRUMENTS: B4, PRO-53, and FM7. These XPRESS versions combine the outstanding sound of the full versions with an incredible ease-of-use. Each of them is equipped with a factory soundbank offering you the most popular sounds of their predecessors.



AUDIO KONTROL 1 includes the XPRESS KEYBOARDS software bundle, offering you three great sounding and easy-to-use software instruments.

Let's choose the PRO-53. First, launch it, and go to the menu **File > Setup**. Here, click on the **MIDI Tab**. We want to be sure that the PRO-53 receives the MIDI message from your AUDIO KONTROL 1 MIDI interface. In the upper table, you will see a list of your **MIDI Input** interfaces. Verify that both entries of the "AUDIO KONTROL 1" are set to On. If one or both of them are set to Off, click on this Off icon to activate the input (the Off will turn to On). Then click OK to save your settings. The PRO-53 is now ready to receive the MIDI messages that your master keyboard will send through AUDIO KONTROL 1. (Additionally, the second MIDI port will pass all messages generated with the AUDIO KONTROL Mapping Application to the PRO-53. This, however, will not be used within this first quickstart.)

To check this, press a key on your master keyboard: the PRO-53 MIDI Indicator (on the left of the virtual keyboard) should turn red, both when you press the key and when you release it. You should see also the corresponding key being pressed on the virtual keyboard:



For more information on the settings in PRO-53 XPRESS, please refer to the PRO-53 manual, included in PDF format in the installation folder.

### 5.1.2. Audio Connections

Now that the MIDI section is done, let's look at the audio section.

Like any software instrument, PRO-53 generates its sound via its virtual outputs. We have to assign these virtual outputs to the AUDIO KONTROL 1 outputs.

To do so, go back to the menu **File > Setup**, and click on the **Soundcard Tab**. There, choose "ASIO AUDIO KONTROL 1" in the **Output Device** menu. Then click on the **Routing Tab**. Here, you can select to which physical connector of your audio interface the signals have to be routed (both input and output). We are interested here in the output signal, so click on the **Output Tab**. You can then choose, in the two menus **Master Left** and **Master Right**, the physical output you want to use for each of them. Let's choose "AUDIO KONTROL 1 Out 1" and "AUDIO KONTROL 1 Out 2". They correspond to the **first two Main Output Jacks** on the rear panel of your AUDIO KONTROL 1 hardware. Then click **OK** to save your settings. The PRO-53 XPRESS will now send its sound to your AUDIO KONTROL 1 Main Outputs Jacks 1 and 2.

Once again, for more information on the settings in PRO-53 XPRESS and all other products included with AUDIO KONTROL 1, don't hesitate to dig into the manual of each product. All manuals are included in PDF format with the installers.

If you haven't already done so, you still have to connect audio cables between those outputs and your amplification system. Be sure to use balanced cables, as the outputs of AUDIO KONTROL 1 require this type of connection.

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**Important:** Be careful! Before doing so, turn all volume levels down to avoid any clicks that might damage your speakers and/or your ears! On your AUDIO KONTROL 1 hardware, turn the **Output Level Knob** (1/2 or 3/4, depending on which outputs you selected in PRO-53) all the way down. Do the same with the volume on your amplifier. Then, and only then, plug the audio cables between the selected outputs and your amplifier inputs, and you can turn the volume levels back up again.

---

When you now play on your master keyboard, you will hear the sound of the PRO-53.

That is the simplest use of AUDIO KONTROL 1, using only its audio/MIDI interface. In the next scenario, we will make use of its particularly outstanding function: the remote control.

## 5.2. Controlling TRAKTOR 3 LE

This second scenario will show you how to quickly start DJing via AUDIO KONTROL 1 and TRAKTOR 3 LE, NATIVE INSTRUMENTS' award-winning DJ software, included with AUDIO KONTROL 1. TRAKTOR 3 LE allows you to mix tracks stored on your computer, via virtual decks equipped with the most advanced mixing features. TRAKTOR 3 LE also includes an internal mixer with outstanding effects and a powerful track browser to manage your music collection. For an in-depth presentation of TRAKTOR 3 LE, please refer to the corresponding operation manual located in the TRAKTOR 3 LE installation folder.

We will make use here of AUDIO KONTROL 1's remote control capabilities to take control of TRAKTOR 3 LE. We will also use the AUDIO KONTROL 1 audio interface to bring everything to the dance floor – and to your ears.

Although TRAKTOR 3 LE can also be used with an external hardware mixer, here we will use its internal mixer, giving us access, among other things, to its great effects. The scenario described here is actually the one depicted in section 4.1.2. Please refer to the picture in this section for an overview of the audio section of our setup.

### 5.2.1. Audio Connections

The most important thing in DJing is the ability for the DJ to **listen to something else** than the music sent to the audience: When a track is playing on the dance floor, the DJ is already working on the next track to be played. This is called “cue listening”. Of course, TRAKTOR 3 LE handles this in various ways. Here

we will build a setup including a main stereo output for the audience (and DJ booth if needed), and a second stereo output for cue listening. Your AUDIO KONTROL 1 hardware is, by the way, equipped with four outputs, i.e. two stereo outputs. Perfect! Let's wire it all up.

### Physical Connections

Connect the **Main Output Jacks 1 and 2** on the hardware's rear panel to your **power amplification system**. Your main mix will come out of the box through those sockets.

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**Important:** As we said in the previous quickstart, be careful when doing so, and turn all relevant volume levels down before plugging anything into anything! Your ears will thank you later.

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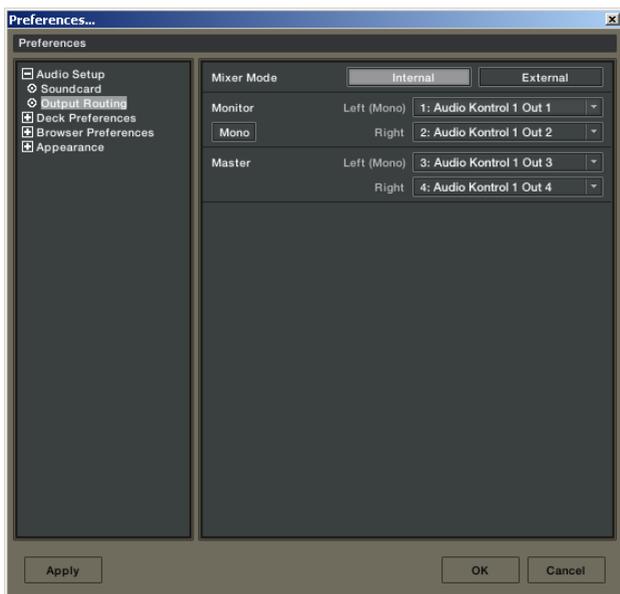
For the cue listening output, we will use the two other outputs of AUDIO KONTROL 1. But actually we won't plug anything into Main Output Jacks 3 and 4. Instead, we want (and we're not the only ones) to use the headphones to work on the next track. So plug your headphones into the **Headphone Output Jack** on the hardware's front panel. Next to the Headphone Output Jack, set the **Headphone Output Selector Switch** to position "3/4" (switch engaged), so that you hear outputs 3 and 4 in your headphones.

### Configuring TRAKTOR 3 LE

Now that the hardware section is ready, let's configure TRAKTOR 3 LE accordingly. Launch TRAKTOR 3 LE and click on the **Preferences Button** on the top right of the window. This brings up the **Preferences** window. In the left pane, unfold the "**Audio Setup**" category by clicking on the little "+" on its left.

Click on the first entry, "**Soundcard**", and check that "Audio Kontrol 1" is selected as audio device.

Now click on the second entry, **Output Routing**. Here, you can choose where to send each of TRAKTOR 3 LE's outputs. In the first line, **Mixer Mode**, select **Internal Mixer**, since we want to use TRAKTOR 3 LE's mixer. The following line, **Monitor**, allows you to choose a routing for TRAKTOR 3 LE's headphone output. In the dropdown menu, select "AUDIO KONTROL 1 Out 3" and "AUDIO KONTROL 1 Out 4" for the left and right channels. If you wish, you can activate the Mono Button to mix both left and right channels together in your headphones. The third line, **Master**, deals with the main output. Here, select "AUDIO KONTROL 1 Out 1" and "AUDIO KONTROL 1 Out 2", as we decided to do earlier. The Output Routings should now look like this:



The TRAKTOR 3 LE Preferences window, for use with the internal mixer and AUDIO KONTROL 1.

Within a later step of this quickstart, we will use the Mapping Application to remotely control TRAKTOR 3 LE. Therefore, TRAKTOR 3 LE needs to listen to the MIDI messages coming from the Mapping Application: Unfold the “**Hotkey & MIDI Setup**” category and click on the entry “**MIDI Interfaces**” and activate both input ports of the AUDIO KONTROL 1 hardware.

We don’t need here to change any other settings in TRAKTOR 3 LE. For more info about the other settings, please refer to the TRAKTOR 3 LE operation manual located in the TRAKTOR 3 LE installation folder.

Let’s check the audio setup by starting the playback on a deck.

Load a track on **Deck A** by dragging and dropping from the **Track List**, click on the **Play Button** and check that the **Crossfader** is set hard left.

Turn the **Ph Mix Knob** on the TRAKTOR 3 LE Mixer hard left, so that only the Cue signal is sent to the Monitor output (your headphones).

If the **Cue Button** for Deck A’s channel is deactivated in the Mixer, the sound will be sent through TRAKTOR 3 LE’s Master Output to AUDIO KONTROL 1’s Main Output Jacks 1 and 2, and finally to your amplification system, and you will hear the sound on the dance floor (or in your room). If you don’t hear anything, check on your AUDIO KONTROL 1 hardware that the **Output Level Knob 1/2** is no longer at zero.

If you activate the **Cue Button** (by clicking it), the sound will be sent through TRAKTOR 3 LE's Monitor Output to AUDIO KONTROL 1's Main Output Jacks 3 and 4. Those jacks are not wired, but AUDIO KONTROL 1's headphone output receives these outputs (thanks to the **Headphone Output Selector Switch**), and you will hear the music in your headphones. Once again, if you don't hear anything, check on your AUDIO KONTROL 1 hardware that the **Headphone Output Level Knob** is not at zero.

That's it; we're done with the audio setup.

---

**Note:** If you wish to check in your headphones what is sent to the audience, you now have the option. You can do it on the software side by adjusting the **Ph Mix Knob** in TRAKTOR 3 LE (you then have a continuous crossfade between the Cue signal and the Master signal). But you can also do it quickly on the hardware side by playing with the **Headphone Output Selector Switch** on the AUDIO KONTROL 1 hardware's front panel: With the switch engaged, you can hear the Cue signal (i.e. the outputs 3/4), and with the switch disengaged, you can hear the Master signal (outputs 1/2).

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(Actually, as if that wasn't enough, you can even do it through the Controller Knob by assigning it to the Ph Mix Knob. After having read this manual, you will be able to do it within seconds.)

### 5.2.2. Controlling TRAKTOR 3 LE

We will now look at the most innovative part of AUDIO KONTROL 1: its Remote Control. Located on the hardware's top panel, its behavior is managed by the Mapping Application. The mapping system for the hardware's four top panel Controllers is organized into the so-called **Controller Pages**. A single Controller Page is a full set of assignments for the four Controllers in the four **Layers**. If this sounds new to you, we recommend you to read the relevant subsections in section 2. The concept of Layers is extensively described in section 7.3.

AUDIO KONTROL 1 comes with plenty of **Factory Pages** for many applications, and there is also one for TRAKTOR 3 LE. We will use such a Page here, to concentrate on the use of the hardware top panel. Later, we will explain how to program custom **User Pages** so you can create your own assignments to fit your needs.

Let's begin. First, brings the Mapping Application to the front in your operating system. This can be done by double-clicking the application's icon within the system tray of Windows XP (the Status Bar on Mac OS X). If you cannot find it

there, the application is not running. In this case, start it from the Start menu (or the application's folder on Mac OS X). In the top line, called the **Application Control Bar**, the first Button is marked either „Assign” or “Display”. If you see “Display”, click on it to switch to the **Display View**. If you see “Assign”, then leave it, as you are already where we need to be: in the Display View.

On the right, we see a menu, called the **Page Select menu**. Its name is clear enough, and we will click on it to select the appropriate Controller Page to control TRAKTOR 3 LE. Select the entry “TRAKTOR 3 LE”. The Mapping Application then loads this Page and you will see all of its assignments in the rest of the window.



The Mapping Application with the TRAKTOR 3 LE Page loaded.

The lower part of the window, called the **Hardware Area**, represents the hardware's top panel. When you move your mouse above one of the displayed Controllers, the upper part of the window, called the **Information Area**, displays the assignments for that Controller.

Now let's take control of TRAKTOR 3 LE. To see what's happening, bring TRAKTOR 3 LE to the front. Move the Controller Knob on your hardware: the **Master Knob** in the Mixer instantaneously follows the Controller Knob movements, adjusting the overall output volume of your mix.

If you press any of the three Buttons, nothing happens: they are all set to the Modifier mode, meaning that they don't have a specific action, but instead they modify the action of each Controller.

For example, **press and hold** the **Left Button**. You are now controlling **Deck A**. The Controller Knob doesn't control the Master Volume anymore, but instead it drives the **Fine Pitch** parameter for that Deck. This parameter is not actually displayed on the TRAKTOR 3 LE interface; it can only be controlled via MIDI - and now via AUDIO KONTROL 1. Like it says, this parameter is a fine pitch adjustment, much more precise than the **Tempo Knob** that you see on each Deck.

With the Left Button still held down, the **Middle** and **Right Buttons** are the **Play** and **Cue Buttons** for Deck A, respectively. There's no need to grab the mouse to start, stop and cue the playback anymore, you just have to press and hold the Left Button, and then play with the two other Buttons. Easy, isn't it? That's exactly what AUDIO KONTROL 1's Remote Control is about.

Now that you've finished with the Left Button, release it and **press and hold** the **Right Button**. You now have access to exactly the same features, but for Deck B. **Fine Pitch**, **Play** and **Cue** for **Deck B** are on your hardware's top panel, right at your fingertips.

We've played up to now with the **Main Layer** (no Button pressed and held), and the **Left** and **Right Layers** (Left or Right Button pressed and held, respectively). The last Layer, the **Middle Layer**, is logically activated by pressing the **Middle Button**. You then have access to the following parameters: the Controller Knob controls the Crossfader, and the Left and Right Buttons control the first and second buttons of the Master Effect currently loaded in TRAKTOR 3 LE.

With four Controllers on your hardware's top panel, you have thus control over 10 parameters in your software. Load another Factory Page dedicated to TRAKTOR 3 LE, or create a custom User Page, and you'll get another 10 parameters on your AUDIO KONTROL 1 hardware top panel.

You will learn how to program your own Controller Pages in sections 6.2 and 6.3, and you can find all info about it in section 7.4.4.

### **5.3. Playing a Guitar Riff with GUITAR COMBOS**

We will now look at another application, this time making use of AUDIO KONTROL 1's audio input capabilities. For this purpose, we will move to another musical world: the electric guitar & bass empire. Following the multi-functional high-end ready-to-use concept driving AUDIO KONTROL 1, we included another great piece of software in the box: GUITAR COMBOS. This set of three outstanding tube amplifier emulations uses the same critically acclaimed technology that has already won NATIVE INSTRUMENTS' GUITAR RIG 16 industry awards, and covers a huge range of musical styles within the

simplest and easiest-to-use interface. It looks just like the real thing, you use it just like the real thing, and it sounds just like the real thing.



GUITAR COMBOS and its three high quality tube combo emulations.

The advantages of such a setup compared with a guitar directly plugged into an amp are numerous: among them, you have here not one, but three amps, modeled from such which would actually cost a considerable amount of money if you wanted to have them all in your rehearsal room or on stage. Additionally, with all of them now on your computer, it's really easy to take them with you. Moreover, AUDIO KONTROL 1's Remote Control allows you to tweak them from its hardware top panel, giving you a physical, analog-like, real world feel when playing with your combos.

Let's set all this up. We will follow here the guidelines provided by the picture in section 4.1.4.

### 5.3.1. Audio Connections

In order to hear, on your amplification system or headphones, what you are playing on your instrument, we will follow these steps.

#### Physical Connections

First, we have to plug your guitar (or bass) into AUDIO KONTROL 1's audio interface instrument input.

As always, before plugging anything into anything, don't forget to turn any relevant signal levels *down*: on your instrument, and on the **Line Input Sensitivity Knob** (labeled **Line**) of your AUDIO KONTROL 1 hardware. Now plug the jack coming from your instrument into **Input 2's Jack**. Because the guitar and the bass are high impedance equipment, you *must* activate the high impedance circuitry by engaging the **Input Impedance Switch (Inst/Line)**, position **Inst**).

There is one more little but important thing to do: adjust the input level. This can be done by adjusting the **Line Input Sensitivity Knob** on the hardware front panel while carefully looking at the **Input 2 LED** on the hardware top panel. This LED gives you an idea of the incoming signal level at this input: If there is no signal at this input, the LED is off; if there is an incoming signal at an acceptable level, the LED lights green; if the incoming signal level is too high, the LED turns red. What we want is to have the LED to light green and never turn red. To do this, play on your guitar the loudest part that you plan to play, and look at the LED: if it is always green, turn the **Line Input Sensitivity Knob** up, until the LED starts turning red. At that point, turn the Knob slightly down, until the LED is no longer red. Now, your signal is at the optimum level, giving you the highest dynamical range without clipping. You won't touch this Knob again for this application.

Now the input section is done, let's look at the output. We will choose, for example, the first two outputs on AUDIO KONTROL 1's hardware, as depicted in section 4.1.4. If it's not already done, connect the **Main Output Jacks 1 and 2** on the hardware's rear panel to your **power amplification system** (of course, only after having checked on your hardware's front panel that the **Output Level Knob 1/2** is fully turned down, as well as the volume control on your amplifier).

We now have to decide which combo we want to use. You've just heard this great version of The Kinks' "You Really Got Me" recorded live at the Kelvin Hall on April 1st 1967, and now you are in a kind of British Invasion trip? Without hesitation, we will take the **AC Box Combo**. Launch it and select **Preset #19, "Amp in the Hall"**. That should do the trick! This preset is optimized for guitars with humbucker pickups (as denoted by the letters HB after the Preset name), but even if you own one with single coil pickups, it won't make a big difference for now.

## Configuring the AC Box Combo

As with TRAKTOR 3 LE, PRO-53 and any other music application, we have to quickly check the audio setup in the software. Go in the menu **File > Audio + MIDI Settings**, and click on the **Soundcard Tab** in the dialog that opens. There, check that the selected **Output Device** is “ASIO AUDIO KONTROL 1”. Then click on the **Routing Tab**, and check the following:

- In the **Inputs Tab**, the inputs must be connected to AUDIO KONTROL 1' inputs (actually only Input 2 in our case).
- In the **Outputs Tab**, the outputs must be connected to those used on the AUDIO KONTROL 1's hardware (in our case Outputs 1 and 2).

The Audio is now ready-to-use. You can turn all relevant levels up again (but don't touch the Line Input Sensitivity Knob!). When you play your guitar, you should now hear Dave Davies' riff!

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**Note:** If you wish to spare your neighbors' ears, we suggest you to use the headphones instead of an amplification system. To do this, just plug your headphones into the Headphone Output Jack, disengage the Headphone Output Selector Switch so that it monitors the Main Outputs 1 and 2 (as we used those in our setup), turn the Output 1/2 Level Knob all the way down to make sure you don't accidentally blast your neighbours with high volume, and carefully turn the Headphone Output Level Knob up. But remember: Using headphones at high levels and/or for a long time can be very dangerous for your ears!

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### 5.3.2. Controlling GUITAR COMBOS

You might love the sound of this preset, developed like the other presets by a team of professional sound designers and guitar lovers. But what if you want to improve it so that it sounds exactly like YOU want it to sound? Nothing could be simpler: you can tweak every combo parameter and save any interesting result in a new **Preset** via the **Save** function (for more info on this, please refer to the GUITAR COMBOS operating manual, included as a PDF file in the GUITAR COMBOS installation folder).

But you don't necessarily need to store each new setting in a new preset. You might want to keep an eye on a few parameters, and to be able to quickly adapt their values to your playing. AUDIO KONTROL 1 allows you to do this in an easy way, without taking the mouse or looking at the computer screen. We will just load the right **Controller Page** in the **Mapping Application**, and you will have the required parameters available on the hardware top panel.

In order to establish a connection between both applications, the AC Box Combo needs to receive the MIDI messages coming from the Mapping Application. As with setting up the audio connections, open the **Audio and MIDI Settings** within the **File** menu, select the **MIDI tab** and activate both input ports of AUDIO KONTROL 1. This can be done by clicking on the **Off** label; if it already reads **On** for both inputs, you don't need to change the options. Click **OK** to close the dialog box.

Bring the Mapping Application to the front in your operating system. In the top **Application Control Bar**, the first Button is labeled either „**Assign**” or “**Display**”. If you see “Display”, click on it to switch to the **Display View**. If you see “Assign”, then leave it, as you are already where we need to be: in the Display View.

On the right, click on the **Page Select menu** and select, for example, the entry “Guitar Combos AC Box Volume”. The Mapping Application automatically loads that Page and you will see all its assignments in the rest of the window.



The Mapping Application with the “Guitar Combos AC Box Volume Set” Page loaded.

The lower part of the window, called the **Hardware Area**, represents the hardware’s top panel. When you move your mouse above one of the displayed Controllers, the upper part of the window, called the **Information Area**, displays the assignments for that Controller.

As shown on the Mapping Application, this Page is quite simple. It implements only four controls, corresponding to the following AC Box parameters, now accessible from the hardware’s top panel:



Let’s play now with the AUDIO KONTROL 1 hardware top panel:

- Without pressing any of the three Buttons, the Controller Knob drives the Input Volume.
- With the Left Button pressed, the Controller Knob controls the Output Volume.
- With the Middle Button pressed, the Controller Knob adjusts the Treble Booster Boost parameter.

- With the Right Button pressed, the Controller Knob sets the Treble Booster Bright parameter.

If you want to have other controls on the hardware's top panel, feel free to load another Page for GUITAR COMBOS AC Box in the **Page Select menu**, or even create your own set(s) of assignments as described in sections 6.2, 6.3 and 7.4.4.

## 5.4. Remote Controlling Winamp/iTunes

This last situation deals with an every-day computer task, actually much more common than playing a guitar or DJing in a club. It is just about listening to music. For that, AUDIO KONTROL 1 will take control of your favorite audio player and bring its main commands right to your fingertips. We assume here that you are using Winamp on your PC or iTunes on your Mac. Of course, if you are using another audio player, you can create one or several User Page(s) to control it from AUDIO KONTROL 1's hardware top panel.

Here we don't have to make any particular audio connections but the usual ones between a computer and a hi-fi or amplification system. We will describe them quickly, assuming that you have already read the previous quickstarts. After all, it's only the fourth time that we've connected AUDIO KONTROL 1's outputs to an amplification system... If anything is unclear, please refer to the previous quickstarts.

- Turn all **relevant volume controls** down.
- Connect the **Main Output Jacks 1** and **2** to your amplification system.
- Plug headphones into the **Headphone Output Jack** if desired.
- Turn all relevant volume controls up to a reasonable level.

That was it on the hardware side. On the software side, the operating system needs to use the AUDIO KONTROL 1 as its default interface, as Winamp and iTunes are simply relying on the operating system's settings. The necessary steps to set up AUDIO KONTROL 1 as your default audio interface are described in sections 4.3.1 (Windows) and 4.3.3 (Mac).

Now we want to load the right **Controller Page**:

- Bring the **Mapping Application** to the front in your operating system.
- In the **Page Select Menu**, choose "Winamp" (Mac: "iTunes").

That's all; everything is now set up to control your audio player from the AUDIO KONTROL 1 hardware top panel.

From now on, you will have the following controls via the **Controller Knob** and the three **Buttons**.

With **no Button pressed**:

- The Controller Knob controls the volume.
- The Left Button doesn't do anything (see below).
- The Middle Button is the Start Button.
- The Right Button is the Pause/Continue Button.

With the **Left Button pressed**:

- The Controller Knob can be used to rewind or forward the current track.
- The Middle Button switches to the previous track in your playlist.
- The Right Button switches to the next track in your playlist.

After a few minutes, you will find that the Remote Control is much more efficient than grabbing your mouse or your keyboard to perform the same actions in the software, notably because you don't need to bring the target application to the front before executing the commands from the AUDIO KONTROL 1 hardware.

As always, you are of course absolutely free to compose other Controller Pages according to your wishes.

These four quickstarts showed you the basics of AUDIO KONTROL 1. But the next section will explain some more complex situations, in which AUDIO KONTROL 1 can considerably improve both efficiency and quality in your workflow.

# 6. Use Cases

We will assume here that you have already read (and understood) the previous sections (Parts of the Product, Setup and Quickstarts). If you are an advanced user, you don't necessarily need to have read all these previous sections carefully, but we think that it's always a good idea to spend a few minutes on the basics (and if you are an advanced user, it shouldn't take you too much time to read). Moreover, the quickstarts also show you how to start using the AUDIO KONTROL 1's Remote Control, and we will start here from that point. If you feel unsure about anything, don't hesitate to get back to the previous sections, or to look in the Reference Section later in this manual.

## 6.1. Recording Vocals

The first use case that we will look at is **recording a voice**. AUDIO KONTROL 1's audio interface allows you to make high quality voice recordings, assuming of course that you have a microphone that is good enough to achieve this... AUDIO KONTROL 1 comes with enough connections to set up an efficient voice-recording configuration. Actually we will implement here something similar to the setup depicted in the section 4.1.1, but without the MIDI part (master keyboard...).

### 6.1.1. What Is the Situation, And How to Connect Everything

You are sitting comfortably in the control room. The song has already been recorded, it's loaded into your favorite multi-track recording software, and only the voice track is missing. The singer is standing in the recording room. You want to:

- record his (her) voice,
- send the song to his (her) headphones, so that he (she) can sing on it,
- listen to the result live and direct in your control room, i.e. the song playback *and* the voice being recorded.

First, we will plug the microphone's balanced XLR jack into AUDIO KONTROL 1's **Combo Input Jack**.

Depending on the type of microphone you use for your recording, the **Phantom Power Switch** needs to be activated. You can find it on the rear panel of AUDIO KONTROL 1. Please have a look into your microphone's documentation if you are not sure whether to use phantom power or not. Using the incorrect setting might damage the microphone.

Don't forget to **engage** the **Input 1 Level Switch**, so that the incoming signal goes through AUDIO KONTROL 1's microphone pre-amplification circuitry. The input signal level is adjustable on the hardware side by the **Microphone Input Sensitivity Knob**. Note that you will probably also have an input level control within your recording software.

As we said, we will here follow the diagram as shown in section 4.1.1. In this diagram, Outputs 1 and 2 are used for monitoring purposes (i.e. they are sent to your control room amplification system). The control signal being sent to the singer is coming from Outputs 3 and 4.

So let's connect your **monitoring system** to **Main Output Jacks 1 and 2** on your AUDIO KONTROL 1's hardware rear panel, and the headphone amplifier device to **Main Output Jacks 3 and 4**.

If you wish, you can plug **your own headphones** into the AUDIO KONTROL 1's **Headphone Output Jack**. As you would expect, the **Headphone Output Selector Switch** next to it allows you to switch between your own mix in the recording room, and what the singer actually hears in his (her) headphones.

That's the physical connections dealt with. Now we have to configure our **recording software** accordingly.

## 6.1.2. Configuring the Recording Software

### General Settings

We will assume here that you have already followed the instructions of the Setup section and have your AUDIO KONTROL 1 working with your Nuendo/Cubase/Logic/Sonar/... software.

Here we will be using Steinberg's Nuendo 3. For other recording-capable software, please refer to their operation manuals. The basic recording functions are generally quite similar in all of them.

We want to specify in the recording software that the main mix has to be sent to AUDIO KONTROL 1's outputs 3 and 4. To do so, we have to configure the virtual busses in the recording software.

In Nuendo 3, open the **VST Connections** window, available in the **Devices** menu. There, you can set up the busses you need.

Click on the **Inputs Tab** and check that AUDIO KONTROL 1's Inputs 1 and 2 are selected for the input bus you are using (you would actually only need Input 1 if you record the voice in mono).

Click on the **Outputs Tab** and check that AUDIO KONTROL 1's Outputs 3 and 4 are selected for the output bus you are using.

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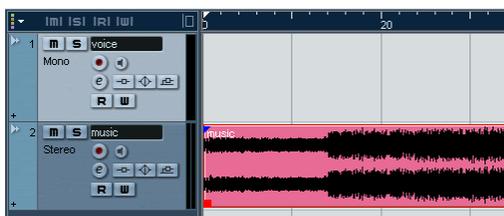
**Note:** If you wish, you can rename each bus so that you can quickly see in Nuendo's mixer where each track is going (e.g. "Control Room Left/Right", "Input Left/Right", etc.).

---

## Project Settings

We will assume that you already have a running project for this song, with an audio mix down track or several audio tracks to be played back, on which the singer will express her (his) talent.

If you have not already done so, open your existing project, or create a new one, in which you will set up one mono track for the voice being recorded, plus one or several other audio/MIDI tracks for the playback material. Your main project window should look more or less like this:



### 6.1.3. Monitoring Configuration

To listen to what is being recorded, you have two options:

- you can either do it in your recording software,
- or you can do it via the Direct Monitoring facilities on AUDIO KONTROL 1's hardware.

#### Monitoring Through Your Recording Software

Nuendo 3 (and Cubase SX 3) provides you with an internal monitoring bus, already set up, called the "**Audition**" bus. You have to specify to Nuendo that the monitoring signal has to be sent to AUDIO KONTROL 1's outputs 1 and 2. To do this, open the **VST Connections** window again (in the **Devices** menu), and click on the **Studio Tab** to check that AUDIO KONTROL 1's Outputs 1 and 2 are selected for the monitoring bus (the **Audition** bus).

You will then have to adjust the monitoring level via the **bus Aux Send #1** (destination Audition bus) on your **main output bus**.

To enable the voice track monitoring, you need to activate its **Monitor button**, on the Mixer, in the main project window or in the track's Inspector:



Note that Nuendo 3, like many other modern recording-capable types of software, can handle very complex recording setups with different busses/mixes/settings covering numerous recording issues. Here we show a very simple example of a recording setup, as we cannot explain in a few lines what a recording software's manual describes in dozens of pages. For an in-depth explanation of what you can do with your recording software, please refer to its operation manual.

### **Direct Monitoring through AUDIO KONTROL 1**

AUDIO KONTROL 1 provides you with its own monitoring facilities. This solution has some advantages:

- It allows you to avoid setting up any monitoring bus in your recording software.
- The monitor signal is not affected by any potential latency issue.

To activate AUDIO KONTROL 1's hardware monitoring, follow these steps:

- Engage the **Monitor On/Off Switch** on the hardware's front panel.
- Engage the **Monitor Mono/Stereo Switch** next to it, so that you can hear the voice on both output channels.
- In the **Mapping Application** you can select to which output the input signal is monitored. Open the main menu's Monitoring entry: If the singer wants to hear her (his) voice in the headphones, select **1/2 and 3/4**. If the singer does not want to hear her (his) voice, select **1/2**, so that the voice only goes to your monitoring speakers.
- At any time, you can adjust the **Monitor Level Knob** to control the mix between the music track coming from the computer and the voice coming directly from Input 1.

#### **6.1.4. Checking the Levels**

First, we have to set the input level on the AUDIO KONTROL 1 audio interface. This is done via the **Microphone Input Sensitivity Knob** (labeled "**Mic**" on the hardware's front panel). The goal is to achieve the highest input level possible (in order to get the highest dynamic range and the lowest noise in your recording), but not so loud that clipping at the A/D converter occurs. To do this, ask your singer to make some noise, approximately at the highest level he or she will be singing. Then do the following:

- First, turn the **Mic Knob** all the way down. Turn it up slowly, so that you see the green LED on the hardware's top panel comes on, until the LED starts turning red.
- At that point, turn the **Mic Knob** back down slightly, ensuring that the LED never goes red anymore.
- Now you're done; the input level is now set correctly on the hardware side.

You might be able to check this input level in your recording software as well. In Nuendo, the input level can be displayed on the Input track, on the far left of the Mixer. Ensure that the meter displays the pre-fader level: In Nuendo, this is done by **right-clicking** (Mac: Ctrl-click) in the **Mixer** window and selecting **Meter Input** in the **Global Settings submenu**. (See your recording software manual for more details on this.)

You may also have to be careful about the levels in your recording software, depending on how you want to record the voice:

- If you want to use EQs and effects directly on the input bus, these settings might lower or raise the level of the recorded signal. You would then have to check that the effectively recorded signal is loud enough but still not clipping. To do this in Nuendo 3, **right-click** (Mac: **Ctrl-click**) in the **Mixer window** and select **Meter Post-Fader** in the **Global Settings**. Adjust the fader so that the **Clipping indicator** does not light up.
- If you want to record the raw voice as it is, you don't need to check any further levels for the recording.

We recommend you avoid adding any EQs/effects on the input bus, because once the voice is recorded, you won't be able to edit or remove these EQs/effects. It might be a better idea to record the voice naturally. You will have the possibility later to add, remove and edit all the EQs and effects you wish on the recorded voice.

### 6.1.5. Recording the Voice

The last thing to do before starting the recording is to enable the corresponding track for recording. In Nuendo, this can be done on the track in main project window, in the mixer or in the track's Inspector, by clicking on the **Record Enable button** next to the **Monitor button** (the Record Enable button turns red):



Now everything is ready, you can start the recording via one of the various methods described in your recording software operation manual (for example, simply click on the **Record button** in the **Transport Bar**).

One more time, this is a very short presentation of what you can achieve when working with AUDIO KONTROL 1 and any serious recording software. Don't hesitate to spend some time in the recording software manual; it will allow you to obtain high quality recordings in more complex setups.

## 6.2. Controlling a Sequencer - Creating Assignments with Key Commands

We will now look at two other cases, in which AUDIO KONTROL 1's Remote Control allows you to pilot your music software as you wish.

The first case deals with a sequencer application. Major sequencers are huge pieces of software with hundreds of functions. Depending on what you are doing, you often need only part of these functions. Here we will use AUDIO KONTROL 1's ability to reproduce keyboard commands. All major sequencers have endless keyboard shortcuts assignments, covering numerous software functions. By assigning the most often used functions to the Remote Control, you can save time by avoiding the most often repeated mouse and/or keyboard actions.

Again, we will use Nuendo 3 as example. Whether you are using this sequencer or another, we recommend you refer to your sequencer's operation manual to get all relevant information about the software's keyboard commands.

### 6.2.1. Factory Page Overview

#### Loading a Factory Page

We will start with a **Factory Page** designed for Nuendo 3.

Bring the **Mapping Application** to the front in your operating system, and click on the **Page Select menu** in the top **Application Control Bar**. In the menu, select "**Nuendo**".

The Controller Page is loaded and the hardware's top panel assignments are now as follows:

With **no Button pressed**:

- The Controller Knob controls the Forward/Rewind commands (corresponding to the shortcuts "+"/"- on the numeric keypad).
- The Middle Button controls the Start/Stop command (shortcut: **space bar**)

- The Right Button controls the Record command (shortcut: “\*” on the numeric keypad)

#### With the **Left Button pressed**:

- The Controller Knob still controls the Forward/Rewind commands.
- The Middle Button now controls the Cycle On/Off commands (shortcut: “/” on the numeric keypad)
- The Right Button sets the cursor back to zero (shortcut: “,” on the numeric keypad).

This set of assignments is definitely transport-oriented: from AUDIO KONTROL 1’s hardware top panel, you have access to all major transport actions in Nuendo. This allows you, for instance, to focus your mouse actions on the mixer or on the plug-ins. The Controller Knob is, moreover, a very intuitive controller for a forward/rewind action like the jog wheels found on some audio or video editing hardware devices.

#### Analyzing the Assign View

Here we need to take a closer look at these mappings, in order to understand how they actually work. Bring the **Mapping Application** to the front, and switch to the **Assign View**: if you see an **Assign Button** in the top **Application Control Bar**, click on it; if don’t, you’re already in the **Assign View**.



In the upper part of the window, called the **Selection Area**, you will see all the Controller assignments. By clicking on one of the **four Layer tabs** on the left,

you select the assignments for that **Layer**. By clicking then on one of the **four Controller Areas** (or on one of the four upper tabs), you select the particular assignment for the corresponding **Controller** (Controller Knob, Left, Middle or Right Button).

Let's start by clicking on the **Main tab** on the left. Not surprisingly, in the column labeled "**Left Button**", you see the word "**Modifier**". Indeed, the **Left Button** is used as a **modifier** in this Page: it does not have any specific action in Nuendo, but instead it changes the actions of the other Controllers in Nuendo.

Because this Left Button is set to **Modifier mode**, the **Left Layer** (the second tab on the left) is available.

Because the other two Buttons are not set to Modifier mode in the Main Layer, their corresponding Layer tabs on the left are grayed out and not available.

Click on the **first Controller Area**, corresponding to the **Controller Knob**. In the lower part of the window, called the **Definition Area**, you can see all assignment details for the Controller Knob in the Main Layer. There, on the left, you can see what happens when you turn the Controller Knob to the left, and on the right what happens when you turn it to the right. Look at the left part of the Definition Area: under the label "Rewind", you can see a menu with the entry "**Key**", meaning that the event "turning the Controller Knob to the left" will generate a **key command** in the target application. That target application is specified in the following **Program menu**, in our case "Nuendo". Below, the **Key text field** displays "**Numpad -**", indicating the particular key command sent by the hardware event "turning the Controller Knob to the left".

(Note that key commands are handled slightly different on Windows XP and Mac OS X. Refer to section 7.3.4 for more information.)

Now, click on the **Left tab**. This tab shows you the mappings for the Controllers when the **Left Button** is pressed. You will notice that the Controller Knob assignment is the **same** as in the Main Layer (i.e. when no Button was pressed). This allows you to always have control of the Forward/Rewind commands via the Controller Knob, whether you press the Left Button or not.

These mappings can be summarized in the following table: 6.2.1. Creating Your Own Assignments

But you might want to change the behavior of this Controller when you press the Left Button, in order to have access to another feature in your target application (Nuendo in our case). For example, one could implement a Fast Forward/Rewind command when the Left Button is pressed. To do so, you just need to do the following:

- **Search** for the corresponding key command in your **target application** for that specific command. In our case, in Nuendo's default key commands settings, the Fast Forward/Rewind commands are achieved by pressing **Shift+Numpad +/-**.
- In the **Mapping Application**, click in each **Key text field** and type the new key commands on your computer keyboard. The Key text fields update the key commands, including the **relevant modifier keys**: here, the Key text fields stay unchanged, *but* you see that the box "**Shift**" is now activated both in the left and right sections.
- Check that the **target** is set correctly, i.e. that the application and the window are set up properly

That's it! From now on, with no Button pressed, the Controller Knob triggers the Forward/Rewind functions, and with the Left Button pressed, it triggers the Fast Forward/Rewind functions, giving you more control of the cursor position, in a very intuitive way.

---

**Note:** If you change the keyboard shortcuts in your target application, AUDIO KONTROL 1 mappings won't be updated! They only send key commands. Please check that these key commands are the one you need in your target application. Moreover, major sequencers often allow you to create whole sets of key commands for different tasks. Don't forget to check the set currently loaded in your application (in Nuendo, the key commands are managed by opening the Key Commands dialog, available in the File menu).

---

Let's say that the Nuendo project that we are currently working on does not use any recording functions, it is just a mix down; we won't be using the Record button in Nuendo. The Right Button mapping is therefore not very useful, at least in the Main Layer (no modifier Button pressed). You wonder: Is there any way to use this Right Button for a more useful function in my project?

We could just replace the Record command by another one that you use more often. But there might be something more interesting (at least from the tutorial point of view). Here is what we could do:

- Transform this **Right Button** into a **modifier** Button: We then lose its key commands assignment in the Main Layer, but it activates a **new Layer** of assignments for the other Controllers.
- In this newly activated **Right Layer**, map a new key command to the Controller Knob, for example the **zoom function**.

To do this:

- In the upper **Selection Area**, select the **Main Layer tab** (on the left) and then the **Right Button tab** (at the top).
- In the **Definition Area** below, click on the menu at the top, that displayed “Trigger” until now. Select the entry “**Modifier**”. The Right Button loses its assignments and becomes a modifier for the other Controllers. You can see that the Right tab (on the left of the Selection Area) is not grayed out anymore.
- Click on this newly activated **Right Layer tab** in the Selection Area to specify the new assignments.

For the **Controller Knob assignment** in this new Right Layer, we want to implement the **zoom in/out** functions. Click on the **Controller Knob Area** (or the Knob tab at the top), and do the following for both left and right sections of the lower Definition Area:

- First type a **label** for the left and right actions (e.g. “Zoom out” for Rotate Left and “Zoom in” for Rotate Right).
- Specify the **kind of event** you want to send (in our case, “**Key**” for both sides).
- In the **Program menu**, choose “**Nuendo**”. The menu displays all possible target applications currently running.
- Click in the **Key text field**, and enter the Nuendo key commands for zooming out/in (by default, the keys “**G**”/“**H**” respectively).

The mappings now look like this:

	Knob	Left Button	Middle Button	Right Button
Main Layer	Forward/Rewind (Numpad +/-)	Modifier	Start/Stop (Space)	Modifier
Left Layer	Fast Forward/Rewind (Shift + Num pad +/-)		Cycle On/Off (Num /)	Cursor at Zero (Num.)
Middle Layer				0
Right Layer	Zoom In/Out (H/G)			

You could make other changes to this Page by adding other mappings (what about a “Zoom out to the entire song” command for the Left Button when the Right Button is pressed?). Feel free to implement other assignments so that this Page meets your particular needs for your current project.

You can save your work in a **User Page** via the Save Button. You cannot overwrite the factory Page you loaded initially. Therefore, answer the upcoming question with “Save to User Page”, enter a new name (e.g. “FM7 XPRESS enhanced”), click OK, and you’re done. You can access the User Pages similar to the Factory Pages with the **Page Select Menu**.

### **6.3. Controlling a Synthesizer – Creating Assignments with MIDI Commands**

The third Use Case that we will study deals with controlling a synthesizer from the Mapping Application, but this time via MIDI commands instead of key commands. Most, if not all software synthesizers can be controlled via MIDI, if only by responding to incoming MIDI notes sent from a master keyboard, or modifying some filter parameters from a MIDI controller. By the way, the AUDIO KONTROL 1’s MIDI interface allows you to connect your MIDI devices to your computer to control your software synthesizers.

But here we want to make use of the hardware remote control feature to achieve this. This solution offers several advantages:

- You don’t need to configure any MIDI controllers (you don’t necessarily have any either).
- Your Remote Control is always next to your computer, and its controls are right beneath your fingers.
- You can quickly and easily change, save and recall all mappings, directly on your computer.
- The Mapping Application remembers at all times what these mappings are. (No more questions like “What is the 7th knob on the MIDI controller’s middle row doing?” or “Where is my self-adhesive tape? I should have written everything down on my MIDI controller”, etc.)
- Moreover, AUDIO KONTROL 1’s ability to seamlessly mix both MIDI and key commands allow you to design very efficient controlling schemes.

If you are using a MIDI controller anyway, the AUDIO KONTROL 1’s hardware top panel can still be a very useful additional control device for the most important functions in your software.

In this case, we will use another great piece of NATIVE INSTRUMENTS software included in the AUDIO KONTROL 1 bundle: the FM7 XPRESS, part of the included XPRESS KEYBOARDS.

FM7 XPRESS is actually quite simple to use. Two Factory Pages are already available for FM7 XPRESS. They control the eight knobs above FM7 XPRESS' virtual keyboard.

Most importantly, the application needs to be connected to both the MIDI input ports that AUDIO KONTROL 1 provides. Note that only one of them is actually present within the hardware. The other port is only virtual. It is used to establish a connection between the Mapping Application and the target application to be controlled remotely, in this case FM7 XPRESS. In the first quickstart we explained how to setup this MIDI connection inside PRO-53. The same is true for FM7 XPRESS (and all other applications by Native Instruments). Refer to that section 5.1 or to the FM7 XPRESS manual to find information on how to configure the MIDI input ports of FM7 XPRESS. Because we won't be repeating all the details every time, we recommend that you read the previous Use Case and the former quickstarts to get used to the terminology (Layers, tabs, etc.). In any case, you will find all relevant information in the Reference section.

### 6.3.1. Factory Page Overview

#### Loading a Factory Page

Let's look at these Pages. If it hasn't already been done, launch FM7 XPRESS.

Bring the **Mapping Application** to the front, open the **Page Select** menu by clicking on it, and select the Page "FM XRESS 1". The Factory Page now loads. On this Page, only the **Controller Knob** actually directly controls FM7 XPRESS parameters: the three **Buttons** are used as **modifiers**, i.e. they modify the Controller Knob behavior when they are pressed and held (like the Shift key on your computer keyboard). Here is what the Controller Knob does:

- With no Button pressed, it controls the Brightness parameter.
- With the Left Button pressed, it controls the Harmonic parameter.
- With the Middle Button pressed, it controls the Effect parameter.
- With the Right Button pressed, it controls the Pan parameter.

#### Analyzing the Assign View

In order to understand how this works (and maybe how to modify this...), we have to select the **Assign View** in the Mapping Application via the **Assign Button**, in the window's top **Application Control Bar** (if the Button is not visible, don't worry, you already are in the Assign View).



In the upper **Selection Area**, you can see all the Controller assignments. By clicking on one of the **four Layer tabs** on the left, you can select the assignments for that **Layer**. By then clicking on one of the **four Controller Areas** (or on one of the four upper tabs), you can select the particular assignment for the corresponding **Controller**.

Click on the **Main tab** on the left. For all Buttons, you can see the word “**Modifier**”. Therefore, the three other Layers (Left, Middle and Right) are available and can receive other assignments.

Click on the **Controller Knob Area**. In the lower **Definition Area**, you have all the assignment details for the Controller Knob in the Main Layer (in the left section for the “rotate left” action, on the right section for the “rotate right” action). In both sections, under the label’s text fields, the **Software Event Type menu** shows the entry “**MIDI**”, meaning that the two actions “turning the Controller Knob to the left/right” will generate **MIDI commands**.

Below, we can find all details about the MIDI message to be sent by the hardware event “turning the Controller Knob to the left”. The **Channel menu** specifies the MIDI Channel to be used. The **Status menu** sets the MIDI message Status Byte (i.e. the type of MIDI message), in our case “**CC Internal**”: this type of message is used to increment/decrement the value of the **Control Change (CC)** specified by the following **Controller menu**. In our case, the CC value is **74**, corresponding to the **Brightness** parameter in FM7 XPRESS. Finally, three numeric fields set the increment step (that can be negative to decrement), and the minimum and maximum values.

---

**Note:** You have probably noticed that, unlike the Key command setting discussed in the previous Use Case, this MIDI command setting does not specify any target application. The MIDI message is sent to the computer, and every MIDI-capable program running on the computer can receive it as long as it listens to both MIDI ports of AUDIO KONTROL 1. If you want to be sure that only one program responds to this message, set the channel number in the Mapping Application and in your programs accordingly.

---

Clicking on the left tab reveals the mapping for the Controller Knob when the **Left Button** is pressed. This looks very similar to the Main Layer assignment, but this time the Controller Knob triggers the Harmonic parameter (CC 71). Idem for the two other Layers; only the CC number is different.

These mappings can be summarized in the following table:

	Knob	Left Button	Middle Button	Right Button
Main Layer	Brightness (CC 74)	Modifier	Modifier	Modifier
Left Layer	Harmonic (CC 71)			
Middle Layer	Effect (CC 12)			
Right Layer	Pan (CC 10)			

### 6.3.2. Creating Your Own Assignments

As you can see, many cells are left free in this Page. Note that it makes no sense to assign a command to the Left Button in the Left Layer: the expression “Left Layer” means precisely that the Left Button is already pressed, changing the behavior of the other Controllers. The same applies to the Middle Button in the Middle Layer and to the Right Button in the Right Layer. Thus, there are six free cells in this Page:

- Middle and Right Buttons in the Left Layer,
- Left and Right Buttons in the Middle Layer,
- Left and Middle Buttons in the Right Layer.

Why not use them to control other FM7 XPRESS parameters?

The “FM7 XPRESS 2” Page already controls the four other parameter knobs, giving you full control on each FM7 XPRESS Preset. But here we could implement a control that would allow you to change the Preset. There is a specific MIDI message type for that purpose: the **Program Change** message.

By happy coincidence, FM7 XPRESS recognizes such MIDI Program Change messages and switches the loaded Preset according to the Program Change number received via MIDI.

The only thing we have to do is to **create assignments** that will send those MIDI Program Change messages to the computer. For that purpose, we will use **two Buttons**: one for incrementing the Preset number and one for decrementing it. That way, we will be able to scan through the whole FM7 XPRESS Factory Bank.

In the **Mapping Application**, the **Assign View** should still be active. If not, bring it back by clicking on the **Assign Button** in the top **Application Control Bar**.

We have to choose two Buttons from the free cells in the previous table. Let's take for example the **Left** and **Right Buttons** in the **Middle Layer**; this choice is quite intuitive: that way, when you press and hold the Middle Button, you can scan the Preset Bank in both directions with the Left and Right Buttons.

The **Middle Button** already is in **Modifier mode**, we don't have to change it.

In the upper **Selection Area**, click on the **Middle Layer tab** on the left. Everything will take place in that Layer.

Now, click on the **Left Button tab** at the top (or directly in the Left Button Area). This displays its assignment in the lower Definition Area. For the moment, there is no assignment for that Button: The **Hardware Event Mode menu**, at the top of the Definition Area, shows the entry "**None**", (meaning "no assignment".)

Let's change that and select the entry "**Trigger**". In this mode, the Button will send a message every time it's pressed, and another one every time it's released (on the contrary, the Toggle mode would send a message each time the Button is pressed, and another one each time it's pressed again, but not when it's released).

In the **Trigger mode**, you can specify a message for the **Press state** (when you press the Button), and another one for the **Release state** (when you release it). This is useful if you want to activate something (such as an effect for example,) only when the Button is pressed and held. In our case, we just want to send the same Program Change message every time, so here we will **only use the Press state**, and leave the Release state without any assigned action, also saving us half of the job.

So let's check the **Press state**, in the left section of the **Definition Area**.

Click on the only visible menu, the **Software Event Type menu**, and select "**MIDI**".

Other settings appear as soon as this entry is selected. In the **Channel menu**, select "**Omni**", so that the message will be sent on all MIDI channels.

In the **Status menu**, choose “**PC Internal**”. This means that the Program Change message will be sent in an **incremental** way, depending on the last Program Change message sent, and not with a constant value.

In the menu below, you can choose if you want to increase or decrease the Program Change number. Bearing in mind that we are assigning the Left Button; you will probably agree that it’s more convenient to assign the “**Decrease**” action to this Button, and assign the Increase action for the Right Button.

That’s it for the Press state.

As previously mentioned, we don’t need to do anything for the Release state, so leave it set to “**Off**”.

The Left Button assignments are now specified.

Do the same for the **Right Button**, the only difference being that we have to select **Increase** in the last menu, instead of Decrease.

Now check that when you press and hold the Middle Button, pressing the Left Button switches to the previous Preset in the FM7 XPRESS Factory Bank, and pressing the Right Button switches to the next Preset.

You can save your work in a **User Page** via the Save Button. You cannot overwrite the factory Page you loaded initially. Therefore, answer the upcoming question with “Save to User Page”, enter a new name (e.g. “FM7 XPRESS enhanced”), click OK, and you’re done. You can access the User Pages similar to the Factory Pages with the **Page Select Menu**.

### **Some More Controls**

What next? One idea could be to implement the **same controls on the second Factory Page**, “FM7 XPRESS 2”. That way, whether you are using one Page or the other, you would always have these Preset Switching controls in the same place on your hardware’s top panel, making it even more intuitive.

Another idea could be to **implement one or several particular Program Change messages** for specific Presets that you might want to use on stage, for example. You could then make use of the other Program Change message type, “**PC fixed**”, and set a particular Program Change number corresponding to the Preset you want to have at your disposal at any time.

Feel free to try other assignments, AUDIO KONTROL 1 offers you endless mapping possibilities!

# 7. Software Reference

In this section, we will describe all the user interface elements of AUDIO KONTROL 1's software section. As previously mentioned, the software section is divided into two programs: the **Driver** and the **Mapping Application** (see section 3.2).

## 7.1. The Driver

The **Driver** is not accessible in itself: like any other driver on your operating system, it's a piece of software loaded in the background when your system starts up. The Driver takes care of all audio and MIDI signals coming from or going to the AK1 hardware through the USB2 connection.

While the driver does not have a user interface, as stated above, it provides interfaces that other applications running on your system can use. These interfaces, like ASIO on Windows or CoreAudio on OSX, make it possible to use AUDIO KONTROL 1 from within another program (e.g. a sequencer, or Winamp/iTunes). You only need to tell the program to use the AUDIO KONTROL 1 interface. Examples of that process are given in the quickstarts (section 5) above.

Although the driver itself is inaccessible, you can edit some of its **settings** to modify its behavior for your audio setup. There are different ways to adjust those settings, depending on whether you work with Windows XP or Mac OS X. Refer to the following chapter for more information.

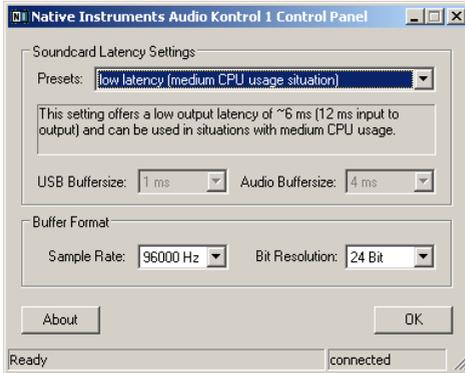
The Driver also handles remote control messages: it receives hardware actions from the AUDIO KONTROL 1 hardware, turns them into hardware events and sends these hardware events to the Mapping Application.

## 7.2. The Driver Control Panel

The **Driver Control Panel** can be accessed in different ways:

- via the link in the Start Menu (Windows) or in the System Preferences (Mac)
- from the **Mapping Application**, in the **Application Control Bar**, via the **Driver Button** (cf. below).

## 7.2.1. Driver Control Panel under Windows XP



- **Presets:** Several Presets are included, from minimal latency suitable for fast systems that don't tax the CPU load heavily, to higher latencies suitable for slower systems or fast systems with heavy CPU loads. Experts can also choose User Defined Settings (see next).
- **USB Buffersize** and **Audio Buffersize:** These parameters are grayed out unless User Defined Settings is selected instead of a Preset. Note that the Audio buffer must always be at least twice as large as the USB buffer. Together the parameters define the system's latency, i.e. the time that passes from when a audio signal is sent into the AUDIO KONTROL 1 hardware, manipulated digitally by the computer and sent back to the hardware's outputs. Note that the USB Buffersize parameter has a very strong effect on the CPU usage of the system. The resulting CPU usage differs greatly between different computers, so it makes sense to try out several USB settings. The USB Buffersize also has a direct impact on the audio buffer, as the audio buffer must be at least twice the USB latency.
- **Sample Rate:** Choose a sample rate that is compatible with your music application. Higher sample rates use more CPU load, but have the potential to offer higher fidelity.
- **Bit Resolution:** Choose the preferred bit resolution. A greater number of bits deliver better dynamic range, but audio data recorded at higher resolutions requires more memory for storage.

We recommend trying the first three latency presets first. If you have dropouts with the preset “minimal latency”, try the “low latency” or “standard latency” settings. The higher you set the audio buffer; the lower is the probability of audio dropouts. The presets should be sufficient for most use cases. Please activate the User Defined Settings only if you know what the USB Buffersize and Audio Buffersize parameters are doing.

There are also two status fields along the bottom that show whether the AUDIO KONTROL 1 hardware is ready and connected.

### **7.2.2. Driver Control Panel under Mac OS X**

The Macintosh dialog does not provide any further settings. It only displays information about the driver’s version and the firmware revision. If you encounter problems with the hardware, this information might be useful when contacting the support.

All properties – like latency and sample rate - can be adjusted in the applications using the audio interface. You can also access some settings from the preferences described in section 4.3.3.

## **7.3. Remote Control Basic Concepts**

In order to fully understand how AUDIO KONTROL 1’s remote control works, and to be able to use it at maximum capacity, it is necessary to explain the basic concepts of AUDIO KONTROL 1’s workflow concerning its remote controlling scheme.

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Note that the remote control capacity is handled by the Mapping Application. This program needs to be running in order to use this function. Normally, it starts up when the computer is booted. It is then minimized to the System Tray (Windows XP) or the Status Bar (Mac OS X) to keep it in the background. If you cannot find it there, start it from the Start menu (or the application’s folder on Mac OS X).

---

We will describe here four important concepts: hardware actions, hardware events, software events and Layers. They all play an important role in the Mapping Application, and understanding them will make the use of the Mapping Application child’s play.

### 7.3.1. Hardware Actions, or what is done with the Hardware

The **hardware actions** are performed with the four elements on the hardware's top panel, the **Controllers**. Here's what you can do with them:

- Controller Knob: Rotate clockwise/counter-clockwise (left/right)
- Left Button: Press/release
- Middle Button: Press/release
- Right Button: Press/release

These actions are transmitted to the Driver, which transforms them into hardware events.

### 7.3.2. Hardware Events, or How Your Computer Understands Them

A **hardware event** is basically defined by two things:

- the original hardware action (for instance, you turn the Controller Knob)
- how it is understood by the Mapping Application (for instance, defining when a movement of the Controller Knob is big enough to be handled as a rotation event)

Here is a list of all possible hardware events.

The **Controller Knob** can be rotated clockwise and counter-clockwise. If a Controller Knob movement exceeds a certain threshold, a hardware event is generated, either "Rotate Left" or "Rotate Right". If the Controller Knob is moved further in the same direction, after the same amount of rotation a subsequent "Rotate Left/Right" event is generated.

For all **Buttons**, there are three **Hardware Event Modes**: each Button can be used in **Trigger mode**, **Toggle mode**, or in **Modifier mode**, resulting in different hardware events:

- In **Trigger mode**, pressing the Button and releasing it creates Press and Release events respectively. Both hardware events can be assigned to software events. For example, pressing the Left Button could switch the B4 XPRESS Rotator Speed to *Fast*, and releasing the Button could switch it back to *Slow*.
- In **Toggle mode**, pressing the Button creates an On event; pressing it a second time creates an Off event. Releasing the Button does not create any event. Both On and Off events can be assigned to software events. For example, pressing the Right Button could start the playback in iTunes, and pressing it again could pause the playback (like a Play/Pause button).

- In **Modifier mode**, pressing or releasing the Button does *not* create any event. Instead, the settings for all other Controllers are modified as long as the Button is held. (Obviously, it cannot modify itself). This is similar to a computer keyboard's Shift key or Ctrl key that modifies another key's assignment and functionality. For example, in FM7 XPRESS, the Controller Knob could adjust the Brightness parameter when no Button is pressed, and adjust the Effect parameter when the Middle Button is pressed. The Middle Button acts like a **modifier**.

### 7.3.3. The concept of Layers, or Making Multiple Uses of One Button

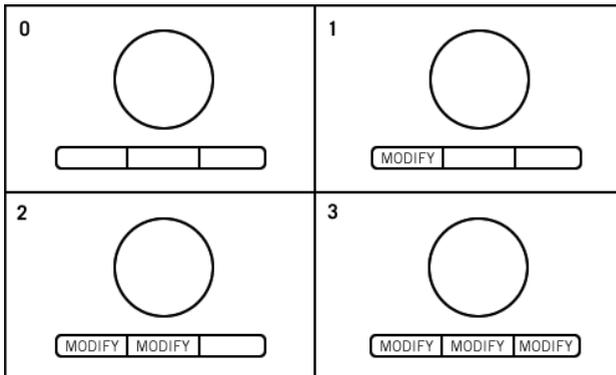
This Modifier function results in four different **Layers** of hardware events: The **Main Layer** contains all events that are generated without any modifier. The **other three Layers** are only available if the corresponding Button is set to Modifier mode in the Main Layer.

---

The Modifier Mode is only available in the Main Layer. This means in particular that you cannot use modifier combinations to define a hardware event (as you could on a computer keyboard with e.g. Ctrl+Shift+A).

---

Depending on the Modifier settings of the three Buttons, there are four (no Buttons used as modifiers) to ten (all Buttons used as modifiers) pairs of possible hardware events... and as many corresponding software events. The picture below illustrates this concept of Layers:



Different configurations of modifiers.

#### **Configuration with 0 modifiers** (upper left):

Each Controller can create a pair of hardware events (rotate left/right or button pressed/released), thus creating all in all 4 pairs of possible hardware events. There is only one Layer, the Main Layer.

### **Configuration with 1 modifier** (upper right):

Each Controller except the modifier can create a pair of hardware events.

- If the modifier (the Left Button in our case) is released, we are in the Main Layer, and that makes 3 possible pairs (Controller Knob, Middle and Right Buttons)
- If the modifier is pressed, we reach the Left Button Layer, and we find three other possible pairs, having a total of 6 pairs of possible events.

You can define any of the three Buttons as a modifier (the picture above only shows one of the three possibilities).

### **Configuration with 2 modifiers** (lower left):

Let's look at each Layer.

- In the Main Layer, two Buttons are set as modifiers. There are two remaining Controllers for creating pairs of hardware events (the Controller Knob and the Right Button in our case).
- If we press the Left Button, we reach the Left Button Layer, which contains other assignments for the **three** other Controllers. *In fact*, the Middle Button, which was a modifier in the Main Layer, becomes a normal Button (*i.e.* in Trigger or Toggle mode) as soon as another Layer is selected. As we said in the note above: you can only define modifiers in the Main Layer, thus you cannot use combinations of modifiers. Thus we have three possible pairs in this Layer: Controller Knob, Middle and Right Buttons.
- Instead, if we press the Middle Button, we reach the Middle Button Layer, where we find three other possible pairs of hardware events (for the same reasons as above.): Controller Knob, Left and Right Buttons.

That makes a total of  $2+3+3 = 8$  pairs of possible hardware events.

Once again, you could have chosen another set of two Buttons as modifiers.

### **Configuration with 3 modifiers** (lower right):

Once again, let's look at each Layer.

- Main Layer: Only the Knob has a pair of possible hardware events, since all the Buttons are set as modifiers.
- Left Button Layer: The other *three* Controllers are available, making thus 3 possible pairs of events (Controller Knob, Middle & Right Buttons.)

- Middle Button Layer: Like the Left Button Layer, 3 pairs of possible events (Controller Knob, Left & Right Buttons.)
- Right Button Layer: Like the two above, 3 pairs of possible events (Controller Knob, Left & Middle Buttons.)

That makes a total of  $1+3+3+3 = 10$  pairs of possible hardware events in this configuration with all Buttons set to Modifier mode.

**Example:** If this configuration with three Buttons as modifiers still seems strange to you, look at this small example. Imagine that you are working on a 3-track project in your favorite sequencer. By correctly setting up your AUDIO KONTROL 1 Mapping Application, you could use AUDIO KONTROL 1's hardware like follows:

- If no Button is pressed (Main Layer), the Controller Knob acts like the Master Level Fader in you project's mixer;
- Pressing any Button (other Layers) and holding it would "select" the corresponding track in your project;
- The Controller Knob would then act like the Level fader for that particular track;
- The two other Buttons would act like the Solo and Mute buttons for that particular track, respectively.

Section 7.4, describing the Mapping Application user interface (below) will help you in getting familiar with this concept of Layers. It's a key concept, which allows you to multiply the assignment possibilities of your AUDIO KONTROL 1. Some of the quickstarts (section 5) and Use Cases (sections 6) show examples of using this Modifier mode.

### 7.3.4. Software Events, or What Is Actually Sent To Your Applications

The **hardware events** that we described above are processed by the Mapping Application and transformed into **software events** routed to the desired application running on your computer. As soon as you execute a hardware action, the Mapping Application sends the corresponding software event to the application in the form of a **key command** or a **MIDI message**:

- **Key Commands** simulate an action on the computer keyboard in the target application (commonly called a "keyboard shortcut" for that application). Note that even if the target application is minimized in the system tray (Windows) or in the Dock (Mac), it will still receive the key command.

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Note that key commands are handled differently on Windows XP and Mac OS X. On Windows, the key command is sent to the target application's main window. On Mac OS X, however, there is no main application window. Therefore, the key command is sent to the currently active window if the target application is in the foreground. If the target application is in the background, the key command is sent directly to the application and not to one of its windows. Depending on the target application, some key commands can become inaccessible due to this particularity of Mac OS X.

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- **MIDI Messages** can also be used to send commands, as almost all music applications support this type of remote control.

---

The MIDI Messages are sent using a second, virtual MIDI port. The application you want to control remotely with MIDI messages needs to be connected to that virtual MIDI port - make sure that the target software's MIDI interface is setup correctly.

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All details about these key commands and MIDI messages can be found in section 7.4.4 describing the Mapping Application's Assign View.

### **7.3.5. Taking Stock**

Now let's take a short break and try to sum up what we've just learned about the remote control signal flow.

The AUDIO KONTROL 1 hardware transmits your commands in the form of hardware actions.

These hardware actions are transformed into hardware events, depending on how the actions should be interpreted (which Controllers are manipulated, on which Layer, in which Mode...).

The Mapping Application receives these hardware events and maps them to the desired application, in the form of key commands or a MIDI messages. Your application executes the task as expected upon reception of the command.

The next section will describe how to configure all these tasks via a few mouse clicks with the Mapping Application.

## 7.4. The Mapping Application

The **Mapping Application** is the control tower of your AUDIO KONTROL 1's remote control system. It stores the links between hardware actions (what you do on AUDIO KONTROL 1 top panel) and software events (what you want to be done within a specific piece of software). Here we will systematically describe all elements of the Mapping Application user interface that controls and organizes the formerly explained hardware and software actions/events and other Layers.

Of course, we strongly recommend that you try each element on your Mapping Application as we describe it in the manual. Learning-by-doing-by-manual-reading is the key to success!

The Mapping Application offers two view modes: the **Display View** and the **Assign View**. Both share the **Application Control Bar** at the top of the window. Let us look at each of them thoroughly.

### 7.4.1. The Application Menu Bar

The Mapping Application menu bar contains three menus: the **File menu**, the **Monitoring menu** and the **Help menu**.

#### File Menu

The File menu allows you to manage the Controller Pages, to access the Driver Control Panel and to quit the Mapping Application. The menu contains the following entries:

- **New Page:** Loads the file “New.xml” that is found within the Factory Pages folder. If the Page was changed after the last save, a warning dialog asks for confirmation as all unsaved data will be lost by executing this command.
- **Open Page:** Provides a list of pages similar to the Page Select Menu within the Application Control Bar.
- **Save Page:** Saves the Page with its current name, like the Save Button within the interface. If the Page was loaded from the Factory Pages folder, a dialog comes up informing about the fact that the page will be saved to the User Pages folder. If you agree, choose Save to User Content; if not, choose Cancel. If the Page's current name is New (i.e. it was created by the New Page command), the command is similar to the Save Page As... command.
- **Save Page As...:** Brings up a dialog that lets you enter a name for the Page. A warning dialog asks for confirmation if the chosen filename is

already used; you then can choose whether to Replace the Page already existing or to Cancel and choose another name.

- **Delete Page...:** This entry is inactive if a Factory Page is loaded. If a User Page is loaded, it brings up a warning dialog asking for confirmation (with the self-explaining options Delete and Cancel). After deletion, the file “New.xml” is loaded automatically.
- **Audio Settings...:** Opens the Driver Control Panel (like the Driver Button in the Application Control Bar). For more info in the Driver Control Panel, see section 7.2.
- **Exit:** Quits the Mapping Application. Note that the AUDIO KONTROL 1’s top panel remote control will then be deactivated, since it needs the Mapping Application to be running in order to function properly.

## Monitoring Menu

This menu allows you to select the output pair from the four Main Output Jacks to which the **Direct Monitoring signal** has to be sent. You can choose pair **1/2**, **3/4**, or **both**. (For more info on how to use Direct Monitoring, see sections 3.1.1 for the theory and 6.1 for the practice.).

## Help Menu

The Help menu provides you with the following entries:

- **About:** Opens the **About dialog** (like clicking the NATIVE INSTRUMENTS logo or the AUDIO KONTROL 1 logo). This dialog contains valuable information about the software such as the version number.
- **Visit Audio Kontrol 1 on the web:** Opens in your internet browser the AUDIO KONTROL 1 page on the Native Instruments website.

## 7.4.2. The Application Control Bar

The **Application Control Bar** is always visible. It contains the Mapping Application global commands like switching between both Views, managing your Controller Pages, and activating the Driver Control Panel.



The Application Control Bar is always visible.

### Assign/Display Button

This Button allows you to switch between the two **View Modes** of the Mapping Application. Depending on which mode the Mapping Application is currently

in, the Button shows the name of the other mode. Click on the Button to switch to the other View Mode.

### **Page Select Menu**

The Page Select menu provides the list of available Controller Pages. You can open it by clicking with the mouse; selecting an entry then loads the page. Each page includes a full set of Controllers Assignments.

Each Page is stored as a separate XML file. Pages are of two types:

- AUDIO KONTROL 1 comes with an extensive set of prepared **Factory Pages** for various NATIVE INSTRUMENTS products, major sequencers and multimedia applications. These Pages cannot be edited.
- You can also create your own **User Pages**, e.g. by customizing a Factory Page.

The Page Select menu shows all available pages: At the top there are the User Pages. They are followed by the Factory Pages which are separated by a small line. If there are no User Pages, e.g. because you did not create save one yet, only the Factory Pages are shown.

### **Save Button**

A click on the Save Button saves the page with its current name, similar to the Save entry within the File menu. If the page is a Factory Page, a dialog comes up informing about the fact that the page will be saved to the User Pages folder. If you agree, choose **Save to User Content**; if not, choose **Cancel**. If the Page's current name is **New** (i.e. it was created by the **New Page** command of the File menu), the button is similar to the **Save Page As...** command.

### **Driver Button**

The **Driver Button** opens the **Driver Control Panel**. For more info, please refer to the section 7.2.

### **AUDIO KONTROL 1 Logo and NATIVE INSTRUMENTS Logo**

Clicking on the **AUDIO KONTROL 1 Logo** or on the **NATIVE INSTRUMENTS Logo** opens the **About dialog**. This dialog contains valuable information about the software such as the version number.

#### **7.4.3. The Display View**

The **Display View** allows you to see what the current assignments are for the four **Controllers** on your AUDIO KONTROL 1 top panel.

If the Display View is not active, click on the **Display Button** in the **Application Control Bar** (if there is no Display Button in the Bar, it means that you are already in the Display View...)



The Display View of the Mapping Application, with its Information Area above and its Hardware Area below.

The Display View consists of two areas: The lower **Hardware Area** displays the AUDIO KONTROL 1 hardware top panel. In the upper **Information Area**, information text is displayed, depending on the mouse position within the Hardware Area. If you position the mouse over one of the elements in the Hardware Area, the Information Area will update to display all mapping information for this particular Controller.

#### 7.4.4. The Assign View

The **Assign View** allows you to precisely define the action of each **Controller** on the hardware's top panel. As we described in the previous section 7.3, each human interaction with a Controller induces a **hardware action** that is translated by the **Driver** into a **hardware event**, itself transformed by the **Mapping Application** into a **software event** sent to the corresponding application. If this sounds new to you, please refer to the above-mentioned section.

The Assign View is the place where you configure this translation between hardware actions and software events.

If the Assign View is not active, click on the **Assign Button** in the **Application Control Bar** (if there is no Assign Button in the Bar, it means that you are already in the Assign View.)

Like the Display View, the Assign View is split into two areas: the upper

**Selection Area** and the lower **Definition Area**. Basically, the Selection Area specifies the element whose mapping is set in the Definition Area.



The Assign View of the Mapping Application, with its Selection Area above and Definition Area below.

## Selection Area

The **Selection Area** consists of four **Controller Areas**, laid out horizontally, and four vertical **Layer Tabs**.

The **Controller Areas** represent the four **Controllers** (Controller Knob and Left, Middle and Right Buttons). Each of them displays the **Hardware Event Mode** of that Controller (e.g., Toggle, Rotate) as well as both Event Labels (e.g. On: Activate Reverb; Off: Deactivate Reverb). They can be selected via the mouse. When a Controller Area is selected, the corresponding element's settings are displayed in the lower Definition Area.

The **Layer Tabs** select the Layer for the Controller Areas. Clicking on the **Main Tab** will for instance display the Controller Assignments of the Main Layer, i.e. when no modifier is pressed. If the Right Button is set to Modifier mode in this Main Layer Tab, then clicking on the **+Right Tab** will display the Controller Assignments defined when the Right Button is pressed.

If a Button is not set as a modifier, the corresponding Layer Tab is not active and its Label is grayed out.

## Definition Area

The **Definition Area** displays the settings related to the Controller Area selected in the Selection Area above. It also allows you to adapt these settings to your needs and tastes.

At the **top middle of the Definition Area**, we find the **Hardware Event Mode menu**, which allows you to select the desired **Hardware Event Mode** for the Controller. It contains the entries **Toggle**, **Trigger** and **Modifier** for the **Buttons**. For the **Controller Knob**, it is always set to **Rotate** and cannot be modified, since it is the only mode possible for that Controller.

If **Modifier** is selected for a Button, there are no further options for the corresponding Button (since obviously a Button cannot be a modifier *and* control a software event at the same time.) Therefore the whole Area is disabled.

The rest of the Definition Area is divided into two identical sections, on the left and on the right. Each of them defines one of the two Hardware Events relating to the corresponding Controller Area. Both contain the following elements, from top to bottom.

The **Event Type Indicator** shows the two possible states of the Controller, depending on the **Hardware Event Mode** selected in the previous menu:

- Rotate: **Left** on the left side, **Right** on the right side.
- Toggle: **On** on the left side, **Off** on the right side.
- Trigger: **Press** on the left side, **Release** on the right side.

The **Event Label Field** holds the name of the respective action. By clicking on the Field, you can enter the desired Label. Press the Enter key on your computer keyboard to save the new name. This **Event Label** is used within the corresponding Controller Area (in the upper Selection Area) and in the Display View's Information Area to summarize the Controller's functionality.

The **Software Event Type menu** lists the possible **Software Event Types** that can be assigned to the Hardware Event chosen in the upper Selection Area. These are:

- **Off**: The mapping for this Hardware Event is de-activated.
- **Key**: Sends a Key Command that simulates an action on the computer keyboard in the target application.
- **MIDI**: Sends a MIDI Message to the target application.

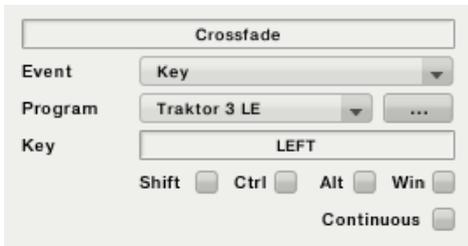
Below, the **Specification Area** contains all information defining the specific **Software Event** to be executed. Depending on the Software Event Type selected in the previous menu, the Specification Area provides different elements.

If **Off** is selected in the **Software Event Type menu**, the Specification Area is disabled:



No Specification Area if **Off** is selected.

If **Key** is selected in the **Software Event Type menu**, the Specification Area offers elements allowing you to specify a Key Command:



Specification Area for the **Key** Software Event Type.

These elements are, from top to bottom:

- **Program menu:** This menu allows you to choose the target application for this Hardware Event. The menu lists all currently active applications that can receive key commands. Their status (window active or not, window displayed or not, minimized or hidden, etc) does not interfere with this selection.
- To the right of the Program menu, a **Browse Button (...)** brings up a file browser dialog box to select an application that is not currently running.
- **Key:** This **text field** and its **four modifier key boxes** below allow you to enter the desired keyboard shortcut. After clicking on the field, press the shortcut on your computer keyboard and the Mapping Application stores it, with the corresponding modifier keys. These modifier keys are Shift, Ctrl, Alt and Win on Windows systems and Shift, Ctrl, Alt and Apple on the Mac.

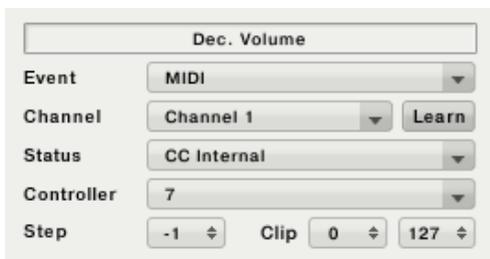
- **Continuous Switch:** This switch activates the **Continuous Mode:** Normally, a key command is generated by simulating a key being pressed and released immediately afterwards. This keystroke is sufficient in most situations. However, sometimes it is necessary to simulate a key that is held down for a given time. This can be simulated with the Continuous Mode. It simulates the key being pressed when the hardware event arrives, for instance when the knob is rotated in either direction. But instead of simulating the key release immediately afterwards, the release is only generated when the knob stops moving. Thus, the key is “held” until the rotation ends. Due to this structure, the Continuous Switch can only be activated for Rotate events and for the Press event of the Trigger mode, i.e. not for Release, On or Off.

If **MIDI** is selected in the **Software Event Type menu**, the Specification Area provides you with the MIDI Message parameters to be sent

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The MIDI Messages are sent using a second, virtual MIDI port. The application you want to remotely control with MIDI messages needs to be connected to that virtual MIDI port - make sure that the target software’s MIDI interface is setup correctly.

---



Specification Area for the **MIDI** Software Event Type.

The **Channel menu** selects the **MIDI channel** on which those messages are sent. You can choose between all 16 channels, and it includes an **Omni** entry (the default setting) that sends the message in omni mode, i.e. on all channels.

The **Status menu** selects the type of MIDI message sent. Technically speaking, this defines the message status byte (for more info on what a status byte is, please refer to some MIDI specification reference). Depending on the selected entry in this menu, the area below displays relevant dedicated elements. The menu provides the following entries:

- **Note:** Sends a **MIDI Note On message**. Two dropdown menus specify the message's pitch and velocity (see the screenshot above). If the velocity is set to zero, the message will be interpreted as MIDI Note Off. This can be used to trigger samples in a sampler or phrases in a sequencer.

The screenshot shows a MIDI event configuration window titled "Start C3". It contains the following settings:

Event	MIDI
Channel	Channel 1
Status	Note
Pitch	C3
Velocity	100

- **Aftertouch:** Sends a MIDI message defining a key's **Aftertouch**. Two dropdown menus specify the message's **Pitch** and **Pressure**. The Pitch menu offers an **All** entry: If this entry is selected, **MIDI Channel Pressure messages** are sent; in all other cases **Polyphonic Key Pressure messages** are sent.

The screenshot shows a MIDI event configuration window titled "F3 Mid AT". It contains the following settings:

Event	MIDI
Channel	Channel 1
Status	Aftertouch
Pitch	F3
Aftertouch	48

- **CC Fixed:** Sends a **MIDI Control Change message**. Two dropdown menus specify the message's **Controller Number** and the **Controller Value** to be set. This can be used, for example, to switch an effect or any other status on or off, e.g. by sending CC value 127 upon a hardware press event, and CC value 0 when the button is released again.

The screenshot shows a MIDI event configuration window titled "High Volume". It contains the following settings:

Event	MIDI
Channel	Channel 1
Status	CC Fixed
Controller	7
Value	127

- **CC Internal:** Sends a **MIDI Control Change message**. A dropdown menu specifies the message's **Controller Number**. Three additional **value fields** specify the **step size** (it can be negative), and the **minimum** and **maximum values** that the controller can use; higher or lower values are cut. This can be used to change a controller value continuously, e.g. the modulation wheel, or an effect's depth.

The screenshot shows a MIDI mapping control window titled "Dec. Volume". It features several dropdown menus and input fields:
 

- Event:** MIDI
- Channel:** Channel 1 (with a "Learn" button)
- Status:** CC Internal
- Controller:** 7
- Step:** -1 (with a "Clip" checkbox), 0, and 127 (all with up/down arrows).

---

If you change the controller value in the target application by another means (with the mouse for example), the target application will not communicate this to the Mapping Application. A subsequent CC Internal message triggered with AUDIO KONTROL 1 might therefore cause a sudden jump of the controller value!

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- **Program Change Fixed:** Sends a **MIDI Program Change message**. A dropdown menu specifies the message's **Program Number**.

The screenshot shows a MIDI mapping control window titled "Init Patch". It features several dropdown menus and input fields:
 

- Event:** MIDI
- Channel:** Channel 1 (with a "Learn" button)
- Status:** PC Fixed
- Program:** 0

- **Program Change Internal:** Sends a **MIDI Program Change message**. A dropdown menu specifies whether the **Program Number** is increased (Next Program) or decreased (Previous Program). It can be used to continuously step through a plug-in's patches.

The screenshot shows a MIDI mapping control window titled "Next Program". It features several dropdown menus and input fields:
 

- Event:** MIDI
- Channel:** Channel 1 (with a "Learn" button)
- Status:** PC Internal
- Step:** 1

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If you change the program number in the target application by another means (with the mouse for example), the incoming PC Internal message might cause a sudden jump of the program number!

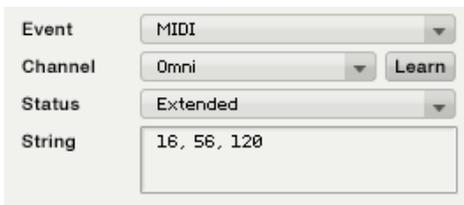
---

- **Channel Mode:** Sends a **MIDI Channel Mode message**. A dropdown menu selects whether this message is an **All Sound Off** message, an **All Notes Off** message, or **both** combined. This can be useful as a **Panic Button**.



The screenshot shows a control panel titled "Panic". It contains four rows of controls: "Event" is set to "MIDI", "Channel" is set to "Channel 1" with a "Learn" button next to it, "Status" is set to "Channel Mode", and "Message" is set to "All Sound Off".

- **Extended:** Sends a **generic MIDI string**. It contains a **Text Field** for entering the MIDI string. The string is entered byte-wise. The bytes are separated by blanks and/or commas. The byte's value can be entered in decimal or hexadecimal notation. The hexadecimal notation is indicated by an "h" succeeding the byte value without blank or comma. The **Channel menu** has *no effect when sending extended MIDI messages*. This can be used to generically encode all MIDI messages, particularly **SysEx commands**. Combined with the **MIDI Learn** feature, it can even be used to record small MIDI phrases that can then be played-back directly from the hardware.



The screenshot shows a control panel for "Extended" MIDI strings. It contains four rows: "Event" is set to "MIDI", "Channel" is set to "Omni" with a "Learn" button next to it, "Status" is set to "Extended", and "String" is a text field containing the value "16, 56, 120".

Clicking on the **Learn switch** activates the **MIDI Learn mode**. The Mapping Application then listens to messages on the driver's MIDI stream, allowing you to enter the MIDI message from any MIDI controller or master keyboard. It does *not* affect the **Channel** and **Status** selection - instead the messages are filtered by these settings. This keeps the Learn mode selective regarding specific modes like CC Fixed/Internal etc. If **Extended** is selected with the **Status menu**, all messages are learnt without filtering, the only exception being MIDI real-time messages. In Extended mode subsequent messages can also

be learnt; in all other cases, a new message overwrites the previous setting. To switch the **MIDI Learn mode** off, click on the **Learn** switch again.

## 7.5. Add-on Software

AUDIO KONTROL 1 features three great products by Native Instruments: XPRESS KEYBOARDS, GUITAR COMBOS and TRAKTOR 3 LE are part of the software package, beside the Mapping Application. These products provide their own dedicated documentation that can be found within their respective installation directories. You can also use the links placed within the Start Menu (the applications' folders on Mac OS X).

Please note that these products need separate registration, using the NATIVE INSTRUMENTS Service Center. For more info on the registration process, please refer to the separate Setup Guide, located in your installation folder.

# 8. Optimizing and Troubleshooting

## 8.1. Hardware Troubleshooting

Native Instruments hardware products meet the highest professional standards. All products are tested extensively in real life situations during the development phase. However, should you encounter any problems with your hardware, please follow these steps for troubleshooting:

- Verify that you have installed the latest driver and the latest software update. Check the Native Instruments website for information.
- Make sure that the AUDIO KONTROL 1 hardware is connected to a USB 2.0 port on your computer.
- Make sure you are connecting directly to a USB port on the computer and not through a USB hub.
- Try another USB cable.
- Disconnect any other USB devices from the computer (except keyboard/mouse).
- Try using any other USB ports on your computer.

You can find more detailed information on these steps in the following sections.

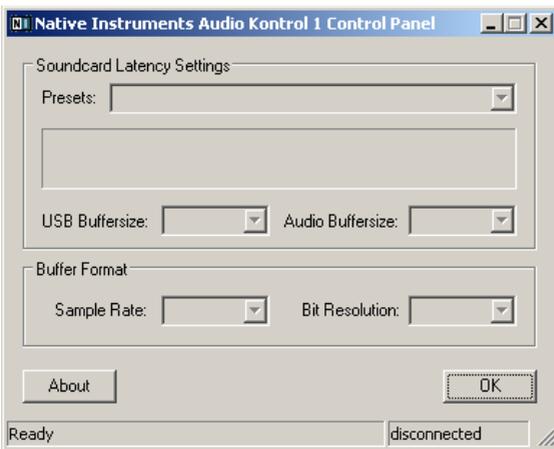
However, if your product needs to be returned, the Technical Support team will assign you an RA (Return Authorization) number to expedite the processing of your return. Please contact our Technical Support team prior to returning any item. The contact information is available under the following URL:

[http://www.nativeinstruments.de/index.php?id=contactinfo\\_us](http://www.nativeinstruments.de/index.php?id=contactinfo_us)

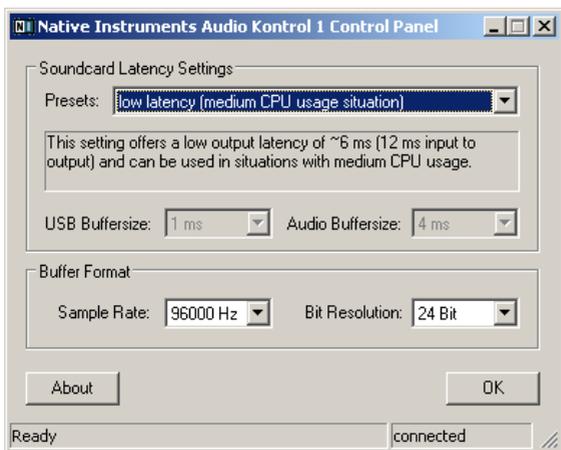
Packages returned without this RA number will not be correctly identified and as such might not be processed properly.

## 8.2. How to check if the driver is installed correctly?

On a PC in the Windows Start menu there should be a new entry called “Native Instruments Controller Driver”. There you will find the helper applications “Audio Statistics” and “Control Panel”. Make sure that the Controller is connected to the computer and open the Control Panel. If all the drop-down menus are grayed out (i.e., there are no presets in the preset drop-down list, no sample rate and bit rate values) there must be something wrong with the connection. If the “Native Instruments Controller Driver” entry in the Start Menu is missing, the driver is most probably not installed at all.



Control Panel PC – AUDIO KONTROL 1 not connected



Control Panel PC – AUDIO KONTROL 1 connected

On a Mac, look into the System Preferences for the NATIVE INSTRUMENTS USB Audio Control Panel icon. Open this control panel to see if the device is found. If no device is found the Control Panel values will appear grayed out. If the NATIVE INSTRUMENTS USB Audio Control Panel icon is missing here, the driver is probably not installed at all.

If the driver is not installed, you can install it using the setup program described in section 4.2 of this manual.

If the Controller is not recognized, here are a few things you should check. See the following sections for details.

### 8.2.1. USB 2.0 required

The Controller is a USB 2.0 interface and will not work at all on a USB 1.0/1.1 port.

In addition, although the minimum power specified for a USB 2.0 port is 500 mA, we have seen a few cases where the USB 2.0 ports on certain computers do not fulfill the minimum requirements and therefore do not meet the official USB 2.0 specification. In this case you may see a message saying that there is not enough power available to operate your device.

In this case the Controller might produce crackles or might not even work at all.

### **8.2.2. Try another USB cable**

A bad USB cable can be responsible for audio dropouts and other connectivity problems. It is highly recommended that you try using a different cable if you are experiencing difficulties; make sure to use a cable bearing the official USB logo.

### **8.2.3. Using a powered USB 2.0 hub**

It is best to connect the AUDIO KONTROL 1 directly to a USB 2.0 port on your computer. However, in certain situations a powered USB hub can also be a solution if you are having problems connecting your AUDIO KONTROL 1 to an onboard USB port. In this case you should avoid connecting other devices to the hub if you can as they will take diminish the total amount of power available.

### **8.2.4. Disable USB energy saving mode**

If you're having problems with AUDIO KONTROL 1 crashing or performing badly on a Windows machine, the first thing to do is to disable power management to the USB hubs. XP turns this on by default. Go to device manager (Control Panel/system/hardware) and right click a USB hub to bring up properties. On the power management page, uncheck all boxes. Repeat for each hub and reboot.

### **8.2.5. Update the Driver**

Check the Native Instruments website regularly for updates of the AUDIO KONTROL 1 driver.

## **8.3. How to use the remote control function?**

Note that the remote control capacity is handled by the Mapping Application. This program needs to be running in order to use this function. So, in case the remote control function is not working, you might want to check whether the Mapping Application is running. Normally, it starts up when the computer is booted. It is then minimized to the System Tray (Windows XP) or the Status Bar (Mac OS X) to keep it in the background. If you cannot find it there, simply start it from the Start menu (the application's folder on Mac OS X).

If this does not help (i.e. the Mapping Application is running but you cannot use the remote functionality), the problem might be caused by a non-established MIDI connection. In order to control an application (e.g. a virtual synthesizer like FM7 XPRESS) with MIDI messages, the target application needs to be

connected to both MIDI ports of the AUDIO KONTROL 1 hardware. Please verify that they are activated correctly within the target application.

However, not all programs are controlled via MIDI, e.g. Winamp or iTunes are controlled with key commands and don't require a MIDI connection. If those applications cannot be controlled correctly, check within the Mapping Application's Assign View whether the loaded page accesses the correct application and window. Refer to chapter 7.4.4 for detailed information about the Assign View.

## **8.4. How to avoid Ground Loops**

Ground loops are a common problem within any environment where multiple electrical devices are connected to the same power circuit. In complex setups the cause(s) of the noise can be difficult to find. Ground loops are perceived usually as a hum or buzz in your audio signal, but this can also transmit and amplify other sounds from the devices connected to the circuit. For example, one very common problem is that you hear internal clicking sounds created by your computer.

The cause of the noise is usually the computer and its internal devices, or devices connected to the computer like external hard drives. (Note that even if the power supply of your notebook computer is not connected, your setup may still be vulnerable to ground noise from an external device with its own power supply.) The cause can also be any other device (such as a television) connected to the same mixer.

The reason why this noise is present at the monitor speakers input has to do with a loop in the setup of electrical and audio cable connections in your studio. Most likely this loop occurs through the ground of one or more of these cables. With this in mind, the following points should help to eliminate the ground loop:

### **8.4.1. Try to eliminate the loop**

Assuming that you have connected the AUDIO KONTROL 1 to a mixer, a first troubleshooting step is to disconnect all devices from your mixer that you are not currently using. This applies also to other peripheral devices you may have connected to your computer (external data storage, CD burners).

### **8.4.2. Use balanced cables**

Always use balanced audio cables if possible to connect the AUDIO KONTROL 1 to your mixer. If your mixer provides both unbalanced and balanced inputs, avoid using the unbalanced inputs if you can.

### 8.4.3. Break the loop with a DI box

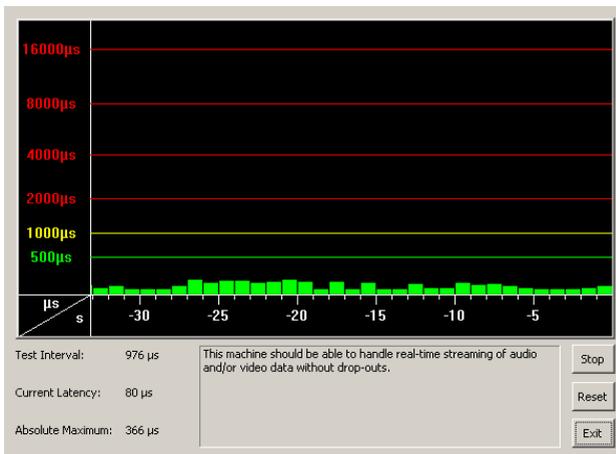
If you cannot fix the ground noise problem by disconnecting equipment and using balanced cables, you still have the possibility of using a DI (direct input) box between the AUDIO KONTROL 1 outputs and the mixer inputs. (This is the same kind of box that is used to connect a line-level instrument like a guitar). Most of these boxes have a ground lift switch on them, this can be used to break the ground loop and eliminate the noise. A DI box is especially recommended if your mixer has unbalanced inputs only.

## 8.5. How to Use AUDIO KONTROL 1 with a Laptop

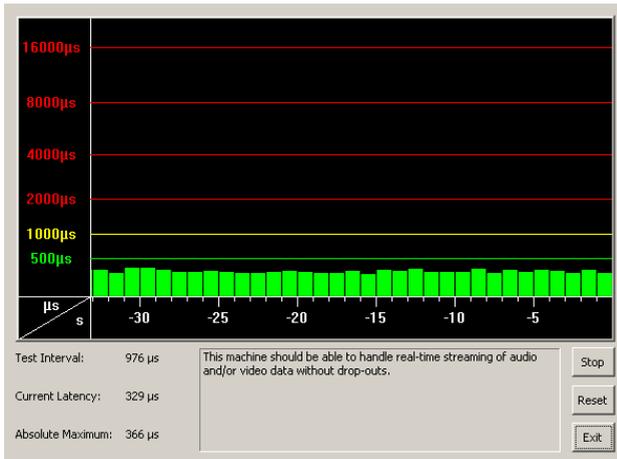
### 8.5.1. Check the Laptop's latency

First you should check if your computer is suited to handling real-time audio processing without experiencing dropouts. Dropouts might be caused by certain components in your computer. Please download a tool that scans your computer regarding suitability for audio processing. You can find an appropriate one at [www.thesycon.de/deu/latency\\_check.shtml](http://www.thesycon.de/deu/latency_check.shtml). There is no Software installation required, just launch the tool after downloading.

With AUDIO KONTROL 1 disconnected the tool will report if your Laptop can handle real-time audio streaming without dropouts.



DPC without AUDIO KONTROL 1 disconnected



DPC with AUDIO KONTROL 1 connected

In case your Computer is unable to handle glitch free audio processing, the tool will show you red latency bars and report this in the box on the bottom. Run it with both settings – AUDIO KONTROL 1 connected and disconnected – to find out about your computer’s capacities.

### 8.5.2. Avoid Shared Memory

In general it is not recommended to use laptops with shared-memory graphic cards. A Shared-memory graphic card accesses to the same memory as the CPU. Other Graphic Cards have their own memory, so that the main memory is reserved for the audio processing. You’ll need memory and processing power available for your audio project.

### 8.5.3. Avoid Battery Usage

It is not recommended to run the laptop on its battery, as the computer might slow the clock rate of the CPU down.

### 8.5.4. Disable Devices

First, disconnect additional hardware (printers, scanners etc.) that you don’t need while you are working with AUDIO KONTROL 1. Thus, the computer does not need to handle superfluous devices.

Beside that, laptops often are equipped with built-in devices that disturb audio processing. An example is a wireless LAN card. In case you experience serious dropouts, you might need to disable these devices while working with AUDIO KONTROL 1.

## **Windows XP**

To do so, please go to the device manager (Start>Run and type 'devmgmt.msc'). You can disable a device (let's say the network adapter) by clicking on *network-adapter* and double clicking on the device to bring up its properties dialog. On the bottom of this pane you can disable the device via the Scroll-Down menu. Please deactivate it and hit "OK". You should see a red cross over the device, which means that it has been deactivated.

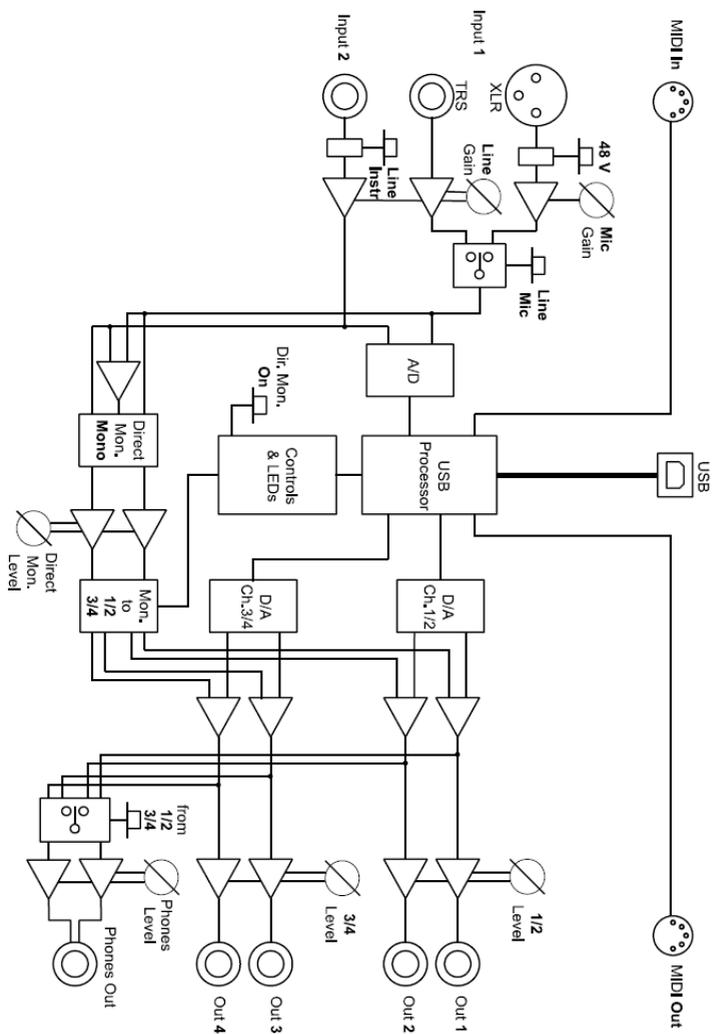
Common built-in devices are: network adapters, wireless LAN cards, bluetooth ports, infrared ports, printer ports etc. Try to disable the network adapter and wireless LAN card first, as they are the most common problem causing devices in audio processing. Make sure that you don't disable devices that are indispensable for your laptop to work properly. Here is a list of devices that you should not deactivate: System timer, Keyboard, System CMOS/real time clock, Microsoft ACPI-Compliant System, Numeric data processor, Primary IDE Channel, Secondary IDE Channel, Graphics Controller, Ultra ATA Storage Controllers.

## **Macintosh OS X**

If you have a wireless LAN card installed and Bluetooth running turn them off while you are using AUDIO KONTROL 1 (you can turn this off in the top OSX menu bar).

# 9. Appendix

## 9.1. Technical Specifications and Block Diagram



<b>Audio Inputs (A/D)</b>	
Channels	2
Sample Rate:	44.1, 48, 96, 192 kHz
Bit Resolution:	16, 24 Bit
Converter	Cirrus Logic

<b>Line Inputs</b>	
Input Impedance:	44 kOhms balanced
Full Scale Level at maximum Gain	+2 dBu
Maximum Input Level:	+16 dBu
SNR (weighted):	100 dB
THD+N:	0.006%
Frequency Response:	20 - 20000 Hz (+0 / -0.5 dB)

<b>Mic Input</b>	
Input Impedance:	4.8 kOhms balanced
Full Scale Level at maximum Gain	-40 dBu
Maximum Input Level:	+10 dBu
SNR (weighted):	100 dB
Equivalent Input Noise:	-128 dBu (weighted)
THD+N:	0.007%
Frequency Response:	20 - 20000 Hz (+0 / -0.5 dB)

<b>Instrument Input</b>	
Input Impedance:	1 MOhms unbalanced
Full Scale Level at maximum Gain	-4 dBu
Maximum Input Level:	+10 dBu
SNR (weighted):	100 dB
THD+N:	0.006%
Frequency Response:	20 - 20000 Hz (+0 / -0.5 dB)

Audio Outputs (D/A)	
Channels	4
Sample Rate:	44.1, 48, 96, 192 kHz
Bit Resolution:	16, 24 Bit
Converter	Cirrus Logic

Line Outputs	
Output Impedance:	100 Ohms unbalanced, 200 Ohms balanced
Maximum Output Level:	+13 dBu
SNR (weighted):	103 dB
THD+N:	0.005%
Frequency Response:	20 - 20000 Hz (+0 / -0.5 dB)

Headphone Outputs	
Load Impedance:	8 ... 600 Ohms
Maximum Output Level:	4.26 V rms, 100 mW @ 100 Ohms
SNR (weighted):	102.5 dB
THD+N (60 Ohms):	0.006%
Frequency Response:	20 - 20000 Hz (+0 / -0.5 dB)

Other Interfaces	
Interface to computer:	USB 2, bus powered
MIDI:	1 Input, 1 Output

Control Elements	
Endless Knobs:	1
Buttons:	3

Dimensions	
Height:	52 mm
Width:	150 mm
Depth:	123 mm
Weight:	400 g

## 9.2 MIDI CC Table

0	Bank Select	0-127
1	Modulation Wheel	0-127
2	Breath Controller	0-127
3	Undefined	0-127
4	Foot Controller	0-127
5	Portamento Time	0-127
6	Data Entry MSB	0-127
7	Channel Volume	0-127
8	Balance	0-127
9	Undefined	0-127
10	Pan	0-127
11	Expression Controller	0-127
12	Effect Control 1	0-127
13	Effect Control 2	0-127
14	Undefined	0-127
15	Undefined	0-127
16	General Purpose Controller 1	0-127
17	General Purpose Controller 2	0-127
18	General Purpose Controller 3	0-127
19	General Purpose Controller 4	0-127
20	Undefined	0-127
21	Undefined	0-127
22	Undefined	0-127
23	Undefined	0-127
24	Undefined	0-127
25	Undefined	0-127
26	Undefined	0-127
27	Undefined	0-127
28	Undefined	0-127
29	Undefined	0-127
30	Undefined	0-127
31	Undefined	0-127

32	LSB for Control 0 (Bank Select)	0-127
33	LSB for Control 1 (Modulation Wheel)	0-127
34	LSB for Control 2 (Breath Controller)	0-127
35	LSB for Control 3 (Undefined)	0-127
36	LSB for Control 4 (Foot Controller)	0-127
37	LSB for Control 5 (Portamento Time)	0-127
38	LSB for Control 6 (Data Entry)	0-127
39	LSB for Control 7 (Channel Volume)	0-127
40	LSB for Control 8 (Balance)	0-127
41	LSB for Control 9 (Undefined)	0-127
42	LSB for Control 10 (Pan)	0-127
43	LSB for Control 11 (Expression Controller)	0-127
44	LSB for Control 12 (Effect control 1)	0-127
45	LSB for Control 13 (Effect control 2)	0-127
46	LSB for Control 14 (Undefined)	0-127
47	LSB for Control 15 (Undefined)	0-127
48	LSB for Control 16 (General Purpose Controller 1)	0-127
49	LSB for Control 17 (General Purpose Controller 2)	0-127
50	LSB for Control 18 (General Purpose Controller 3)	0-127
51	LSB for Control 19 (General Purpose Controller 4)	0-127
52	LSB for Control 20 (Undefined)	0-127
53	LSB for Control 21 (Undefined)	0-127
54	LSB for Control 22 (Undefined)	0-127
55	LSB for Control 23 (Undefined)	0-127
56	LSB for Control 24 (Undefined)	0-127
57	LSB for Control 25 (Undefined)	0-127
58	LSB for Control 26 (Undefined)	0-127
59	LSB for Control 27 (Undefined)	0-127
60	LSB for Control 28 (Undefined)	0-127
61	LSB for Control 29 (Undefined)	0-127
62	LSB for Control 30 (Undefined)	0-127
63	LSB for Control 31 (Undefined)	0-127

64	Damper Pedal on/off (Sustain)	<63 off, >64 on
65	Portamento On/Off	<63 off, >64 on
66	Sostenuto On/Off	<63 off, >64 on
67	Soft Pedal On/Off	<63 off, >64 on
68	Legato Footswitch	<63 Normal, >64 Legato
69	Hold 2	<63 off, >64 on
70	Sound Controller 1 (default: Sound Variation)	0-127
71	Sound Controller 2 (default: Timbre/Harmonic Intens.)	0-127
72	Sound Controller 3 (default: Release Time)	0-127
73	Sound Controller 4 (default: Attack Time)	0-127
74	Sound Controller 5 (default: Brightness)	0-127
75	Sound Controller 6 (default: Decay Time)	0-127
76	Sound Controller 7 (default: Vibrato Rate)	0-127
77	Sound Controller 8 (default: Vibrato Depth)	0-127
78	Sound Controller 9 (default: Vibrato Delay)	0-127
79	Sound Controller 10 (default: undefined)	0-127
80	General Purpose Controller 5	0-127
81	General Purpose Controller 6	0-127
82	General Purpose Controller 7	0-127
83	General Purpose Controller 8	0-127
84	Portamento Control	0-127
85	Undefined	---
86	Undefined	---
87	Undefined	---
88	Undefined	---
89	Undefined	---
90	Undefined	---
91	Effects 1 Depth (default: Reverb Send Level)	0-127
92	Effects 2 Depth	0-127
93	Effects 3 Depth (default: Chorus Send Level)	0-127

94	Effects 4 Depth	0-127
95	Effects 5 Depth	0-127
96	Data Increment (Data Entry +1)	N/A
97	Data Decrement (Data Entry -1)	N/A
98	Non-Registered Parameter Number (NRPN) - LSB	0-127
99	Non-Registered Parameter Number (NRPN) - MSB	0-127
100	Registered Parameter Number (RPN) - LSB	0-127
101	Registered Parameter Number (RPN) - MSB	0-127
102	Undefined	---
103	Undefined	---
104	Undefined	---
105	Undefined	---
106	Undefined	---
107	Undefined	---
108	Undefined	---
109	Undefined	---
110	Undefined	---
111	Undefined	---
112	Undefined	---
113	Undefined	---
114	Undefined	---
115	Undefined	---
116	Undefined	---
117	Undefined	---
118	Undefined	---
119	Undefined	---

The Controller numbers 120-127 are reserved for Channel Mode Messages, which rather than controlling sound parameters, affect the channel's operating mode.

# Index

## Symbols

48V Switch ..... 12

## A

About dialog..... 67

Add-on software ..... 76

Aftertouch..... 73

Application Control Bar..... 32, 66

Assign Button..... 66, 68

Assign View..... 47, 68

AUDIO KONTROL 1 logo..... 67

## B

Browse Button..... 71

## C

Channel menu ..... 53, 55, 72

Combo Input Jack ..... 41

Combo Input Jack (Input 1)..... 8

Continuous Switch ..... 72

Controller Areas ..... 48, 53

Controller Knob..... 60

Controller Knob Area ..... 53

Controller menu ..... 53

Controller Pages..... 31

Controllers ..... 12, 14

Controlling a sequencer ..... 46

Controlling a synthesizer ..... 51

Cue listening ..... 28

## D

Definition Area..... 48, 53, 70

Direct Monitoring ..... 44

Display Button..... 66

Display View..... 32, 67

DJ setup (external mixer) ..... 19

DJ setup (internal mixer)..... 18

Driver ..... 14, 57

Driver Button..... 57, 67

Driver Control Panel ..... 57

Bit Resolution..... 58

Mac OS X..... 59

Presets ..... 58

Sample Rate..... 58

USB Buffersize

and Audio Buffersize ..... 58

Windows XP..... 58

## E

Event Label Field ..... 70

Event Type Indicator..... 70

## F

Factory Page ..... 46, 52

Factory Pages..... 31

FM7 XPRESS ..... 51

Front Panel ..... 8

## G

Generic MIDI string ..... 75

Ground loops..... 80

GUITAR COMBOS ..... 33

Guitar setup ..... 20

## H

Hardware actions ..... 57, 60, 68

Hardware Area..... 32

Hardware description..... 8

Hardware Event Mode menu . 55, 70

Hardware events ..... 57, 60, 68

Hardware setups ..... 16

Headphone Output Jack..... 11, 42

Headphone Output Level Knob ... 11

Headphone Output	
Selector Switch.....	10, 31, 42
<b>I</b>	
Impedance.....	9, 35
Info LEDs.....	13
Information Area.....	32
Input 1.....	8
Input 1 Level Switch.....	9, 42
Input 2.....	9, 35
Input Impedance Switch.....	9, 35
Inst/Line Switch.....	9, 35
Installation.....	20
iTunes.....	39
<b>K</b>	
Keyboard setup.....	17
Key commands.....	46, 63
Key text field.....	48, 49, 71
<b>L</b>	
Layer.....	31
Layers.....	14, 53, 61
LED.....	13, 35
Left Button.....	60
Left Layer.....	33
Line Input Sensitivity Knob....	9, 35
Line Knob.....	9, 35
<b>M</b>	
Main Layer.....	33
Main Outputs Jacks.....	11
Mapping Application.....	14, 65
Mapping Application menu bar...	65
Mic/Line.....	9
Mic/Line Switch.....	9
Mic Knob.....	9
Microphone Input	
Sensitivity Knob.....	9, 42, 44
Microphone preamp.....	9
Middle Button.....	60
Middle Layer.....	33
MIDI CC table.....	87
MIDI Channel Mode message....	75
MIDI Channel Pressure messages	73
MIDI commands.....	51, 53, 64
MIDI Control Change message....	73
MIDI In/Out Connectors.....	11
MIDI keyboard.....	25
MIDI Learn.....	75
MIDI Note On message.....	73
MIDI Program Change message..	74
Modifier mode.....	14, 48, 61
Monitoring.....	43
Monitor Level Knob.....	10, 44
Monitor Mono/Stereo Switch.	10, 44
Monitor On/Off Switch.....	10, 44
<b>N</b>	
NI logo.....	67
Notebook.....	81
Nuendo 3.....	42
<b>O</b>	
Optimizing.....	76
Output Level Knobs.....	10
<b>P</b>	
Page.....	15
Pages.....	31
Page Select menu.....	32, 46, 67
Phantom Power Switch.....	12
Polyphonic Key	
Pressure messages.....	73
PRO-53.....	26
Program Change.....	54
Program menu.....	50, 71

<b>Q</b>		USB2 Connector.....	11
Quickstarts.....	25	Use cases .....	41
		User Pages.....	31
<b>R</b>		<b>V</b>	
Rear Panel .....	11	Voice recording .....	17, 41
Recording software.....	42	<b>W</b>	
Remote Control.....	51	Winamp .....	39
Basic concepts .....	59	<b>X</b>	
Remote control .. 12, 28, 31, 46, 79		XL.....	8
Right Button.....	60	XPRESS KEYBOARDS .....	25
Right Layer .....	33		
Rotate .....	70		
<b>S</b>			
Safety Considerations .....	6		
Save Button .....	67		
Schéma Fonctionnel .....	84		
Selection Area .....	47, 53, 69		
Setup .....	16		
Software description.....	13		
Software events .....	63, 68		
Software Event			
Type menu .....	53, 55, 70		
Software Installation.....	20		
Software reference .....	57		
Status menu.....	53, 56, 72		
Studio setup.....	17		
SysEx commands .....	75		
<b>T</b>			
Technical specifications .....	84		
Toggle mode.....	55, 60		
Top Panel.....	12		
TRAKTOR LE .....	28		
Trigger mode .....	55, 60		
Troubleshooting .....	76		
<b>U</b>			
USB .....	78		