Getting Started Guide

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1 Welcome to REAKTOR

REAKTOR is a musical instrument. It creates sound. You can play it like any other music software—stand-alone with a MIDI keyboard, or as plug-in within a sequencing host.
But you define what type of instrument it is. Each time you launch REAKTOR, it will follow your musical needs. You need a synthesizer? You need a drum computer? You need this particular noise-making device you never heard before? Just load the according instrument file and start playing.
The full version of REAKTOR comes with over 50 individual instruments. An included collection of instruments from earlier REAKTOR versions unfolds more than ten years of legacy within electronic music. And the online library holds more than 3000 instruments of any type you can imagine.
If you don't own the full version, you can still use the REAKTOR engine's musical power. A continuously growing set of KOMPLETE Instruments is separately available for REAKTOR. When you load any of those instruments, REAKTOR switches into its Player mode. This is explained in section ↑1.2, REAKTOR Modes: Full, Player and Demo below.
However, loading pre-configured instruments only scratches the surface. You can edit your favorite instrument's signal processing, adjust its internal structure to a specific song's needs or start building your own instrument from scratch, thus designing your very personal signature sound.
This document will help you get started.
The REAKTOR team at Native Instruments

1.1 System Requirements

For up-to-date information about system requirements and compatibility with current and legacy operating systems, please see our website at:
www.native-instruments.com/REAKTOR

1.2 REAKTOR Modes: Full, Player and Demo

What you can do with the REAKTOR version installed on your computer depends on which mode REAKTOR is running in. This mode is connected to the kind of license you are using:

- **Full mode:** If you already installed and activated REAKTOR, as a single product or as part of a bundle like KOMPLETE, you are using it in Full mode. In Full mode, all functionality is available without restrictions.
- **Player mode:** You installed and activated any of the KOMPLETE Instruments for REAKTOR, or a bundle of these Instruments like KOMPLETE Elements. Additionally, you installed REAKTOR as a player application for these Instruments. In this case you are using REAKTOR in Player mode. In Player mode you can play Instruments and change their settings, but cannot edit their internal structure. While REAKTOR's Player mode does not support saving of Instruments, all Instrument settings are saved with your host's project.
- **Demo mode:** You installed REAKTOR and a number of KOMPLETE Instruments as demo versions, but did not activate any of the products yet. In this case you are using the demo license for REAKTOR, and REAKTOR is running in Demo mode. In Demo mode, you have all functionality but the application will stop generating sound after 30 minutes. Furthermore, storing is disabled.

[!] Installation and activation are explained in detail in the separate Native Instruments Setup Guide.

1.3 How to Get Started

This document explains all necessary steps to get started with REAKTOR:

- Chapters ↑2, Basic Settings in REAKTOR and ↑3, Loading and Playing describe how to setup the application, and how to load and play an instrument. This part of the documentation is relevant for all users.
- Chapters ↑4, Modifying a REAKTOR Ensemble to ↑9, What's Next? explain features only available in REAKTOR's Full mode. If you are using REAKTOR's Player mode, this is not relevant for you.

In the course of the following chapters you will learn how to perform the most common tasks in REAKTOR. Without bothering you with technical detail, a number of tutorials will teach you how to effectively use REAKTOR's capacities. Following the order of the tutorials given in this document is recommended, as later sections will rely on parts explained earlier.

1.4 The REAKTOR Documentation

Once you are familiar with the basic usage of REAKTOR, you may want to learn more. The REAKTOR reference documentation contains detailed descriptions of all relevant items and features within REAKTOR:

- The **Application Reference** explains all elementary concepts of REAKTOR. It tells you how to operate the application in detail. If you want to use and understand REAKTOR's capacities beyond the level of this Getting Started document, the Application Reference is your starting point.
- The **Instrument Reference** describes all instruments that come with REAKTOR as its factory content. Read this if you want to explore the musical options of each individual instrument in greater detail.
- The **Module and Macro Reference** provides detailed information about all parts available when designing own instruments in REAKTOR. If you want to leave the beaten path, this document will become your guide.
- The **Core Reference**, finally, is divided into two parts: The first half is a tutorial that explains the Core level of REAKTOR, where you can build your own low-level digital signal processing devices. The second is a comprehensive reference which lists all Core level components.

These documents are most useful if you are using REAKTOR in Full mode. However, especially the Application Reference will provide a deeper understanding of how to use REAKTOR's instruments, so it might be worth a look if you are using REAKTOR in Player mode, too.

All of these documents are available from REAKTOR's Help menu.

In addition to the manuals coming with REAKTOR, there is more information available online: Be sure to visit the Native Instruments user forum at
http://www.native-instruments.com/forum/.
The huge community of REAKTOR users is sharing tips and tricks, and will help you with specific questions.

1.5 Special Formatting used in this Document

This manual uses particular formatting to point out special facts and to warn you of potential issues. The icons introducing these notes let you see what kind of information is to be expected:

Whenever this exclamation mark icon appears, you should read the corresponding note carefully and follow the instructions and hints given there if applicable.

This lightbulb icon indicates that a note contains useful extra information. This information may often help you to solve a task more efficiently, but does not necessarily apply to the setup or operating system you are using. However, it should be worth reading for most users.

2 Basic Settings in REAKTOR

REAKTOR 5 is capable of running as a stand-alone software with its own interface to your audio and MIDI hardware. This way you can play REAKTOR using a MIDI keyboard/controller attached to your computer. Hereafter we will assume that you are running REAKTOR as a stand-alone application.
In this chapter you will learn how to link REAKTOR to the MIDI devices and audio hardware connected to you computer. You will also get to know REAKTOR a little bit without the distraction of making music using your DAW.
Before you start your work with REAKTOR 5 it is a good idea to configure its audio settings to fit your needs.
This only applies to the stand-alone version of REAKTOR 5, as with the REAKTOR 5 plug-ins all things audio and MIDI are handled by the host software.

2.1 Configuring the Audio Hardware

In order to listen to the sound REAKTOR generates, you need to configure your audio hardware device (i.e., your soundcard or external audio interface) for use with REAKTOR.

Use Low-Latency Drivers
Whenever possible you should use low-latency drivers while working with REAKTOR. REAKTOR works with two types of low-latency drivers:

- ASIO™
- Core Audio™ (only on computers running Mac OS® X)

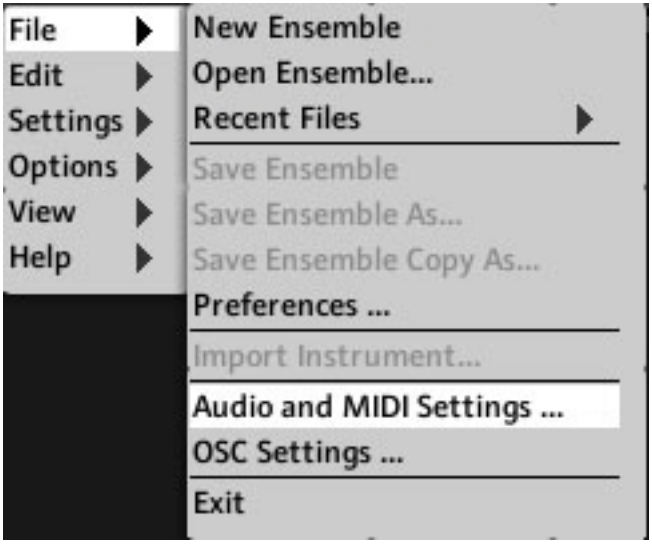
These technologies have been developed to ensure an efficient data transfer between software and audio hardware and should provide a latency that is suitable for live play, if not unnoticeable.

2.1.1 Accessing the Audio and MIDI Settings… dialog

When you start REAKTOR for the first time, the Audio and MIDI Settings...dialog should open automatically. You can call up this dialog again at a later point in time from within REAKTOR:

1. Click the Menu button to open the application menu.

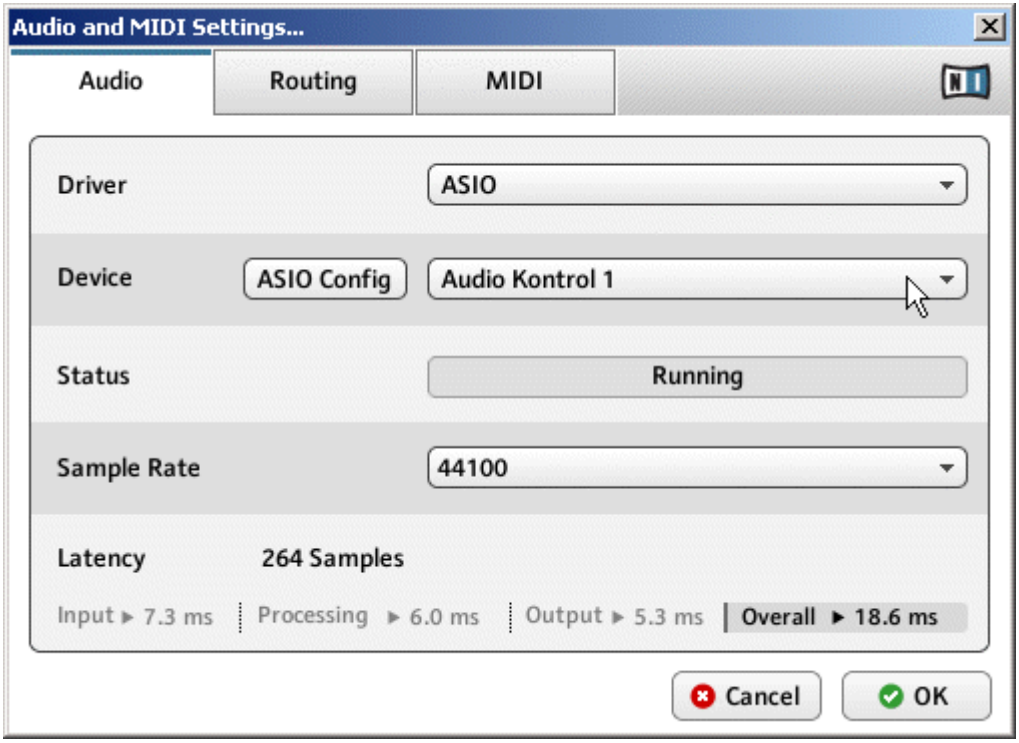
2. Select the *File > Audio and MIDI Settings...* menu entry:



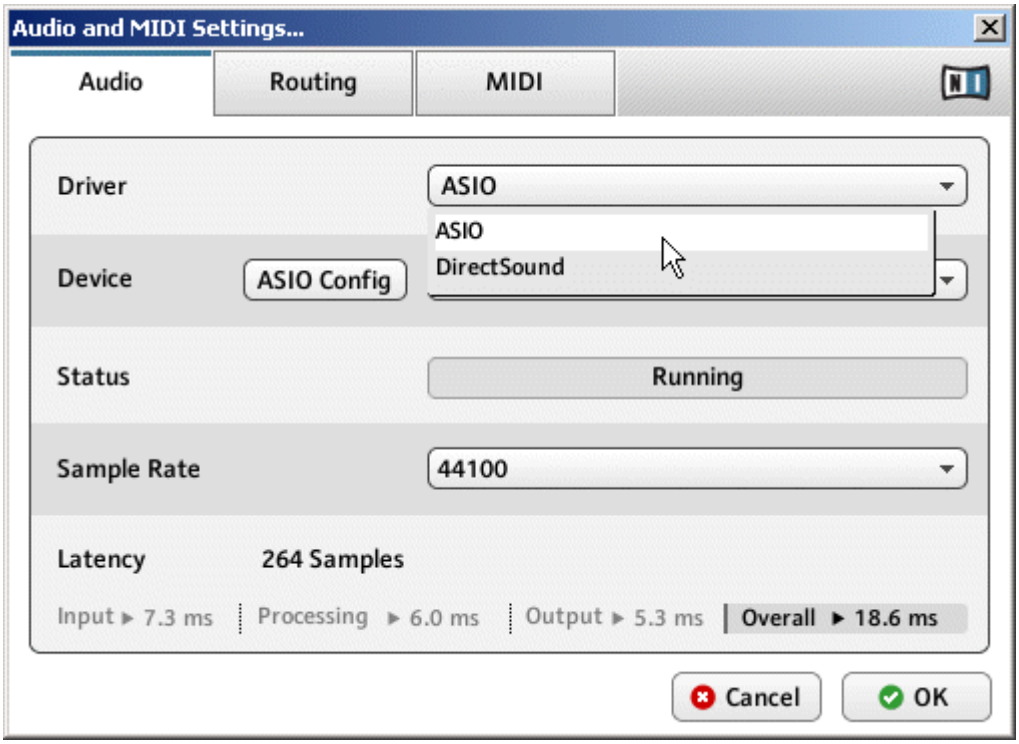
2.1.2 Selecting an Audio Hardware Device

To select the audio hardware device you want REAKTOR to use:

1. Double-click on the REAKTOR application to launch it. You will be presented with the Audio and MIDI Settings... dialog window.
2. In the Audio and MIDI Settings... dialog window, click the Device menu to open the list of available audio interfaces. If only one audio hardware device is present, the device and sample rate will be selected automatically. If there are two or more audio devices installed on your computer, select the one you want REAKTOR to use by clicking its entry in the Device menu.



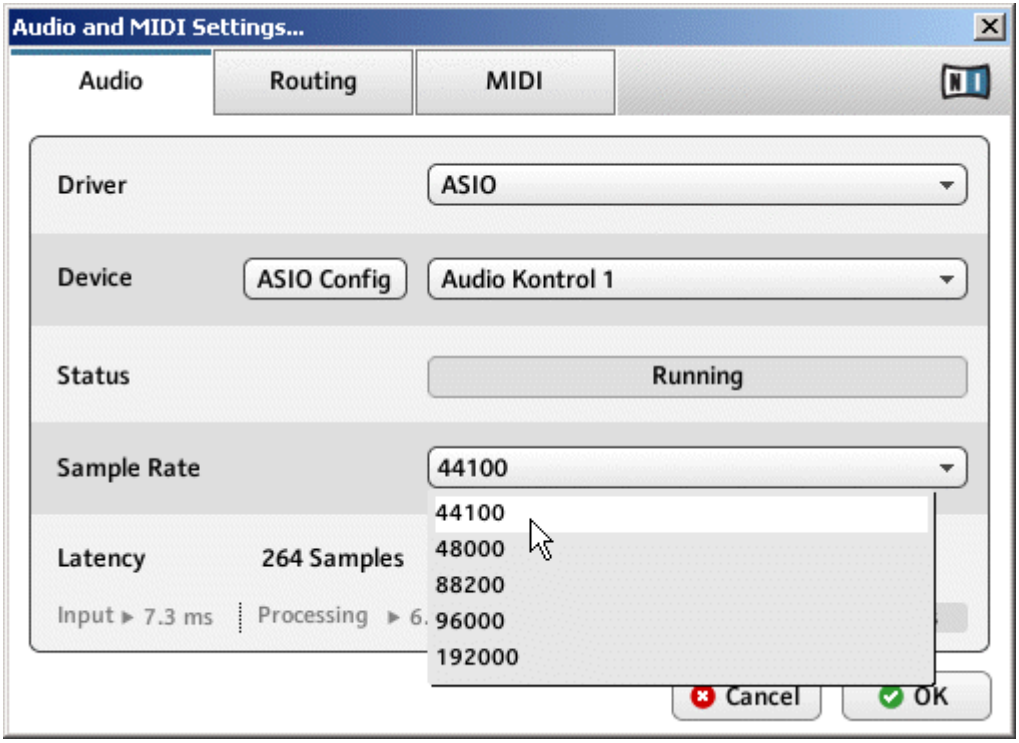
3. From the Driver menu, select the type of driver you want to use. On computers running a Windows® operating system, using ASIO™ is highly recommended. On computer running Mac OS® X, Core Audio™ is pre-selected.



Now that you have selected an audio hardware device and according driver, proceed with the audio hardware setup by selecting a sample rate.

2.1.3 Selecting a Sample Rate

1. Select the sample rate that you want your audio hardware to work at from the Sample Rate menu. We recommend selecting a sample rate of 44100 Hz.



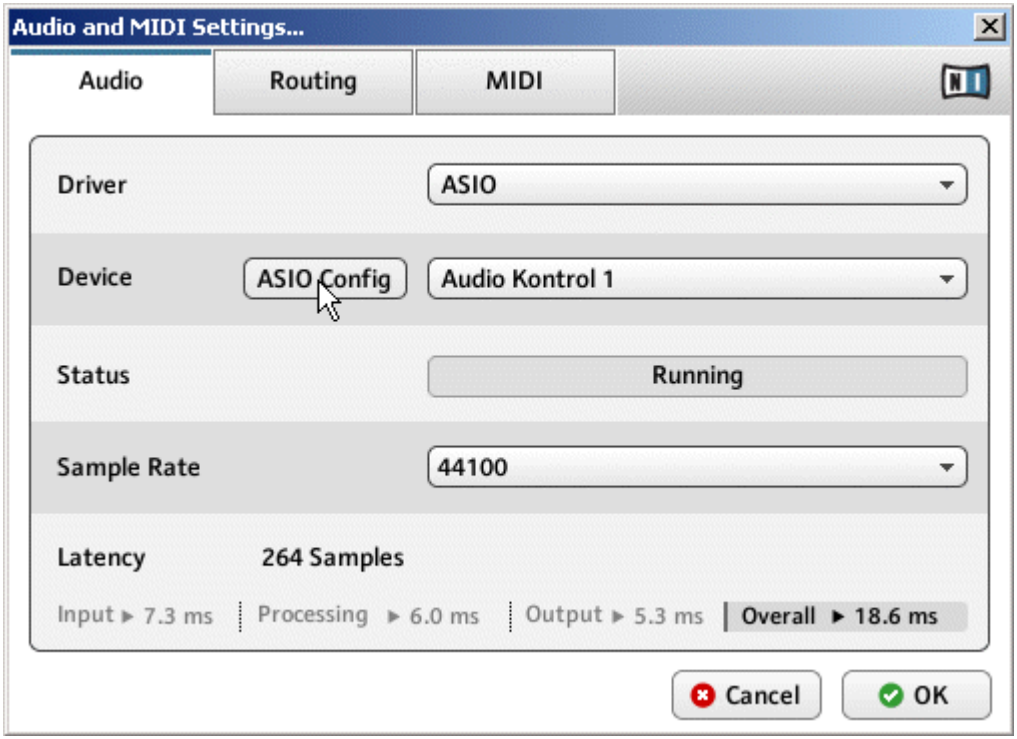
2. Now that you have selected a sample rate, proceed with the audio hardware setup by adjusting the output latency.

2.1.4 Adjusting Output Latency

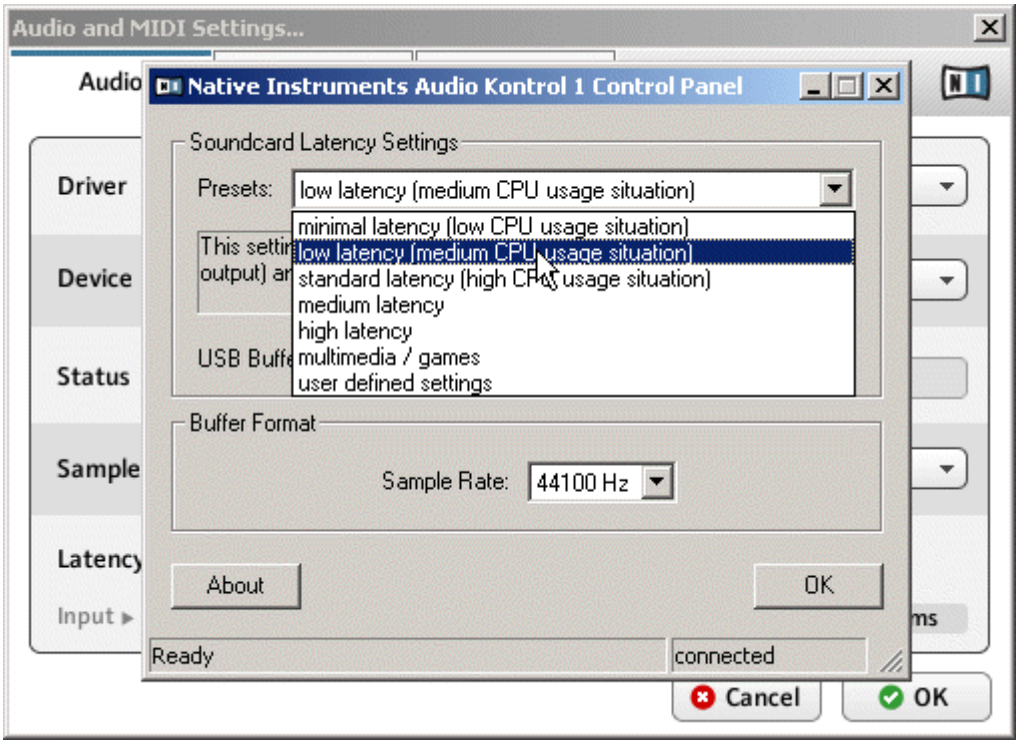
By adjusting the output latency of your audio hardware you can control how quickly the audio signal generated by REAKTOR becomes audible after you have pressed a key on your MIDI keyboard. The minimum amount of latency that can be achieved without inducing crackles and other noises depends on how much CPU power is available to audio processing. On a modern computer that has been set up correctly, there should be no perceptible delay. Older computers may require a more relaxed latency setting. The way the latency is adjusted from within REAKTOR differs depending on the operating system you are using.

Windows®

1. Click the ASIO Config button in the Audio and MIDI Settings... dialog to open your audio hardware's control panel.



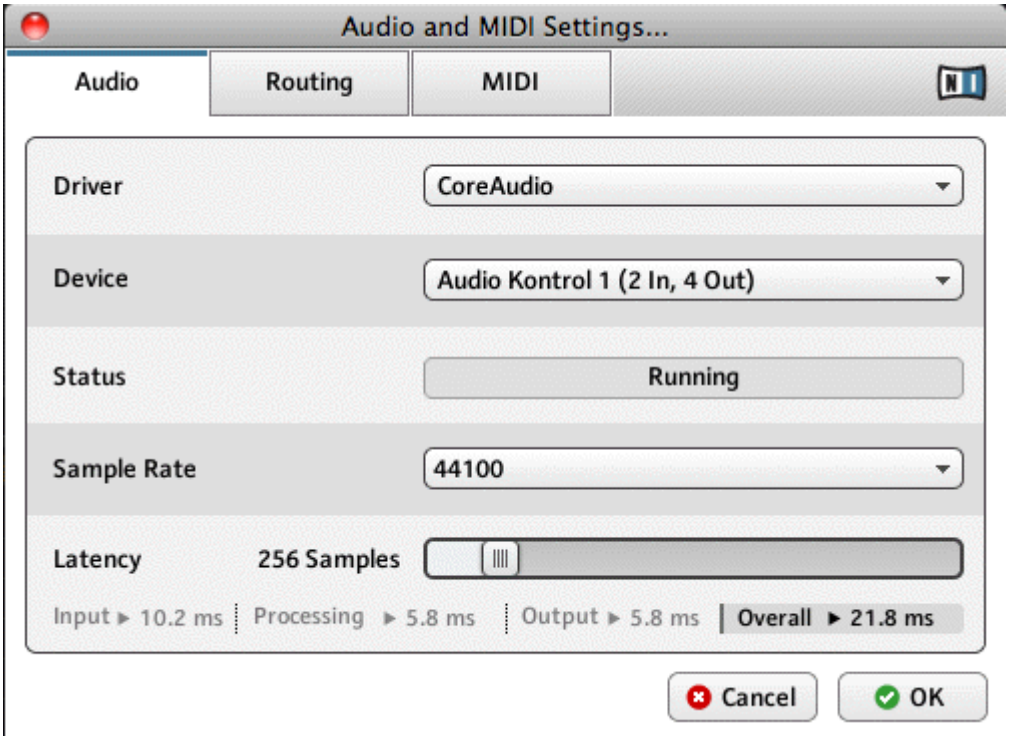
2. In the control panel belonging to your audio hardware, select an output latency of about 10 ms. This should work well on most computer systems.



3. To confirm the settings you have made, click OK.

Mac OS® X

1. Move the Latency slider at the bottom of the Audio and MIDI Settings... dialog to a value of about 256 samples.

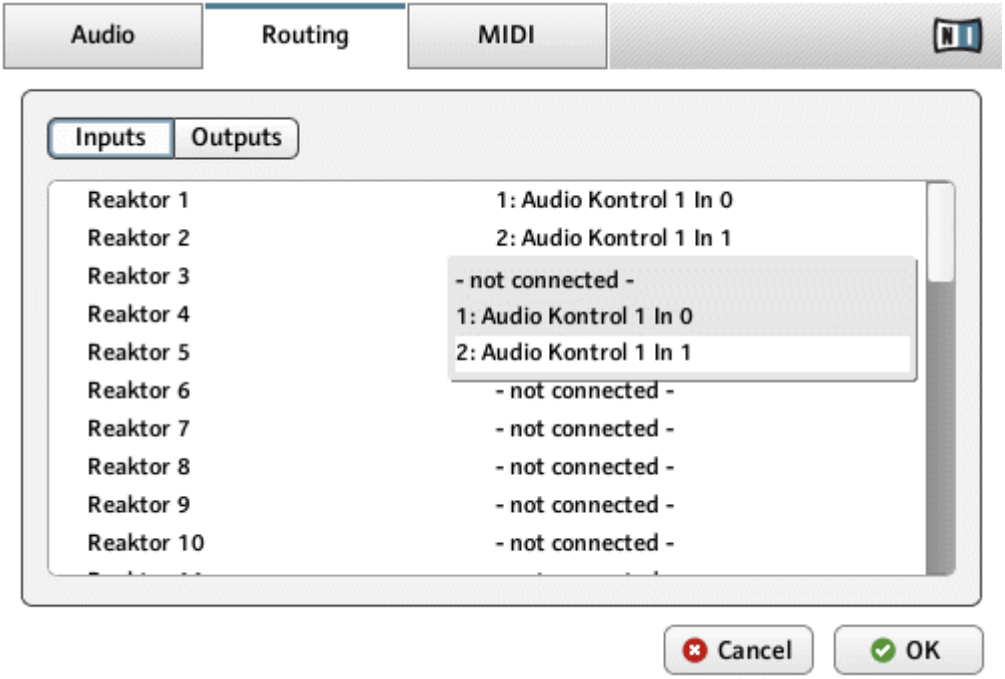


2. To confirm the settings you have made, click OK.

2.1.5 Routing: Assigning REAKTOR's Inputs

You can assign each of REAKTOR's input channels to an arbitrary input of your audio device:

1. In the Audio and MIDI Settings... dialog, click on the Routing tab at the top. (If you are using Mac OS® X and want to use your Mac's built-in inputs you will need to setup an Aggregate Device using "Audio MIDI Setup.app.")
2. Click the Inputs button to access the Inputs view.
3. To assign one of REAKTOR's inputs to an input of your audio hardware device, click the corresponding entry in the right column of the Inputs view.

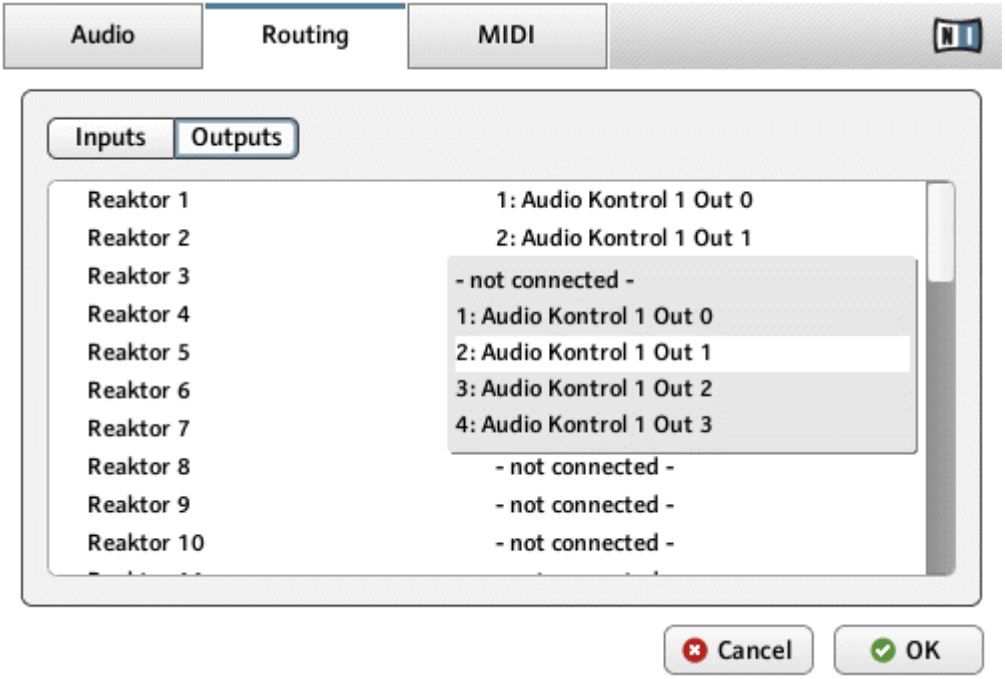


4. To confirm the selection you have made, click OK.

2.1.6 Routing: Assigning REAKTOR's Outputs

You can assign each of REAKTOR's output channels to an arbitrary output of your audio device:

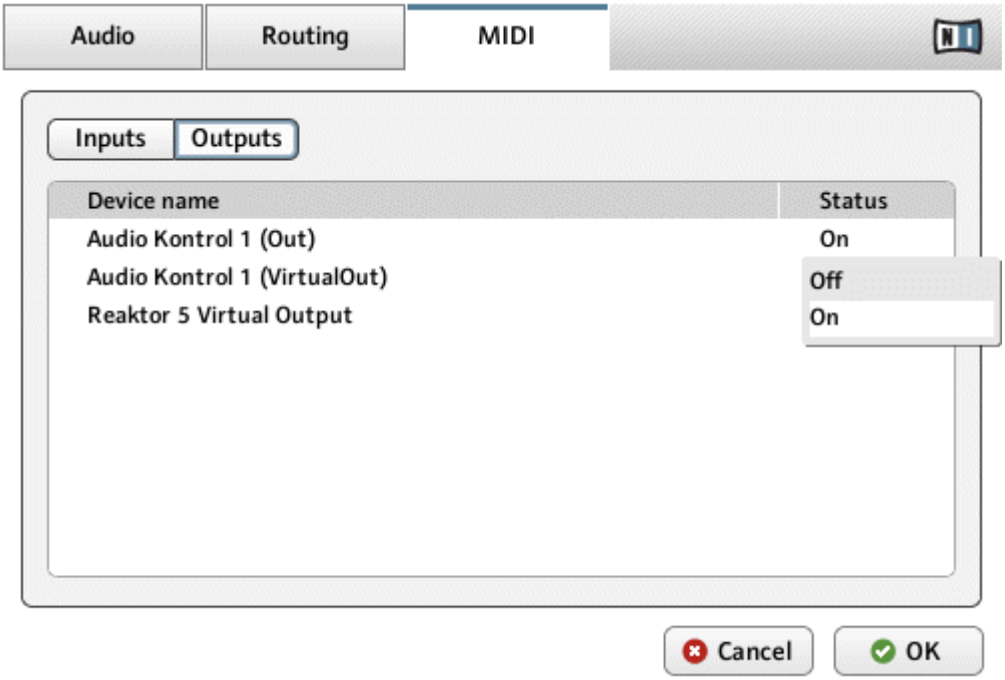
1. In the Audio and MIDI Settings... dialog, click on the Routing tab at the top (If you are using Mac OS® X and want to use your Mac's built-in outputs you will need to setup an Aggregate Device using "Audio MIDI Setup.app").
2. Click the Outputs button to access the Outputs view.
3. To assign one of REAKTOR's outputs to an output of your audio hardware device, click the corresponding entry in the right column of the Outputs view.



4. To confirm the selection you have made, click OK.

2.2 Configuring the MIDI Hardware

1. Click the MIDI tab in the Audio and MIDI Settings... dialog. Again you will be presented with a number of choices depending on what is plugged into your computer.
2. Click the *Off* text to the right of the device you which to use. The text should read *On* next to items you wish to be active.


Audio
Routing
MIDI
Inputs
Outputs
Device name
Status
Audio Kontrol 1 (Out)
On
Audio Kontrol 1 (VirtualOut)
Reaktor 5 Virtual Output
Off
On
Cancel
OK

3 Loading and Playing

In this tutorial you will learn how to load and play existing instruments.

- You will be guided through using the REAKTOR Browser to open REAKTOR Ensembles.
- We will take a look at Snapshots.
- Finally, we will have a look at saving your work.

This tutorial assumes that you installed REAKTOR and the freely available REAKTOR Factory Selection, a collection of KOMPLETE Instruments. Also, it assumes that you use REAKTOR as a plug-in within your favorite sequencing host.

! If you own the full license of REAKTOR, you don't need to install the REAKTOR Factory Selection package: Carbon 2, the instrument used as an example, is available within REAKTOR's factory content within the *New Additions* > *Synthesizers* section.

3.1 A Few Important Buttons

Before you start, it is important to familiarize yourself with four very important buttons found in the Main Bar and the Sidepane.

- The Sidepane button in the Main Bar is used to open and close the Sidepane. The Sidepane is where the Browser, Snapshot, Panelsets, and Properties tabs are located.

Fig. 3.1 The Sidepane button

- Click the Browser tab to open the Browser, used for finding files in REAKTOR.

Fig. 3.2 The Browser tab

- Click the Snapshot button to open the Snapshot tab, used for loading, saving, and morphing presets.

Fig. 3.3 The Snapshot button

- From here on we will always use the Menu button to access global menu entries. However, all these menu entries can also be accessed from the application menu.

Fig. 3.4 The Menu button

Fig. 3.5 The application File menu (Windows® version shown)

It is possible to access all views in REAKTOR from the global menu entries under the *View* menu. For the sake of brevity, this will only be mentioned in this part of the Getting Started manual.

We will be using these buttons during the tutorial. Now let's use the Browser to load our first REAKTOR Ensemble.

3.2 Ensembles, Instruments and KOMPLETE Instruments

Aside from the buttons, you should understand the following terms, as they are used within the REAKTOR community und will be common within this document's tutorials:

- The **Ensemble** is a set of Instruments that can be loaded directly into REAKTOR. This can be a single synthesizer or a full channel strip with various effects. The Instruments are connected among each other, and they are connected to the application's audio input and output. When storing, you typically use the Ensemble file format.
- The **Instrument** is a part of an Ensemble, for instance a single delay effect unit. You can load Instruments into an Ensemble, to connect them to the application's audio inputs and outputs.
- The **KOMPLETE Instrument** is the only file you can use with the Player license. Technically close to an Ensemble (it connects to the inputs and outputs, for instance), it is called Instrument as it is a single unit from a musical point of view.

3.3 Loading Carbon 2

As a first step, we are going to open Carbon 2, a subtractive synthesizer contained in the REAKTOR Factory Library.

3.3.1 Opening the Sidepane

If not already visible after startup, you need to open the Sidepane which holds REAKTOR's File Browser. To open and close the Sidepane, click the Sidepane button in the Main Bar.

Fig. 3.6 The Sidepane button

3.3.2 Opening the Browser

With the Sidepane open, click on the Browser tab, or press [F5] on your computer keyboard.

Fig. 3.7 The Browser tab

This makes the Sidepane show the File Browser. It is split into three parts: At the top, you have four buttons to access four different types of content. Below, there is a folder tree. And at the bottom, there is a list of files contained within the selected folder from the tree above.

Click the Player button at the Browser's top. You will see all installed KOMPLETE Instruments listed in the upper area. Select the package REAKTOR Factory Selection with a mouse click.

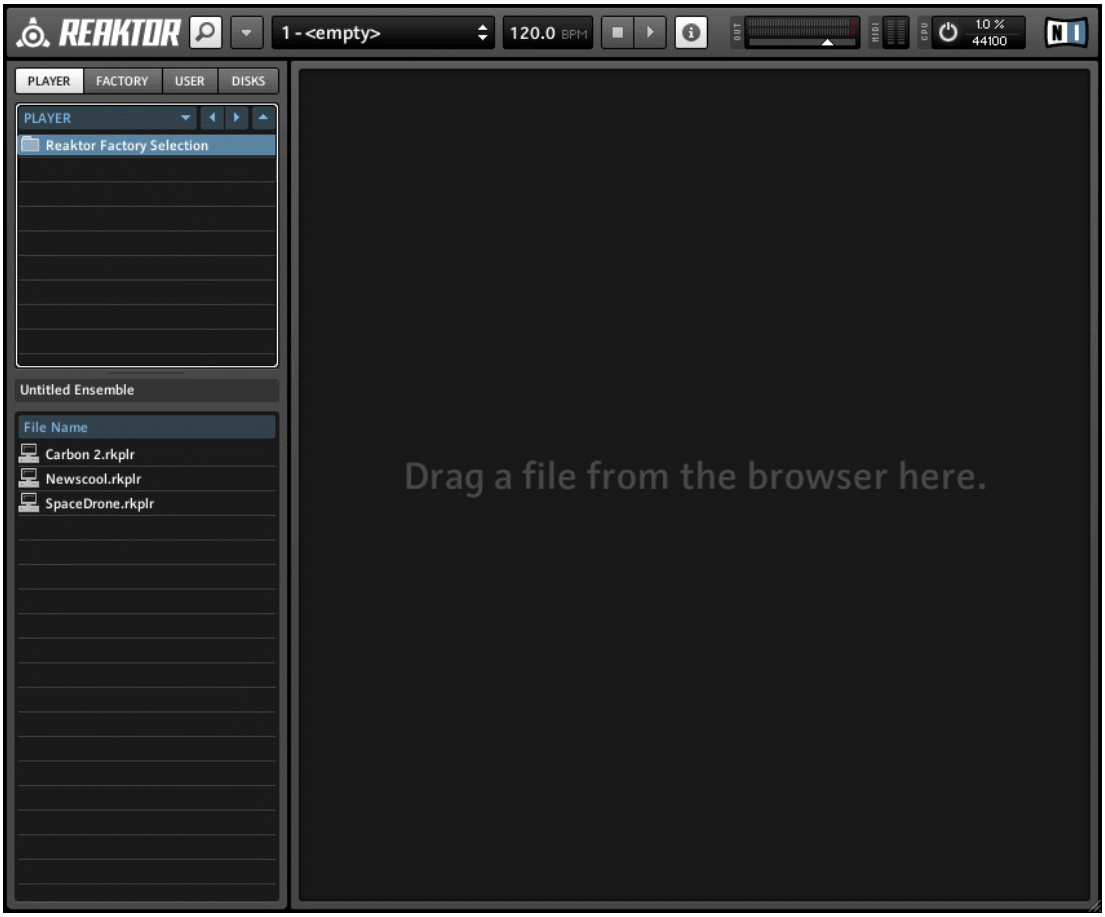


Fig. 3.1 The Browser with Factory Selection selected

The button next to the Player button switches its name depending on your activation of REAKTOR: It holds the factory content of REAKTOR and reads “Factory” after REAKTOR is activated. Until then, it is labeled “Demo”. This indicates that REAKTOR will switch into Demo mode if you load any Ensemble from that location.

3.3.3 Loading a File

As you selected the REAKTOR Factory Selection, its contained instruments are listed in the Browser's lower area. Click the entry *Carbon 2* and drag it to the application's main area. REAKTOR now loads the file.

3.4 Playing Carbon 2 and its Snapshots

Fig. 3.2 Carbon 2 loaded in REAKTOR PLAYER

Carbon 2 is a classic subtractive synthesizer with sections for oscillators, filters, modulation sources and integrated effect units.

Check the Instrument Reference for a detailed explanation of Carbon 2, or the documentation that comes with REAKTOR Factory Selection.

3.4.1 Loading a Snapshot

Play some notes on your MIDI keyboard to get an idea of how the synthesizer sounds. Then, let's change the sound completely by loading a different Snapshot.

A Snapshot is REAKTOR's terminology for a sound, preset, or patch. Each Instrument can hold Snapshots, and loading any of these Snapshots will set each control of that Instrument to a specific value, thus re-creating a particular sound.

The Snapshots of Carbon 2 are accessible from the central control in the application's Main Bar.

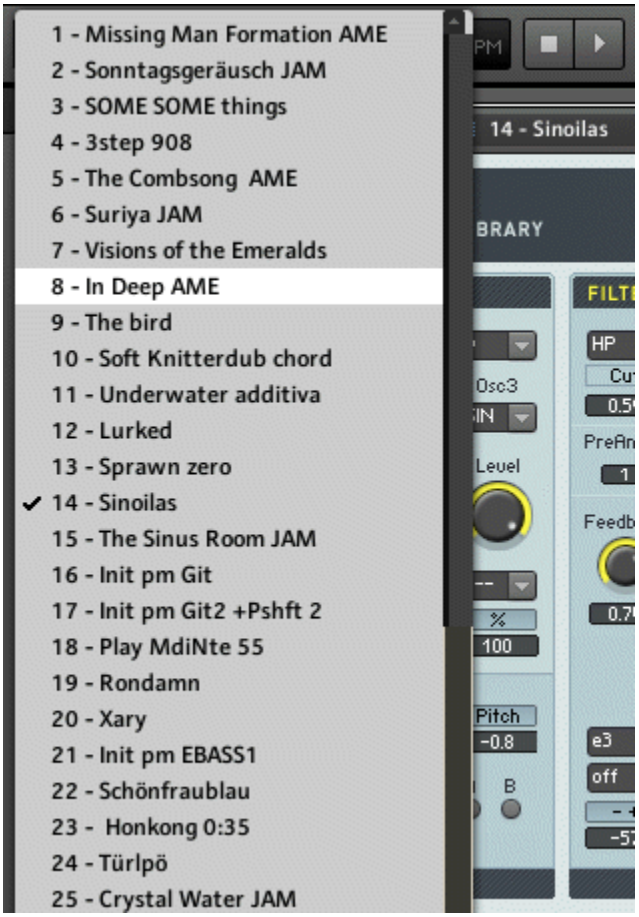


Fig. 3.3 The Snapshot control

1. Click into the Snapshot control to open a drop-down menu. The menu holds all Snapshots of the instrument.
2. Select the entry *In Deep*.
3. Play some notes to hear the difference.

3.5 Adjusting the Sound

In this section you will learn how to manipulate a sound by making some basic adjustments.

3.5.1 Switching Effects

The Snapshot *In Deep* uses the delay effect excessively to create a spatial sound. Let's assume the song you are working on does not require this type of space: switch the effect off by clicking the Delay button. Instead of the Delay, switch on the Chorus button to add some stereo spread.

Fig. 3.4 Effects tab with Chorus and EQ effect activated

3.5.2 Changing the Filter Movement

Also, let's change the filter's movement.

1. To manipulate the filter's movement, switch the right side of the instrument to the Source section with the according tab.
2. Select LFO1 within the lower area of the Source section, again using the according tab.
3. Click the Rate knob and drag it upwards to increase the control's value to 8.
4. Play a note: the filter movement's speed has doubled.

Fig. 3.5 The LFO section in the Source tab after changes have been applied

3.5.3 Changing the Filter Settings

To change the filter itself:

1. In the Instrument's central Filter section, click the Resonance knob and drag it upwards until its value is 0.5. This will render the movement more audible.
2. Add brightness to the sound by increasing the Cutoff value, again by clicking the according knob and dragging it upwards.

Fig. 3.6 The Filter section after changes have been applied

3.6 Saving Your Settings

There are two ways to save the changes you made to the sound:

- **Store your host's project file:** This is the most common way when making music, and the only way if you are using REAKTOR in Player mode. When storing, your host application will ask the REAKTOR plug-in for all information necessary to restore your settings, which are then stored with the host project. When you re-load your host project, REAKTOR will re-create the current state.
- **Store the Ensemble file:** This is only possible if you are using the full license of REAKTOR. In this case, you create a modified copy of the file you loaded earlier in this tutorial. You can then re-use the modified sound in a different song by loading the altered instrument instead of the original one.

! Please refer to your host's documentation for details about storing host projects.

To store the Ensemble file as a copy of the original instrument, select the *Save As...* entry from the application menu. This will open a default window to select folder and filename. After you selected the new location and typed in a new filename, click the Save button.

4 Modifying a REAKTOR Ensemble

In this tutorial:

- We will modify an existing REAKTOR Ensemble called Junatik. Junatik comprises a Synth Instrument and a Delay Instrument.
- We will insert a Reverb Instrument into the Structure, and connect it to the Synth.
- We will remove the Delay Instrument from the Structure.
- We will also learn more about REAKTOR's Snapshot system.
- We will use the Browser to load up Junatik, but also to insert the Reverb Instrument.

! If you are using REAKTOR PLAYER, you do not need to continue reading. After you have read chapter 2 and 3 you are set to go!

4.1 Recap

In the first tutorial we learnt how to create and save Snapshots using the *Append* button. Also we saved our work, using *Save Ensemble As...*command. As we will be using these techniques again, you might want to have a look at the first tutorial again before proceeding.

Using REAKTOR Buttons

To recap, in the last tutorial we used:

- Click the Sidepane button in the Main Bar to open and close the Sidepane. The Sidepane is where the Browser, Snapshot, Panelsets, and Properties tabs are located.

Fig. 4.1 The Sidepane button

- Clicking the Browser tab opens the Browser.

Fig. 4.2 The Browser tab

- Clicking the Snapshot tab opens the Snapshots list.

Fig. 4.3 The Snapshot tab

In this tutorial we will learn about REAKTOR Properties. We will also learn about the Structure button.

- Clicking the Properties tab opens the Properties of REAKTOR Ensembles, Instruments, Macros, Modules, et cetera.

Fig. 4.4 The Properties tab

- Clicking the Structure button opens REAKTOR's Structure.

Fig. 4.5 The Structure button

It is a good idea to get used to these buttons and their icons as they are very useful, especially later on when you use REAKTOR as a plug-in!

4.2 Using the Browser to Load the Ensemble

Again we will use the Browser to load the Ensemble.

1. Click on the Sidepane button to open the Sidepane.
2. Click on the Browser tab to open the Browser.
3. Click on the Factory button to navigate to the Factory Library.
4. Using the folder tree in the top part of the Browser, navigate to *Ensembles > Classics > Synthesizer*. You should now see a list of Synths in the bottom part of the Browser.
5. In the bottom part of the Browser, double-click on Junatik to open it.

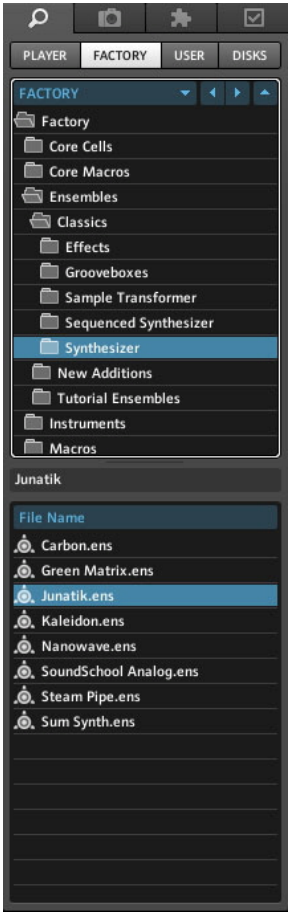


Fig. 4.6 Junatik in the Browser

4.3 Instruments inside Ensembles

In this section we will look at REAKTOR's hierarchy of Ensembles and Instruments.

4.3.1 Junatik Panel Overview

Fig. 4.7 Junatik Synth with StereoTDelay folded away

Let's have a look at Junatik. You might be able to tell which one is the Synth (it's labeled Junatik). Below the Synth you can see something labeled StereoTDelay. To keep the Ensemble panel view tidy, Instruments are often folded away. Indeed the StereoTDelay is folded away in Junatik.

- Click on the A button in the lower right to open it. Clicking on the — button next to A and B will fold it away again.

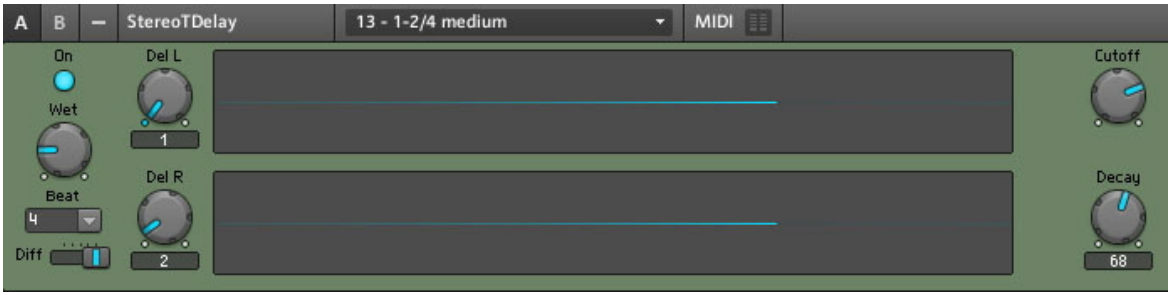


Fig. 4.8 StereoTDelay in full view

4.3.2 The Difference Between an Ensemble and an Instrument

When we looked at 2-Osc, the Delay was built into the Synth. Here the Delay is a separate Instrument. In REAKTOR terminology, an Ensemble can host more than one Instrument. On this occasion, there are two Instruments—the Junatik Synth and the StereoTDelay.

In REAKTOR terminology, an Instrument can be a traditional instrument like Synth or Sampler, an effect like a Delay or Reverb, or anything else like a Sequencer or even just a picture.

Fig. 4.9 Junatik Instrument

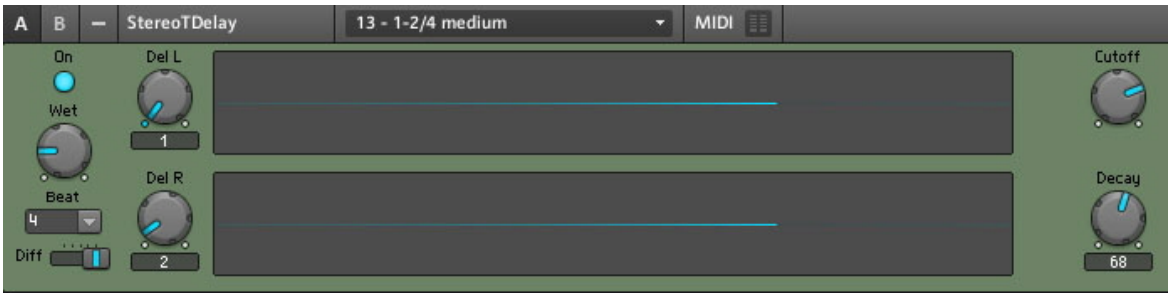


Fig. 4.10 Delay Instrument

Play some notes, and you will hear the Synth and Delay together. Lets change some of the Snapshots to hear some different sounds. Because Junatik has a separate Synth Instrument and Effect Instrument, the Snapshot system is a little bit different.

4.4 Snapshot Master for Plug-In and Snapshot Hierarchies

Have a look at the top of the Ensemble, and you will see a Panel named Ens – Junatik.

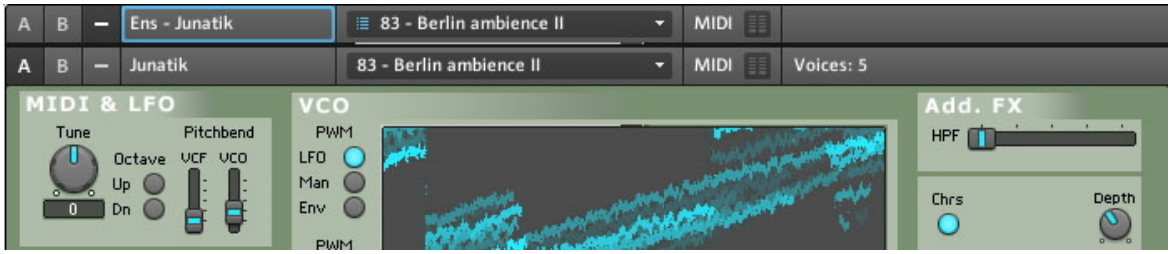


Fig. 4.11 Ensemble Panel

On the Ensemble Panel you will see the Snapshot number *83 – Berlin ambience II*.

4.4.1 Snapshot Hierarchy as seen in Properties

We need to bring up Properties, to understand the Snapshot hierarchy. To do this you need to:

1. Double-click Ens – Junatik. Alternatively you can click on the Properties tab in the Sidepane.

2. Click on the Function button to see the Function page of Junatik's Properties.

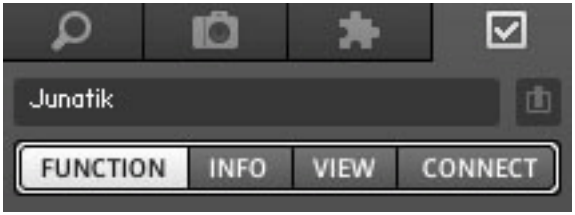


Fig. 4.12 The Function button

Fig. 4.13 Ensemble Properties with Recall by MIDI and Snapshot Master ticked

Have a look above at the Properties, in the Snapshot area, the checkboxes Recall by MIDI and Snapshot Master for Plug-In, are both engaged.

4.4.2 Recall by MIDI and Snapshot Master for Plug-In

- **Snapshot Master for PlugIn** means that when these Snapshots are changed by the Ensemble (the master), the Snapshots for the Synth and the Delay will also change together. In other words, the Junatik Instrument and StereoTDelay Instrument are slaves to the Ensemble master.
- **Recall by MIDI** means that this Instrument can receive Program Change messages. If the master also has this setting and is on the same MIDI channel, the master's Snapshot with take precedence.

4.4.3 Snapshot Properties for the Junatik Instrument

If you single click on the Junatik Panel, you will see that the *Recall by Parent* box is ticked.

Fig. 4.14 The Snapshot area of the Junatik Instrument Properties with the Recall by Parent checkbox engaged

This confirms that the Snapshots on the Ensemble Panel, are the Master Snapshots.
Try changing some Snapshots and you will see how different Snapshots in the Junatik Instrument, sometimes (but not always), have different Snapshots in the StereoTDelay Instrument. Let's choose Snapshot "24 – Pointer 1". Note that the StereoTDelay Snapshot says, *1 – Delay off*. Now try choosing different Snapshots in the Junatik Instrument.

4.4.4 Snapshot with a REAKTOR Switch Turned Off

You will notice that the Snapshots in the Junatik Instrument all play back with no Delay effect: Snapshot 1 in the StereoTDelay has the Delay turned off, because the On switch—above the Wet knob, is turned off.

Fig. 4.15 The Delay is switched off

Switches like this not only Mute the Instrument, they also conserve CPU resources. So if you used this Ensemble in a DAW, and used the DAW's Effects, it would make sense to turn the switch off.

4.4.5 Snapshot Flexibility

Of course if you change the Snapshots in the StereoTDelay Instrument, you will have a choice of different Delay effects without changing the Synth Snapshot. So having different Instruments, with different Snapshots adds to the flexibility, and having a Snapshot Master, means being able to change the Snapshots on more than one Instrument!

4.5 Swapping the Delay Instrument for a Reverb Instrument

So we like the Junatik Synth but instead of having a Delay effect we want to try it with a Reverb. That means we will need to substitute the Delay for one of REAKTOR's Reverbs.

4.5.1 Opening a REAKTOR Structure

To do that, we need to have a look at the Structure of the Ensemble.

- Click on the Structure button in the Sidepane.

Fig. 4.16 The Structure button

This will open the Ensemble Structure.

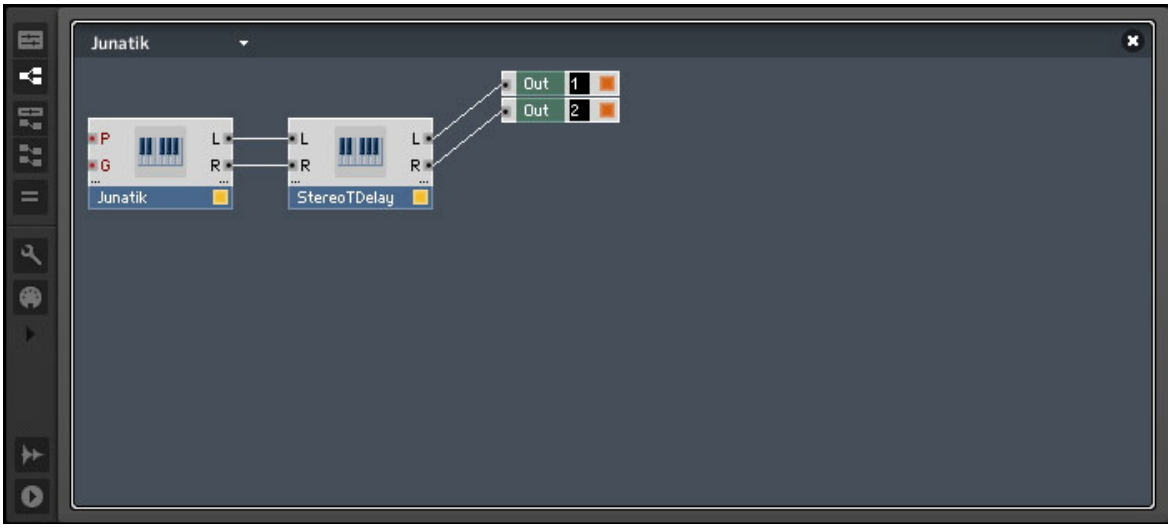


Fig. 4.17 Ensemble Structure of Junatik

As you can see the Junatik Synth is connected to the StereoTDelay. The L (Left) and R (Right) Outputs of the Junatik are connected to the L and R Inputs of the StereoTDelay. The L and R Outputs from the StereoTDelay are connected to the Audio Out Terminals.
Soon we are now going to use the Browser to insert a Reverb Instrument into the Ensemble Structure. This will be connected to the Junatik Instrument. But before that, we need to remove the StereoTDelay from the Structure.

4.5.2 Removing an Instrument from the Structure

To remove the Delay from the Structure of this Ensemble:

1. Right-click if you are on Windows® ([Ctrl]+click if you are on Mac OS® X) on the StereoTDelay Object in the Structure Window—this will open a context menu.
2. Highlight the *Delete* menu entry with your mouse and click on it. This will remove the Instrument from the Structure.

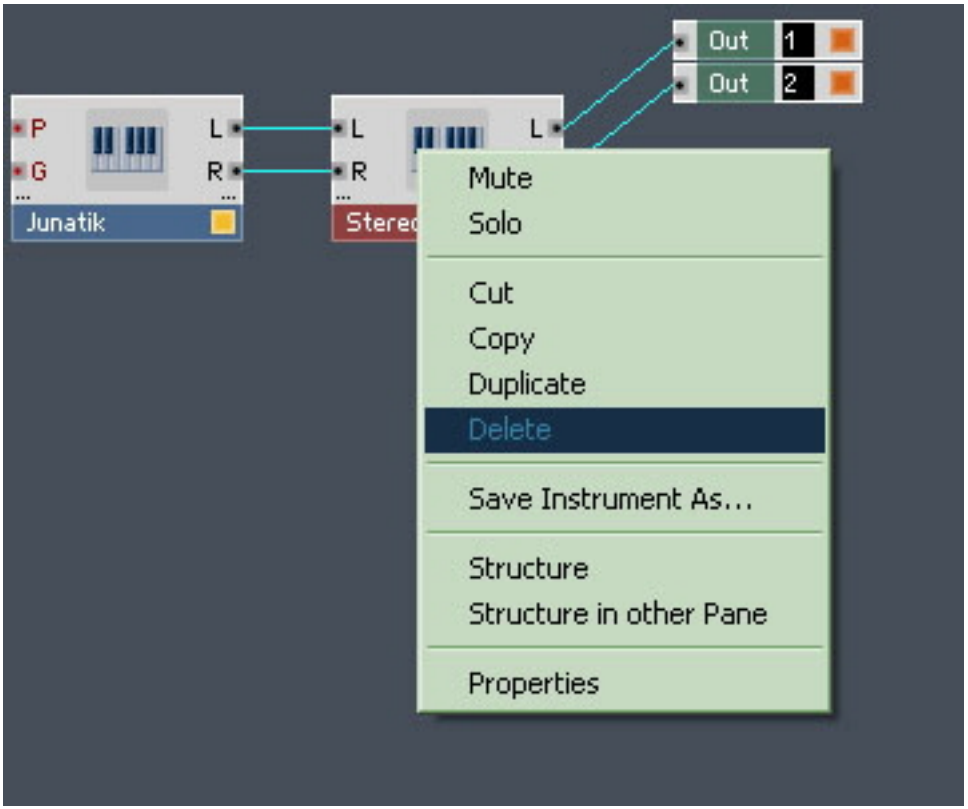


Fig. 4.18 Deleting an Instrument

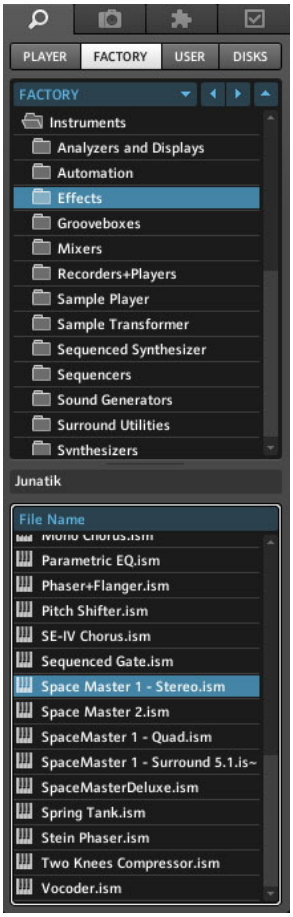
The StereoTDelay Instrument should now have disappeared.

4.6 Using the Bowser to Search for Instruments

Now we need to replace the Delay with a Reverb Instrument. We will use the Browser to load “SpaceMaster.ism.”

1. In the Sidepane, click on the Browser tab to bring up the REAKTOR Browser.

2. In the folder tree of the Browser, navigate to *Instruments* > *Effects*.



3. From the bottom part of the Browser, click and drag Space Master 1 – Stereo.ism into the Structure area. This will insert this Instrument it into the Ensemble Structure.

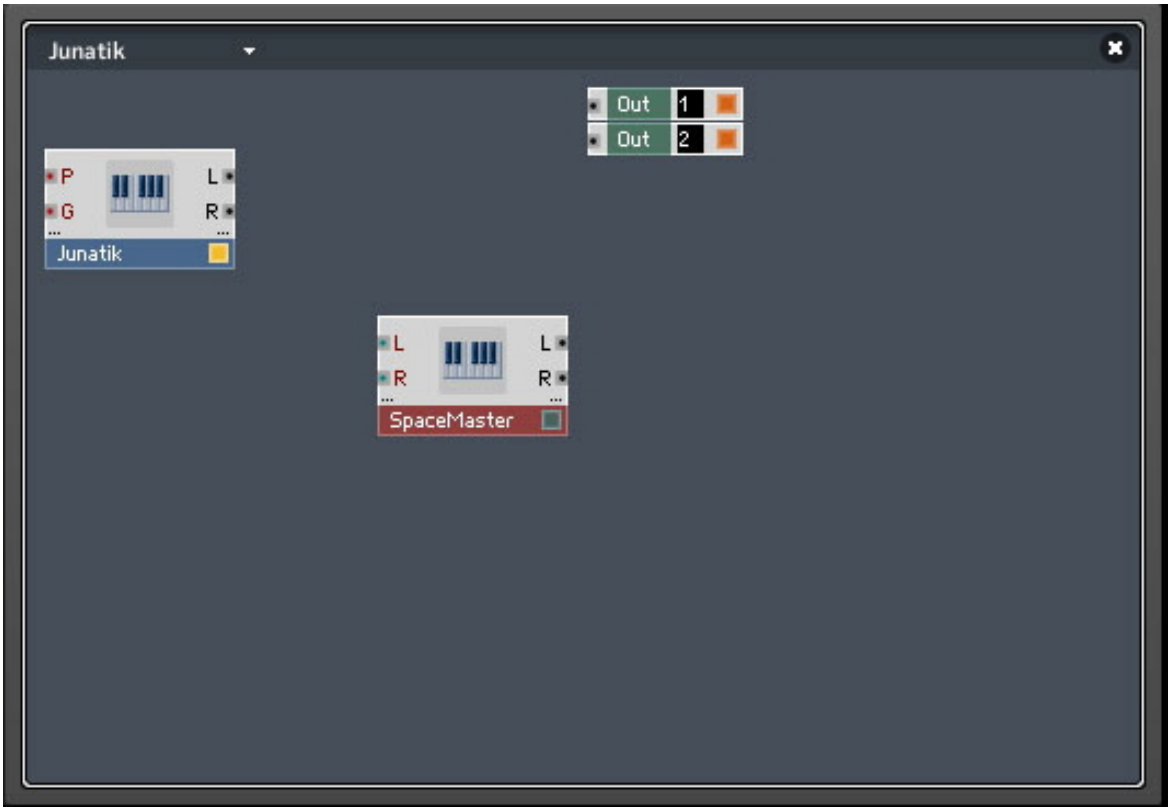


Fig. 4.19 SpaceMaster has been inserted into the Structure.

You can also right-click in the Structure and see a context menu that contains instruments to add.

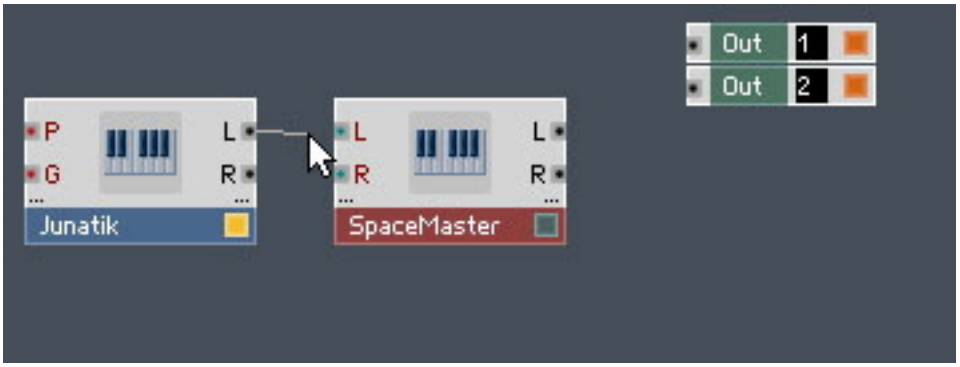
Fig. 4.20 SpaceMaster in Panel View

4.7 Connecting the Instrument to the Audio Out

Now we need to connect the Junatik to the SpaceMaster Reverb and the Reverb to the Audio Out Terminals.

4.7.1 Making the Connections

1. Click and hold on the L Output (or the small dot beside it) of the Junatik Instrument, and then drag your mouse towards the L Input of the SpaceMaster. When you do this, you should see a wire being dragged by your mouse as your cursor turns into a pointed finger. When you reach the SpaceMaster L Input or the dot beside it, let go of your mouse button.



2. Repeat this with all the connections—including connecting the L and R Outputs from the SpaceMaster to the 1 and 2 Inputs of the Audio Out Terminals.

After having done that, it should look like this:

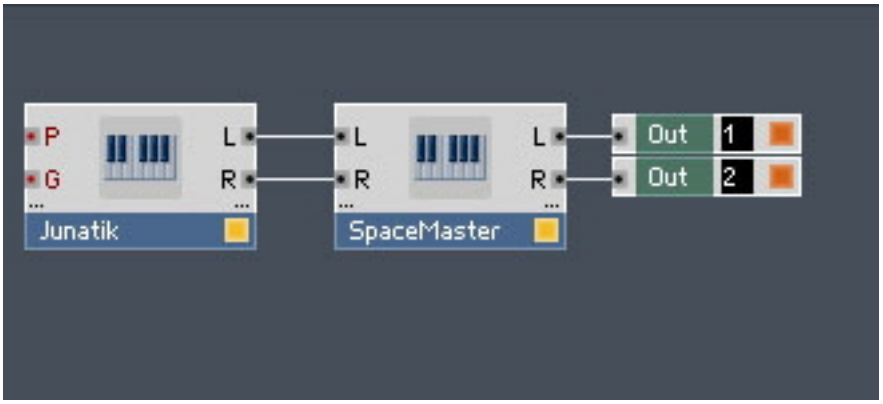


Fig. 4.21 SpaceMaster connected to Junatik and the Ouputs

Now we need to check how our two Instruments look in the Ensemble Panel.

4.7.2 Resetting the Positions of Instruments in the Ensemble Panel

Now it is possible that the insertion procedure has placed the SpaceMaster Instrument above the Junatik Instrument in the Ensemble's Panel—if this has not happened, skip this bit. To change the position, all you have to do is:

1. Go to Panel View by pressing the Panel button in the Sidebar.

2. Select the SpaceMaster Panel by clicking on its name.
3. Then click and drag the Instrument so that it is below the Junatik, and then let go—it should snap into place. So the Junatik will back at the top!

Fig. 4.22 Junatik on top

4.8 Restoring the Correct Snapshot Hierarchy

Inserting the SpaceMaster Instrument into the Structure changed the Snapshot hierarchy. We need to make some changes to restore the Snapshot Master hierarchy—where the Ensemble is the Snapshot Master for Plug-In. We will have to change the Properties of the Junatik Instrument and SpaceMaster Instrument.

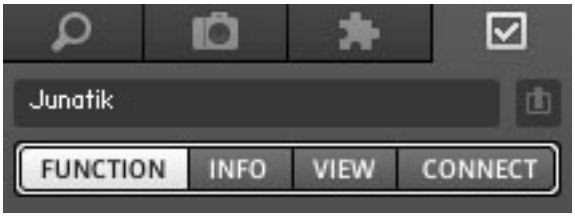
4.8.1 Opening the Instrument Properties

First we need to make the Junatik Ensemble the Snapshot Master for Plug-In again and then turn the Recall by Parent feature on for SpaceMaster.

1. In the Sidepane, click on the Properties tab.

2. Click on Ens – Junatik header. This will bring up the Junatik Ensemble Properties.

3. Click on the Function button.



4. Now engage the Snapshot Master for Plug-In checkbox in the Snapshot area.

5. Now click on the SpaceMaster Panel—clicking on its name will do. This will bring up the SpaceMaster Properties.
6. Engage the Recall by Parent checkbox.

5 Creating a Sequenced Synthesizer

In this tutorial we will create a Synth Sequencer.

5.1 Recap and Overview

When we looked at the Junatik Ensemble, we learned that Junatik consists of the Junatik Synth Instrument and the StereoTDelay Instrument. We are now going to create an Ensemble that uses two REAKTOR Instruments. One of the Instruments will be a Sequencer called Monoliner, the other Instrument will be a Synth called Soundschool Analog (or ANALOG, in short).
Monoliner emulates classic analog-style Step Sequencers with three rows of knobs, whilst Soundschool Analog is a classic semi-modular, 2-Oscillator analog style Synth.
We will then make the necessary connections—MIDI and Audio—so that the Sequencer will trigger the Synth.

Fig. 5.1 Monoliner and Soundschool Analog (ANALOG)

5.2 Creating the Synth Sequencer Ensemble

We need to start from a new Ensemble and then insert the Instruments.

5.2.1 Create a New Ensemble

- Create a new Ensemble by pressing the Menu button and choosing the *File > New Ensemble* menu entry.

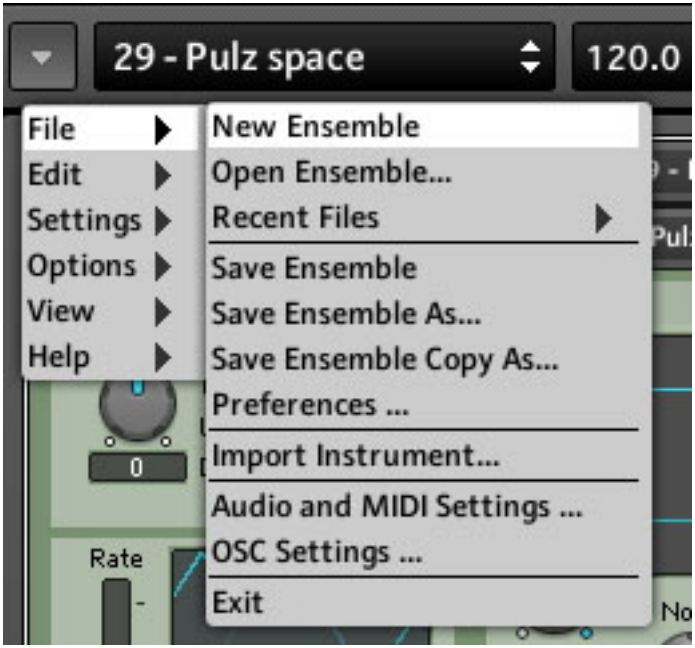


Fig. 5.2 New Ensemble menu entry in the global menu

Fig. 5.3 The Panel of a new Ensemble

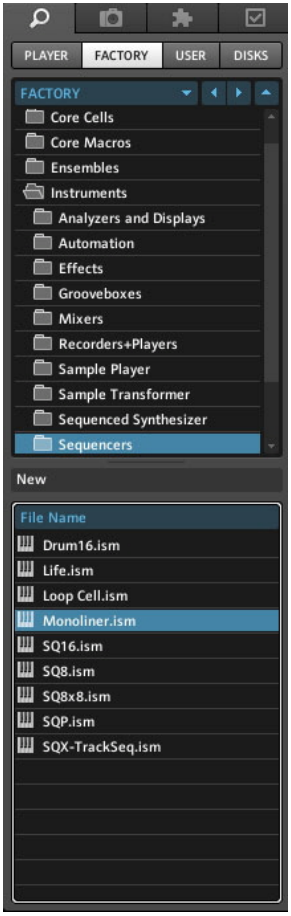
You can also use the keyboard shortcut [Ctrl]+[N] for Windows® ([Cmd]+[N] if you are on Mac OS® X) to create a new Ensemble.

5.2.2 Using the Browser to Load the Instruments

1. In the Sidepane, click the Browser tab to open the Browser.

2. Click the Factory button to go to the Factory Library.

3. Then, using the folder tree of the Browser, navigate to the path *Instruments > Sequencers*.
4. Drag Monoliner.ism from the bottom part of the Browser to the Panel area on the right. This will insert Monoliner into your Ensemble.



Now we will use the Browser to load Soundschool Analog.

1. Using the folder tree, navigate to *Instruments > Synthesizers*.
2. Scroll down until you see Soundschool Analog.ism.
3. Click and drag Soundschool Analog.ism to the Panel area on the right.

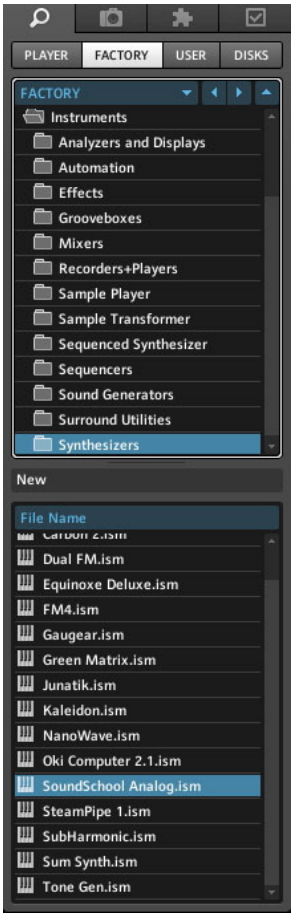


Fig. 5.4 Inserting SoundSchool Analog into your Ensemble

5.3 Making the Synth Sequencer Work

We will need to do some wiring and make a MIDI connection from Monoliner to Soundschool Analog.

5.3.1 Overview of the Structure

Once loaded, your Structure should look something like this:

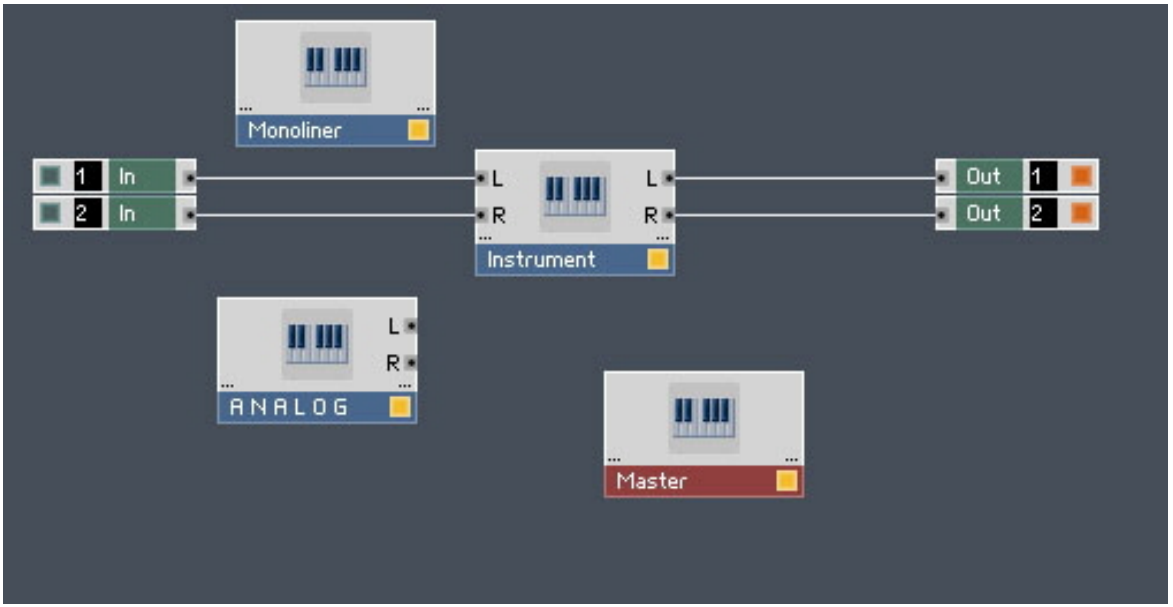


Fig. 5.5 Ensemble Structure with Monoliner and ANALOG

We can see the Monoliner and ANALOG Instruments and also the default empty Instrument, which is connected to the Audio In and the Audio Out Terminals. Let's remove the unwanted Instrument from the Structure.

5.3.2 Removing the Unwanted Instrument

- Right-click on Windows® ([Ctrl]+click on Mac OS® X) on top of the Instrument and choose the *Delete* menu entry from the context menu.

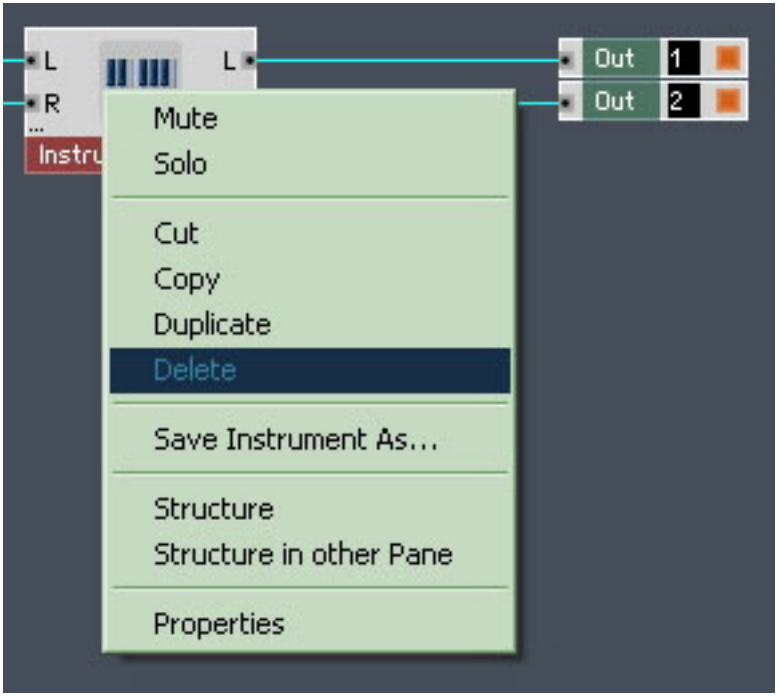


Fig. 5.6 Deleting an Instrument using the context menu

Whilst we are here, let's connect the L and R Outputs from the ANALOG Synth to the Inputs of the Audio Out Terminals 1 and 2, respectively.

5.3.3 Connecting ANALOG Outputs to the Audio Out

You might remember we did this when we connected the Junatik Synth to the SpaceMaster Reverb.

1. Click and drag—so you get a visible wire—from the L (or black dot beside it) towards the Input of the first Audio Out Terminal or black dot beside it—and let go. A connection will be made.
2. Repeat the same procedure for the R Output and Audio Out Terminal 2.

Your Structure should look like this:

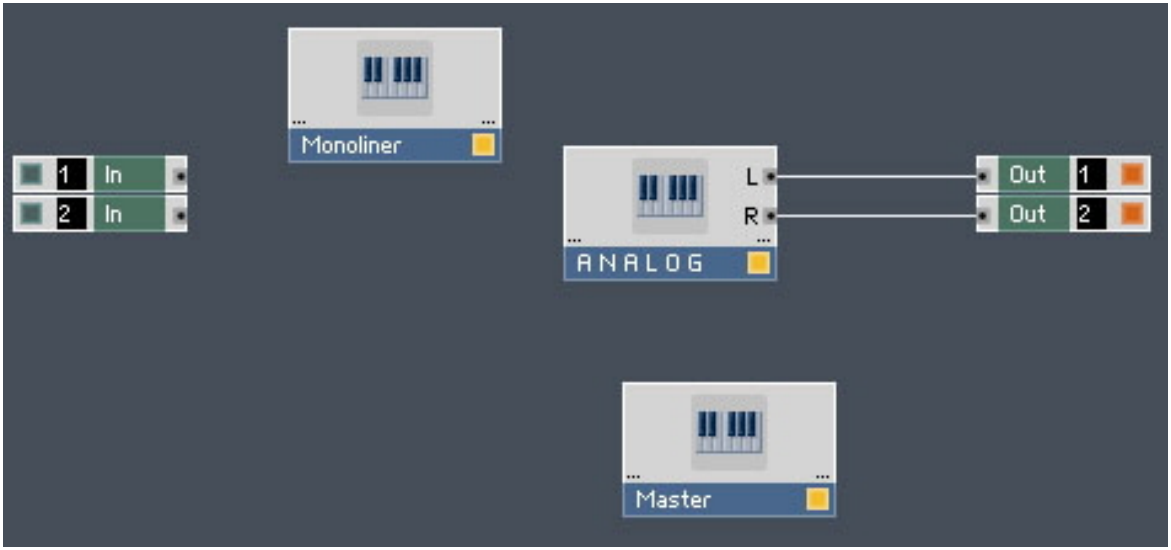


Fig. 5.7 ANALOG with its audio outputs connected.

As you can see, we are keeping the Master Instrument, because it has a useful Master Level Fader. Now we will have a look at the two Instruments in the Ensemble Panel.

5.3.4 Overview of Monoliner and ANALOG

- To go to the Panel View of your Ensemble, press the Panel button.

Fig. 5.8 The Panel button

Fig. 5.9 Monoliner and ANALOG

As you can see Monoliner has three rows of knobs, which control Gate, Velocity and Pitch. The snc&pos section to the left controls the speed and direction of the Sequencer playback, and also how many steps are used. We will look at the other controls later on. Importantly, Monoliner has a built-in MIDI Out!
ANALOG features 2 Oscillators with Ring Modulation, 2 Envelopes, an LFO and a built-in Stereo Delay.

5.4 Making the MIDI Connections between Instruments

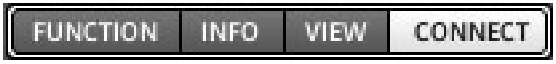
As I said above, Monoliner has been programmed to send MIDI to other REAKTOR Synths, and also external Synths! We do need to make a small connection to make an internal MIDI connection in this Ensemble. Fortunately this is easy to set up.

5.4.1 Using Internal MIDI Connections

To internally route the MIDI output of the Monoliner Instrument to the MIDI input of ANALOG, you need to go to the Connect page of Monoliner's Properties.

1. In the Sidepane, click the Properties tab.

2. Now click on the Connect button to reach the Connect page of the Properties.



3. To make the MIDI connection between the Sequencer and Synth, find the Select Instruments drop-down menu in the MIDI Out area of the Connect page. Click on the drop-down menu and choose the *ANALOG* menu entry.

4. To check if the connection has been made, go to the Connect page of the ANALOG Instrument. Just click on the ANALOG Instrument header to select the Instrument.
5. The Connect page of ANALOG should now be shown in the Sidepane. Click on the Select Instruments drop-down menu in the MIDI In area of the connect page. You will notice that the checkbox next to the *Monoliner* menu entry is checked now.

6. Now save your work by selecting the *Save Ensemble As...*command from the global menu. That's it; you can now try out the Sequencer/Synth combination!

5.5 REAKTOR Run and Stop Buttons

REAKTOR's Run and Stop buttons are used to start and stop the Sequencer.

Overview of the Run and Stop Buttons

The Run and Stop buttons are found in the Main Toolbar, at the top of the Instrument, next to the BPM edit field.

Fig. 5.10 BPM/Run/Stop

- To run the Sequencer, click on the Run button with your mouse. The Sequencer will start and you will see it running. The MIDI Activity lamps will also confirm the MIDI connection. You should also hear sounds coming from the Synth!

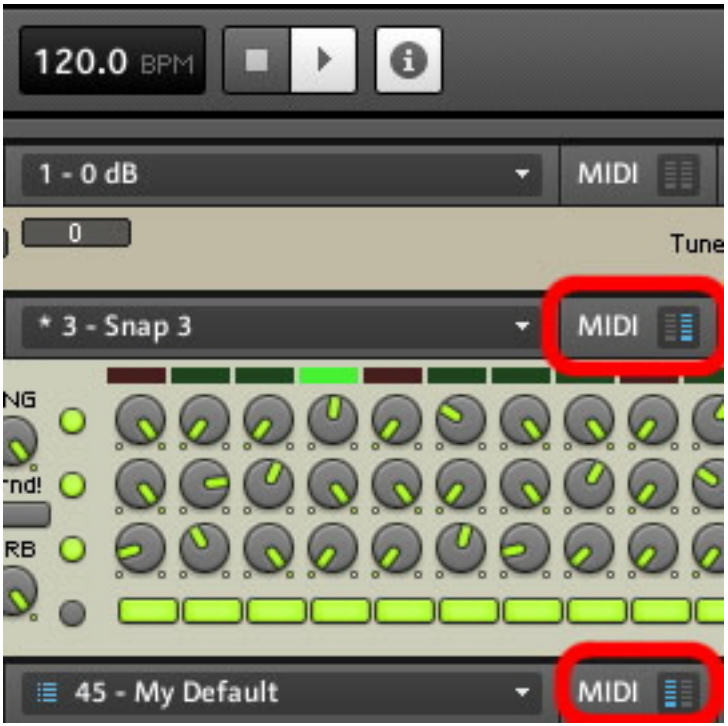


Fig. 5.11 MIDI Activity lights

Pausing and Resetting the Sequencer

- Whilst the sequencer is running, a single click on the Run button will pause the sequence—it will start from where it stopped when the Run button is pressed again. A click on the Stop button will reset the Sequencer to the beginning of the pattern.

5.6 Looking More Closely at Monoliner

Let's have a closer look at the speed and direction controls.

5.6.1 Changing the Direction and Speed

This Sequencer is very flexible in terms of how it plays back the patterns.

- To change the direction from forward to backwards and to introduce some random playback characteristics, open the direction list by clicking on the side arrow. You can also similarly change the Speed by clicking the sync menu.

Fig. 5.12 Direction

Fig. 5.13 Speed

The default value, 1/16, divides a bar into 16th notes.

5.6.2 Number of Steps, Step Offset and Shuffle/Swing

- The stps knob can change the total number of steps—anywhere between 1 and 16.
- The offs knob shifts where the sequence starts from.
- SHFL adds swing to the playback. Try changing the number of steps to 6 and then shift the offset to 9.

5.6.3 GATE, VELOCITY and PITCH Knobs and On/Off Buttons

- The top row of the knobs—labeled GATE—is used to program the length of each trigger.
- The knob at the end is the Master, and will affect the overall Gate lengths.
- The next row—labeled VELO—programs the volume of each trigger. Again there is a Master volume.
- The bottom row of knobs—labeled PITCH—is for Pitch.
- The row of buttons controls Gate On and Off.

Fig. 5.14 Master knobs

Fig. 5.15 Gate On/Off buttons

5.7 Exploring the Snapshots/Show Hints

Let's explore this combination of Sequencer and Synth.

5.7.1 Exploring Snapshots in Monoliner and ANALOG

Monoliner comes with only a few Snapshots but it is worth trying them out. The real fun with the Sequencer is changing the directions and numbers of steps and offsets in the snc&pos controls, as this can produce a wide range of variations. You can also randomize the settings by pressing the rnd! button. The ANALOG Synth has quite a few Snapshots, and it is very productive to change the Snapshots whilst a sequence is playing.

5.7.2 Show/Hide Hints

Once again I suggest that you make sure your Hints are on by pressing the Hints button. You will find the Synth in particular has some good information notes which you will see by hovering your mouse over the knobs and switches:

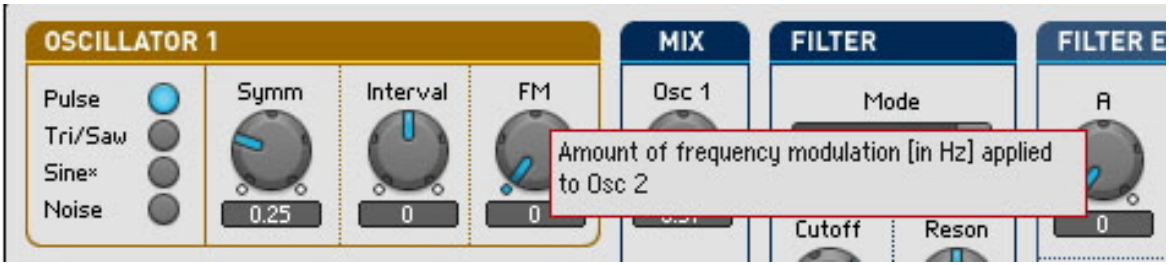


Fig. 5.16 Info for FM knob

After you have finished exploring, make sure you re-save your work!
Remember, you can use the *Save Ensemble* command from the global menu if you want to overwrite your previously saved version. Or you can use *Save Ensemble As...*command if you want to keep an old version, and save a different version with an amended name.

6 Exploring a REAKTOR Sampler

In this tutorial we will have a look at Memory Drum 2 which is a very useful sample player for drum kit samples.

6.1 Recap and Overview

Now we have explored two of the Synths in the REAKTOR Library, it is time to have a look at one of its Sampler Players.

- We will learn how to replace one the samples in the Sample Map with one of own samples.
- We will also learn how add a sample to the Sample Map.
- We will look at how to select samples in the Sample Map using our MIDI keyboard, and how we can audition samples by using our mouse.
- We will also look at Sample Mapping in REAKTOR.
- Finally, we will have a brief look at some of the unique features of Memory Drum.

So first, we are again going to use the Browser to load up Memory Drum 2.

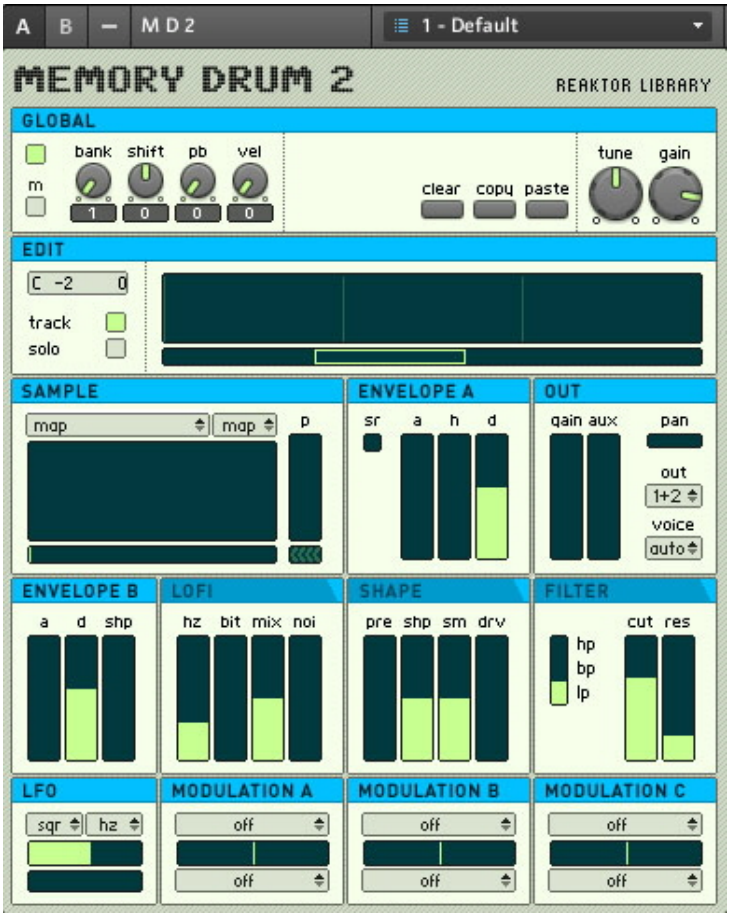


Fig. 6.1 Memory Drum 2

6.2 Using the Browser to Launch Memory Drum 2

1. In the Sidepane, click on the Browser tab to open the Browser.

2. In the folder tree, navigate to *Ensembles > New Additions > Sample Player*.
3. Double-click on *MemoryDrum2.ens* to launch it.

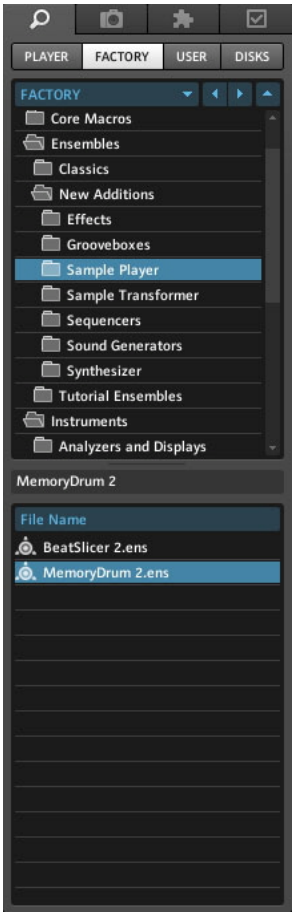


Fig. 6.2 Choosing Memory Drum 2 in the Browser

Memory Drum 2 is mapped so that C1 will play the first sample and each semitone will play a new sound. First of all, explore the sounds by playing different pitches on your keyboard. Maybe you are happy with the samples but you would like to replace them with some of your Samples? To do that, we need to open the Sample Map Editor.

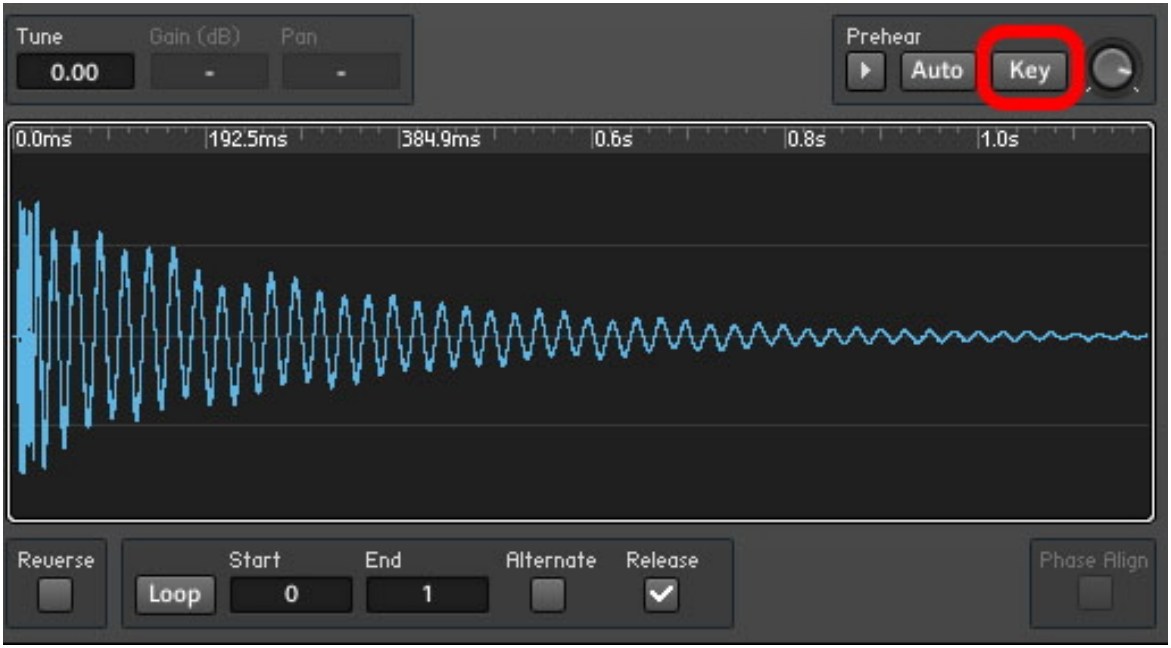
6.3 Replacing and Editing Samples in the Sample Map Editor

Now we will use the Sample Map Editor to replace Samples. We will open the Sample Map, use SEL BY KEY so our MIDI keyboard can play Samples in the Map, and also use our mouse to audition Samples.

6.3.1 Opening the Map and Playing the Samples

1. Double-click on the Sample waveform. The Sample Map Editor will open up. Alternatively you can also press the Sample Map button in the Sidebar or use the keyboard shortcut [F9].

2. Turn on the Select Sample by Key feature by pressing the Key button in the top-right of the Sample Map. You can now select Samples with your MIDI keyboard.



3. Click on the Sample Prehear button to hear the samples in their original form.

Fig. 6.3 The Sample Prehear button

Let's replace some samples with some of our own ones. Let's replace the snare sample on MIDI Note 48. First of all we need to select it by pressing C2 on our keyboard.

6.3.2 Using Replace in the Edit Sample List

- Open the Edit drop-down menu in the top-left of the Sample Map Editor and choose the *Replace* menu entry.

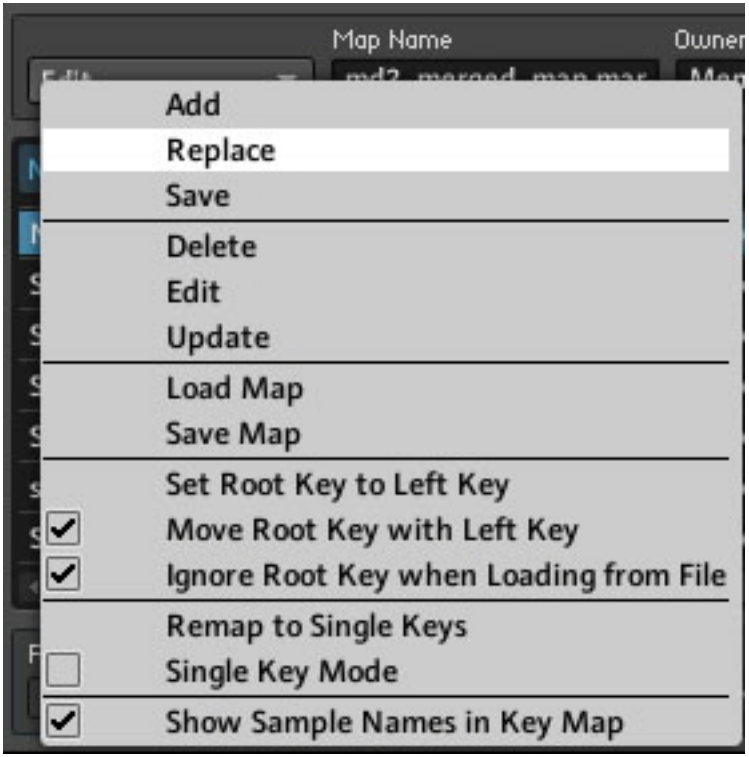


Fig. 6.4 The Replace menu entry replaces the selected sample

This should open the folder that we selected when we chose the pathways to our audio files in the REAKTOR Preferences. In my example I have replaced the Snare placed on the slot corresponding to MIDI Note 48.

6.3.3 Sample Key-Split and Root Note

Let's have a closer look at the sample.

Fig. 6.5 Clap CloseTheBook.wav as seen in the Sample Map Editor

L and R both have values of 48. That means the Key-split of this sample on the keyboard is just one note, that of MIDI 48, which is fine for a drum sound. Root is also 48. This means that the sample will play back at its original pitch, when allocated to the MIDI Note 48.
We have just replaced a sample, now we are going to add a new sample to the map.

6.3.4 Using Add from the Edit Sample List

1. We need to scroll down to the last sample in the list, which is on MIDI Note 77 and bears the name Sound 9.
2. Click on the Edit drop-down menu and choose the menu entry *Add*.

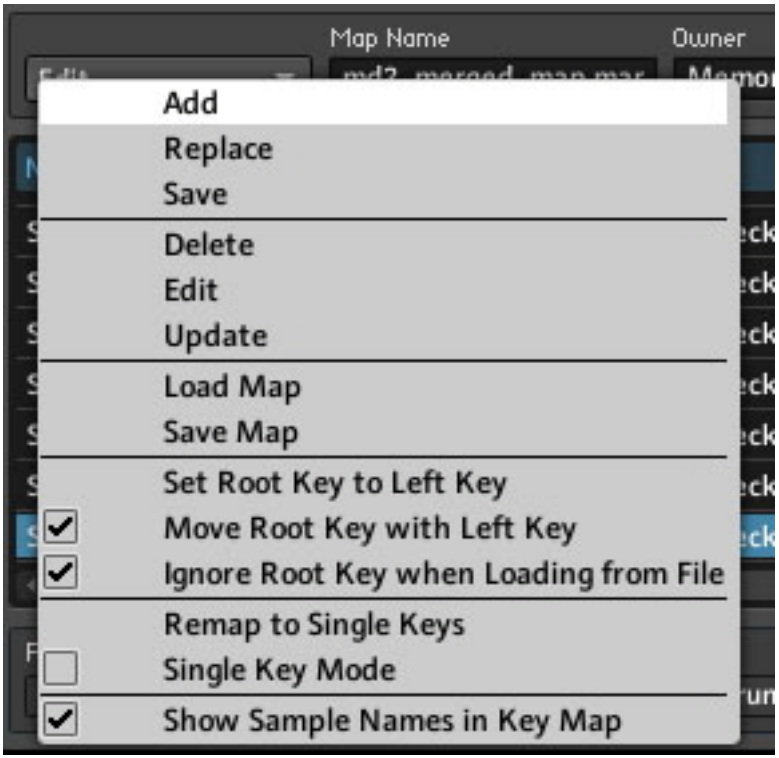


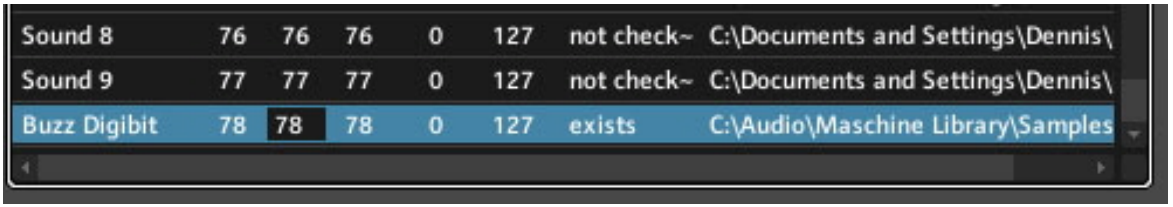
Fig. 6.6 Adding a new sample to the Sample Map using the Add menu entry

This time the last folder we opened when we replaced the Sample will open. We can either choose another sample from that folder or navigate to another folder. Again, double-clicking on our chosen sample will load it into the map.

6.3.5 Editing the Key-Split

We will edit the Key-split, so that the L and R are the same — 78. To change a value:

1. Double-click on the number in the desired row and column (here, the row corresponding to your new sample and the column labeled R).
2. Type in a new number.
3. Press [Enter] when you have finished. That will make it easier to add more samples



4. Feel free to add more samples. When you are done editing the Sample Map and wish to close it, just press the Sample Map button again. In the next section we will have another look at the Memory Drum Interface.

Fig. 6.7 The Sample Map button

6.4 The Memory Drum Interface

Each MIDI Note value not only selects a different Sample, but can also select drastically different characteristics for each Sample Slot.

6.4.1 Changing Pitch for Just one Sample Slot

Let's go back to the first sample that we replaced and change the pitch. With Memory Drum it is possible to just change the pitch of one slot without affecting any of the other slots.

- Click on the p fader and change the pitch downwards by dragging down in the middle of the fader:

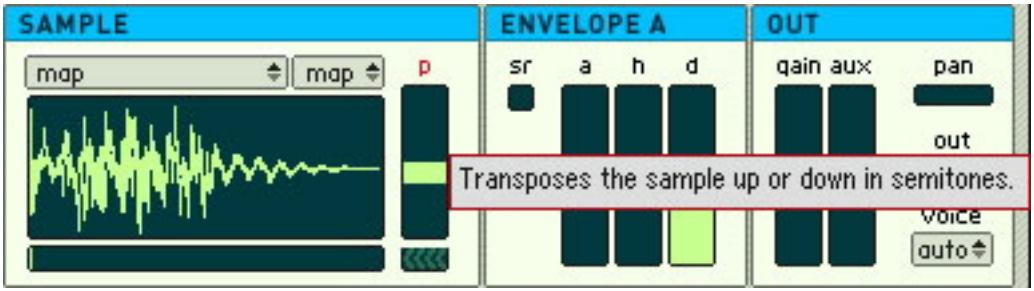


Fig. 6.8 Changing p setting to change the pitch for that sample

Now play the sample, from your MIDI keyboard, and you should hear a lower pitch. If you then play another sound... you will see that all the other sounds play back at their original pitch. This is what is unique with this sample drum player. Each sample sound-slot can have different settings of all of its parameters. Try changing other controls, you can have different Envelope, and Filter settings for each Note.
Let's explore this a bit more.

6.4.2 Exploring the Memory Drum Snapshots

Fig. 6.9 The Snapshots list for Memory Drum

The Default Snapshot has the same settings for every drum. Choose one of the other Snapshots to see / hear different settings. You will notice how different key presses not only trigger different samples they can also have quite different settings. Maybe you want to add more samples and change the setting before you save your version of the Ensemble. If you do make some changes to the Snapshots make sure you save them to a new Snapshot by pressing the Append button and renaming the Snapshot. When you have finished adding / replacing samples, remember to use *Save Ensemble As...* command. If you don't, all

of your hard work will not have been saved! In the tutorial in chapter ↑8, Make a Sampler Using REAKTOR Modules, we will also look at various sample playback possibilities such as reverse, forward / backwards, and forward / backwards reverse. Also, we will learn how to transpose samples in the Sample Map Editor.

7 Building a Synth Using Macros

In this tutorial, we are going to build an analog-style Synth using some pre-build Factory Macros. The Synth will have two Oscillators, a mixer, two Envelope Shapers and a Filter. It is assumed that you have done the previous tutorials, as they touch on a number of techniques in terms of inserting and connecting.

7.1 What is a Macro

REAKTOR has a whole library of pre-built Macros. A Macro contains a group of Modules that are already connected and contained in their own Module with just the inputs and outputs it needs. A Macro is a little like an Instrument but smaller. And it’s a little like a Module, only customized to make more complex Oscillators, Filters, Envelope Shapers, Delays, etc. that you might find for example in modular Synths. It's a good idea when you become a more advanced builder to think of your building ideas as objects and abstract the Modules that have a specific relationship by encapsulating them in Macros.
Below in the finished Synth you can see the different Macros by where the lines and titles around groups of controls are.

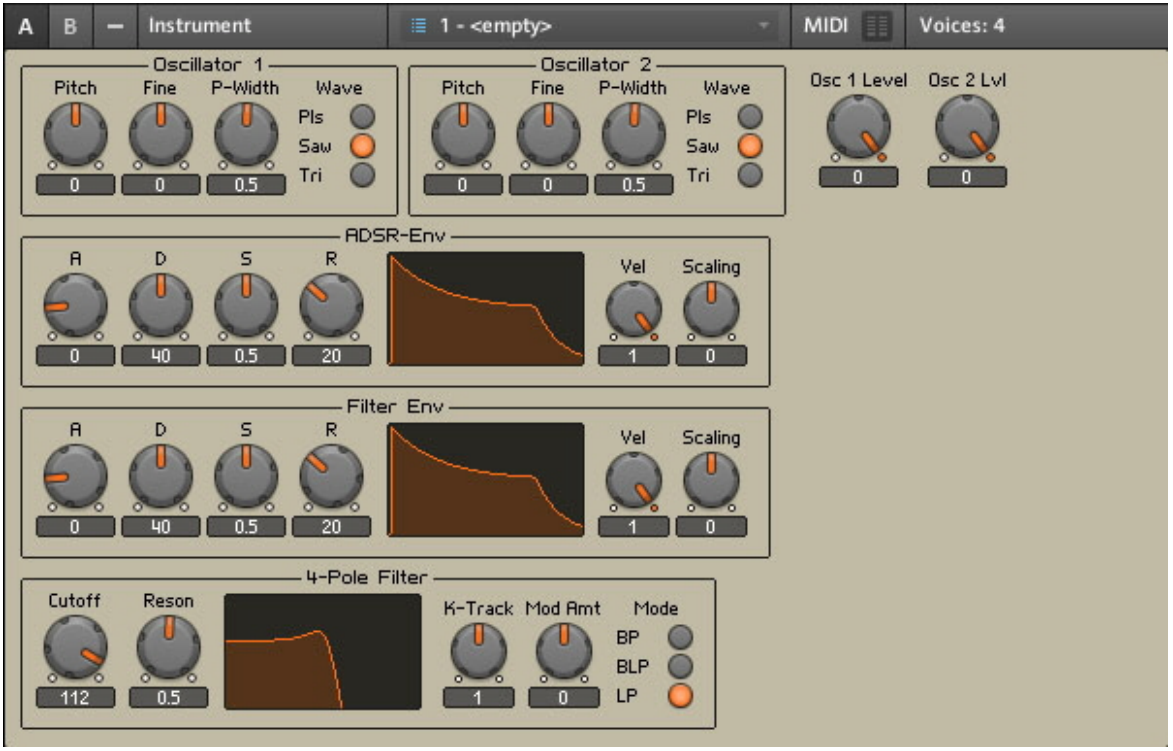


Fig. 7.1 Finished Synth

The Oscillator 1 Macro contains 3 Oscillators in the Structure, and controls for Pitch, Fine, P-Width and a Wave Switch. These are all individual Modules, but they have been connected and put in a small 'folder' we call a Macro.

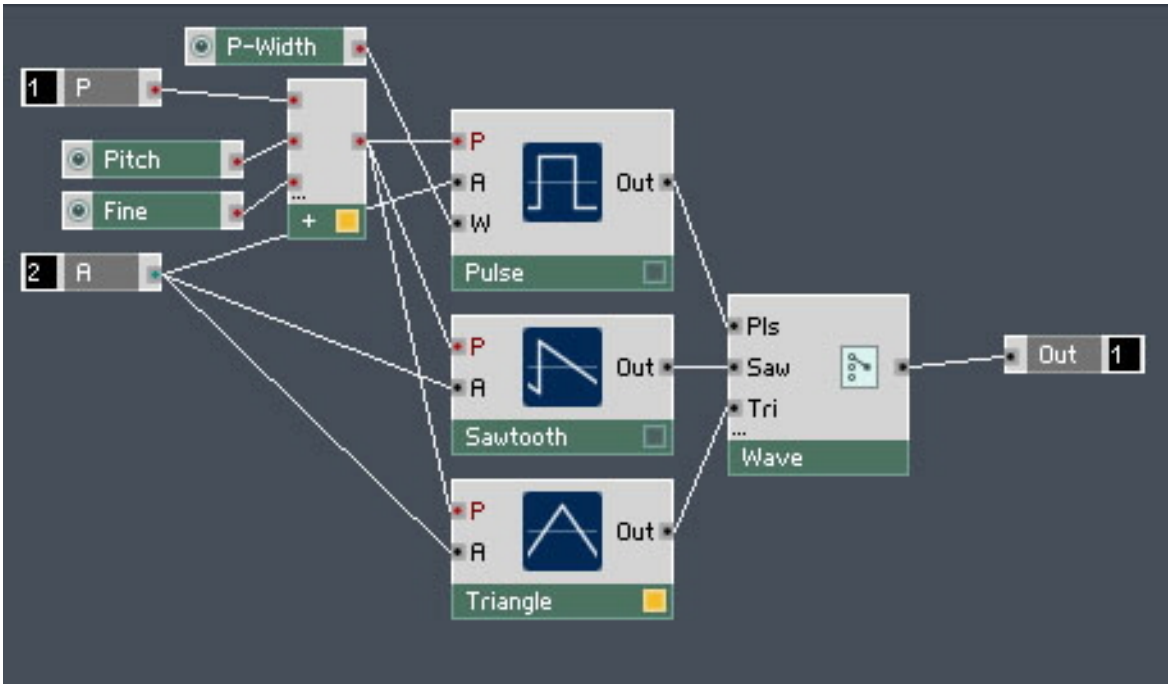


Fig. 7.2 Oscillator Macro Structure View

Advanced builders will often select parts of an Ensemble that are related and cut them out and paste them into a new Macro for clarity and re-use.

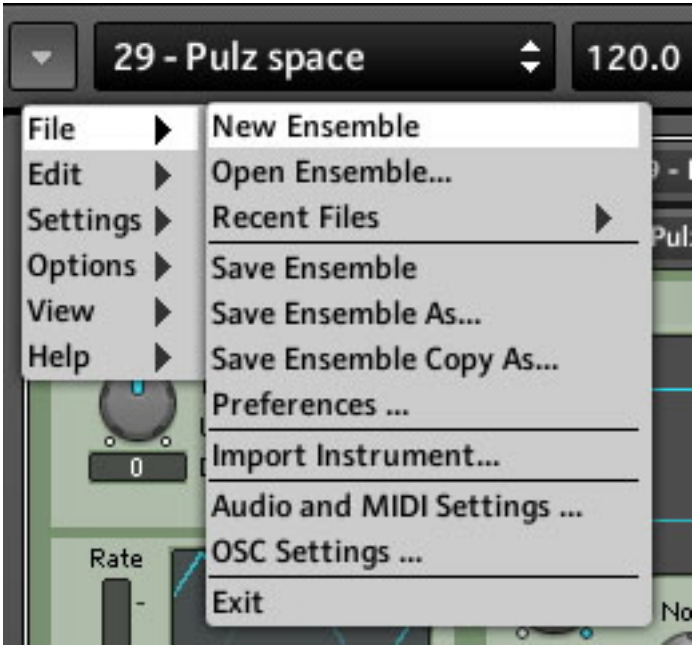
7.2 Preparation

We need to start off by loading a new Ensemble, deleting the default Instrument, and inserting an Instrument that is appropriate for the task.

7.2.1 Loading a New Ensemble

We will start with REAKTOR's default New Ensemble.

1. Press the Menu button and choose the *File > New Ensemble* menu entry.



You will see an Ensemble Panel.

Fig. 7.3 Panel View of a new Ensemble

- Press the Structure button to see its Structure.

Fig. 7.4 The Structure button

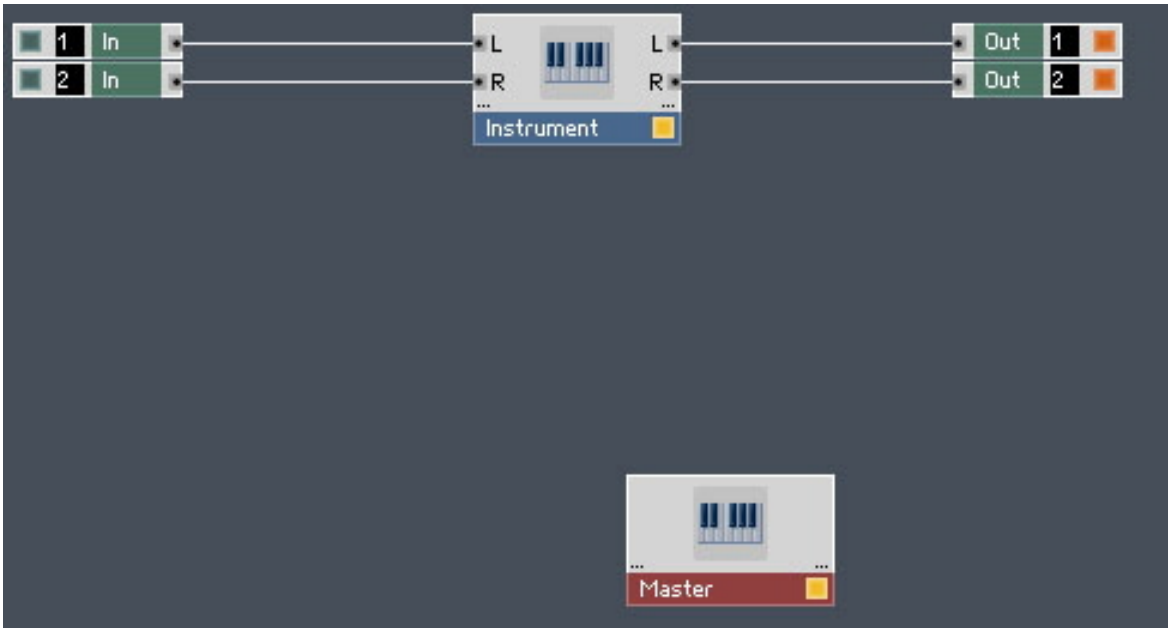


Fig. 7.5 The Structure of a new Ensemble

To start off, we will be working with the Structure.

7.2.2 Removing the Default Instrument

As our Synth will have a single output only, we don't need the default Instrument that has two Outputs, Left and Right.

- To delete the default Instrument right-click on Windows® ([Ctrl]+click on Mac OS® X) on the Instrument and choose the *Delete* menu entry from the context menu.

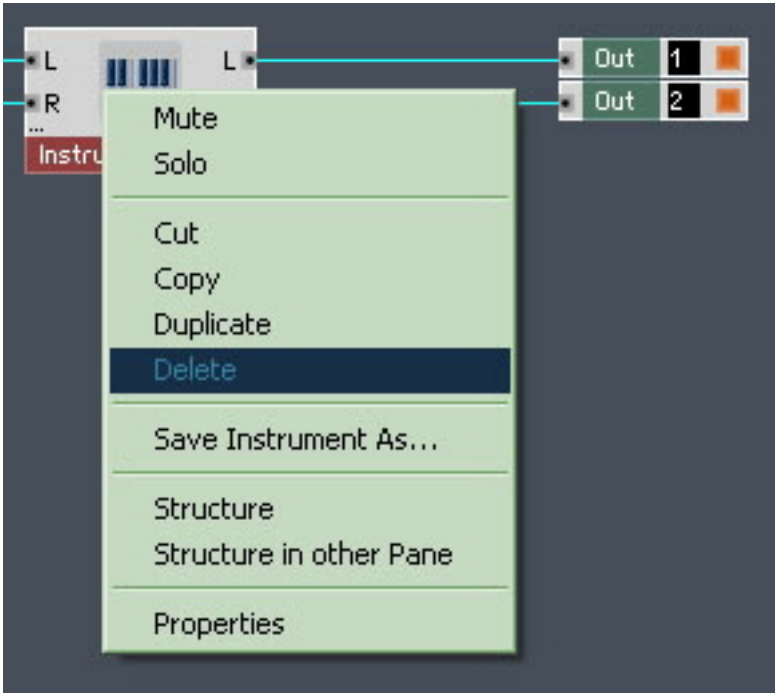


Fig. 7.6 Deleting the default Instrument

Now we need to insert an Instrument that is right for the Synth, an instrument that has just one output, because our Synth is not going to be stereo, but mono.

7.2.3 Inserting a New Instrument

- To insert a new Instrument, right click if you are in Windows® ([Ctrl]+click for Mac OS® X) on a blank part of the Ensemble Structure to open the context menu. Choose the *Insert Instrument >_New – 1in1out* menu entry.

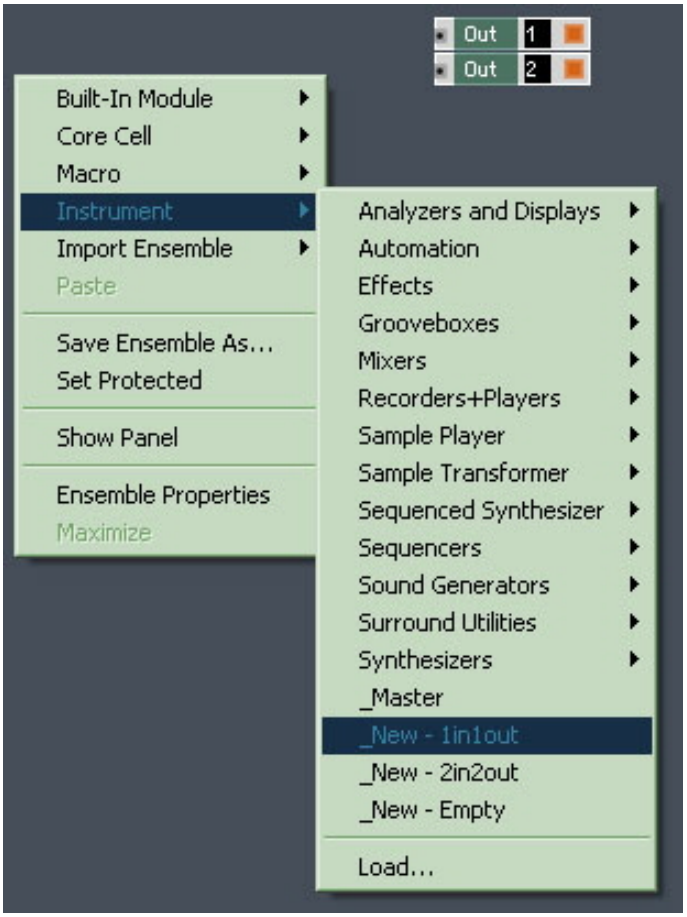


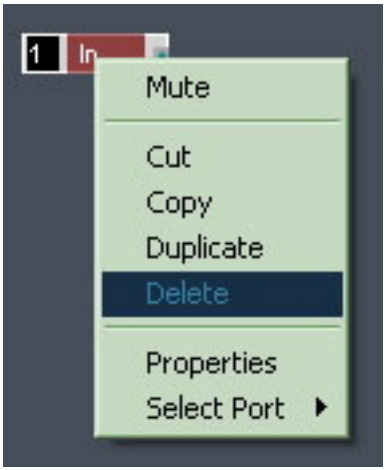
Fig. 7.7 Inserting a new Instrument

Our inserted Instrument has an Input and an Output.

Fig. 7.8 Inserted Instrument in the Structure

For our Synth, we only need the Output, so we need to delete the Input.

1. Double-click on the Instrument to open it.
2. Right-click (on Windows®; [Ctrl]+click if you are on Mac OS® X) the In Module to open up its context menu. Then select the *Delete* menu entry.



3. Double-click the Structure background to go back to the top-level Structure.

7.2.4 Connecting the Instrument to the Audio Out

We need to connect the Output of the Instrument to Audio Out Terminals 1 and 2.

1. Place your cursor on Out—or the small dot beside it.
2. Click and hold the mouse down, whilst you move it to the Input port of the Audio Out Module labeled 1.
3. When you reach 1 (or the dot beside it) of the Audio Out Module, let go, and you should see a wire connection.

Do the same again, but this time connect the Instrument Out to the Input port of the Audio Out Module labeled 2. This will place the sound on both Left and Right Outputs to your audio system. Your connection should look like this. The yellow lamp in the bottom right corner of the Instrument confirms the connection!

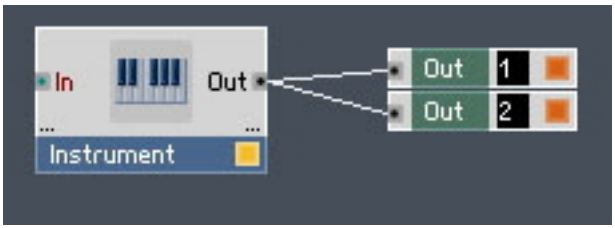


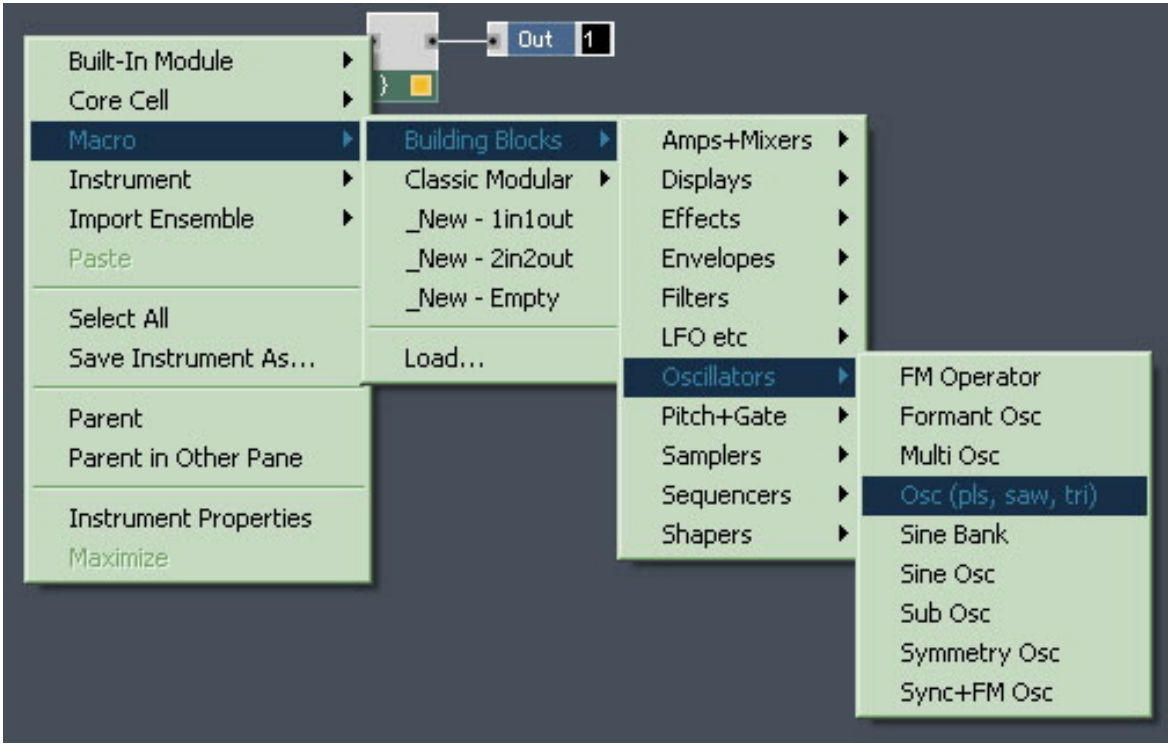
Fig. 7.9 Instrument connected to Output

7.3 Adding an Oscillator and an ADSR Env to the Instrument

Now we need to add an Oscillator Macro, an ADSR Env and make the connections. We also need to insert NotePitch and Gate Modules, so that we can play our Synth via our MIDI keyboard.

7.3.1 Inserting an Oscillator

1. First, make sure you are inside the Instrument. To go inside the Instrument, double-click the Instrument Object.
2. To insert an Oscillator Macro into the Instrument Structure, right-click if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) on a blank part of the Instrument Structure and choose the *Macro > Building Blocks > Oscillators > Osc (pls, saw, tri)* menu entry. An Osc 3 Wave Oscillator will appear in the Instrument Structure and Instrument Panel.



3. In the Instrument Structure connect the Out from the Osc 3 Wave Macro to the Audio Voice Combiner, by clicking and dragging so that the wire connects, much the same as we did before when we connected the Instrument to the Audio Output Terminals.

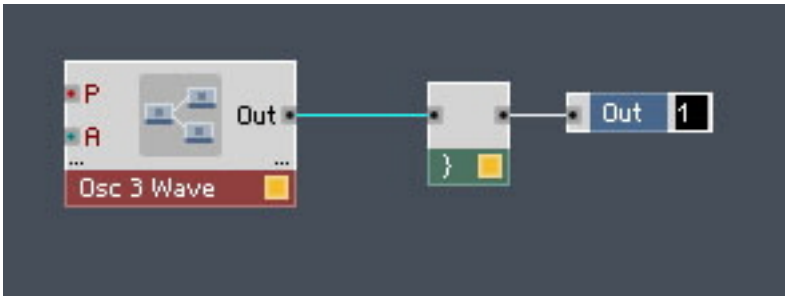


Fig. 7.10 Oscillator connected to Audio Voice Combiner

7.3.2 Inserting the ADSR Env

- Right-click if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) on a blank part of the Instrument Structure and choose *Macro > Building Blocks > Envelopes > ADSR – Env* menu entry.

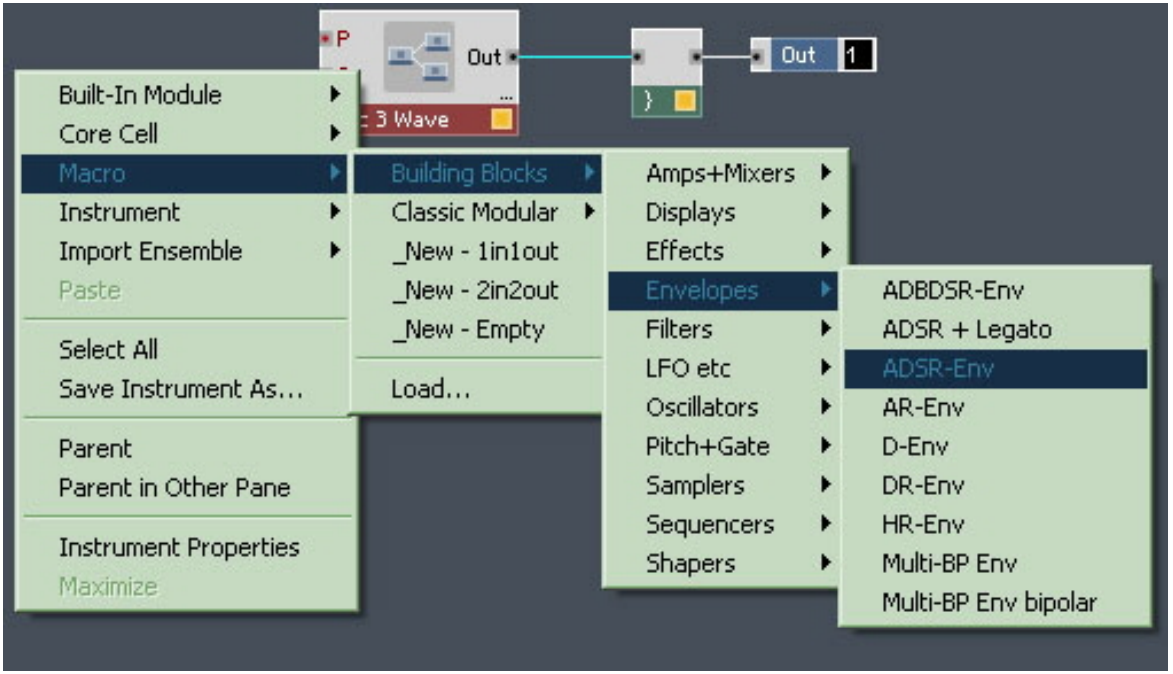


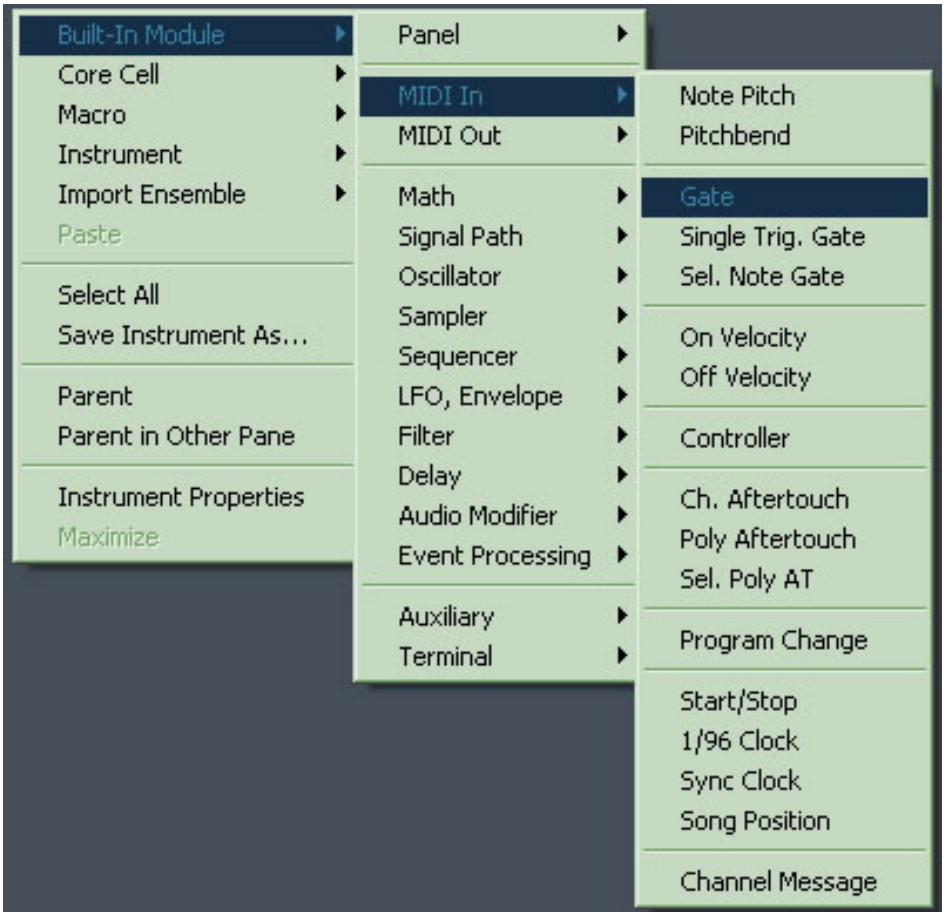
Fig. 7.11 Inserting the ADSR-Env

7.3.3 Inserting Pitch and Gate Modules

Next we need to add a couple of components—Modules in REAKTOR terminology. The Note Pitch and Gate Modules will enable our MIDI keyboard to play this Synth.

1. Right-click if you are in Windows® ([Ctrl]+click if you are on Mac OS® X) on an empty space in the Instrument Structure and choose the *Built-In Module > MIDI In > Note Pitch* menu entry to insert the Note Pitch Module into the Structure.

2. Repeat the same procedure but choose the *Built-In Module > MIDI In > Gate* menu entry for the Gate Module.



7.3.4 Connecting the Pitch and Gate Modules

Now we need to make connections so that we can play our fledgling Synth.

1. Using the same click and drag techniques as before, connect the NotePitch Module to the P (Pitch) Input of the Osc 3 Wave Macro.
2. Then connect the Gate Module to the G (Gate) Input of the ADSR-Env Macro.

3. Finally, we need to connect the top Out from the ADSR-Env to the A (Amplitude) of the Osc 3 Wave Macro.

Now your Synth should look like this:

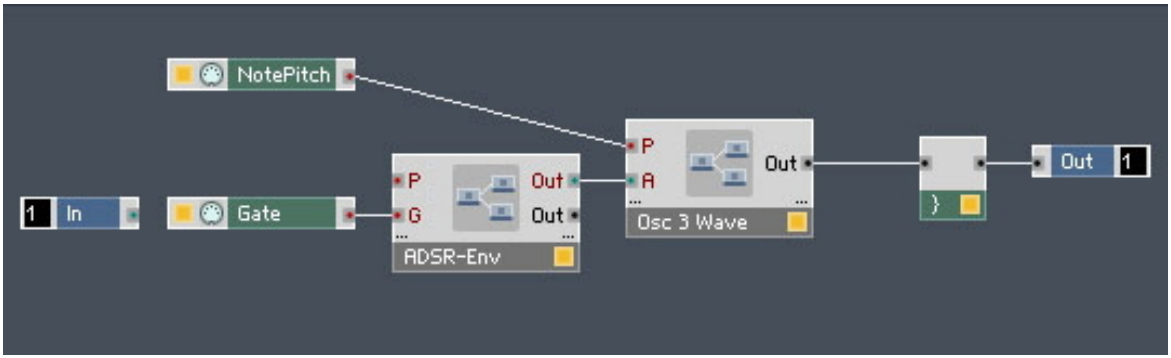


Fig. 7.12 Your Synth with finished connections

7.3.5 Safe Output Level

Before we play our Synth, we need to check that the Output Level will be safe.

1. To do this, first go to the Ensemble Panel by clicking on the Panel button.

2. Look at the Master Instrument's Panel, and reset the Level Fader to -10.

Fig. 7.13 Use the Master Instrument to select a safe output level

Now play a few notes, and you should hear the Oscillator change pitch and start and stop with your key presses!

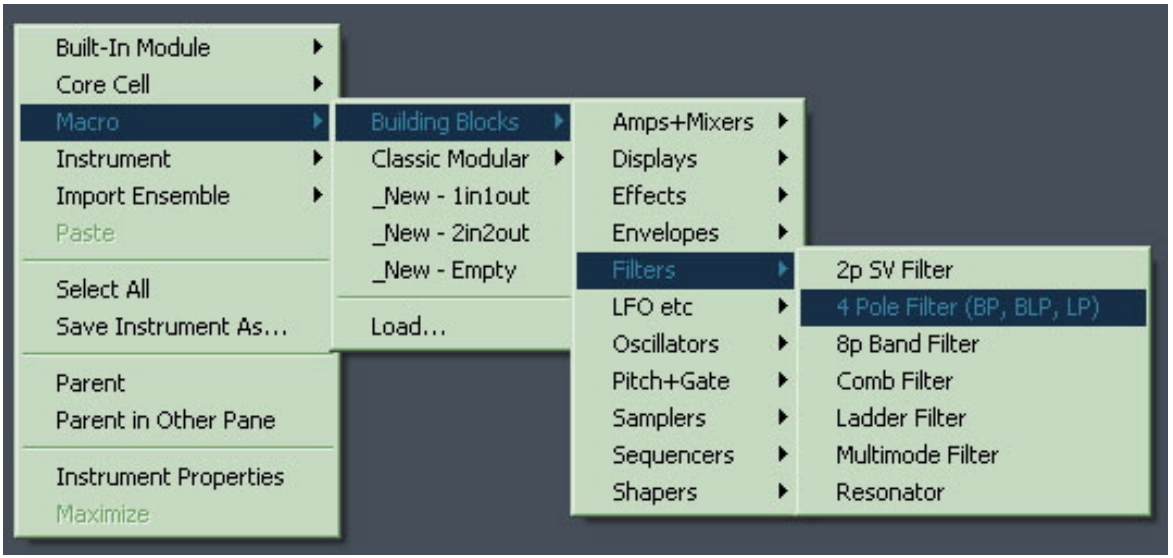
7.4 Inserting the Filter

The next thing to add is a Filter Macro.

7.4.1 Inserting the Filter Macro and Doing Some Rewiring

1. Make sure you are inside the Instrument Structure. If you are looking at the Panel, first press the Structure button.

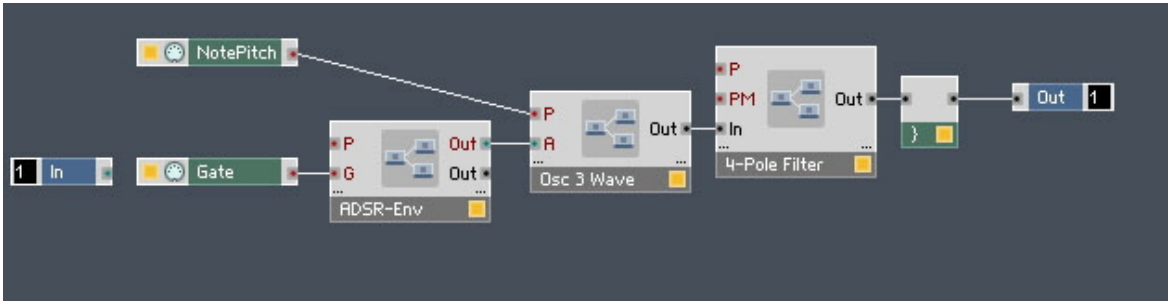
2. Then double-click the Instrument Object to enter its Structure.
3. Right-click if you are on Windows® ([Ctrl]+click if you are on Mac OS® X) on a blank part in the Instrument Structure and choose the *Macro > Building Blocks > Filters > 4 Pole Filter (BP, BLP, LP)* menu entry.



We now need to do some rewiring.

1. By clicking and dragging, connect the Out of the Osc 3 Wave Macro to the In of the 4-Pole Filter Macro.
2. Then connect Out of the 4-Pole Filter to the Input of the Audio Voice Combiner labeled "}".

Your Synth should now look something like this:



We have now finished inserting the Filter Macro into the Instrument Structure. Now we have to turn our attention to the Instrument Panel view. You will see that all the Macros are on top of each other. We can fix this by unlocking the Panel.

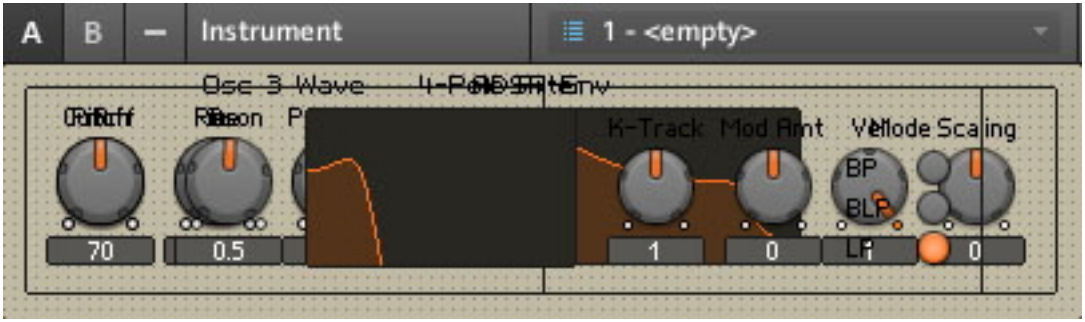
- To view the Instrument Panel, press the Panel button.

Fig. 7.14 The Panel button

7.4.2 Unlocking the Panel to Move the Macros

After unlocking the Panel, you will be able to move the Macros to other positions so that they are not on top of each other.

1. Click on the Panel Lock button to unlock the Panel. Alternatively you can use the keyboard shortcut [Ctrl]+[P] if you are in Windows® ([Cmd]+[P] if you are in Mac OS® X) to toggle between a locked and unlocked Panel.



Your Synth will now look a bit like this:

7.5 Adding a Second Oscillator and a Mixer

We will now add a second Oscillator, as this will make a fatter sound. We will also add a mixer, and make all the necessary connections.

7.5.1 Adding a Second Oscillator Using Duplicate

Instead of inserting another Oscillator, we will duplicate the one we already have.

- Go back into the Instrument Structure and right-click if you are in Windows® ([Ctrl] +click if you are in Mac OS® X) on top of the Osc 3 Wave Macro and choose the *Duplicate* menu entry.

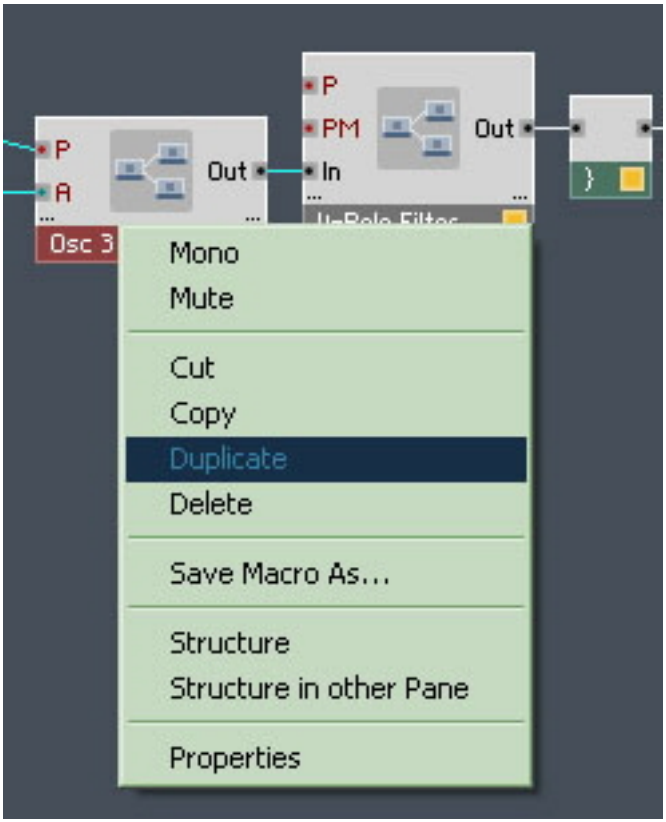


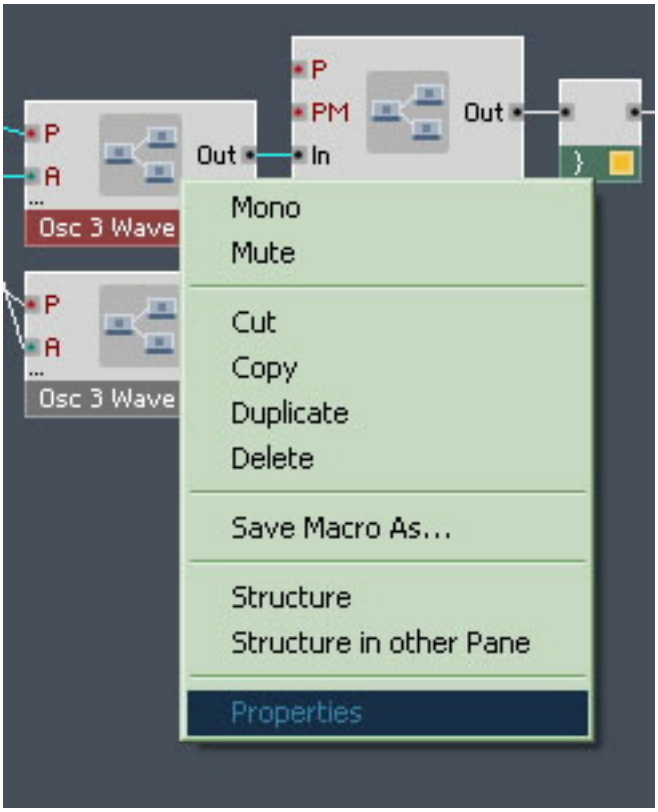
Fig. 7.15 Duplicating the Oscillator

A copy will be placed on top of the old Osc 3 Wave Macro.

7.5.2 Using Properties to Rename the Oscillator Macros

Both Oscillators have the same name, so we need to rename them.

1. Right-click if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) on top of the first Osc 3 Wave Macro and choose the *Properties* menu entry. This will open up the Properties tab for that Macro.



2. In the label area click and drag across the text, and type “Oscillator 1” and press [Enter].
3. Do the same for the other Oscillator and this time type Oscillator 2.

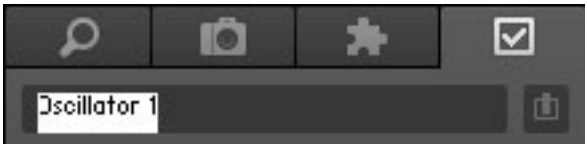


Fig. 7.16 Typing in a name in the label area of the Properties tab

7.5.3 Adding a Mixer

Now that we have two Oscillators we need to add a mixer so that we have some flexibility for their respective levels. An Amp/Mixer Module is what we need. We then need to make the connections and increase the numbers of Mixer Inputs.

- To insert the mixer, right-click if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) on a blank part of the Instrument Structure and choose the *Built-In Module > Signal Path > Amp/Mixer* menu entry.

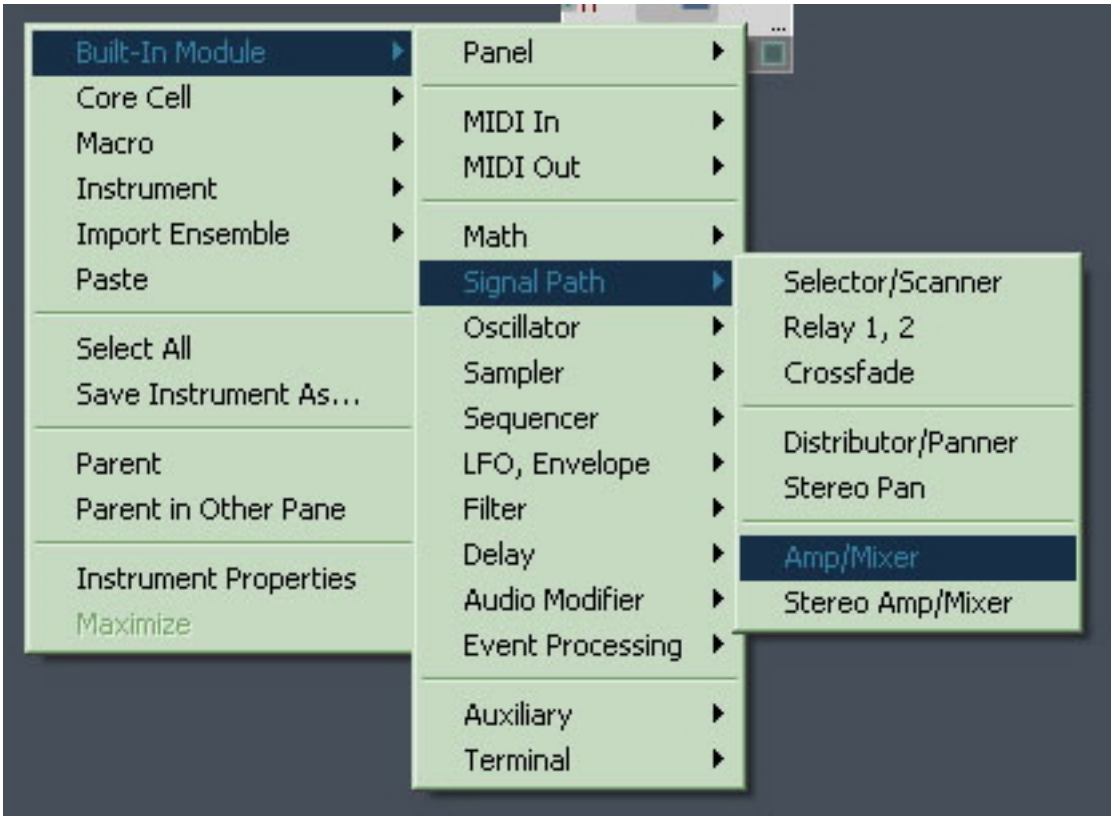


Fig. 7.17 Inserting a Mixer

We need to connect the Output of the Oscillator 1 and 2 to the Mixer.

- Click and drag on the Out of Oscillator 1 and connect the wire to In of the Mixer Module.

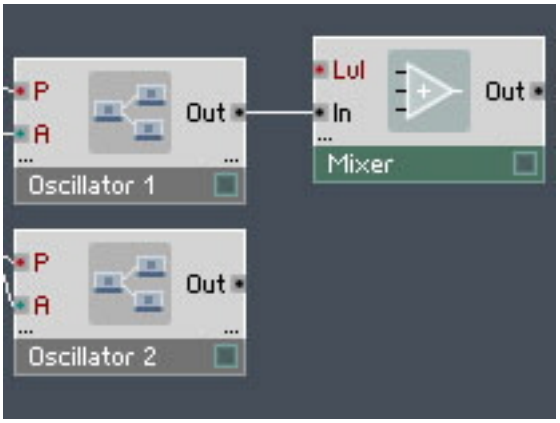


Fig. 7.18 Oscillator 1 connected to Mixer

7.5.4 Increasing the Number of Mixer Inputs

As you can see the Mixer only has one Input. We can, however, make a second connection.

- To make a second connection, in Windows® [Ctrl]+drag (in Mac OS® X [Cmd]+drag) (i.e. hold down [Cmd]/[Ctrl] while dragging) from the Out port of Oscillator 2 to the green bottom of the Mixer Module. When you reach it, a connection will be made to a new port.

After connecting the Output of the Mixer to the 4-Pole Filter, your Synth will look something like this:

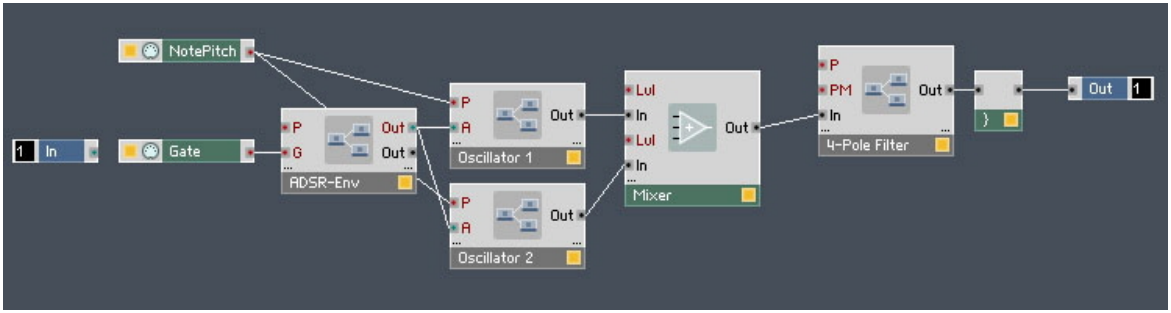


Fig. 7.19 Mixer connected to both Oscillators and the Filter

7.5.5 Adding Faders and Connecting them to the Mixer

We need to add some Faders to control the Levels of each Oscillator.

- Right-click if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) on a Lvl Input of the Mixer Module and choose the *Create Control* menu entry. This will create a Fader.

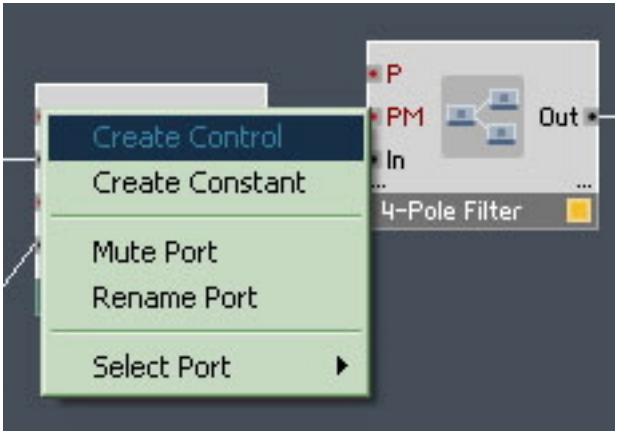


Fig. 7.20 Using the context menu to create a control at an Input

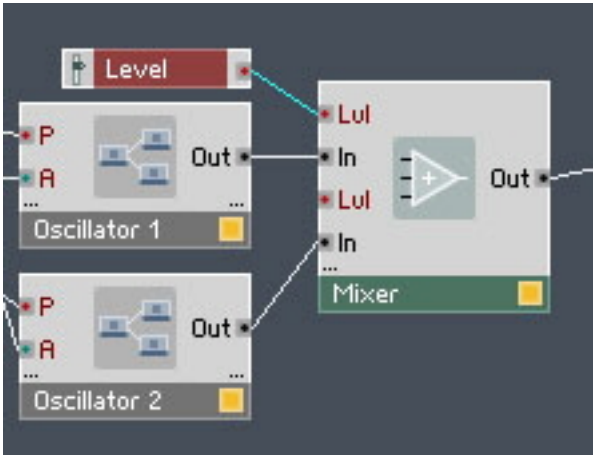


Fig. 7.21 The connected Fader

Do the same thing with the second Lvl input on the Mixer, so you have two Faders.

7.5.6 Using Duplicate to Add a Second ADSR-Env

Before we do some tidying up, we will duplicate the ADSR-Env, so that we can use it to shape the Filter envelope. If you remember, in Windows® right-click (in Mac OS® X [Ctrl] +click) on the ADSR-Env Macro, and choose the *Duplicate* menu entry. After you connect the second ADSR-Env Macro Out to the PM (Pitch Modulation) Input of the 4-Pole Filter, the Structure should look something like this:

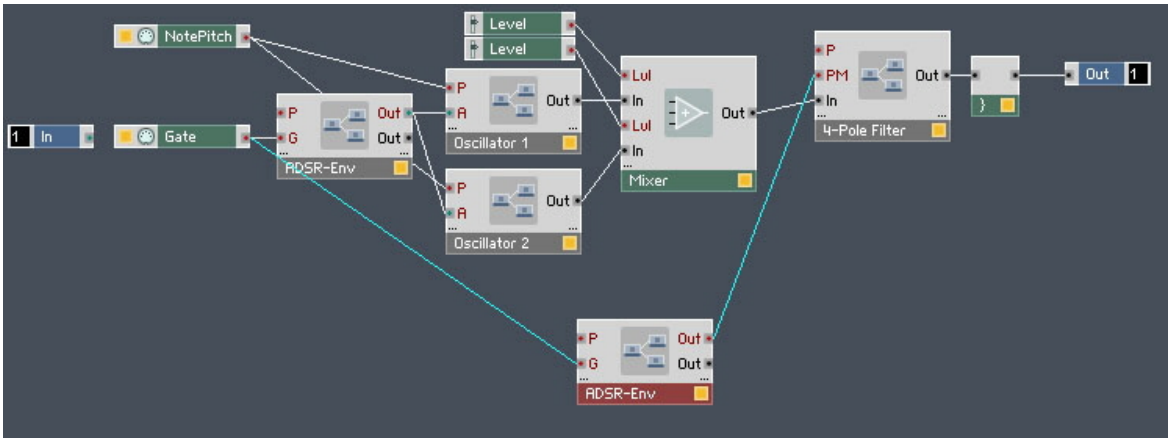


Fig. 7.22 Structure with second ADSR-Env connected

7.5.7 Connecting the NotePitch Module to the ADSR Envelopes and Filter

There are some important connections still to make. The NotePitch Module needs to be connected to all of the P (Pitch) Inputs of the Macros. This recreates real characteristics of instruments, where the higher the note, the brighter, and shorter the sound.

- So to do this, click and hold on the red output from the NotePitch Module and then drag the wire to all of the P Inputs of the Macros, including the ADSR-Env and 4-Pole Filter. Your Structure should look something like this:

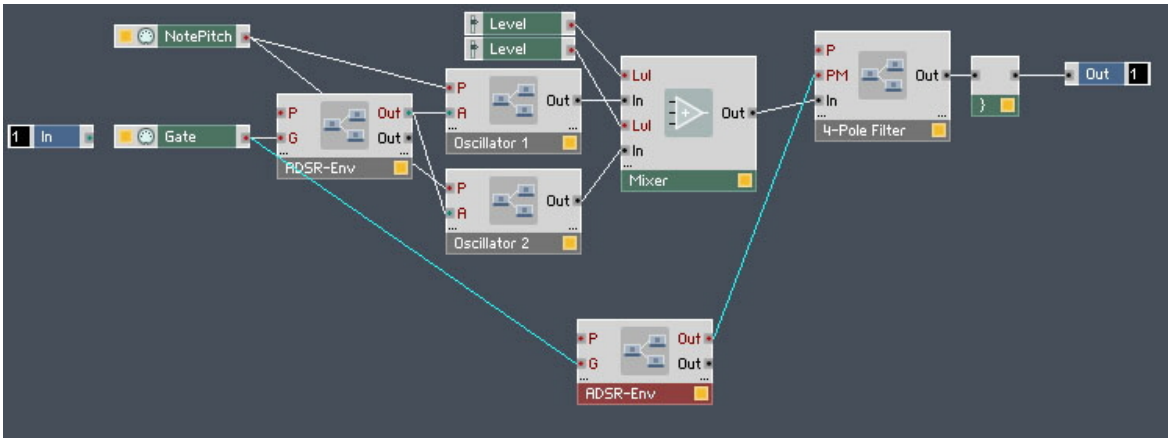


Fig. 7.23 The additional connections for the NotePitch Module

7.5.8 Tidying Up in the Instrument Panel

Now it is time to do some tidying up. If you remember you need to click on the Panel Lock button to unlock the Panel.

Fig. 7.24 The Panel Lock button

You can grab the Macros by their titles. If an item's text is red, it is selected. You can also select multiple items at once by dragging a box around all you want to select or by using [Shift]+click. Move the Macros around so that they look like this:

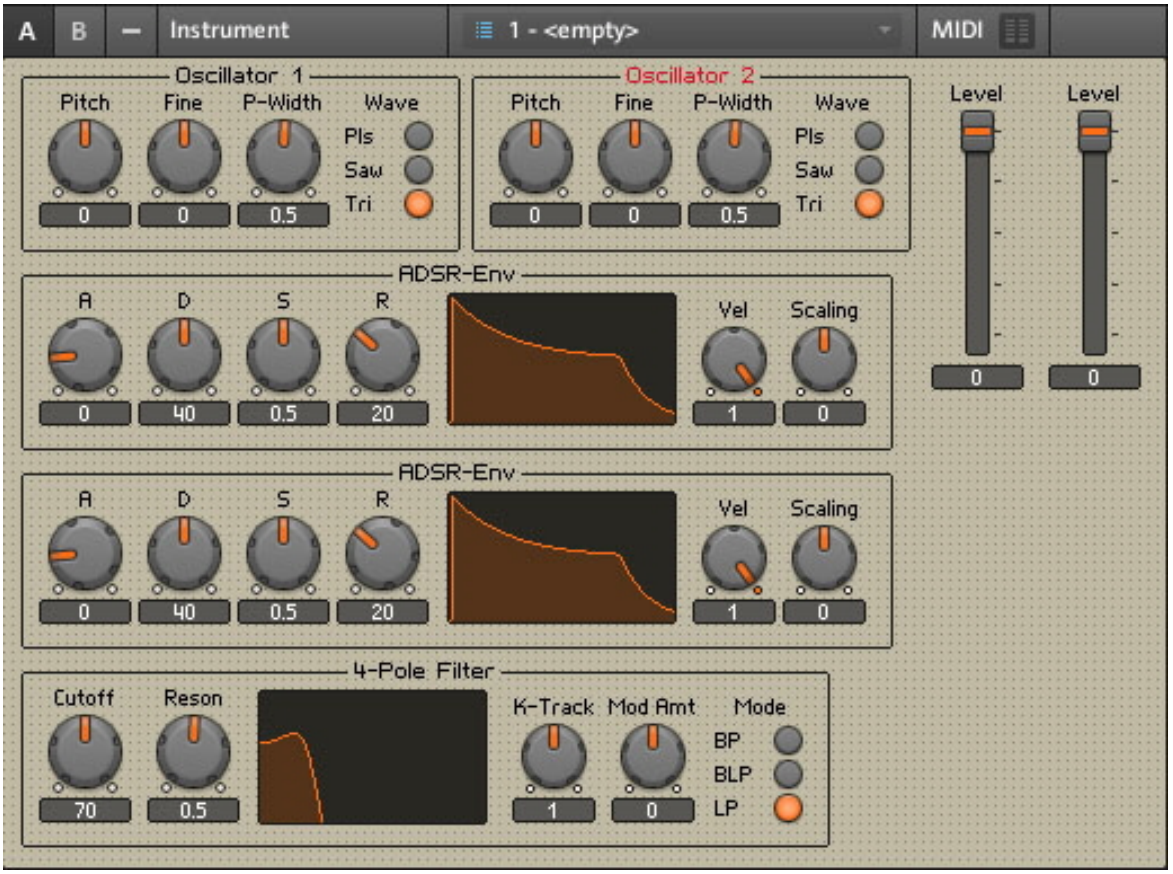


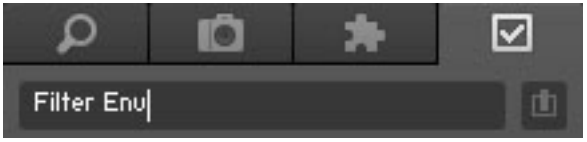
Fig. 7.25 The Panel of your Synth after rearranging the Macros

Renaming the ADSR-Env

As you can see, we have 2 ADSR-Env Macros, and both have the same name. We need to rename the second ADSR-Env, so that we know it is modulating the Filter. We will use the Macro's Properties to do this.

1. In the Instrument Structure, in Windows® right-click (in Mac OS® X [Ctrl]+click) on the ADSR-Env Macro that is connected to the Filter Macro and choose the *Properties* menu entry.

2. In the label area click and drag across the text, and type “Filter Env” and press [Enter].



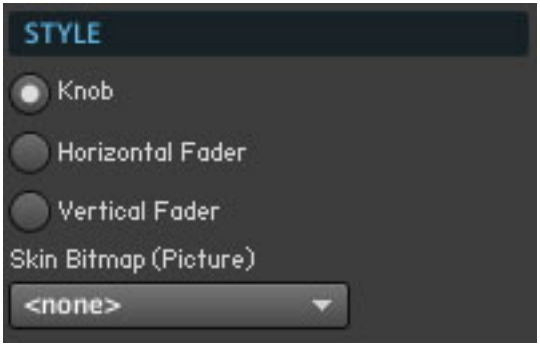
7.5.9 Changing the Appearance of the Faders

In REAKTOR you can change the appearance of Faders so that they look like knobs. Knobs take up less space, so sometimes it is a good idea to do this. If you are happy with the Faders, you can skip this section. To change the appearance, we are again going to use REAKTOR’s Properties and press the View button.

1. In Windows®, right-click (in Mac OS® X [Ctrl]+click) on one of the Faders to bring up its Properties.

2. Now click on the View button to open the View page.

3. Change Style selector from Vertical Fader to Knob.



4. Do the same for the other Fader. Whilst we are at it, we might as well rename the Knobs to Osc 1 Level and Osc 2 Level.

7.6 Playing Your Synth and Making Changes to the Sound

Now we can explore our Synth, make some changes the Filter and Oscillator settings and create some Snapshots. Finally we will need to save our work.

7.6.1 Changing the Oscillators Waveform, Resetting the Filter and Output Level

You might find that the Synth might sound a bit muffled. I would suggest changing the Oscillator waveform to Saw, by using the Wave switch, and also turning the Filter's Cutoff control clockwise.

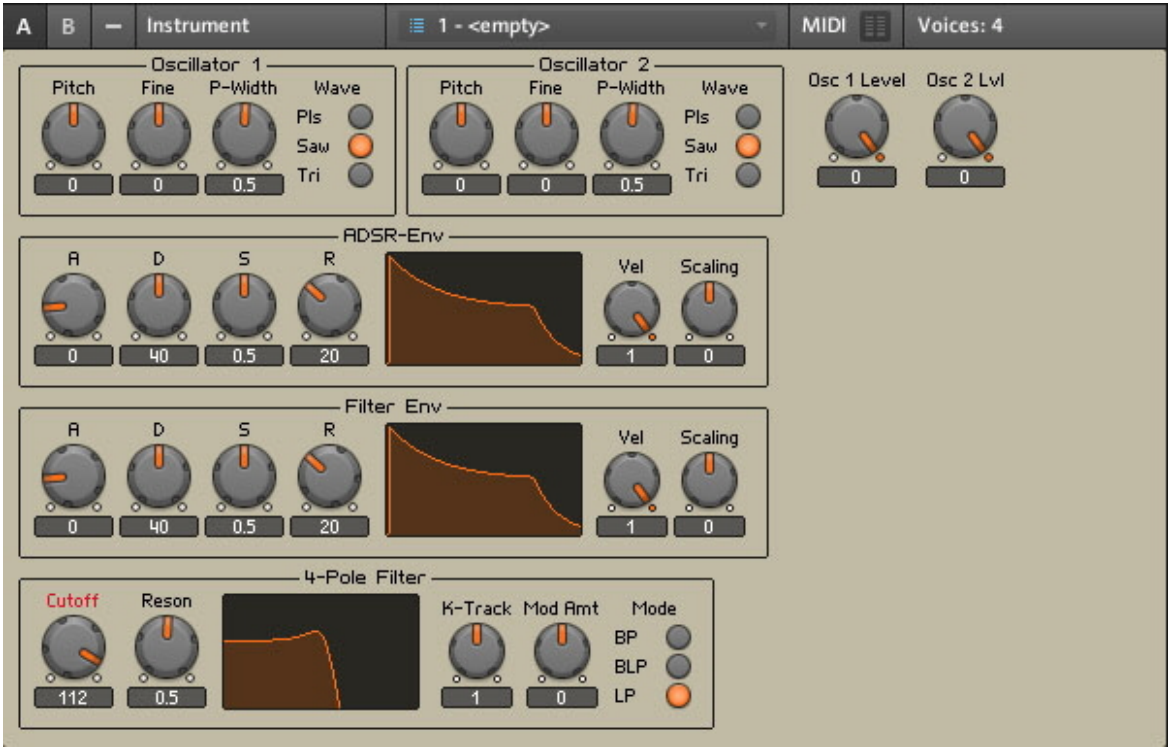


Fig. 7.26 Changed Filter and Oscillator settings

- Also you could turn the Output Level down to -20.

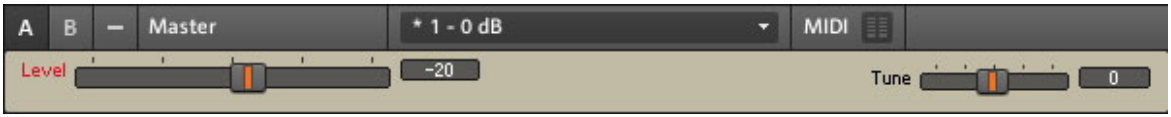


Fig. 7.27 Safer output level

7.6.2 Creating some Snapshots

Try different settings of the Mod Amt knob in the Filter. This will effect how much the Filter-Env modulates the Filter. Also experiment with the A, D, S, and R (Attack Decay Sustain Release) knobs in both of the Envelopes. Changing the relative Pitch settings and Osc Levels of the two Oscillators is also fun! Once you have a setting that you like, save it as a Snapshot. If you remember we did this when we explored the 2-Osc and Junatik Synths.

1. With the Sidepane open, click on the Snapshot tab.

2. Press the Append button at the bottom of the Snapshot list.

3. Type in a name for the Snapshot and press [Enter].

7.6.3 Saving Your Work Using Save As

Once you have made some Snapshots, don't forget to save your work!

- This time we will use the operating system shortcut: in Windows®, press [Ctrl]+[Shift]+[S] (in Mac OS® X press [Shift]+[Cmd]+[S]) to execute the *Save Ensemble As...* command. Because we started off with a new Ensemble you will probably need to navigate back to your User Folder.

8 Make a Sampler Using REAKTOR Modules

We will now build a Sampler using REAKTOR Modules.

8.1 Recap and Overview

- We have already explored samples with the REAKTOR Sampler Memory Drum 2.
- We have also build a Synth using ready-made REAKTOR Macros.
- Following on from this, we are going onto build a Sampler from scratch using REAKTOR Modules.

8.2 What Kind of Sampler?

We will build a Sampler that is ideal for playing back vocal loops, drone textures and sound effects, etc.
The samples will be able to playback forward, reversed and forward/backwards.
We will use REAKTOR's basic Sampler Module. We will use an Envelope and a Filter Module, and connect the controls such as Attack, Decay, Sustain and Release for the Envelope, and Cutoff and Resonance for the Filter.

Fig. 8.1 The Finished Sampler

8.3 Building the Basic Structure

We will start in much the same way as when we built our Synth. So we need to start off by creating a New Ensemble.

8.3.1 Load up a New Ensemble

- Press the Menu button and choose the *File > New Ensemble* menu entry.

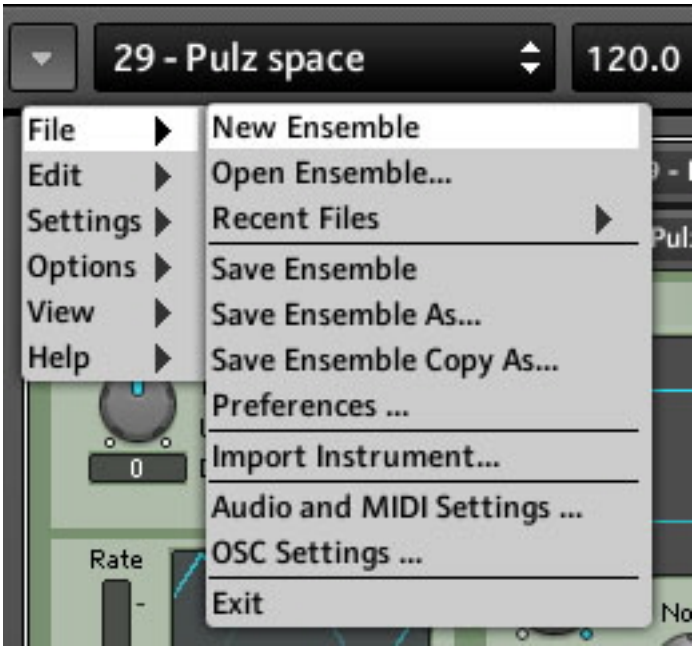


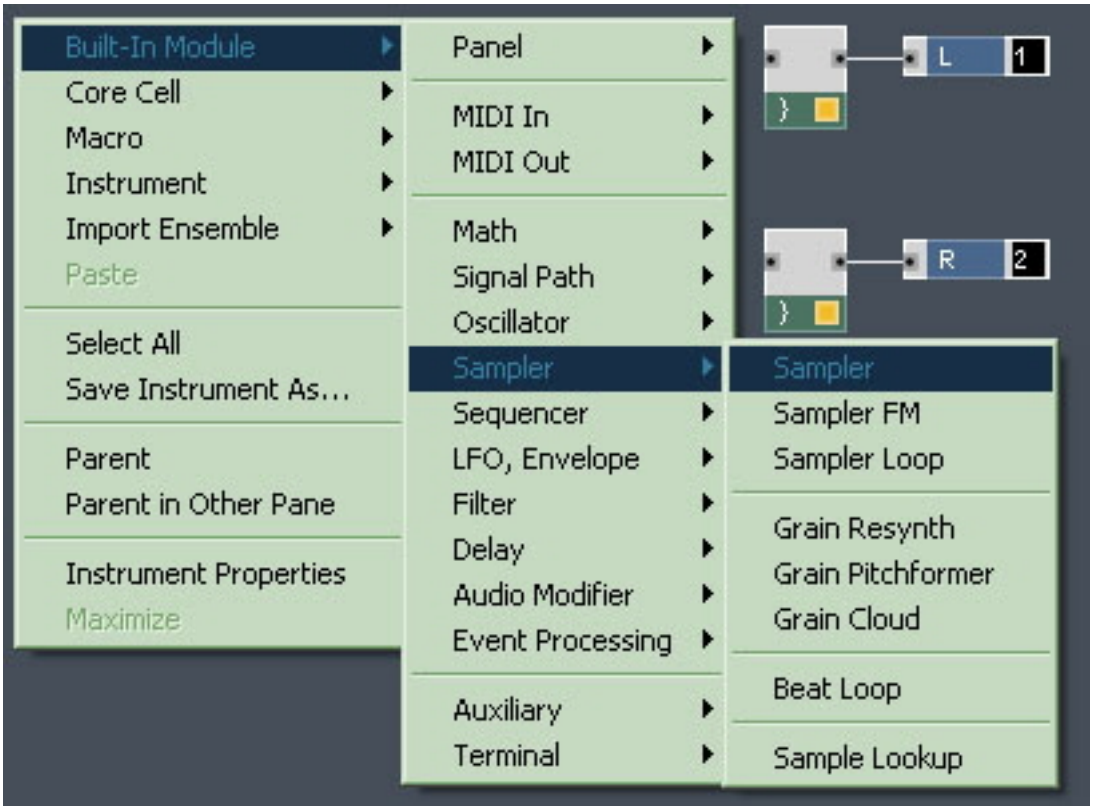
Fig. 8.2 Creating a new Ensemble

On this occasion we will use the default Stereo In/Stereo Out Instrument. This gives us the option of changing our Sampler at a later stage to one with left and right outputs.

8.3.2 Inserting the First Modules

We will now insert the Sampler Module along with Pitch and Gate Modules.

1. Go to the Ensemble Structure by clicking on the Structure button.
2. If you remember, double-clicking on the Instrument in the Ensemble Structure will open it, ready for inserting some Modules.
3. In Windows®, right-click (in Mac OS® X [Ctrl]+click) on a space inside the Instrument Structure and choose the *Built-In Module > Sampler > Sampler* menu entry.



4. Next insert the NotePitch and Gate Modules. If you remember, we did this when we built our Synth. So choose the *Built-In Module > MIDI In > NotePitch* menu entry and then from the same place in the Structure context menu the *Built-In Module > MIDI In > Gate* menu entry.

Your Structure should look something like this:

8.3.3 Inserting the Envelope

Next we will insert an ADSR Envelope and controls for Attack, Decay, Sustain and Release.

In Windows®, right-click (in Mac OS® X [Ctrl]+click) on a space inside the Instrument Structure and choose the *Built-In Module > LFO, Envelope > ADSR* menu entry.

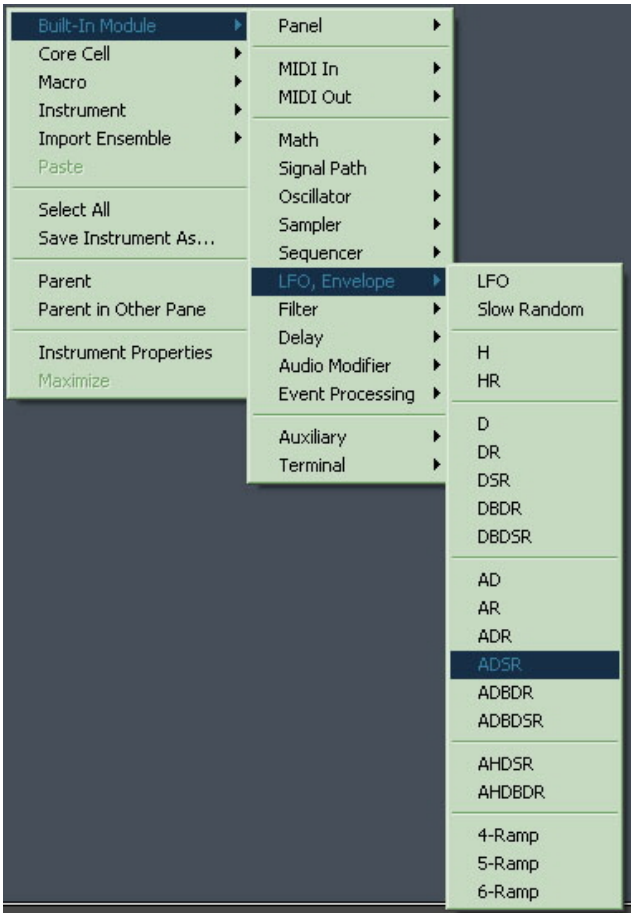
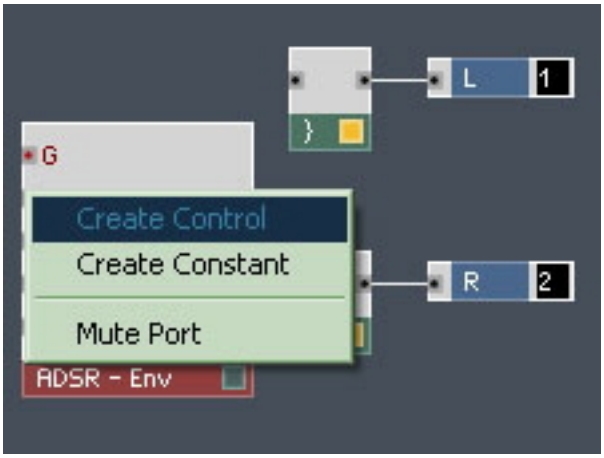


Fig. 8.3 Inserting an ADSR Module

8.3.4 Adding the Controls for the Envelope

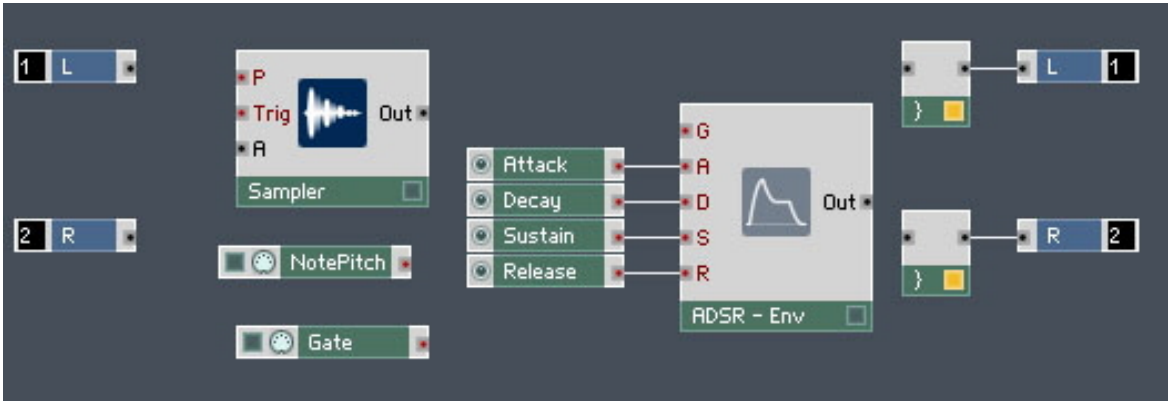
We will use the same technique to create Controls that we used when we added Faders to the Mixer in our Synth.

1. To add an Attack Fader to the Envelope we need to right-click in Windows® ([Ctrl] +click in Mac OS® X) on the A or red dot beside it, and choose the *Create Control* menu entry.



2. Repeat this process for the D, S, and R Inputs of the Envelope.

Now our Structure should look like this:



8.4 Making the Connections

Now we need to connect the Sampler to our Outputs, and the Gate and NotePitch Modules need to be connected to the Sampler and ADSR-Env, using click / hold and drag.

8.4.1 Connecting the Sampler to the 2 Audio Voice Combiners

1. Click on the Out dot of the Sampler, hold the mouse button down, and drag the wire to left Audio Voice Combiner.
2. When you have reached the black dot In of the Audio Voice Combiner, let go of your mouse button. The wire should connect.
3. Repeat the same procedure for the right Audio Voice Combiner.

Again, the yellow lamp confirms the connection!

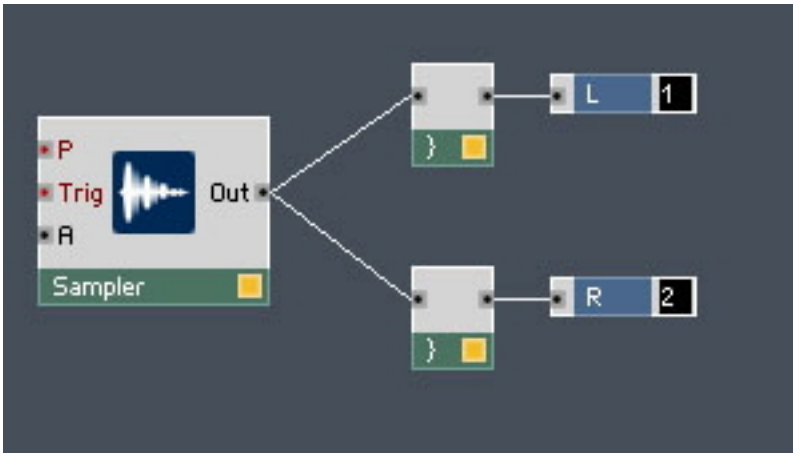
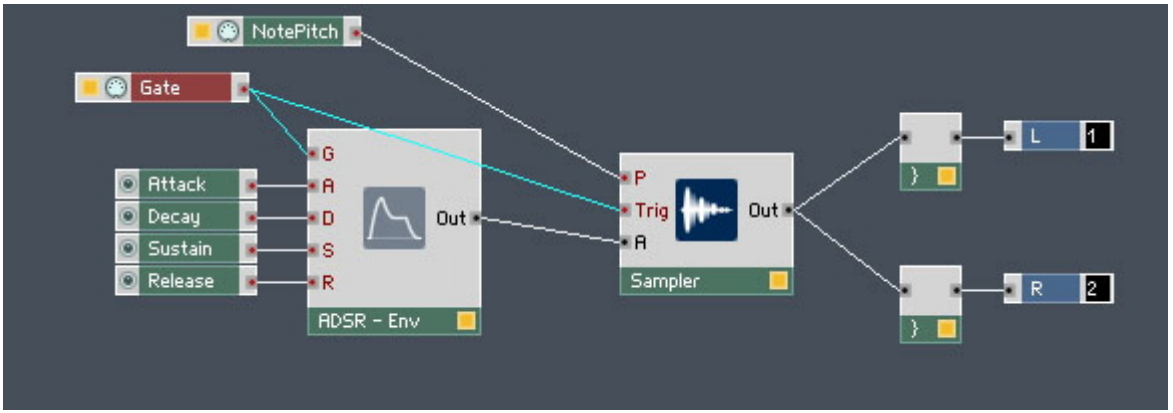


Fig. 8.4 Sampler connected to Audio Voice Combiners

8.4.2 Connecting the NotePitch and Gate Modules

1. Click/hold on the red dot of the NotePitch Module, and drag the wire to the P (Pitch) Input of the Sampler.
2. Let go when you touch the red dot.
3. Repeat the same procedure for the Gate Module, which needs to be connected to the Trig Input of the Sampler and the G (Gate) Input of the ADSR-Env.

Your Structure will now look something like this:



8.5 Loading a Sample into the Sampler

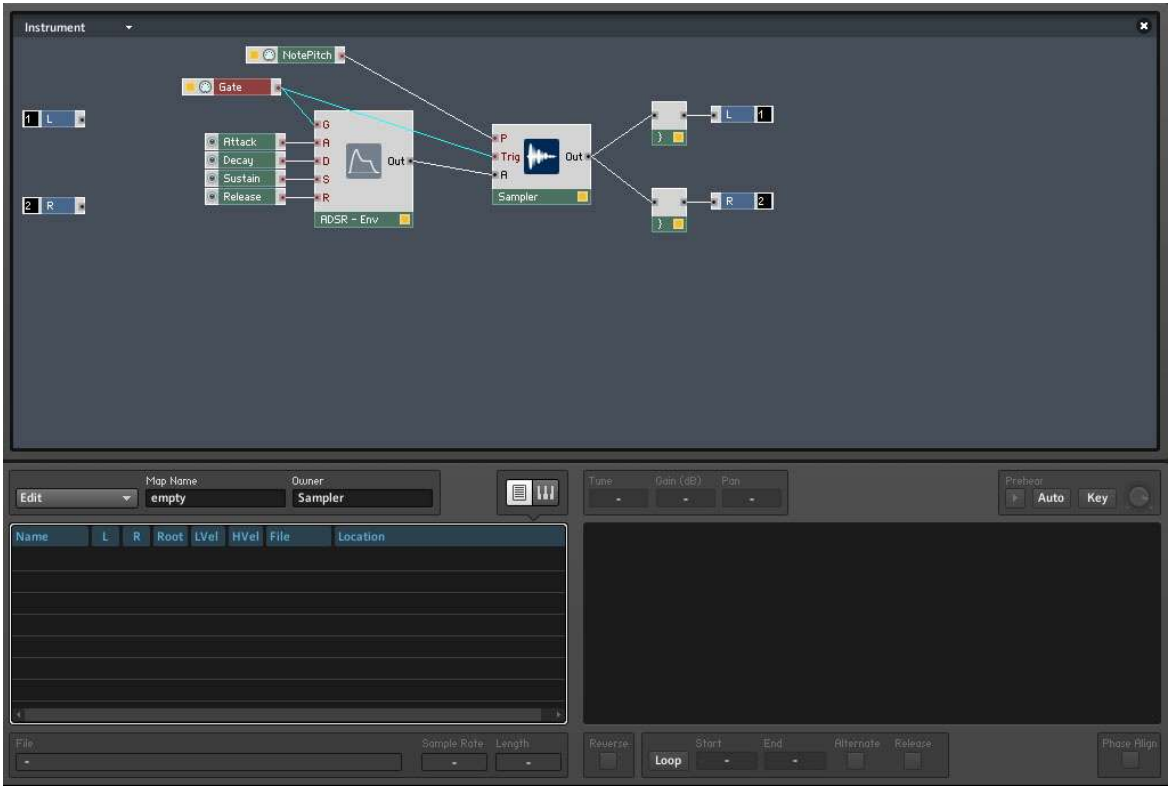
We have built a simple Sampler, but now we need to load a sample, just to hear that it works.
First thing to do is to open the Sample Map Editor.

8.5.1 Opening the Sample Map Editor from the View Menu

- Click on the Sample Map button in the Sidebar.

Fig. 8.5 The Sample Map button

You will see the Sample Map Editor below the Instrument.



Now we have the Sample Map Editor, we do the same procedure as before when we added a sample to the Sample Map in Memory Drum 2.

8.5.2 Adding a Sample to the Sample Map Editor

- To add a sample to the Sample Map, click on Edit drop-down menu and choose the *Add* menu entry.

Fig. 8.6 Using the Edit drop-down menu to add a Sample

This should open up your Audio folder. It is suggested to navigate to where you keep vocal loops or sound FX or some drone textures. After clicking “Open”, the Sample will be placed in the Sample Map.

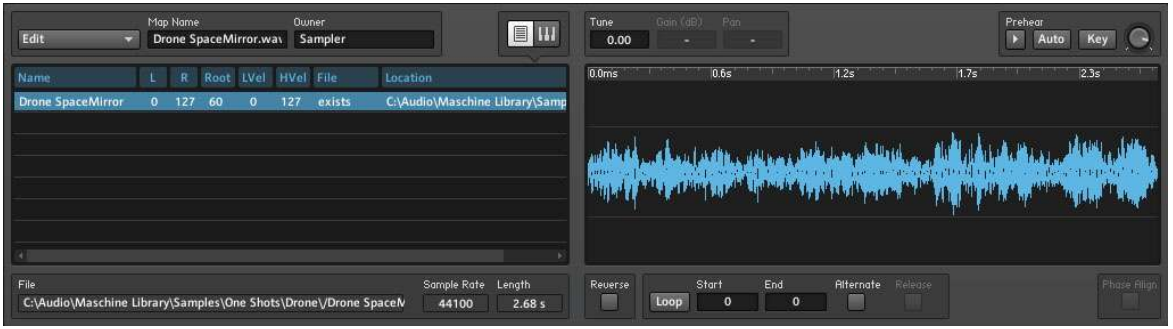


Fig. 8.7 Sample in place

Now if you play your MIDI keyboard you should here the sample play back at different pitches!

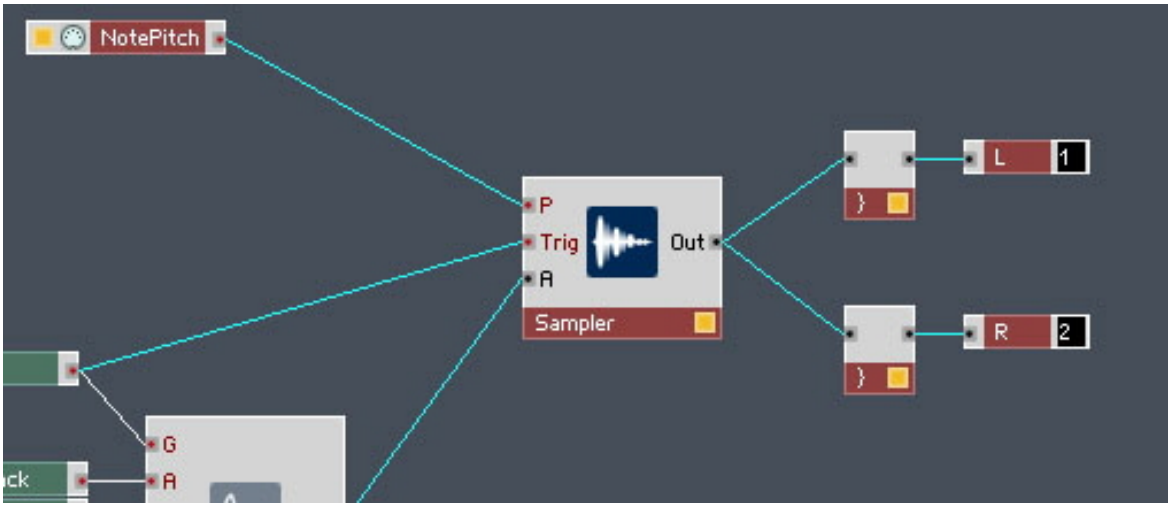
8.6 Tidying Up the Appearance and Moving the Modules

We need now to rearrange the Modules in the Structure and also how they appearing the Ensemble's Panel.
We will then see the Structure more clearly and also create space to add more Modules.

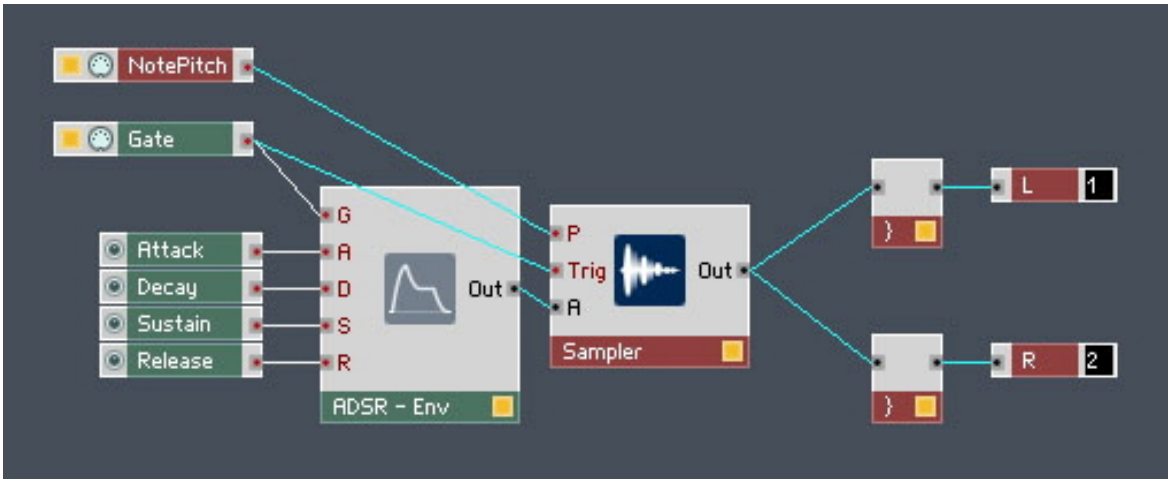
8.6.1 Moving Modules in the Structure

Let's first tidy up our Structure by highlighting Modules and then dragging them to a different position.

1. We'll start off by [Shift]-clicking on the Note Pitch, Sampler, the Audio Voice Combiners and the L and R Output.



2. We will then drag the selected Modules down and to the left.



8.6.2 Deleting unwanted Modules

1. We don't need the L and R Audio Inputs, so let's delete them.
2. [Shift]-click to highlight both Modules.
3. In Windows®, right-click (in Mac OS® X [Ctrl]+click) one of the selected Modules and then choose the *Delete Selection* menu entry to remove the Modules from the Structure.

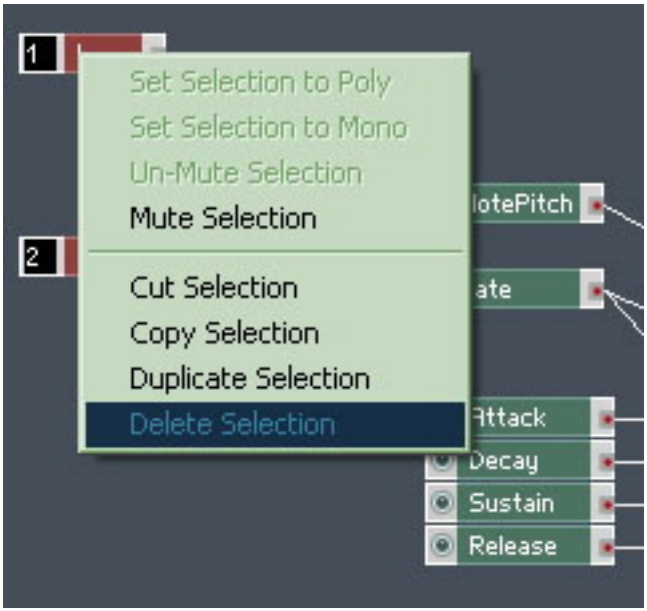


Fig. 8.8 Delete Selection

8.6.3 Using the Panel Lock Button to Move the Knobs

The controls for the ADSR are on top of each other in the Ensemble Panel. We need to unlock the Panel so we can drag the knobs to another position.

1. Click on the Panel button to view the Instrument Panel.

2. Click on the Panel Lock button to unlock the Panel.

Your Instrument Panel should look something like this:

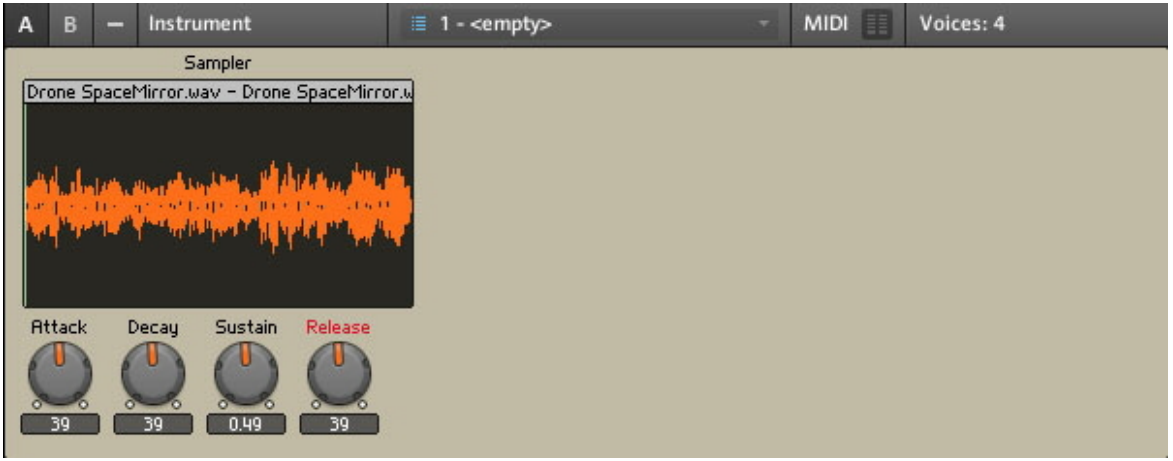


Fig. 8.9 Panel tidied up

8.7 Adding More Samples and Changing their Settings

If you remember, the idea of this Sampler is to map different sample loops to different keys. So we need to make changes to the Sample Map and add more samples. We will need to reopen the Sample Map Editor to do this.

8.7.1 Double-clicking on the Waveform to Open the Sample Map

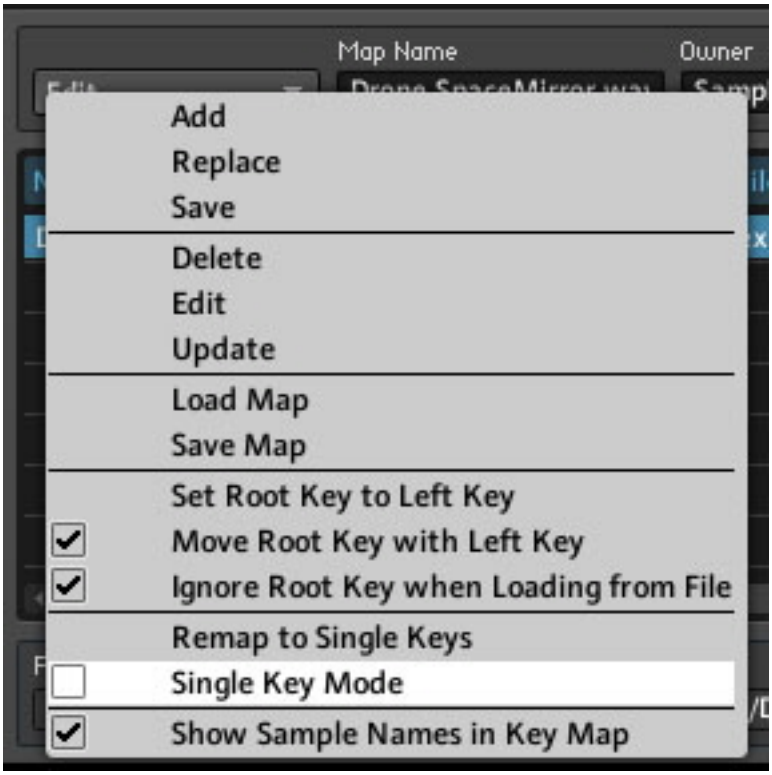
Now we have tidied the appearance in the Instrument Panel, we can double-click on the sample waveform to open the Sample Map Editor.

8.7.2 Changing the Settings of the Existing Sample

Before we add more samples, we need to make some changes to the existing sample. The idea is that we will map our samples to the white MIDI Keys starting on MIDI Note 48.
So first of all we need to make sure that our sample will playback correctly on MIDI Note 48. We also want the sample to just play back on that note.

8.7.3 Making Changes to the Key-Split and Root Key

1. We want our sample to playback at its correct pitch when MIDI Note 48 is played. The first thing to change is the Root Note—currently at 60—to 48. Double-click the entry in the Root column and type in the new value.
2. Since we only want the sample to playback on that key, you need to activate the Single Key Mode. To do this, select the *Single Key Mode* menu entry from the Edit drop-down menu.



3. Now you can change the L and R Key-Split mapping to 48. Highlight a Sample, double-click on one of the entries in the corresponding row and columns (L or R) and then type in the new value. Press [Enter] on your computer keyboard when you are finished.

The sample will only play back on MIDI Note 48 at its correct Pitch.

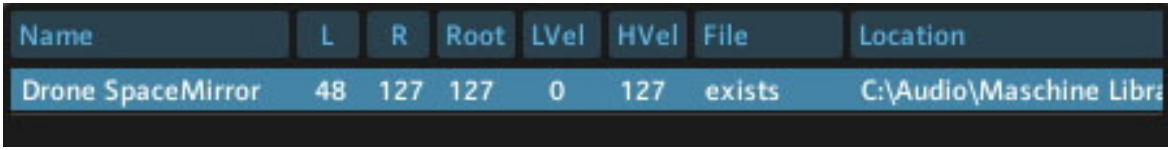


Fig. 8.10 Remapping the Sample

8.7.4 Adding More Samples

We will add another sample and map the new sample to MIDI Note 50.

1. Again use the *Add* menu entry from the Edit drop-down menu to add another sample.
2. Now map that Sample so the L and R Key-Split is also set to 50.
3. We want to reproduce this procedure, and add two more samples. We want to keep them on the white keys, so the next sample should have L and R and Root set to 52.
4. The fourth sample should have L and R and Root set to 53.

Now our 4 samples will play back using the notes C2, D2, E2, and F2—that is MIDI Notes 48, 50, 52, and 53.

Our Sample Map should look something like this:

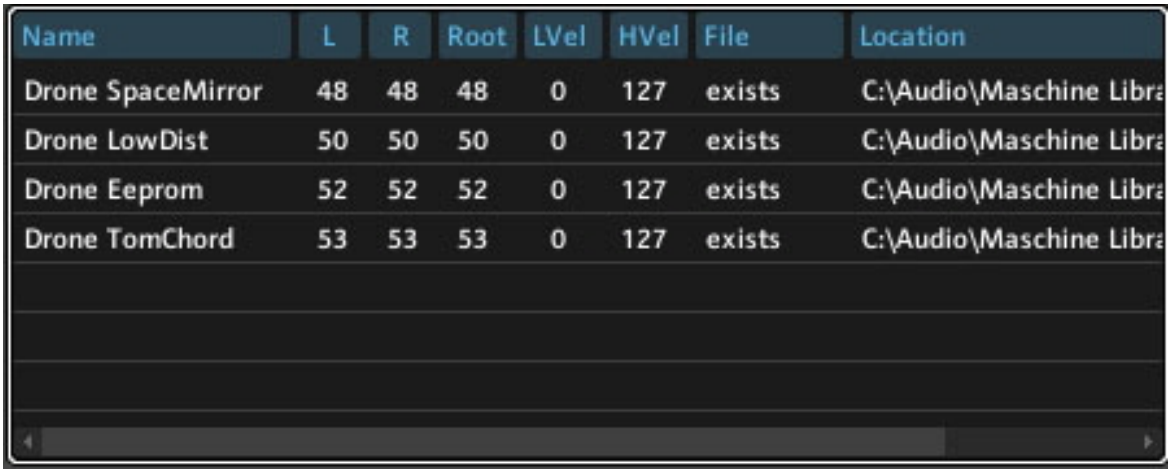


Fig. 8.11 Four samples mapped to single keys.

If you like, you can add more samples on MIDI Notes 55, 57, 59, and 60. But for the purpose of this tutorial, we will move on to explore sample playback. We will learn how to change the direction of sample playback.

8.8 Sample Reverse and Other Playback Possibilities

Now we will explore ways to loop reverse and transpose samples.

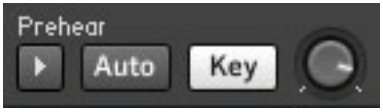
8.8.1 Looping, and Direction Buttons

This might be a simple Sampler, but each sample can have some different characteristics in terms of how it plays back. Let's have a closer look at some of the features in the Sample Map Editor. Below the sample waveform you can see Buttons for Loop, Reverse, and Alternating Loop.

Fig. 8.12 Buttons and checkboxes for Loop, Reverse, and Alternating Loop

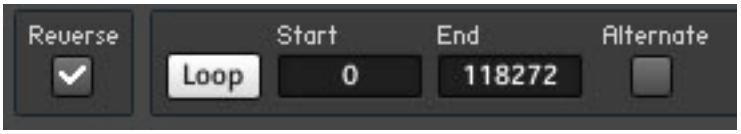
As you can see the defaults for these 3 features are off.

1. Make sure the Key button is active so we can use our MIDI keyboard to select a sample. Let's start off with the one on MIDI Note 48.



2. Now click on the Loop button—its background will light up.

3. Use your MIDI keyboard to play the note corresponding to the sample you are editing and keep holding the note down. You should hear the sample looping by going back to its beginning and then repeating.
4. Now engage the Reverse checkbox.



Now you should hear the Sample looping but this time reversed.
Engaging the Alternate checkbox will cause the sample to be played back reversed and then forwards.

Try other combinations!
Each of your 4 Samples can have different settings.

You could also place the same sample over 4 keys and have different playback characteristics!

8.8.2 Transposing a Sample

At the moment all 4 of our samples are playing at their original pitch.

- Use the Root settings to change the Pitch.

In my example, I have transposed the sample down 7 semitones by changing the Root note to 7 semitones higher.

Name	L	R	Root	LVel	HVel	File	Location
Drone SpaceMirror	48	48	55	0	127	exists	C:\Audio\Maschine Library\Samp

Fig. 8.13 Transposing a Sample

8.9 Adding a Filter

Now we will add a Filter to our Sampler, and create controls for Cutoff and Resonance. We will also try different filter characteristics such as High Pass, Band Pass, and Low Pass.

8.9.1 Inserting the Filter Into the Structure

In Windows®, right-click (in Mac OS® X [Ctrl]+click) on a space inside the Instrument Structure and choose the *Built-In Module > Filter > Multi 2-Pole* menu entry.

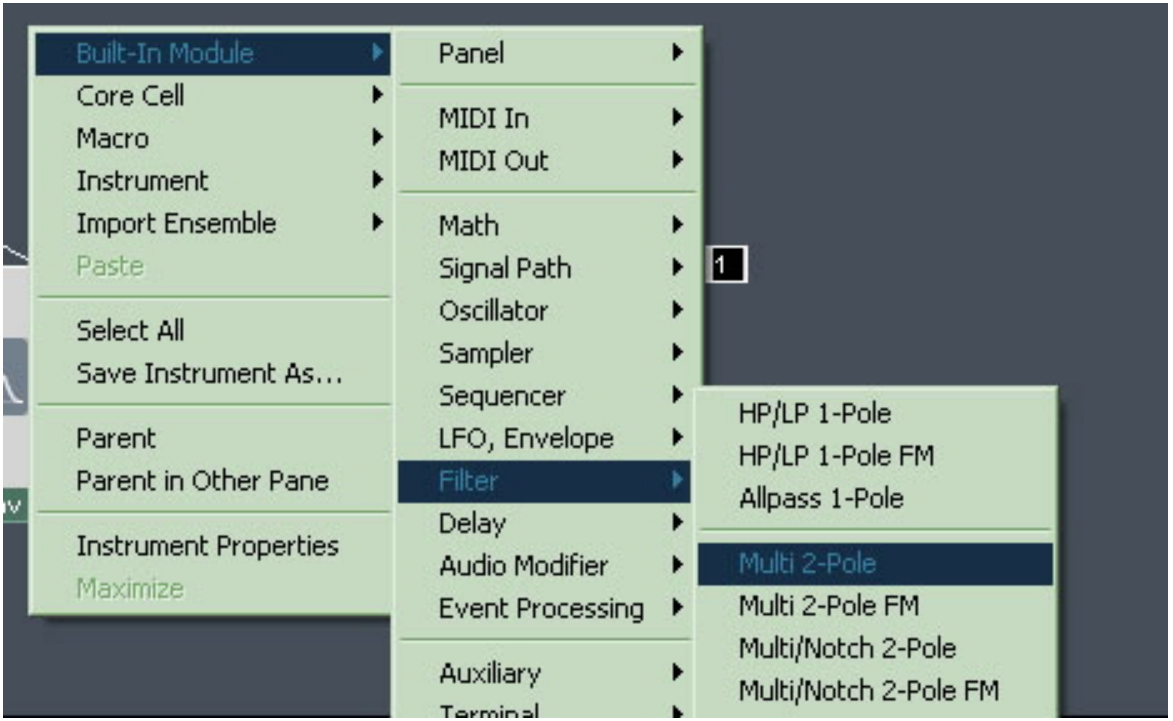


Fig. 8.14 Inserting a Filter.

8.9.2 Creating the Filter Controls and Making the Connections

We are going to create controls for the P (Pitch Cutoff) Input and the Res (Resonance) Input.

1. As before, right-click on the respective Inputs if you are in Windows® ([Ctrl]+click if you are in Mac OS® X) and choose the *Create Control* menu entry.

2. Now connect the output of the Sampler to the Input of the Multi 2-Pole, and the Output of the LP (Lowpass) Output of the Filter to the 2 Audio Voice Combiners.

After moving the Modules around to create some space, your Structure should look something like this:

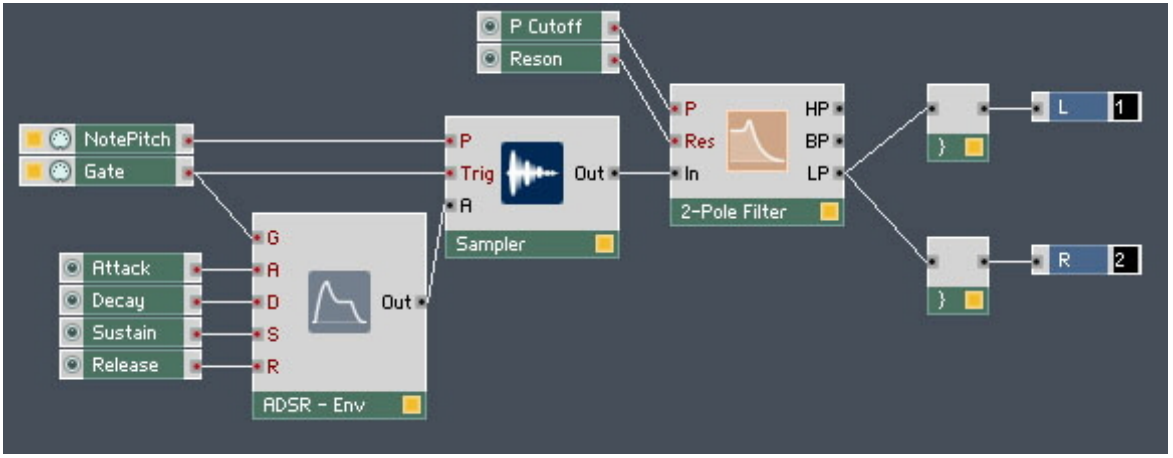


Fig. 8.15 Filter with controls in the Structure

8.9.3 Tidying Up the Appearance in the Instrument Panel

- Once more, we need to unlock the Panel, so that we can move the Cutoff and Resonance knobs. After moving, they are no longer on top of the Sampler.

Your Instrument Panel should look like this:

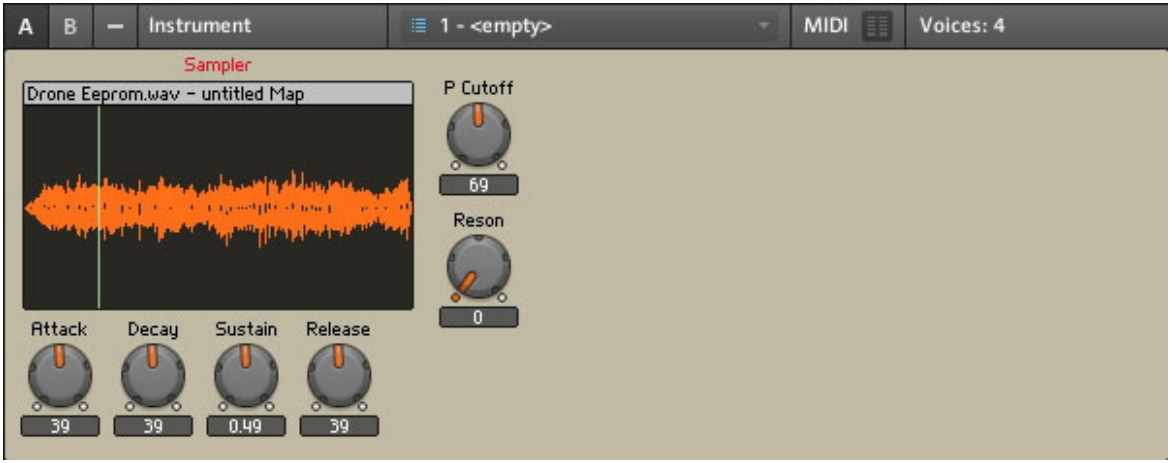
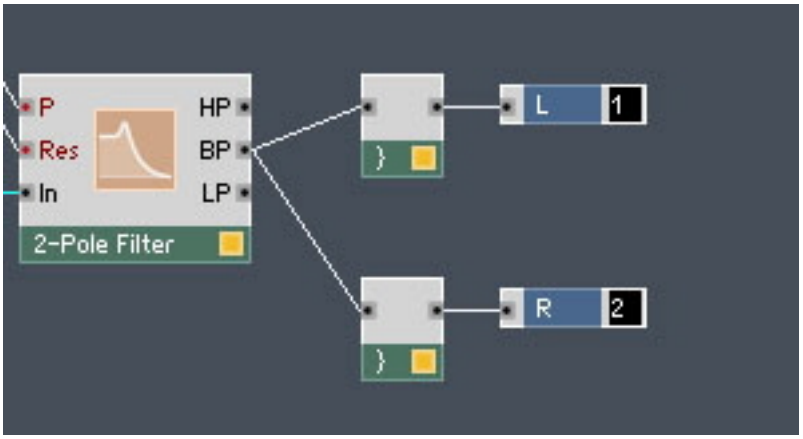


Fig. 8.16 Tidied Panel

8.9.4 Trying the Band-Pass and Hi-Pass Filter Outputs/Saving Your Work

With Samples, it is sometimes better to use the Band-Pass or High-Pass Filters, as these are often more suitable than the Low-Pass.

1. But before we do that, press the Menu button and choose the *Save Ensemble As...* menu entry to save your Ensemble!
2. Now you have saved your work, just experiment with the different Filter Outputs. In your Instrument Structure, click on the BP Output from the Multi 2-Pole and drag the wires to the Audio Voice Combiners.



3. Now play your MIDI keyboard and change the settings of the Filter and maybe the controls for the ADSR as well.

4. Finally connect the HP Output to the 2 Audio Voice Combiners. Then decide which Filter Outputs is best for you.
5. Save your work.

8.9.5 Using Save Ensemble to Update Your Already Saved Sampler

As we have already used the *Save Ensemble As...* command to save our work before, we can now use the *Save Ensemble* command to update and overwrite our previously saved version.

- Press the Menu button and choose the *File > Save Ensemble* menu entry.

Fig. 8.17 Saving the Ensemble

If you want, there is a modification that can make the Filter more flexible. If you are interested in that, have a look at the next section. If you are happy with the Sampler as it is, you can skip the next section!

8.10 Modifying the Existing Sampler

This section is for those of you who want a bit more flexibility with the Filter section of the Sampler.

8.10.1 Overview of Selector Used to Cross-fade

Some of you might want to cross-fade between the 3 Filters just to have an easy way to select which Filter—Hi Pass, Band Pass, Low Pass—is best for your samples. If you are interested in adding this, here is what your final Structure will look like.

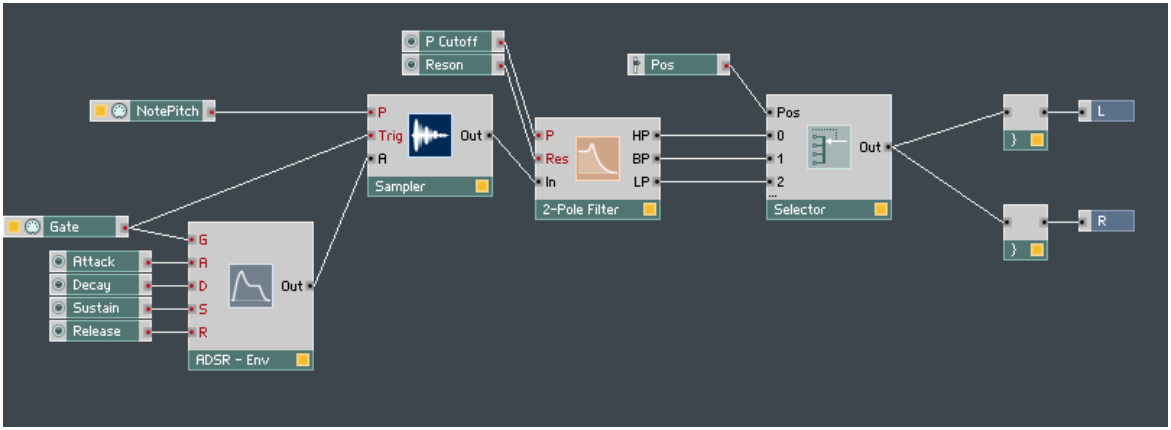


Fig. 8.18 Structure with the Selector Module

As you can see the Selector has 3 Inputs and a Position Fader.
The Position Fader will cross-fade between the 3 Filters, going from Hi Pass, to Band Pass and finally to Low Pass. The cross-fades will be smooth so you can have some Hi Pass mixed with some Band Pass. Here is how to create this.

8.10.2 Inserting the Selector

We need to insert a Selector Module, connect the 3 Outputs from the Filter to it. Then we need to create a Position Fader and connect the Output to the 2 Audio Voice Combiners.

- On Mac OS® X [Ctrl]+click, on Windows® right-click on a space inside the Instrument Structure and choose *Built-In Module > Signal Path > Selector/Scanner* menu entry.

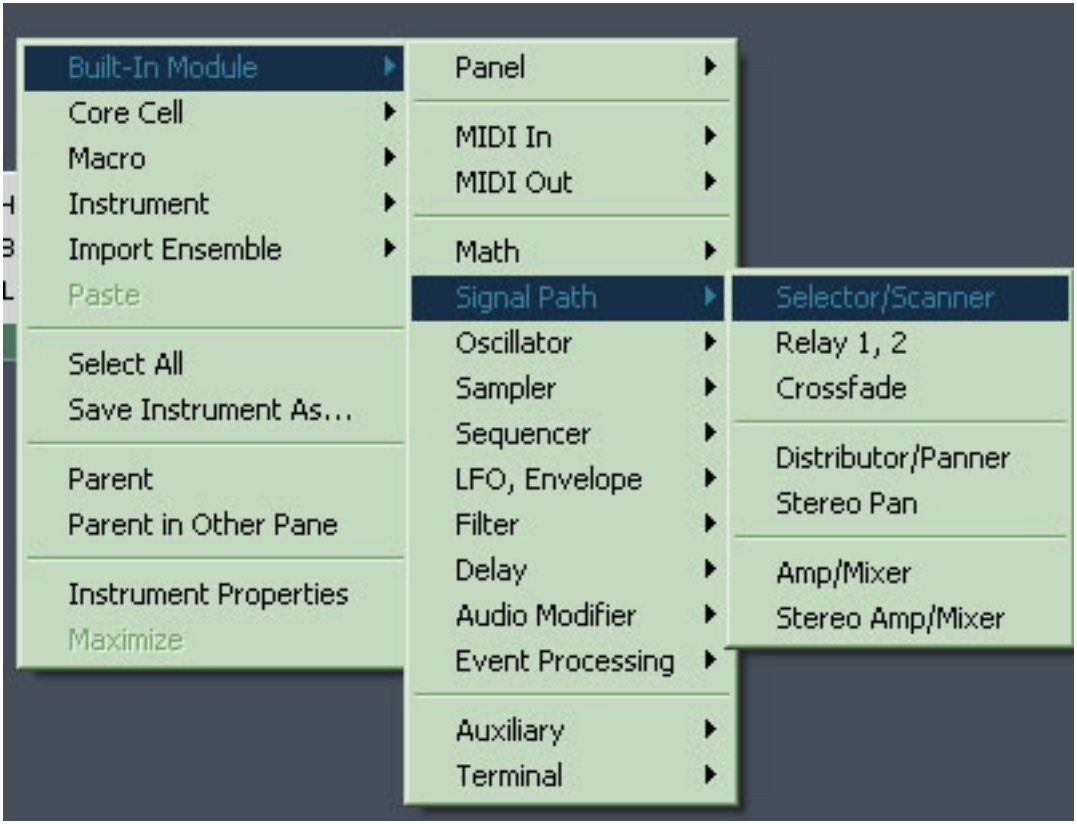


Fig. 8.19 Inserting the Selector Module

8.10.3 Connecting the Filter Outputs

1. First, we need to connect the HP Output of the Filter to the 0 Input of the Selector.
2. Click on the black dot beside the HP Output and hold down whilst you drag the wire towards the Selector.
3. When your cursor reaches the blue dot next to the 0 Input, let go, and the connection will be made.

The Selector Input turns black which confirms the audio connection has been created.

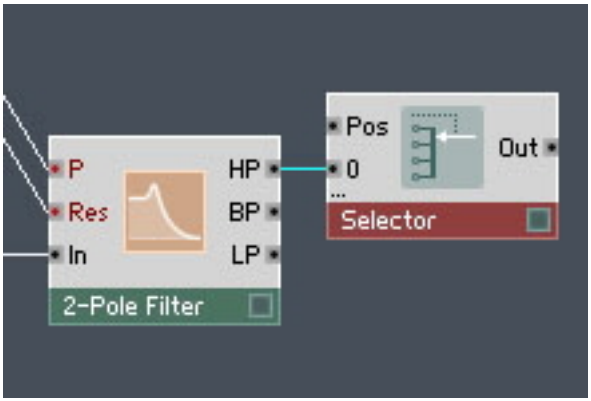


Fig. 8.20 Filter and Selector connected

8.10.4 Increasing the Number of Selector Inputs

We need to create extra inputs for the Selector, so that all 3 Filter Outputs can be connected.

1. While dragging a wire from the BP Output towards the Selector, we hold our Mac OS® X [Cmd] key or Windows® [Ctrl] key down as well.
2. When we reach the Selector just below our previous connection, a new input is connected!
3. Repeat the process to connect the LP Output to a third Selector Input:

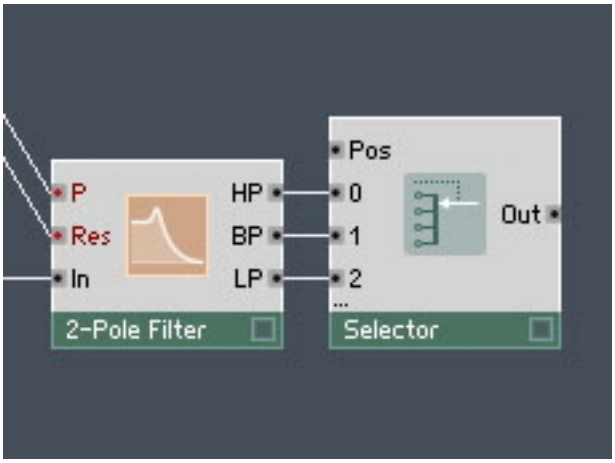
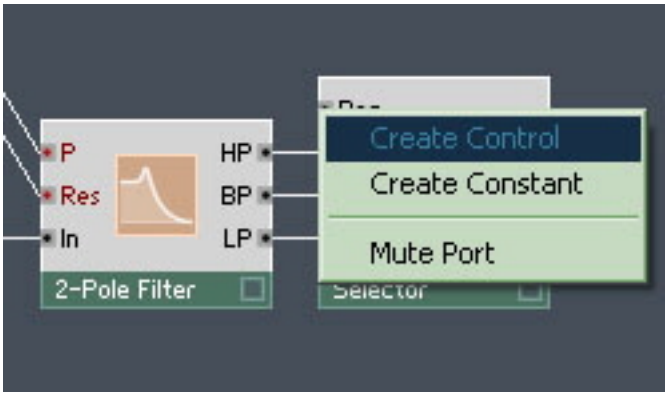


Fig. 8.21 Selector Inputs connected to the Filter Outputs

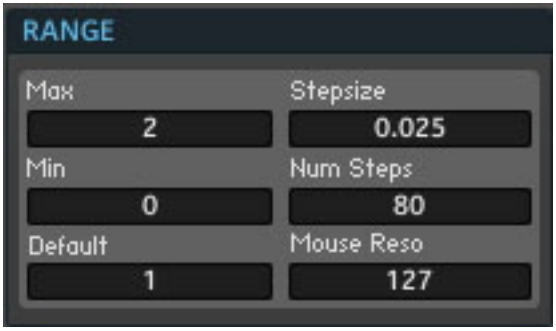
8.10.5 Adding the Position Fader and Changing its Range

1. To add the Fader to the Selector, on Mac OS® X [Ctrl]+click, on Windows® right-click on the Pos Input of the Selector and choose the *Create Control* menu entry.



2. We need to change the range of the Fader by bringing up its Properties. Do this by double-clicking on the Fader in the Structure.
3. Go to the Function page of the Fader Properties by pressing the Function button.

4. Now change the Max edit field to 2.



The Position Fader will now sweep between the values of 0, 1, and 2. As a result, it will sweep between the 3 Filter Outputs.

8.10.6 Final connections and Panel Appearance

Finally we need to connect the Selector to the 2 Audio Voice Combiners.

- Again click and hold, and drag the wire towards the Inputs of the Audio Voice Combiners.

After making both connection and moving the Selector, the Structure looks like this:

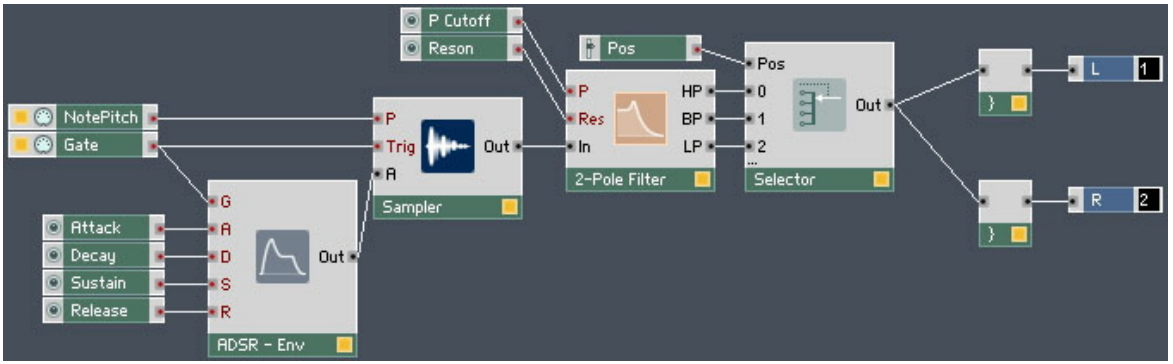


Fig. 8.22 Connections made

- Finally we need to unlock the Instrument Panel to move the Fader, by clicking on the Panel Lock button and dragging the Pos Fader to the right.

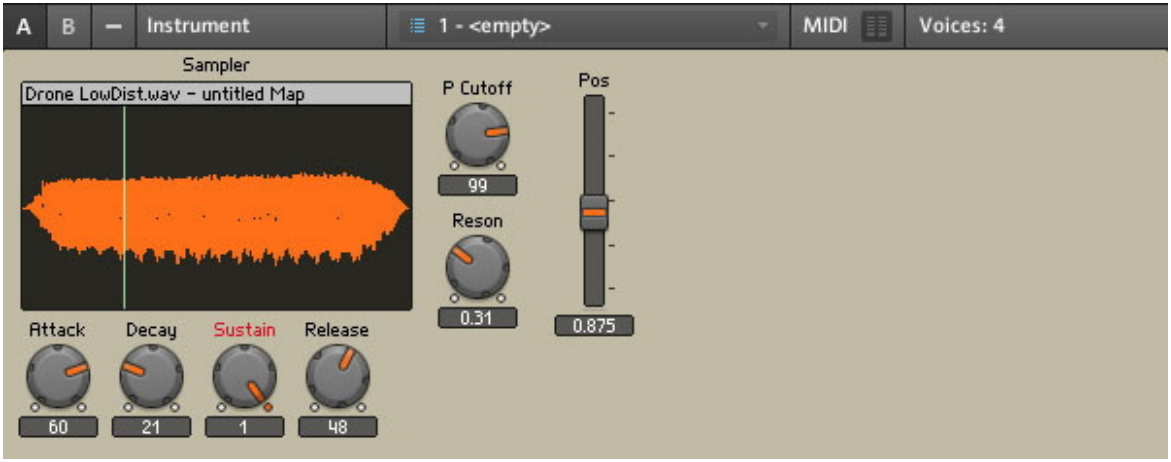
Fig. 8.23 Panel Lock button

Fig. 8.24 Moved Position Fader

- Lock the Panel by pressing the Panel Lock button again.

8.10.7 Explore Your Sampler and Make Some Snapshots

1. Make some changes to the settings of your DIY Sampler and save them as Snapshots.



2. Remember, we press the Snapshot tab and use the Append button to store our Snapshot.

Fig. 8.25 The Snapshot Tab

Fig. 8.26 Using Append

As you know, you must save your Ensemble again to save your new Snapshots. You can again use the *Save Ensemble* command or if you decided you want to keep an earlier version of the Sampler, maybe one without the Selector, then use the *Save Ensemble As...* command and type in an amended name.

9 What's Next?

Now that you have completed the tutorials in the REAKTOR Getting Started guide you can turn to the more advanced techniques by reading the other manuals that REAKTOR comes with. Or you can head directly to the REAKTOR user forums on our website for the latest tips and for a growing number of beautifully crafted Instruments and Ensembles.
Wherever you go from here, have fun with REAKTOR and don't forget to share your creations with the user community!