VSTHost

A program to run VST-compatible PlugIns

Version 1.56

Download Information

The latest version of VSTHost can be found at http://www.hermannseib.com/english/vsthost.htm (or http://www.hermannseib.com/vsthost.htm for the German-speaking minority).

Betas of the upcoming next version can be downloaded from http://www.hermannseib.com/programs/beta – if you got a problem with the current release version, you can always look whether it's already fixed before contacting the author about it.

Contact Information

The author can be reached per email at office@hermannseib.com

Translations

The French localization has been done by Patrice Vigier of Vigier Guitars (www.vigierguitars.com).

Skins

Vera Kinter aka Artvera (www.artvera-music.com) has created some beautiful skins for VSTHost which can be downloaded from VSTHost's web site.

Tests

A lot of intensive tests (and bug detections) have been done by Christian Boileau and friends from the French community "Fans des Shadows".

All above contributions have been done voluntarily and unpaid – and I can imagine the effort that's gone into them.
Thank you very much for this!

Information required/requested by licensing

The Windows 98 version of VSTHost uses jpeglib v9 to load JPEG images, so it is based in part on the work of the Independent JPEG Group; it also uses libpng and zlib to load .PNG images.

Copyright Information

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Introduction

What is VST?

“Okay, what are VST PlugIns?”, I hear some of you say… well, let’s do a little history research. If you already know what it means, just skip to the next section.

The term **VST** was coined by Steinberg some years ago as an abbreviation for „**V**irtual **S**tudio **T**echnology“. It is an interface definition that allows communication between a **VST Host** (originally, of course, Steinberg’s Cubase sequencer, but many more programs have adopted the interface by now) and **virtual effects** and **instruments**. These effects and instruments are implemented as separate units and can be “plugged into” the VST Host wherever they’re needed, thus they are commonly called “PlugIns”. The VST Host sends audio data streams to the PlugIns in a special format and adds their output to its own audio processing.

Since V2 of the VST definition, there are two kinds of VST PlugIns: **effects** and **instruments**. The distinction is that effects process an incoming audio stream, while instruments *create* their own – they are triggered by MIDI events, just like an external synthesizer would be.

With V3 of the VST definition, Steinberg created a completely new interface which is incompatible to V1 and V2. Since V1.46, VSTHost can load VST3 PlugIns – there are a few, but since they're so radically different internally, PlugIn writers have been *very* reluctant to adopt it so far – but it doesn't yet fully explore the VST3 capabilities. There's a bit of a chicken-and-egg problem here; I can only add features if I got PlugIns to test them with. Fine, but – there are nearly no freeware VST3 PlugIns available, only some commercial ones, which are primarily targeted at the Cubase / Nuendo environments. I can't afford to buy them just for this purpose, so I'm a bit stuck...

Then, there's yet another PlugIn type: VST *modules*. The “VST Module Architecture” describes a kind of sidestep between VST 2 and VST 3 – these PlugIns are architecturally related to VST 3, but offer only MIDI capabilities. I don't think that there are many of these. Since V1.46, VSTHost supports a relatively big subset of the VST Module Architecture capabilities, but I've got the same problem here as with VST 3 – no test material, no further development...

Steinberg’s SDKs provide a VST implementation for quite some operating systems; VSTHost, however, only works on Windows.

VSTHost can use the old-fashioned Windows Multimedia Extensions (MME) and DirectSound (DS) interfaces to exchange audio data with the sound card, or it can use an ASIO driver, if available.

What is ASIO?

“Okay, but what is ASIO?”, I hear some of you say… probably the ones who didn’t know “VST” ☺… well, let’s do a little history research again. If you already know what it means, just skip to the next section.

The term **ASIO**, again, was coined by Steinberg some years ago as an abbreviation for “**A**udio **S**treaming **I**nput **O**utput”. It defines a rather fast communication method between the audio hardware and an audio-processing program, such as a VST Host. An ASIO driver, if available, normally performs better than a MME driver, since it has considerably less overhead, allows multi-channel communication and so on.

More Information on VST, ASIO and PlugIns

The SDKs for Steinberg’s VST and ASIO Software Development Kits can be found on the Internet. When I last checked, they could be found at http://www.steinberg.net/en/company/developer.html .

An exhaustive, searchable list of PlugIn descriptions can be found at http://www.kvraudio.com .

What is VSTHost?

VSTHost is a program to run VST PlugIns. In contrast to the big programs (Cubase, Nuendo, Logic come to mind), it is not a full-fledged giant sequencer package that needs many seconds just to come up to a point where it can say “Hello”. It’s relatively small, and hopefully will stay so, and it *only* runs PlugIns. No sequencing (well, it can play back simple audio and MIDI files), no elaborate recording facilities (although it does have a simple multitrack recorder built in). To make up for that, you can define very complex PlugIn setups and switch between them easily.

Evolution

The main goal for VSTHost, in the beginning, was simply to provide a little test bed for VST PlugIn development, and to understand how VST works “under the hood”. By now, this goal has been reached; VSTHost can load nearly every PlugIn (it even occurs in the “list of compatible hosts” for quite some PlugIns, which I find rather flattering). If you want to perform some in-depth debugging, the full source code for a reduced version of VSTHost is available for download on my web site (see page 2 for details).

VSTHost is still evolving, however; the goal for now is to turn it into a valuable tool for performing artists in a live environment. Sort of a “super-synthesizer”, if you want.

What does it cost?

Aaaah, this is the point where money comes into play; I was never good at that ☺… basically, it’s free. The download version is not restricted in any way, and only show a nag screen once. Why encourage pirates to tinker with it?

In theory, it’s “donationware”, which means that you can download and use it; if you find it useful, it would be nice to register by sending a little bit of money to my PayPal account. There’s a “Donate” button on VSTHost’s web site for that. If that doesn’t work, sending to my PayPal account using office@hermannseib.com as receiver does the trick. I don’t insist on it, but it would be nice if you honored the countless hours I’ve invested into making this thing usable by donating a bit to the further development of VSTHost.

Installation

VSTHost is too simple (or too intelligently written? You decide ☺) to need an elaborate installation procedure. Simply copy the contents of the .zip file into a directory that suits you, eventually create a link to it in your start menu or on the desktop, and that's it.

In theory, this would make it possible to use VSTHost as "stickware" (i.e., software directly running from an USB stick); however, since it relies heavily on outside resources (audio cards, PlugIns, …), this can only be reached by restricting yourself to a very basic setup.

Requirements

To run VSTHost, you need at least the following:

- a contemporary computer with a Pentium II (or better) or Athlon processor with least 500MHz; the more, the better (actually, it does even work with an AMD K6-II at 300MHz, but only with *very* simple PlugIns, so this is not really recommendable);
- a fair amount of RAM; while 128MB should be sufficient for a minimalistic setup, 256MB are much better; for larger setups, 512MB or more are recommended; the sky is the limit ☺
- a sound card; while VSTHost works even with the measliest AC97 on-board chips, a modern card that can handle 24bit audio is recommended;
- Windows operating system; Windows 98, ME, NT4, 2000, XP, Vista, and 7 are supported. It also runs in an up-to-date WINE environment on x86-based Mac OS X or Linux, like the one used by the MediaStation (see http://www.lionstracs.com for that); while it does work, it is not a supported configuration..

Packages

One of the consequences of not using an installer is that there's more than one VSTHost package. In fact, at the time of writing, there are *seven* of them. Each has its own *raison d'être*, as detailed below.

The normal packages are:

vsthostx86.zip

This package contains a version of the main program that

- uses 32bit code, so it can run on any Windows starting with Windows 2000, on 32bit and 64bit Windows systems
- uses 32bit wide audio data

vsthostx64.zip

This package contains a version of the main program that

- uses 64bit code, so it can only run on a 64-bit Windows starting with Windows XP 64bit
- uses 32bit wide audio data

If you're running it on a 64bit system, it's a bit hard to decide whether using the x86 or the x64 version suits your purposes better. The main point to consider is this: which PlugIns are you mainly using? If it's mainly 32bit PlugIns, you should use the 32bit host; if, on the other hand, most of your PlugIns are 64bit, you should use the 64bit host. Each of the two can handle PlugIns of the other kind (see "Bridging" on page 34 for details), but that needs much more processing power and may introduce unwanted instabilities.

Slightly less normal variants are these:

dvsthostx86.zip

This package contains a version of the main program that

- uses 32bit code, so it can run on any Windows starting with Windows 2000, on 32bit and 64bit Windows systems
- uses 64bit wide audio data

dvsthostx64.zip

This package contains a version of the main program that

- uses 64bit code, so it can only run on a 64-bit Windows starting with Windows XP 64bit
- uses 64bit wide audio data

64bit audio data means that all internal audio paths in VSTHost are done in 64bit floating point. Normally, this is completely irrelevant, since (a) most PlugIns only process audio data in 32bit and (b) VSTHost doesn't do much with the data anyway. It just makes things slower, since twice as many data have to be moved around. But if you happen to have lots of PlugIns that can process 64bit audio data and want to go for the utmost sound fidelity, you can with these packages.

vsthostw98.zip

This package contains a version of the main program that

- uses 32bit code built with a rather old compiler, so it can run on any Windows starting with Windows 98, on 32bit and 64bit Windows systems
- uses 32bit wide audio data

Since V1.53, there's this separate package for Windows 98/ME, because I've switched the main VSTHost development environment to Visual Studio 2008 – and programs generated with that won't run on Windows 98/ME. The Win98 package is functionally nearly identical to the normal one, except for slight UI differences and some “under the hood” goodies that come for free with VS2008 (like Active Accessibility integration, for example).

The main difference is that the Win98 package doesn't contain the 64bit bridge program, since that's impossible to use in Windows 98/ME anyway. The Win98 package ***does*** run in newer operating systems, however – so, if you want to run it in a 64-bit Windows environment, you can simply copy vsthostbridge64.exe from the normal version.

Another difference, if you're running this on Windows Vista or later versions, is that the Windows 98 version has no embedded UAC settings, so it's treated differently. This may help with older PlugIns which use bad practices like storing files in the Windows system directories or in parts of the registry which normal programs shouldn't touch.

I haven't tried whether WINE requires the Win98 version, too, but it's easy to find out – if so, the now normal VSTHost refuses to start and requests you to “install a newer operating system”.

And then there are the “completely abnormal versions”:

tvsthostx86.zip

This package contains a version of the main program that

- uses 32bit code, so it can run on any Windows starting with Windows 2000, on 32bit and 64bit Windows systems
- uses 32bit wide audio data
- writes out a trace file detailing its activities

tvsthostx64.zip

This package contains a version of the main program that

- uses 64bit code, so it can only run on a 64-bit Windows starting with Windows XP 64bit
- uses 32bit wide audio data

- writes out a trace file detailing its activities

Both of these packages are only intended for debugging purposes. I can't easily jet around the globe each time somebody has a peculiar problem that only comes up on his or her machine, or with a commercial PlugIn. In such a case, producing a set of trace files and sending them to me (.zipped, for heaven's sake! These things are *huge*!) can be a great help to fix the problem.

Attention: these packages also contain tracing bridge programs, so you shouldn't mix them with the normal packages.

Additional useful packages

If your sound card came without an ASIO driver (obviously created with game players in mind instead of musicians), you might try to use Michael Tippach's ASIO4ALL driver, which can be found at, surprise, surprise, http://www.asio4all.com – it can work wonders compared to the MME and DirectX drivers that are normally provided with the sound cards.

That's it – there isn't more to it. Unless you used a very early VSTHost version; in this case…

Attention Upgraders!

Starting with V1.43, VSTHost doesn't store its settings in the registry any more. Instead, it uses a "Data" directory for storing information, such as performance banks, recordings, global initialization files and the like. If you just downloaded and installed VSTHost for the first time, that's no problem – the distribution comes with a populated "Data" sub-directory, and VSTHost defaults to using the path where it is installed, with an appended "\Data", so everything just starts up nicely.

For long-term users, the situation isn't so simple, since their settings are already stored in the registry. In previous versions, VSTHost contained startup code that automatically corrected such things, but in the meantime this means *quite* some code that isn't normally needed, so I decided to move it into a separate program. Starting with V1.43, the VSTHost package includes a little helper program called **vsthostregclean**. Simply double-click on this in the Explorer, and it should transfer all your registry settings into the corresponding files (and clean up the registry while doing so).

If you're upgrading from a version >= V1.43, you should *still* execute vsthostregclean, as it also corrects settings that are different from previous versions.

The Slave mode settings are a completely different subset in the registry, so if you previously used VSTHost in Slave mode, you'll have to append the command line parameter **/slave** to vsthostregclean. The easiest way to do this, from my point of view, is to open a command prompt, CD to the VSTHost installation directory, and issue the command, like

```
C:\Program Files\VSTHost>vsthostregclean /slave
```

Mouse junkies can right-click on vsthostregclean.exe, select "Create Link" (or whatever that's called in your local version of Windows) to create a link, then modify the link's properties to include the **/slave** parameter on the invoked program's command line, save the new properties, and then double-click on the link (and remove the link again, since this is a one-time operation).

If you're also using the Open Source variant of VSTHost, vsthostregclean has the unfortunate side effect of removing all the settings for this one, too; for such an environment, you can pass the additional parameter **/keep** to vsthostregclean so that it doesn't remove the **Settings** and **Load** sub-keys from the registry after having copied them.

Then, there's one more possible parameter – this deals with the fact that in previous versions VSTHost used its own file name (normally "VSTHost") as its start point in the registry. If you renamed VSTHost (or created a hardlink for it), the key in the registry isn't VSTHost, either. For such situations, you can append the parameter **/app=*appname*** so that vsthostregclean uses *appname* instead of “VSTHost” for its operation.

That’s it – there isn’t any more to it. Simply start VSTHost for the next task:

Configuration

When you start VSTHost for the first time, it comes up with a minimal configuration. A “deaf, dumb, and blind kid”, as The Who would have called it. You’ll see a window like this (the exact look, of course, is determined by your Windows setup):

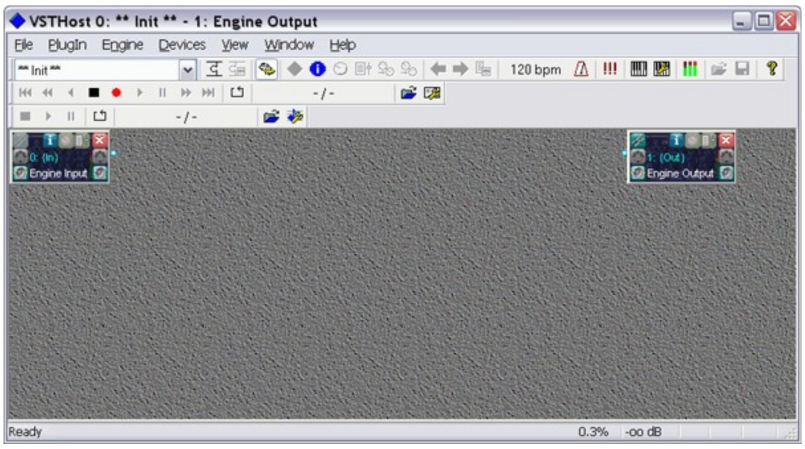

VSTHost 0: ** Init ** - 1: Engine Output
File PlugIn Engine Devices View Window Help
** Init **
120 bpm
0: (In)
Engine Input
1: (Out)
Engine Output
Ready
0.3%
-oo dB

Figure 1: Initial VSTHost window

Hmmm. Well. OK. So what does that mean…? Let’s start with the obvious first task:

Audio Configuration

When VSTHost comes up the first time, it doesn’t know anything about the computer’s configuration. Being rather conservative in its views, it doesn’t preload any specific driver. In Windows systems, there’s something called the **Wave Mapper** device. The user can predefine an audio device as the default device – the thing that is used whenever Windows needs to issue a “Ping!” or “Bleep!” or “Whoop!” to indicate certain conditions. VSTHost preloads this standard device as its Audio output device, and that with a very large buffer size. This is probably the worst possible solution – but one that’s practically guaranteed to work.

To set up a better configuration, we have to enter the **Wave Device Settings** dialog by choosing its menu entry:

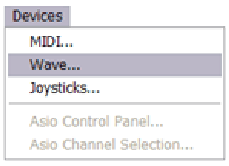
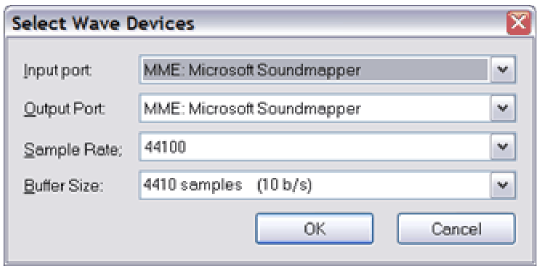


Figure 2: Wave Device Settings menu entry

… which opens the following dialog:


Select Wave Devices

Input port: MME: Microsoft Soundmapper

Output Port: MME: Microsoft Soundmapper

Sample Rate: 44100

Buffer Size: 4410 samples (10 b/s)

OK Cancel

Figure 3: Wave Device Selection Dialog

Here, the wave devices used by VSTHost can be defined. The combo boxes contain the possible devices. As you can see, the Wave Mapper is preselected (and loaded), with a large buffer size. At 44.1kHz, which VSTHost uses with MME devices, this means that it processes audio at a rate of 10 buffers per second. This buffer size should work even on the slowest computers, but it doesn't allow real-time operation. So, we'd better redefine that setup to the best possible for the computer at hand.

The devices listed in the combo boxes all have a prefix, either **MME:** for Windows Multimedia Extensions drivers, or **DSound:** for DirectSound drivers (DirectSound5 at the moment – doesn't work well in Vista or 7. Be warned.), or **ASIO:** for ASIO drivers.

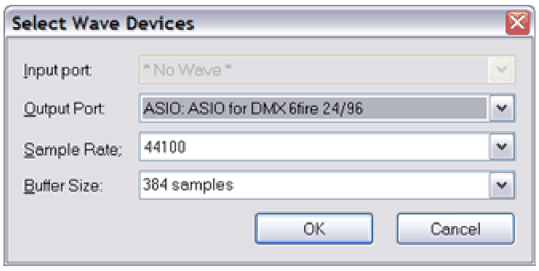
The **Input port** combo box shows all available input devices. This box will never contain ASIO drivers; since ASIO drivers combine the operation of input and output drivers, they are only listed in the **Output Port** combo box. Whenever an ASIO driver is selected in the Output Port box, the Input Port box is grayed out to reflect the fact that ASIO doesn't need a separate Input port.

The **Output Port** combo box shows all available output devices. If it should be empty, your computer doesn't have (or doesn't think it has; Windows 98 sometimes works in mysterious ways ☺) any sound card. In this case, VSTHost can still be used to load and debug PlugIns, but you won't hear anything, which makes it a kind of useless intellectual exercise for most of us.

You should select the best possible combination for your computer; with Windows NT, there's not much choice, since there are not many ASIO drivers for NT floating around (read that as: zero). ASIO4ALL doesn't work, since NT4 doesn't follow the WDM driver model, so your choice will probably be rather limited. In general, you should always take the drivers that are closest to the hardware; in audio processing applications, speed really counts, and avoidable overhead is bad. If an ASIO driver is available for your sound card, take it; it will provide the best performance in most cases… with a notable exception: if you have Cubase or Nuendo installed, they installed an ASIO emulation driver called "ASIO Multimedia Driver", which adds a layer *above* the Windows MME driver. Avoid this ASIO driver whenever possible (it always *is*, since VSTHost can handle the MME driver itself), it gives a horrible performance.

The **Sample Rate** combo box allows to select between various available sample rates, if the configured output driver allows them; VSTHost tries its best to determine what the driver can do and what not, but this doesn't always work out – some drivers happily report that they can playback at 192kHz, although they can't even do 88.2kHz. Also, most ASIO drivers rely on the **ASIO Control Panel** to determine the sample rate. In these cases, the combo box will hold exactly one possible value.

The **Buffer Size** combo box lets you select between some buffer sizes; these are carefully selected for their property that their multiples exactly fit into one second at 44.1kHz. Now, that may be nice, but… first of all, 44.1kHz isn't mandatory for ASIO drivers, and some of these mandate other buffer sizes. Therefore, apart from the predefined values, you can enter any (reasonable) buffer size you want into this combo box.
Here's how a sample configuration looks like (this PC uses a Terratec DMX 6fire 24/96 card):


Select Wave Devices

Input port: * No Wave *

Output Port: ASIO: ASIO for DMX 6fire 24/96

Sample Rate: 44100

Buffer Size: 384 samples

Figure 4: Setup for Terratec DMX 6fire 24/96

Experiment with the buffer size; if it is too large, you'll hear noticeable delays between the triggering of a note and its actual appearance at the speakers. If it is too small, the overhead introduced by the frequent buffer handling might become too much for your poor little computer; in that case, it starts to skip processing some buffers since it doesn't have enough *time* for it. This results in an occasionally audible crackling noise. In this case, increase the buffer size until it goes away.

Note: if you're switching from an MME or DirectSound driver to ASIO4All, take care. The ASIO4All driver might try to open the device you just closed, and there are some drivers that don't like this – they need a little time to pass before re-opening them works. So, in this case, it's better to select "* No Wave *" for Input and Output Port, close the dialog, reopen it, and *then* select ASIO4All as output driver. This should work with all audio drivers, even if they're poorly written.

Once you have configured an ASIO driver, the following two menu entries can be used:

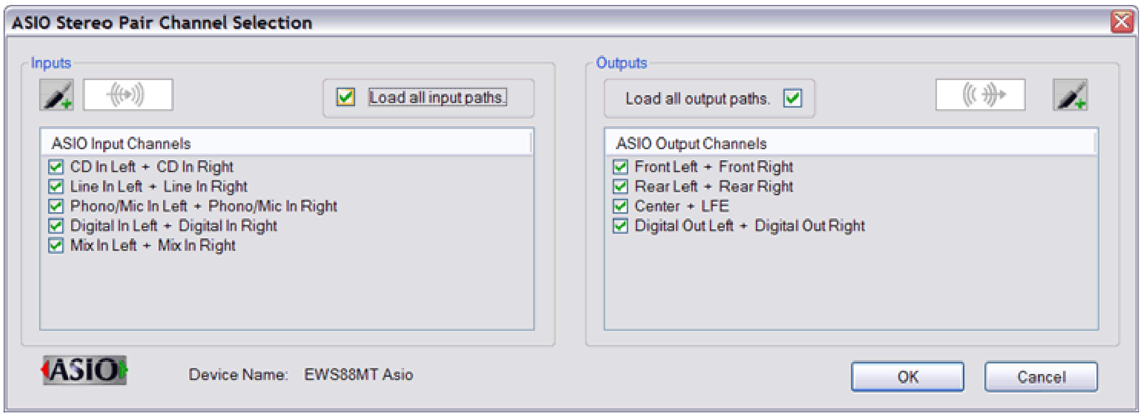
ASIO Control Panel

Here, you can call up the selected ASIO Driver's configuration panel. This varies greatly between the various drivers and is not part of VSTHost. The VSTHost audio engine is stopped while the ASIO Control Panel is open(ed – depending on the driver, this may or may not be a synchronous operation).

ASIO Channel Selection

Normally, VSTHost operates with as many channels as the Wave device drivers permit. If you only need specific channels, however, you can use this to select a subset of the available stereo pairs to use.

Selecting the menu entry brings up the following dialog:


ASIO Stereo Pair Channel Selection

Inputs

☑ Load all input paths.

ASIO Input Channels
- ☑ CD In Left + CD In Right
- ☑ Line In Left + Line In Right
- ☑ Phono/Mic In Left + Phono/Mic In Right
- ☑ Digital In Left + Digital In Right
- ☑ Mix In Left + Mix In Right

Outputs

Load all output paths. ☑

ASIO Output Channels
- ☑ Front Left + Front Right
- ☑ Rear Left + Rear Right
- ☑ Center + LFE
- ☑ Digital Out Left + Digital Out Right

Device Name: EWS88MT Asio

Figure 5: ASIO Channel Selection Dialog

Checking the "Load all input / output paths" boxes sets the normal behavior of using all possible channels. If unchecked, you can select any possible combination (deselecting all restores the default). This can save quite a lot of precious CPU cycles.

OK, we've set up our Wave devices… so now what?

MIDI Configuration

If you're only using VSTHost to load some VST Effects, you don't need this step. Most effects don't rely on MIDI communication. VST Instruments, however, need MIDI data. While VSTHost has a built-in keyboard bar (see "Keyboard Bar" on page 77 for details) that allows you to trigger MIDI notes with the mouse, this can't really be considered a good solution; an external keyboard (the one with the black and white keys, not your computer's ☺) is far superior. To tell VSTHost how to find this external keyboard, you have to define the MIDI devices it should use. So, open the **MIDI Device Configuration** dialog by choosing its menu entry:

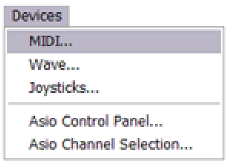
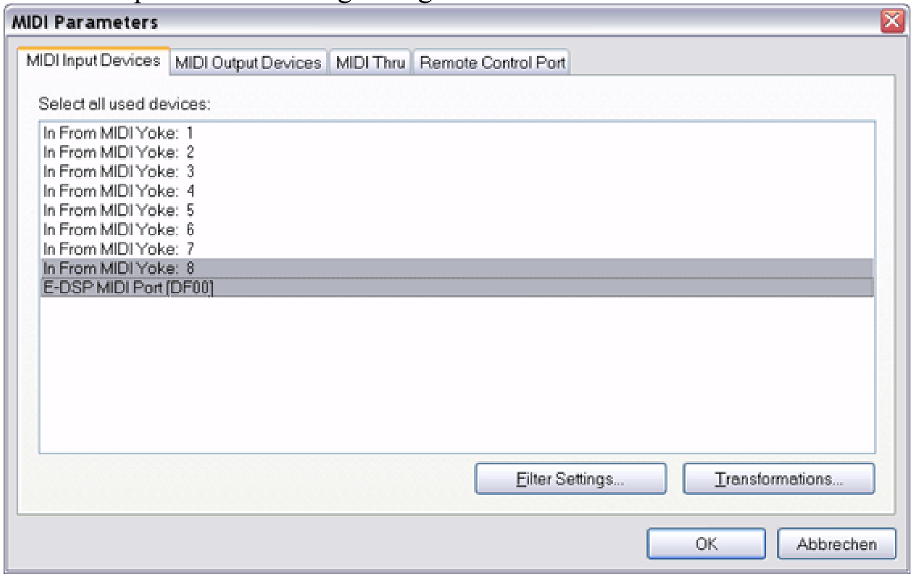


Figure 6: MIDI Device Settings menu entry

… which opens the following dialog:



Select all used devices:

In From MIDI Yoke: 1
In From MIDI Yoke: 2
In From MIDI Yoke: 3
In From MIDI Yoke: 4
In From MIDI Yoke: 5
In From MIDI Yoke: 6
In From MIDI Yoke: 7
In From MIDI Yoke: 8
E-DSP MIDI Port [DF00]

Figure 7: MIDI Device Configuration Dialog

Now *this* is a more complex dialog. It has 4 tabs to define all necessary parameters. Let's start from left to right:

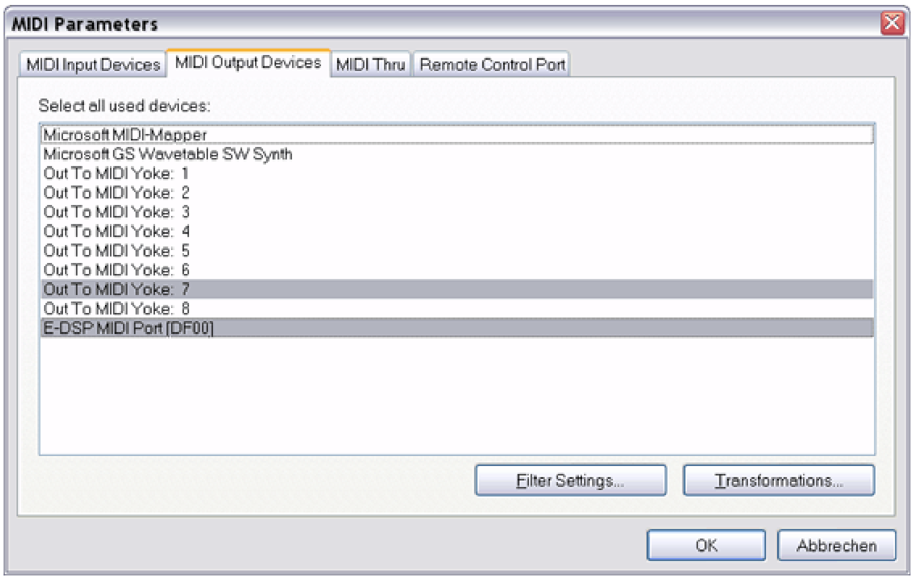
MIDI Input Devices

This tab is shown in the above figure, so have a look at it there. Here, you can select the MIDI Input Device(s) that VSTHost should use. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

The "**Filter Settings...**" button opens a dialog where you can define MIDI Input filters. Filters set on the **MIDI Input Devices** tab are *global* filters; they act on all incoming MIDI messages, no matter where they come from or where they go to, and before anything else sees them.

The "**Transformations...**" button opens a dialog where you can define MIDI Input transformations. Transformations set on the **MIDI Input Devices** tab are *global* filters; they act on all incoming MIDI messages, no matter where they come from or where they go to, and before anything else sees them, unless they have been filtered. See "Filter Settings and Transformations" on page 42 for details.

MIDI Output Devices



Select all used devices:

Microsoft MIDI-Mapper
Microsoft GS Wavetable SW Synth
Out To MIDI Yoke: 1
Out To MIDI Yoke: 2
Out To MIDI Yoke: 3
Out To MIDI Yoke: 4
Out To MIDI Yoke: 5
Out To MIDI Yoke: 6
Out To MIDI Yoke: 7
Out To MIDI Yoke: 8
E-DSP MIDI Port [DF00]

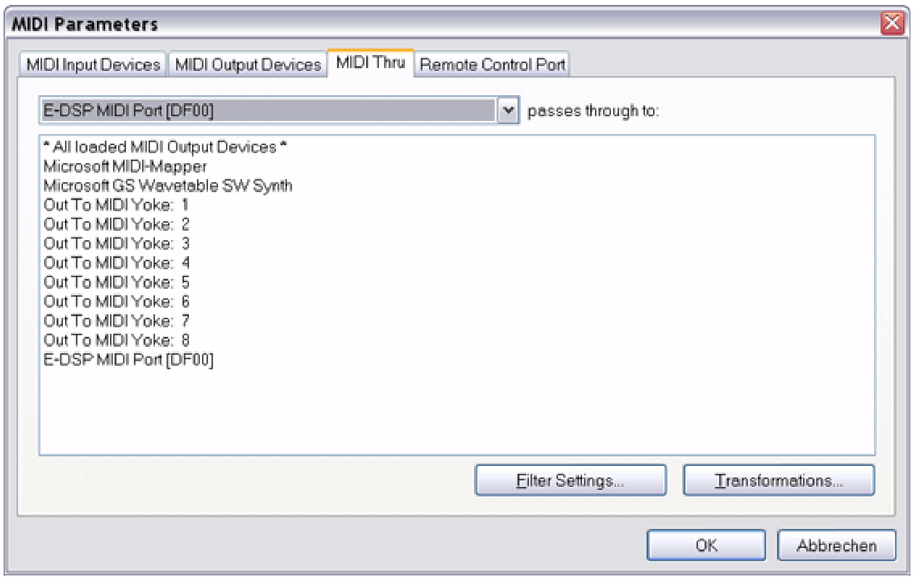
Figure 8: MIDI Output Device selection

Here, you can select the MIDI Output Device(s) that VSTHost should use. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

The "**Filter Settings...**" button opens a dialog where you can define MIDI Output filters. Filters set on the **MIDI Output Devices** tab are *global* filters; they act on all MIDI messages coming from VSTHost itself, no matter where they come from.

The "**Transformations...**" button opens a dialog where you can define MIDI Output transformations. Transformations set on the **MIDI Output Devices** tab are *global* filters; they act on all MIDI messages coming from VSTHost itself, no matter where they come from, unless they have been filtered. See "Filter Settings and Transformations" on page 42 for details.

MIDI Thru



E-DSP MIDI Port [DF00] passes through to:

* All loaded MIDI Output Devices *
Microsoft MIDI-Mapper
Microsoft GS Wavetable SW Synth
Out To MIDI Yoke: 1
Out To MIDI Yoke: 2
Out To MIDI Yoke: 3
Out To MIDI Yoke: 4
Out To MIDI Yoke: 5
Out To MIDI Yoke: 6
Out To MIDI Yoke: 7
Out To MIDI Yoke: 8
E-DSP MIDI Port [DF00]

Figure 9: MIDI Thru Definitions

Here, you can define VSTHost's "Soft MIDI Thru" behavior. Since PC sound cards normally don't have a MIDI Thru connector, the software has to provide it. Since VSTHost can load multiple MIDI input and output devices, a general MIDI Thru setting would be inappropriate; it might even lead to

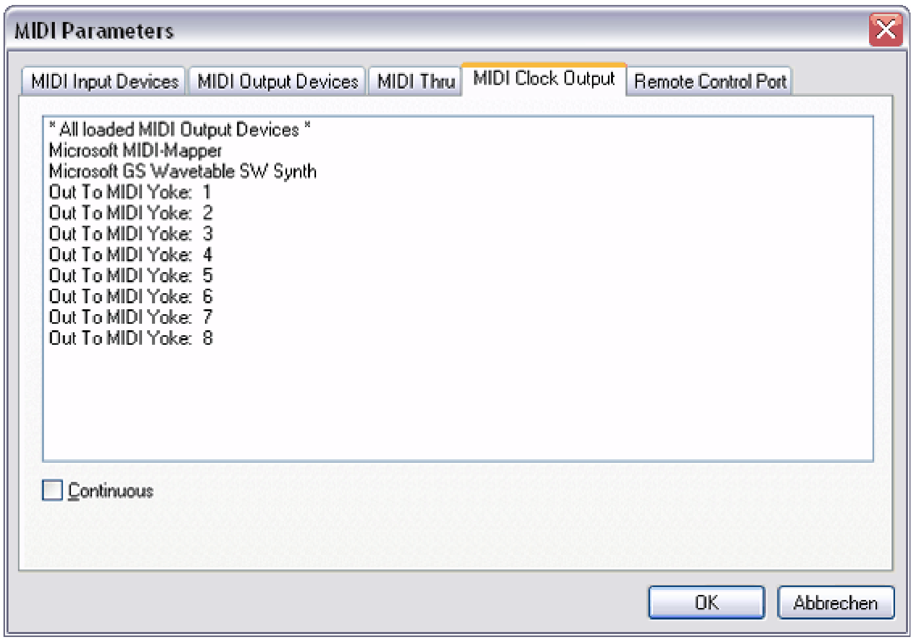
MIDI feedback loops. Therefore, you can separately define the MIDI Output devices for each MIDI Input device that it forwards incoming MIDI messages to. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific selection, control-click on it.

Note: while you can define as many combinations as you like, VSTHost doesn't remember them all (spoilsport that it is). When you close the dialog, it loads all configured devices and their MIDI Thru settings. All MIDI Thru settings for devices that are *not* loaded (either because they haven't been selected or because they could not be loaded for some reason) are lost.

The "**Filter Settings...**" button opens a dialog where you can define MIDI Thru filters. Filters set on the **MIDI Thru** tab are *global* filters; they act on all MIDI messages that are passed thru from MIDI In before they are sent to the target device(s).

The "**Transformations...**" button opens a dialog where you can define MIDI Thru transformations. Transformations set on the **MIDI Thru** tab are *global* filters; they act on all MIDI messages that are passed thru from MIDI In before they are sent to the target device(s), unless they have been filtered. See "Filter Settings and Transformations" on page 42 for details.

MIDI Clock Output



* All loaded MIDI Output Devices *
Microsoft MIDI-Mapper
Microsoft GS Wavetable SW Synth
Out To MIDI Yoke: 1
Out To MIDI Yoke: 2
Out To MIDI Yoke: 3
Out To MIDI Yoke: 4
Out To MIDI Yoke: 5
Out To MIDI Yoke: 6
Out To MIDI Yoke: 7
Out To MIDI Yoke: 8

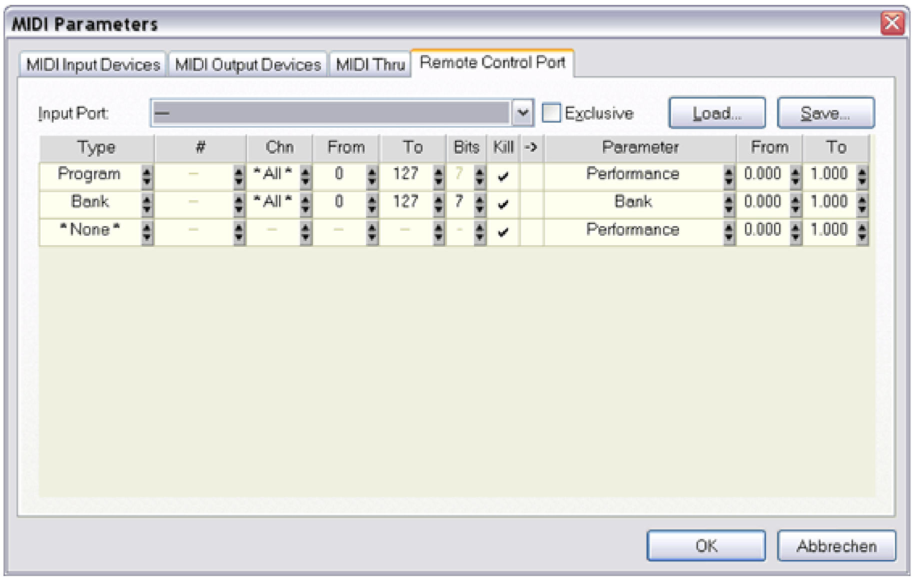
☐ Continuous

Figure 10: MIDI Clock Output Definition

Here, you can define whether VSTHost sends out MIDI Clock signals. Since VSTHost can load multiple MIDI input and output devices, a general MIDI Clock Output setting would be inappropriate. Therefore, you can define the MIDI Output devices it sends MIDI Clock messages to. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific selection, control-click on it.

Normally, VSTHost sends MIDI Clock signals only while playing a MIDI sequence; if the **Continuous** box is checked, MIDI Clock messages are sent out continuously, not only between Start/Continue and Stop.

Remote Control Port



Input Port: ---   Exclusive ☐

Type	#	Chn	From	To	Bits	Kill	->	Parameter	From	To
Program	--	*All*	0	127	7	✓		Performance	0.000	1.000
Bank	--	*All*	0	127	7	✓		Bank	0.000	1.000
None	--	--	--	--	-	✓		Performance	0.000	1.000

Figure 11: Remote Control Port/Channel Definition

Here, you can define VSTHost's *Remote Control*. In addition to passing MIDI messages to the loaded PlugIns, VSTHost can be remotely controlled by MIDI messages, too. Here, you can define a MIDI Input Port (mental note to self: *finally* decide on "port" or "device" nomenclature!) that controls VSTHost. It has to be one of the devices selected on the **MIDI Input Devices** tab, otherwise VSTHost simply ignores the settings when you close the dialog. The default setting of "---" means that there's no Remote Control port.

Below the port, you can configure the action for each of VSTHost's settings that is remote-controllable; this, I have to admit, is a rather complicated list. This list is of the same type as the one used in the **MIDI -> Parameter Mapping** window (see "MIDI -> Parameter" on page 48 for details on editing it); the difference is that the **From** and **To** settings on the **Parameter** side represent the full range for the parameter (given below) expressed as a floating-point value in range 0.0 .. 1.0. Unless you're really sure what you're doing, it is probably a good idea to leave these settings alone.

Currently, the following VSTHost parameters can be remotely controlled:

Parameter	**Type**	**Range**	**Comment**
Performance	Numeric	0-127	Selects one of the 128 possible performances in the current bank (see "Load" on page 61 for details).
Bank	Numeric	0-16383	Selects one of the 16384 possible banks (see "Use Bank…" on page 30 for details).
Full Rewind Rewind Play Backwards Stop Record Play Pause Forward Full Forward	Switch	0-1	These parameters correspond to the transport buttons in the built-in Wave Player and Recorder (see "Recorder" on page 69 for details). Any incoming value maps to a value below 0.5 is ignored; those that *do* map to 0.5 and above (e.g., incoming value 127 for a 7-bit MIDI CC) trigger the corresponding action.
MIDI Stop MIDI Play MIDI Pause	Switch	0-1	These parameters correspond to the transport buttons in the built-in MIDI Player (see "MIDI Player" on page 72 for details). Any incoming value maps to a value below 0.5 is ignored; those that *do* map to 0.5 and above (e.g., incoming value 127 for a 7-bit MIDI CC) trigger the corresponding

			action.
BPM	Numeric	1-280	Can be used to set the VST engine’s BPM value. Please note that a 7-bit controller can not access all possible BPM values – a 14-bit controller, however, can.
Master Output	Numeric	-60..+10dB	Can be used to set the VST engine's master output level.
Master Input	Numeric	-60..+10dB	Can be used to set the VST engine's master input level.
Next Performance	Switch	0-1	Selects the next performance in the current bank. Any incoming value maps to a value below 0.5 is ignored; those that *do* map to 0.5 and above (e.g., incoming value 127 for a 7-bit MIDI CC) trigger the action.
Previous Performance	Switch	0-1	Selects the previous performance in the current bank. Any incoming value maps to a value below 0.5 is ignored; those that *do* map to 0.5 and above (e.g., incoming value 127 for a 7-bit MIDI CC) trigger the action.

All MIDI messages that are translated into Remote Control operations are swallowed by VSTHost; all others are passed to the VST host engine’s MIDI processing so that the currently loaded PlugIns can use them.

Joystick Configuration

This, obviously, can only be done if at least one joystick or game pad is installed in your system. If you have, you can use the joystick(s, up to 2 can be used) to generate MIDI messages for the loaded PlugIns and/or MIDI Out ports. The joystick handling defaults to no processing at all; so, if you want to use your joystick(s) in VSTHost, open the **Joystick Configuration** dialog by selecting its menu entry:

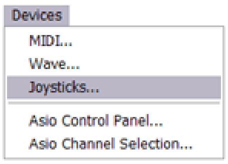
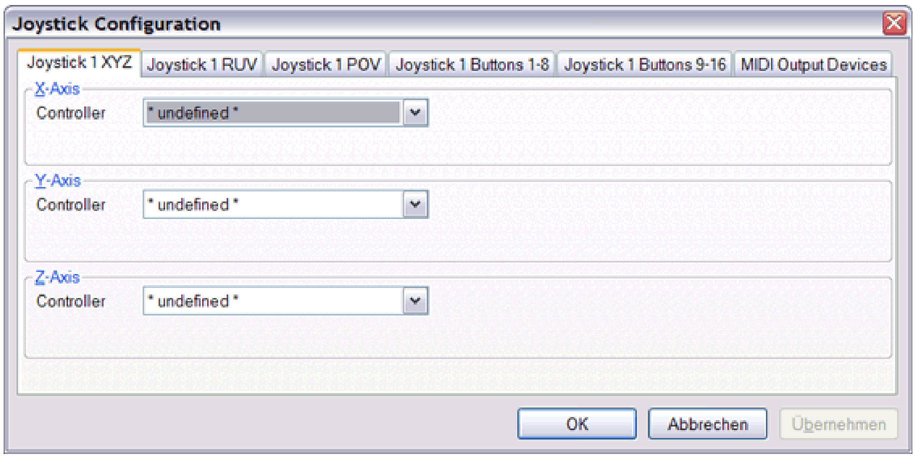


Figure 12: Joystick Configuration menu entry

This opens the following dialog:



X-Axis
Controller: * undefined *

Y-Axis
Controller: * undefined *

Z-Axis
Controller: * undefined *

Figure 13: Joystick Configuration dialog

This is one of the many tabbed dialogs in VSTHost; here, a number of tabs appear for each attached joystick. It depends on the joystick capabilities which ones really appear.

Note: VSTHost only loads the joystick properties once when it starts; Joysticks that are attached or detached while the program is running are not considered in this dialog.

Joystick *n* XYZ

The above tab allows the definition of a joystick's X, Y, and Z axes. These axes normally send *analog* data (well, not really… they're quantized to 0-65535) to allow a wide range of possible positions. Only the axes that are available are displayed. Each of the combo boxes contains the same entries:

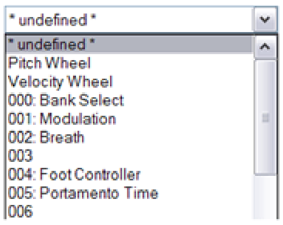


Figure 14: Target MIDI message (partial)

Here, you can select the type of message that is generated. Nearly all of them are MIDI messages that are routed to PlugIns and/or MIDI Output ports, with one notable exception: the **Velocity Wheel** is part of the MIDI Keyboard Bar (see "Keyboard Bar" on page 77 for details).

Once you select a message type, fields defining additional properties appear:

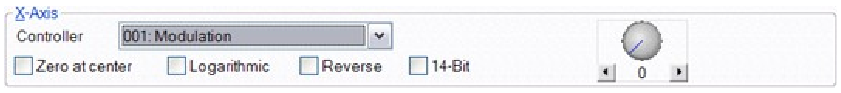


Figure 15: Axis / Controller Properties

The check boxes have the following meaning:

Zero at center	This is mainly interesting for self-centering joystick axes. If this check box is selected, the stick's center position is interpreted as the zero position, and moving the stick in one of the both possible directions increases the value up to the maximum position. If it is not selected, the leftmost (or topmost, for the Y axis) position of the stick is interpreted as the zero position, and the rightmost (or bottommost, for the Y axis) position is the maximum position.
Logarithmic	Here, you can define whether the stick's output is interpreted as a linear or logarithmic value. "Logarithmic" means that moving the stick in the lower value area means much finer changes in the MIDI output value than in the higher value area. This can be useful if your joystick is of the "nervous" kind; VSTHost uses a relatively generous "center" area, which is interpreted as 0, if **Zero at center** is checked. Some joysticks, however, generate values outside that area, or the values jump around even if you don't touch the thing. In this case, it can be very useful to check **Logarithmic**, since this means that variations near the center area have much less effect. It can also be interesting for Pitch Wheels, for example, to add a bit of dynamics.
Reverse	This setting reverses the highest and lowest position. This is mainly useful for the Y axis, where the joystick specification defines that the topmost position has the lowest value, and the bottommost position has the highest value – which is precisely the opposite of what you'd expect for a pitch wheel, for example ☺.
14-Bit	Depending on which controller is selected (000-031, (N)RPN, you can also define whether the stick sends 7-bit or 14-bit MIDI messages.

The little knob on the right can be used to determine the MIDI channel (numbered 0..15 here) used.

If you select **101: RPN MSB**, the following combo box appears:

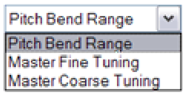


Figure 16: RPN Parameter selection

Here, you can define which of the defined Registered Parameter Numbers is used.

If you select **99: NRPN MSB**, an additional knob appears:

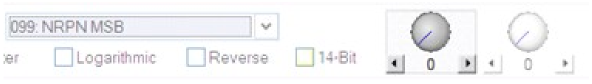


Figure 17: NRPN Parameter selection

Here, you can select the Non-Registered Parameter Number (0-16383).

Joystick *n* RUV

This tab allows the definition of a joystick's R(udder), U, and V axes. Only the axes that are available are displayed. The possibilities are identical to those on the **Joystick *n* XYZ** tab, so I won't repeat them here.

Joystick *n* POV

This tab can be used to define the joystick's **Point-Of-View** controller, also called "coolie hat" sometimes. The following tab is displayed:

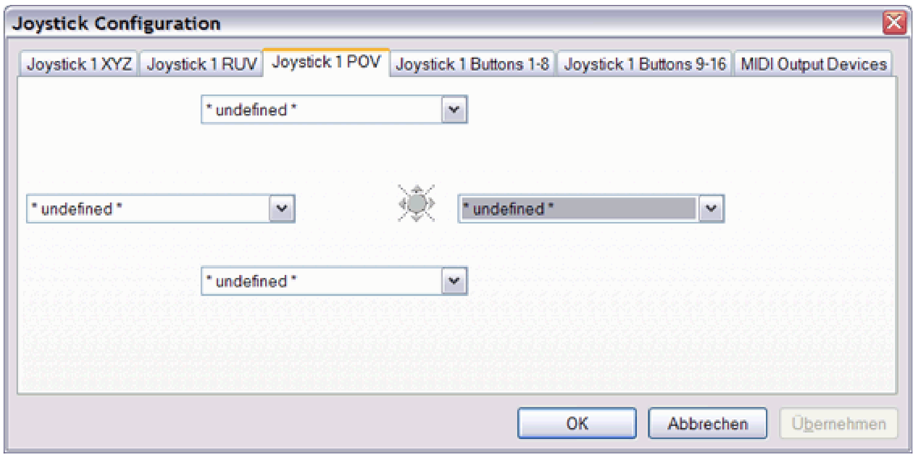


Figure 18: Joystick *n* POV Configuration tab

This little knob, normally sitting on top of the stick, is a *digital* device, like the buttons described below. It can normally be moved into 8 possible positions (besides the center position): up, up+right, right, right+down, down, … you get it. Putting it into one of the combined positions can be used to emit up to 2 MIDI messages at once. Each of the combo boxes contains the same entries:

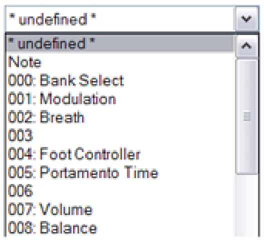


Figure 19: POV Target MIDI Message (partial)

As you can see, there are less possibilities here than on the analog axes described above; since the POV controller is effectively just a set of 4 buttons that are either on or off, it makes no sense to use it as, for example, a controller for pitch wheels.

Once you select a message type, fields defining additional properties appear:

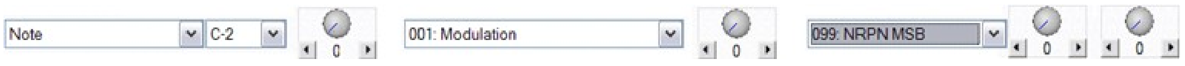
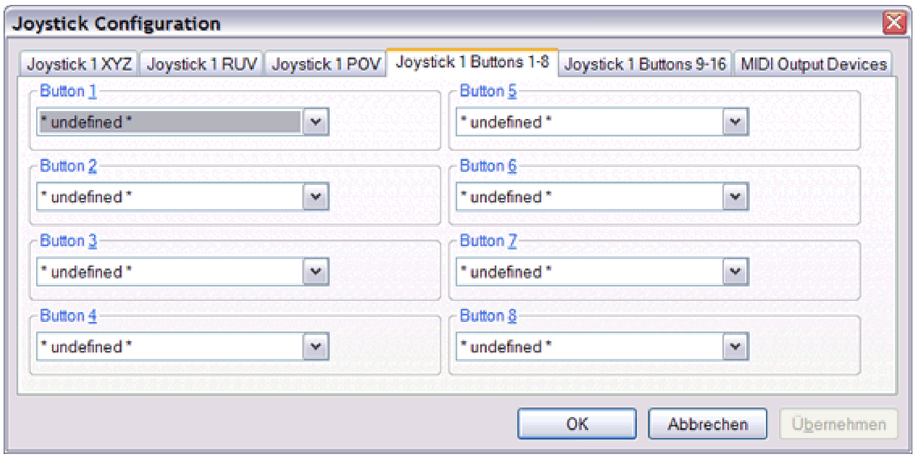


Figure 20: POV Controller Properties

If Note is selected, an additional combo box appears where you can select the note number. This note will be turned on if you activate the POV button and turned off if you release it. The (right, for NRPNs) knob defines the MIDI channel (range 0..15 here); the left knob (NRPNs only) defines the Non-Registered parameter number (0..16383), just like in the analog axes described above. RPNs are not used for joystick buttons; none of them makes any sense for an on-off type of message. Also, the various options available for the analog axes are not implemented for the POV buttons (I mean, how much sense does it make to send “Off” or “On” with 14-bit resolution? ☺).

Joystick *n* Buttons *m-n*

This tab can be used to define a set of the joysticks’ buttons. The number of these tabs is defined by the number of buttons on the joystick (up to 32, although I’ve never seen one with that many buttons). The following tab is displayed:



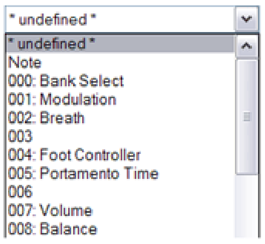
Joystick Configuration

Joystick 1 XYZ | Joystick 1 RUV | Joystick 1 POV | Joystick 1 Buttons 1-8 | Joystick 1 Buttons 9-16 | MIDI Output Devices

Button 1: * undefined *
Button 2: * undefined *
Button 3: * undefined *
Button 4: * undefined *
Button 5: * undefined *
Button 6: * undefined *
Button 7: * undefined *
Button 8: * undefined *

Figure 21: Joystick Button Configuration tab

Only the buttons that are available are displayed. Each of the combo boxes contains the same entries:



* undefined *
* undefined *
Note
000: Bank Select
001: Modulation
002: Breath
003
004: Foot Controller
005: Portamento Time
006
007: Volume
008: Balance

Figure 22: Button Target MIDI Message (partial)

As you can see, there are less possibilities here than on the analog axes described above; since a joystick button can only be either on or off, it makes no sense to use it as, for example, a controller for pitch wheels.

Once you select a message type, fields defining additional properties appear:

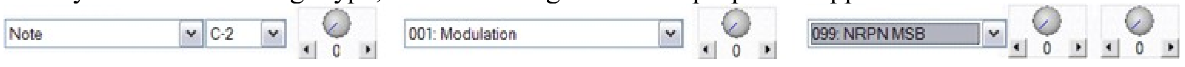
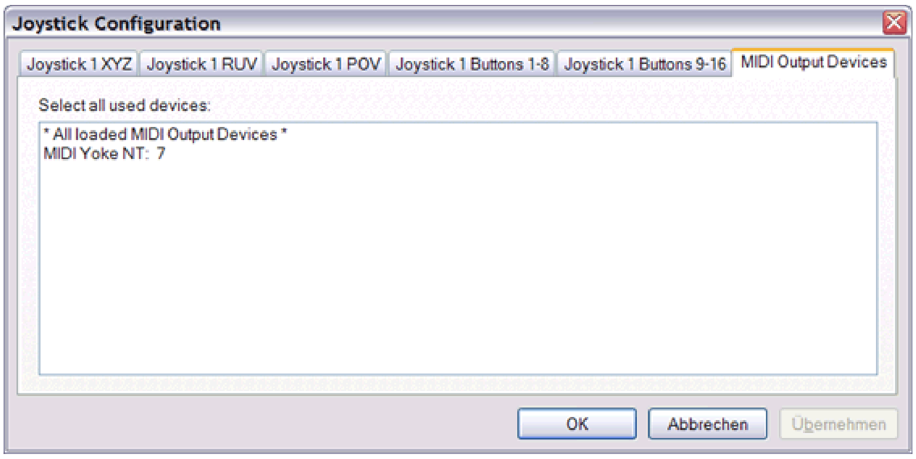


Figure 23: Button Controller Properties

If Note is selected, an additional combo box appears where you can select the note number. This note will be turned on if you activate the button and turned off if you release it. The (right, for NRPNs) knob defines the MIDI channel (range 0..15 here); the left knob (NRPNs only) defines the Non-Registered parameter number (0..16383), just like in the analog axes described above. RPNs are not used for joystick buttons; none of them makes any sense for an on-off type of message. Also, the various options available for the analog axes are not implemented for buttons (I mean, how much sense does it make to send “Off” or “On” with 14-bit resolution? ☺).

MIDI Output Devices

Here, you can define the MIDI Output device(s) that the joysticks send their data to. The following tab is displayed:



Select all used devices:

* All loaded MIDI Output Devices *
MIDI Yoke NT: 7

Figure 24: MIDI Output Devices tab

This tab is always available. Normally, the joysticks don’t send MIDI data to the MIDI Output ports; if you want to, you can configure it here. The list box displays all loaded MIDI Output devices. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

Other Configuration Tasks

While there are quite some other things that can be configured in VSTHost, they are not installation-related, so they’ll be described later, when it is appropriate.

Operation

Command line parameters

Just to prevent mouse junkies from going “Eeeek!” – no, VSTHost is not a command line oriented text program, it is GUI-oriented; but you can give it some command line parameters for special occasions. So, let’s describe them in a good old-fashioned style…

Syntax

```
VSTHost [/option]* [PlugIn]
```

The []’s mean that all parameters are optional. If the command line parameter starts with a ‘/’ or ‘-‘, it is treated as an *option*. The ‘*’ means that more than one option can be given. Here’s the meaning of all possible parameters, in alphabetical order:

/automidi	If no MIDI devices are configured, this setting forces VSTHost to load the first configured MIDI input and output device.
/bank=*n*	Forces VSTHost to load the bank with the number given instead of the one last stored in the .ini file. ***N*** can be any number in range -1 to 16383. See “Use Bank…” on page 30 for the bank concept in VSTHost.
/forceBridged	Sets the default bridging mode to “force bridged” (see “Bridging” on page 34 for details)
/forceJBridged	Sets the default bridging mode to “force bridging using jBridge” (see “Bridging” on page 34 for details)
/fullscreen	Forces VSTHost to come up in full-screen mode (for that extra bit of screen estate). In this mode, the menu is only accessible as a pop-up context menu.
/hidden	Forces VSTHost to come up with a hidden main window; this is a *very* special option that should not be used unless you really know what you're doing.
/maxchn=*n*	Normally, VSTHost's audio engine uses a maximum of 32 for the number of channels. That's sufficient for most configurations; sometimes, however, this limit may be too low. With this parameter, the maximum number of channels can be set to anything between 2 and 256.
/noasio	Forces VSTHost to ignore all ASIO drivers. This can help to determine the cause if VSTHost inexplicably dies while initializing (see **/noaudio** below).
/noaudio	Forces VSTHost to come up without any loaded audio driver. This can help to determine the cause if VSTHost inexplicably dies while initializing. At least in one case, VSTHost tried to load a (still installed) driver for a sound card that was *removed* from the computer – bang…
/nodsound	Forces VSTHost to ignore all DirectSound audio drivers. This is mainly interesting as a diagnosis aid if you experience strange problems when VSTHost starts. In a Linux / wineasio environment, it is automatically assumed, since the DirectSound device capabilities detection routine in VSTHost obviously doesn’t work correctly in a WINE environment.
/noexc	Forces VSTHost to run in a less secure mode. Normally, exceptions generated by badly behaving PlugIns (and VSTHost itself) are caught at various points in VSTHost, and it tries its best to recover as gracefully as possible. If something *really* goes wrong, VSTHost tries to perform an orderly shutdown (close all opened audio and MIDI devices, then stop). Sometimes, under mysterious conditions, this can lead to problems; in this case, you can try to disable this outermost “catch-all” exception handler.
/noft	Forces VSTHost into an even less secure mode ☺ - this stands short for “No Fault Tolerance”. In this mode, VSTHost doesn’t catch *any* exceptions. Whatever happens will kill VSTHost. This parameter is interesting for VST

	PlugIn developers only.
/nokillvstkeys	Listed just for completeness – don't touch this one unless specifically requested to do so.
/noload	Forces VSTHost to skip the initial loading of the previous (or default) setup when it comes up. This, together with the **/nosave** parameter, can be used to quickly debug a PlugIn.
/nolocal	Forces VSTHost to come up with the internal English language. Since V1.44, VSTHost can use so-called "satellite DLLs" – DLLs with localized resources in other languages. vsthostDEU.dll and vsthostFRA.dll are included, and automatically loaded on systems where the primary UI language is set to German or French.
	By the way - if somebody would volunteer to translate VSTHost's texts into another language, please don't hesitate to contact me!
/nomidi	Forces VSTHost to come up without any loaded MIDI driver. Same reason as for **/noaudio**.
/nomme	Forces VSTHost to ignore MME audio drivers. See **/noaudio** above.
/nopv	Forces VSTHost to ignore pure virtual call errors.
	This is a rather arcane problem which indicates a programming error in VSTHost. Normally, VSTHost gives as much diagnostic output as possible (very useful if you contact me!) and tries an orderly shutdown; with **/nopv** given, VSTHost only shows the standard error message "R6025 pure virtual function call" and terminates without any cleanup attempts.
	Note: this setting has no effect in the Win98 version which uses a compiler version that can't handle this problem.
/nosave	Forces VSTHost to skip the saving of the complete current setup upon program termination. Normally used together with the **/noload** parameter in a debugging situation.
/noskin	Forces VSTHost to come up without a skin (see "Skin" on page 81 for details).
/nosse	Forces VSTHost to ignore the processor's SSE capabilities (if available) and only use the x87-compatible FPU.
	Since SSE speeds up operations considerably, this option should be used with care. In most cases, its only effect is to slow VSTHost down a bit.
/nosse2	Forces VSTHost to ignore the processor's SSE2 capabilities; setting **/nosse** automatically includes **/nosse2**.
	Unless you're using the double-precision version of VSTHost, SSE2 is not used very much inside VSTHost – but where it's used, it is normally faster than the FPU. On some Core Duo variants, however, SSE2 can be slightly slower than the normal FPU usage, so setting this option might help to squeeze out a tiny little bit more processing power (in the range of 0.1% for a setup with many PlugIns).
/numProcessors=*n*	In a multiprocessor environment, VSTHost normally uses as many cores and processors as possible. Using this option, you can force VSTHost to operate in single-processor mode, like versions before V1.43 did, by specifying
	/numProcessors=1
	You can enter any value here; values below 1 are ignored, values greater than 32 are interpreted as 32. Please keep in mind that it makes absolutely no sense to specify a higher number of processors than you have inside the PC; it won't make your computer go faster ☺.
/perf=*n*	Forces VSTHost to load the performance with the number given instead of the one last stored in the .ini file or 0, depending on the setting of the "Reload" Performance setting (see page 64). ***N*** can be any number in range 0 to 128. /perf itself can be overridden by specifying **/noload**.
/runBridged	Sets the default bridging mode to "run bridged" (see "Bridging" on page 34 for details)
/slave[:*nn*]	Forces VSTHost into *Slave mode*; the Slave mode and how to use it is not

	part of this document.
/tracebase=*nnnn* **/tracemask=*nnnn***	These parameters are only interesting for the tracing version of VSTHost; normally, you don't need them. Details and other ways to override the default settings are described on page 89.
/userexit=*name*	Forces VSTHost to load a User Exit DLL. Currently only one User Exit DLL has been created for the Lionstracs Mediastation (see www.lionstracs.com for details) to allow a better integration into this environment.
plugin	The complete path name of a PlugIn to load. This is normally used in a debugging environment, but also if you drag a PlugIn onto VSTHost's icon.

Multiprocessor provisions

In versions before V1.43, VSTHost didn't care much about the capabilities of the machine it runs on. There are, as I freely admit, only very few processor-specific optimizations, which may make it a little bit slower than commercial packages, but it also means that it simply *works* on practically every machine that can load at least Windows 98 (Windows 95 doesn't require a floating-point coprocessor, which VSTHost absolutely needs). In case of a multiprocessor machine, however, this lack of interest for its environment is a bit out of place, since it would mean that VSTHost only uses one processor. Since the rise of the Core Duo and Athlon64 X2, this isn't a good idea any more; a steadily increasing number of machines have multiprocessor cores, and it's not really fine if VSTHost uses only one half (or less, in case of a quad core machine) of the available processing power.

Since V1.43, VSTHost can use as many processors as there are in the machine (up to 32, which is a hard-coded 32-bit Windows limit; the x64 version can use 64 cores). If there's only one processor, the overhead is minimal (2 additional "if" statements in the audio processing thread). If there are more, it's considerable, but it pays off in the end.

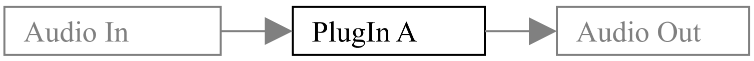
Technical explanation

If you just want to make *music, damnit!*, you can safely ignore these paragraphs, although they might help you to get the maximum performance from VSTHost if a certain configuration simply doesn't work the way you thought it should.

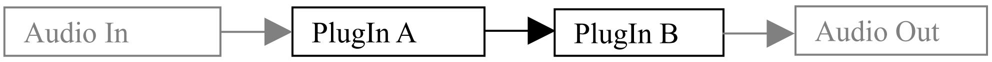
VSTHost starts as many processing threads as there are processors available. While processing audio, it determines how many possible thread start points are possible, and then triggers as many threads as possible and necessary to go to work on them. Each thread finds the same set of thread start points; the first thread going to work on a start point blocks this path for the other threads, which go on searching for thread start points to process. This continues until all threads come to the conclusion that there are no more thread start points to process.

Thread Start Points

What is a "thread start point"? Hmm… well, VSTHost can only parallelize audio processing of independent PlugIns. If a PlugIn's input is dependent on another PlugIn's output, they have to be processed sequentially. Consider a simple setup:

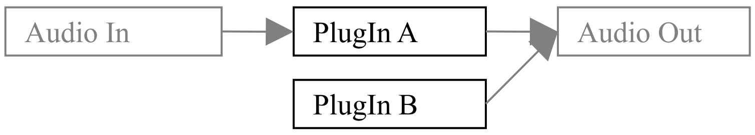


Here, nothing can be run in parallel. Everything has to be done in a strict order. VSTHost doesn't even bother to trigger a thread running on a second processor, as there is only one thread start point – PlugIn A. Now, let's assume that PlugIn A is a VSTi, and you want to run its output through a delay effect:



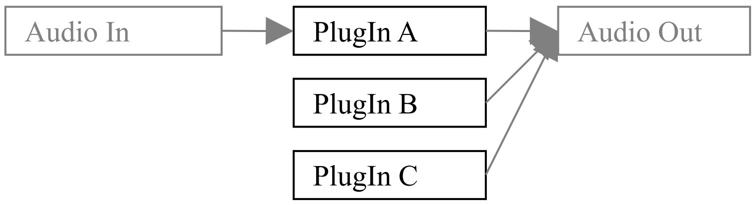
Everything still has to be done in a strict order, PlugIn a remains the only thread start point. In such a configuration, there's absolutely no performance gain from a multiprocessor machine.

A slightly more complex setup would be this:



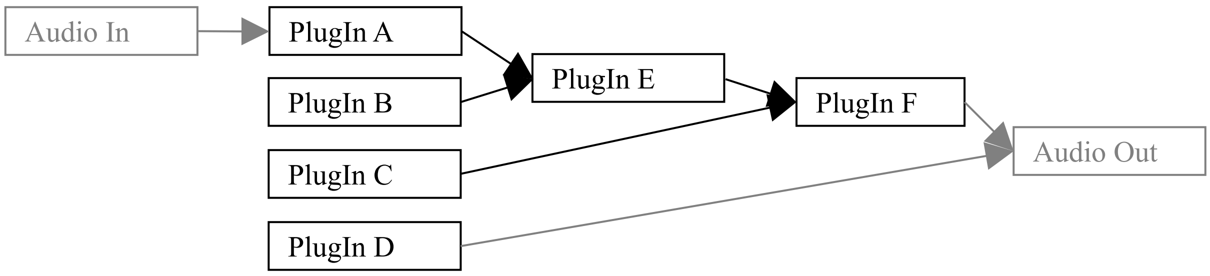
Here, VSTHost *can* run the two PlugIns in parallel; it just to wait with the final audio output until both PlugIns contributed their outputs. PlugIn A and PlugIn B are thread start points.

Let's progress to an even more complex example:



Here, VSTHost could, in theory, run all three PlugIns in parallel; it just has to wait with the final audio output until all three PlugIns have contributed their outputs. PlugIn A, B, and C are thread start points. There's no problem… but wait – let's assume that there are only 2 processors available. What happens now? In this case, VSTHost sends 2 threads to work, one on each processor. The first one that "sees" PlugIn A starts to work on it and marks it as "started". The second one sees that PlugIn A is already being worked on, looks for another start point, and finds PlugIn B, so it starts to work on this one. After some microseconds, both threads come back for more work as PlugIns A and B are finished; the first one processes PlugIn C, the second one stops.

And now for a really complex example:



Here, we see 4 thread start points: PlugIns A, B, C, and D. Assuming our 2 processors again, the behavior becomes rather indeterminable now. One thread will presumably go to work on PlugIn A, the other one will go to work on PlugIn B. Each of them will contribute the respective PlugIn's output to PlugIn E's input. The thread that determines that PlugIn E has enough input now will continue processing E, the other one will continue with the next thread start point, which is PlugIn C. Now, each of the 2 threads contributes to PlugIn F's input; the one that determines that PlugIn F has enough input will process PlugIn F, while the other one begins work on PlugIn D. In this setup, processing should be rather evenly spread over the two processors – *unless* one of the PlugIns A, B, C, or E takes much longer than the others. In this case, the other thread will finish its work after going through all the other start points and finding that there's nothing more to do after the first PlugIn, since PlugIns E and/or F need more input; VSTHost has to wait until the first thread completes the whole sequence. This situation leads to an uneven work distribution, but there's nothing that VSTHost can do about it.

In other words, even if there are two or more processors, VSTHost can not guarantee that they are fully used; depending on the configuration, it might happen that the performance gain is negligible. Some PlugIns contribute to the uncertainty in their own way by being multiprocessor-aware, so they try to spread their processing over multiple processors themselves.

OK, technical stuff finished, let's continue and finally *start working* with VSTHost…

Main Window

Now that we've finally started and parametrized VSTHost, let's return to our initial picture:

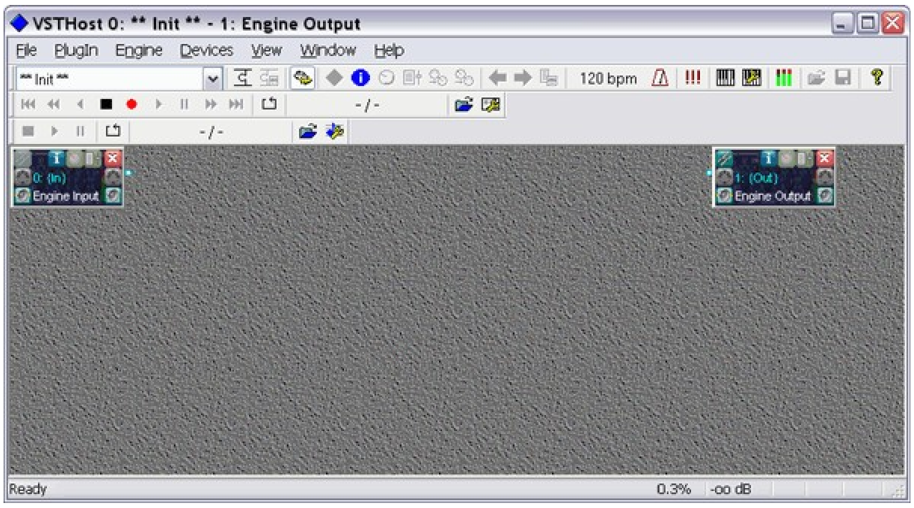

VSTHost 0: ** Init ** - 1: Engine Output
File PlugIn Engine Devices View Window Help
** Init **
120 bpm
0: (In)
Engine Input
1: (Out)
Engine Output
Ready
0.3%
-oo dB

Figure 25: VSTHost Initial (again)

Since V1.46, VSTHost always shows two built-in PlugIns: **{In}** and **{Out}**. These "PlugIns" are used to make it easier to graphically show the audio flow, and they have the additional benefit that you can set up Remote Control operations for them – you can, for example, define a MIDI controller to silence Audio In or Out separately. The buttons and connectors on the windows for these PlugIns are described later (see "New PlugIn" on page 32 or "PlugIn Menu" on page 40 for details).

Voilà – VSTHost works.

Menu Entries

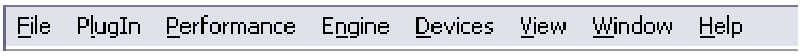


Figure 26: VSTHost's unimpressive Main Menu

Practically all of VSTHost's operations can be controlled from the menu, so let's examine that in detail.

File Menu

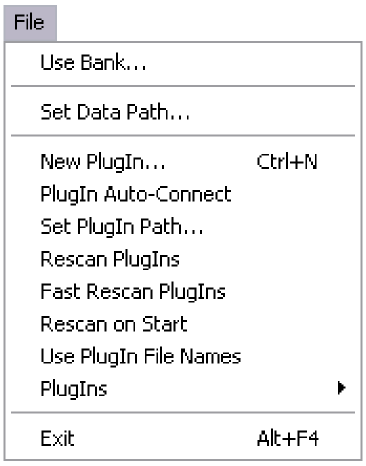
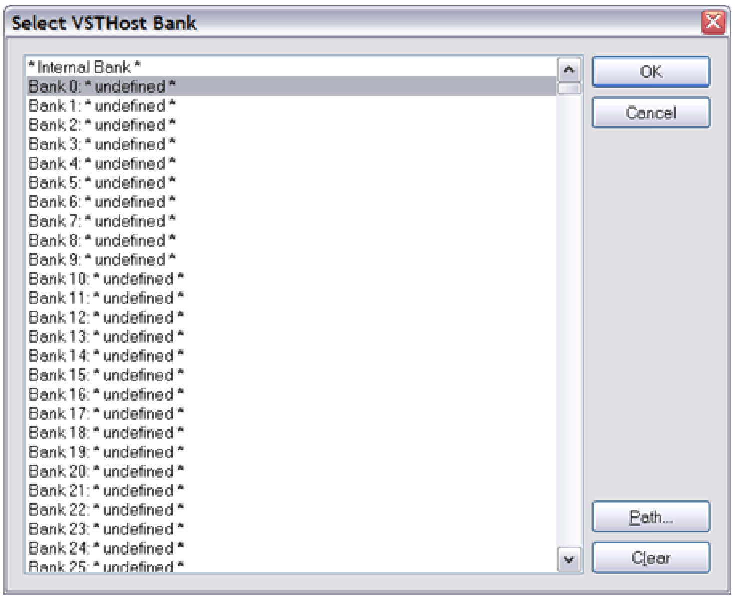


Figure 27: File Menu

Here, you can organize VSTHost setups (called “performances”, organized into “banks”) and load new PlugIns into the current performance. Plus, of course, terminate VSTHost ☺.

Use Bank…

This menu opens a dialog to let you select one of the possible VSTHost Performance Banks:



```
*Internal Bank*
Bank 0: *undefined*
Bank 1: *undefined*
Bank 2: *undefined*
Bank 3: *undefined*
Bank 4: *undefined*
Bank 5: *undefined*
Bank 6: *undefined*
Bank 7: *undefined*
Bank 8: *undefined*
Bank 9: *undefined*
Bank 10: *undefined*
Bank 11: *undefined*
Bank 12: *undefined*
Bank 13: *undefined*
Bank 14: *undefined*
Bank 15: *undefined*
Bank 16: *undefined*
Bank 17: *undefined*
Bank 18: *undefined*
Bank 19: *undefined*
Bank 20: *undefined*
Bank 21: *undefined*
Bank 22: *undefined*
Bank 23: *undefined*
Bank 24: *undefined*
Bank 25: *undefined*
```

Figure 28: Bank Selection Dialog

There are two types of banks in VSTHost; the *Internal Bank*, which is stored in the file “#Internal.vsthost” in VSTHost’s data directory (see “Set Data Path” on page 30), and up to 16384 different *file banks*. The internal bank is used by default, as no file bank has yet been allocated. Only the file banks can be selected by remote operation.

To select one of the banks, simply double-click it, or select it and press OK. If the bank file has already been configured, the dialog is closed and the new bank is used from now on; if, however, the bank file is not configured (or the file name has been removed with the **Clear** button), a file selection dialog is opened where you can select a file to be used to store VSTHost’s performances to. The default value should normally be OK, but you can override it, if you want to. You can enter the name of a non-existing file here; if it doesn’t exist, VSTHost allocates it.

A *Bank file* contains a set of up to 129 VSTHost performances (see “Load” below). By default, VSTHost stores its performances in the internal bank; since 129 configurations might be too few for some people, you can change to file mode, which gives you up to 16385 banks of up to 129 performances each. That should be enough, I think ☺.

Note: selecting another bank does *not* change the currently loaded performance in any way; if you want to select a program from the new bank, you have to load another performance, too. This behavior can be used to copy performances from one bank to another; simply load the performance, then switch to the target bank, and save the performance (you can use “Save Performance As…” to save it to a new name and/or position, if you want to).

Set Data Path

This menu entry can be used to set a new Data path for VSTHost. The default value is VSTHost’s location, with an appended **\Data**.

Before V1.43, VSTHost stored nearly all settings in the Windows registry; over time, this amounted to a *very* complicated setup with hundreds of sub-keys, which isn’t really easy to work with. VSTHost is using an initialization-file-based operation now. This makes it easier to change settings outside

VSTHost (one click opens the correct file, no cunning navigation through Regedit's nested structures needed), and eases the path to a preconfigured setup – instead of an installer program, just copy the necessary files together with the application.

VSTHost uses a layered approach; when it starts up, it reads the data path from an initialization file that resides in the same directory as the VSTHost executable, and has the same name, but with the extension .ini (please note the careful wording – you might have renamed the thing from VSTHost.exe to blabla.exe, for example; in this case, it would be blabla.ini). This initialization file, allocated when you start up VSTHost for the first time, is very simple; here's an example:

```
[Settings]
DataPath=C:\Program Files\VSTHost\Data
```

Figure 29: VSTHost.ini

The interesting thing about this setting is that it allows a multi-user setup, because you can put environment variable names into the data path. Here's an example that should work in all Windows NT variants (NT / 2000 / XP / Vista / 7):

```
[Settings]
DataPath=%APPDATA%\VSTHost
```

Figure 30: Multi-user VSTHost.ini

An additional method has been added in V1.53 to allow the installation of VSTHost on a machine that contains multiple operating systems, where each operating system should have its own setup. This case is a bit more complex.

First, you need to define an environment variable (either globally or by starting VSTHost from a batch file), with a value that's different for each operating system. Then, you can put additional settings into the .ini file for each operating system by setting an entry called DataPathMulti to the .ini file, which defines a value that is appended to the DataPath key, and adding the various DataPathXXXX settings.

As an example, let's say you have Vista and XP installed and want both to use the same VSTHost, but with different settings. So you might add the following environment variable to the system:
`OSNAME=Vista`
(on Vista) and
`OSNAME=XP`
(on XP). Then, you can direct VSTHost to use a specific path by adding the following settings:

```
[Settings]
DataPathMulti=%OSNAME%
DataPathXP=D:\Programme\VSTHost\Data
DataPathVista=C:\Program Files\VSTHost\Vista\Data
```

Figure 31: Multi-OS VSTHost.ini

Once VSTHost has read the data path from this initialization file, it switches to *another* initialization file that resides in the given data path, and has the same name as VSTHost's executable, but with the extension .ini (see above regarding the careful wording ☺). *This* is VSTHost's main initialization file, where all the settings are kept. Other files that are read from there are PlugIns.ini (containing information about all PlugIns that VSTHost knows; see "Set PlugIn Path" on page 35 for details), effCanDos.ini, and hostCanDos.ini (these files, which come with the VSTHost package, contain a header that details what they are good for).

The default setup assumes that all data that VSTHost uses are put into the same directory; with this menu item, you can define another data path for them.

Attention: if you decide to change the data path to another directory, and want to put some or all of the already existing data there, you have to copy the data files from the old to the new directory yourself – and you have to change the absolute paths that might be stored inside VSTHost.ini, and/or the *.vsthost bank files. VSTHost doesn't do that for you (unless the configuration has been saved with one of the latest VSTHost versions and contain "%BankPath%" instead of an absolute path).

New PlugIn

Now it gets interesting… if this menu entry is selected, VSTHost opens a file selection dialog box that allows locating a PlugIn that you want to add to the current performance. Since VSTHost is a simple little program, it doesn't perform lengthy "Where are the PlugIns?" scans upon program start to present a nice, preformed list of available PlugIns (unless you specifically tell it to; see "Rescan on Start" on page 36 for details); it simply allows you to select the file containing the PlugIn. In Windows, PlugIns are normally simple DLLs, i.e., their names end with ".dll".

If a "big player" (Cubase, Nuendo, etc.) has already been installed on your computer, it has set up a directory where VST PlugIns are installed; normally, the path to this directory is stored in the registry under **HKEY_LOCAL_MACHINE\Software\VST** in the value **VSTPluginsPath**. If VSTHost finds this value, it starts the file selection dialog there; if not, it uses the current directory.

In any case, once a PlugIn has been selected and loaded, VSTHost remembers the directory where it took it from as its new start point.

Once you have loaded a PlugIn, VSTHost presents it in a little window on its main client area, like this (the example uses ASynth, a nice freeware VST instrument):

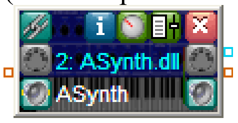


Figure 32: Example for a loaded PlugIn's Main window

There are some buttons on that window. All of them are just alternatives to entries of the PlugIn menu (see "PlugIn Menu" on page 40 for details) and the main toolbar (see "Toolbar" on page 75 for details). If you move the mouse over a button and leave it there, a little pop-up text will be displayed that tells what the respective button can be used for. On the right side, there's a little level meter that displays the PlugIn's current output level. The Main window can be dragged around on the screen with the mouse to any location you like.

Since the links between PlugIns are displayed there, too, this can be used to arrange the PlugIn windows in a way that shows the relations between them, like this:

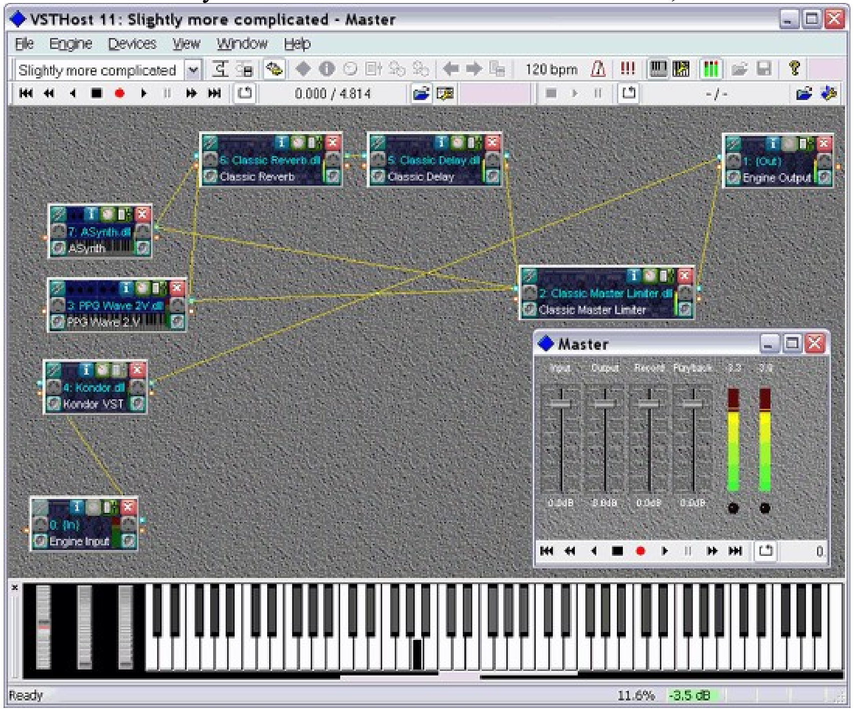


Figure 33: VSTHost Main Window with some PlugIns loaded

Since V1.44, there are some funny little dots to the left and to the right of the PlugIn main windows; these are “connectors” which allow to define links between the PlugIns as a convenient alternative to the “Chain After…” menu item (see page 56 for this one). On the left side, there’s an Audio Input connector and a MIDI input connector; on the right side, there’s an Audio Output connector and a MIDI Output connector. Only connectors that make sense for this PlugIn are shown; if, for example, a PlugIn as no audio input channels, the Audio In connector is omitted.

You can click on one of the connectors with the left mouse button, upon which the connector changes its color; now, without releasing the mouse button, move to the corresponding connector of another PlugIn that you want to create a link to. If you reach a connector that can be used, it changes its color, too; now you can release the mouse button to create a link.

Double-clicking on a line between two connectors opens the “Chain After…” window of the target PlugIn so that you can change the link type, level, and so on.

To delete a link, simply select a connection; you can do this either by clicking on a connector and then dragging the mouse onto an existing line, upon which the line changes its color, or by clicking directly on the line between the two connectors. As soon as the line changes its color, you can delete the connection by clicking with the right mouse button – *without releasing the left mouse button first*. This may sound complicated at first, but if you try it, it’s rather intuitive (as “intuitive” as this whole computer stuff can get ☺).
Unfortunately, this doesn't always work (as an example, I got a mouse pad on a laptop that flatly refuses to consider “2 buttons pressed simultaneously” as something a sensible user might ask for); in this case, double-clicking the line to get to the target PlugIn's “Chain After...” window and deleting the link there is the fastest option.

Another notable thing about the PlugIn main window is the background image; this one is different for Instrument and Effect PlugIns. If you don’t like it, you can provide another one – VSTHost looks for a .BMP, .JPG, .JPEG, or .PNG file that comes with the PlugIn. If, for example, your PlugIn is a DLL located at “C:\Program Files\VstPlugins\Again.dll”, and there is a file called “C:\Program

Files\VstPlugins\Again.bmp” (which really holds a bitmap ☺), VSTHost will use the this bitmap as the background for the PlugIn main window.

You can also use the PlugIn main window to assign a *label* to the PlugIn; double-clicking on the second text line brings up an edit field where you can override the PlugIn's display text. If you got more than one PlugIn of the same kind (let's say, 2 compressors for different signal paths), this can make it easier to identify them, since all windows for the PlugIn carry this label in their title bar, and also in the Window Menu (see page 81 for details). Removing the text brings back the original display text.

Bridging

Up to V1.47, VSTHost was a pure 32-bit program (code, not audio format this time ☺). This means that it could only load 32-bit PlugIns; if you're running it on a 64-bit system (Windows Vista / Windows 7), and already have assembled a nice collection of 64-bit PlugIns (still very much future music while I'm writing this), VSTHost couldn't load these. Steinberg provides a separate bridge program in their Cubase / Nuendo products for this; VSTHost didn't.

Since V1.48, VSTHost contains its own set of bridging programs (VSTHostBridge32.exe and VSTHostBridge64.exe) which, on a 64bit Windows, allows the 32-bit version of VSTHost to load 64-bit PlugIns – and the other way round, as VSTHost also comes in 64bit form. VSTHost's bridge program allows all PlugIn kinds supported by VSTHost to be bridged: VST 1/2/3 and VST Module Architecture. There's no need for an installation procedure; just place the two programs into the same directory where VSTHost.exe resides, and they are found automatically.

If VSTHost and the PlugIn have a different “bitness” (i.e., one is a 32-bit module, the other one a 64-bit), bridging takes place automatically; if you want to force bridging for a PlugIn that has the same “bitness”, you have to add the entry **runBridged=1** (run all PlugIns in one concentrated bridge program) or **forceBridged=1** (run each PlugIn in its own dedicated bridge program) to the PlugIn's section in **effCanDos.ini** (look into VSTHost's data directory for that). **effCanDos.ini** contains a descriptive header that describes which values can be set for each PlugIn, and how. It's a simple text file, so any text editor can be used to modify it.

Alternatively, you can use the command line parameters **/runBridged**, **/forceBridged**, or **/forceJBridged** to set the default values VSTHost uses when loading PlugIns (see “Command line parameters” on page 25 for details). These command line parameters can be overridden, too:

- pressing **Ctrl** while loading a PlugIn toggles the **/runBridged** setting
- pressing **Ctrl+Shift** while loading a PlugIn toggles the **/runBridged** and **/forceBridged** settings

Please note that this does not override settings given in effCanDos.ini.

Attention: there are some limits to what bridging can do. A bridged PlugIn that tries to modify a window in the host by sub-classing it (a very bad practice anyway), for example, is doomed to an instant death, since the host windows are *not* handled in the same process. I've tried to make VSTHost's bridge as universally usable as possible, but it can't catch every possible misbehavior.

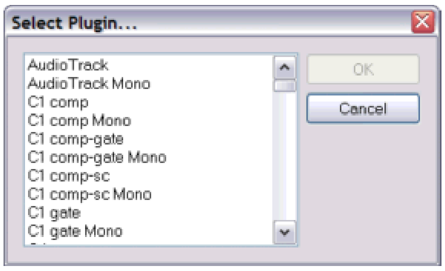
This bridging code is still quite new; I can't guarantee that it works satisfactorily under all conditions. If VSTHost's bridge programs don't work for a specific PlugIn, there's another possibility:

JBridge

Since V1.47, VSTHost supports **JBridge**, which can also be used to “bridge” the gap between the 32-bit and the 64-bit world. You can find JBridge at http://jstuff.wordpress.com/jbridge/. Just installing it is sufficient – you don't need to do anything else, as far as VSTHost is concerned. If you want to use JBridge for a specific PlugIn, you have to add the entry **forceJBridged=1** to the PlugIn's section in **effCanDos.ini** (look into VSTHost's data directory for that). **effCanDos.ini** contains a descriptive header that describes which values can be set for each PlugIn, and how. It's a simple text file, so any text editor can be used to modify it. JBridge only supports VST1/2 PlugIns, however.

Shell PlugIns

There are some special PlugIns called “Shell PlugIns”; these are special in that they are no effect or VSTi by themselves, but they provide a “shell” for a set of secondary PlugIns. The Waves bundles (see www.waves.com for these) are a prominent – and perhaps the only – example for this special kind of PlugIn. If VSTHost encounters one of these, it doesn’t immediately load the PlugIn, but presents a dialog that allows you to select one of the secondary PlugIns, like this:



AudioTrack
AudioTrack Mono
C1 comp
C1 comp Mono
C1 comp-gate
C1 comp-gate Mono
C1 comp-sc
C1 comp-sc Mono
C1 gate
C1 gate Mono

Figure 34: Shell PlugIn Selection Dialog

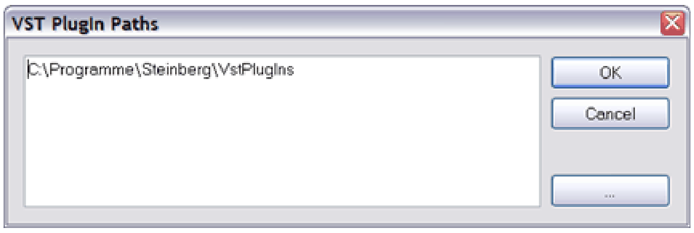
Once one of the PlugIns has been selected, it is opened just like any normal PlugIn.

PlugIn Auto-Connect

This menu entry defines what happens when a new PlugIn is loaded. Normally, it is checked; in this setting, a new PlugIn is automatically connected to Audio In and Audio Out. This is a good thing for quick tests – when loaded, the PlugIn can instantly be used. If you're in the process of setting up a more complex configuration, however, it may be easier to clear this setting. In this case, the PlugIn is not connected at all, which makes it easier to set up a PlugIn chain, as you don't have to remove the unnecessary Audio In and Out links.

Set PlugIn Path

This menu entry opens a dialog where you can define the PlugIn path(s) that VSTHost uses to generate its PlugIn list.



C:\Programme\Steinberg\VstPlugIns

Figure 35: VST PlugIn Path dialog

Here, you can define a set of paths that are searched, one in each line. The “…” button opens a standard directory selection dialog where you can select new paths to be added to the list, if you don’t know the location by heart. Changing the contents of this list and leaving the dialog with OK automatically leads to a Fast Rescan (see below).

If a “big player” (Cubase, Nuendo, etc.) has already been installed on your computer, it has set up a directory where VST PlugIns are installed; normally, the path to this directory is stored in the registry under **HKEY_LOCAL_MACHINE\Software\VST** in the value **VSTPluginsPath**. If VSTHost finds this value, and has no PlugIn path of its own set yet, it automatically initializes the list to this value.

You can also put *exclusions* here by prefixing them with a < character. These exclusions can be both directories (in which case VSTHost won't search any path that *starts* with the text following <) and files (in which case VSTHost won't search any path that *ends* with the text following <).

Note: exclusions have to precede paths that would include the excluded directories and/or files, since VSTHost processes the list sequentially. Also note that excluded directories have to be fully qualified.

Rescan PlugIns

When selected, VSTHost performs a full scan of all PlugIns in the configured PlugIn paths (see above) to fill the **PlugIns** submenu (see “PlugIns” on page 37). This can take quite some time, since VSTHost has to load, analyze, and unload each file that's possibly a PlugIn which it encounters.

Fast Rescan PlugIns

Does the same as “Rescan PlugIns” (see above), but it only scans PlugIns that it doesn’t already have in its list, which can be much faster, depending on the number of installed PlugIns.

Rescan on Start

When checked, VSTHost performs a fast rescan (see above) every time it is started. While this can slow down things a bit, it guarantees an accurate PlugIn list.

Force Bridged Rescan

When checked, VSTHost loads all PlugIns in bridged mode while scanning them. While this can slow down things *quite* a bit, it should prevent VSTHost from dying in a spectacular way each time it encounters a rogue PlugIn, as each PlugIn is loaded into a dedicated new bridge process. If a problem comes up, only the bridge process dies, but VSTHost remains alive.
Note: sometimes, the PlugIn doesn't kill the host, but just hangs (PlugIns employing eLicenser protection seem particularly inclined to do that if their dongle is missing). In this case, the scan in VSTHost will hang; the only way to get it to continue is to kill the hanging bridge process (normally called “VSTHostBridge*XX*.exe”, *XX* being 32 or 64) from the Windows Task Manager.

Use PlugIn File Names

When checked, VSTHost uses the PlugIn file names instead of their display names in the PlugIn lists (see “PlugIns” below for this). This can sometimes be helpful, and is in most cases far more compact, but not necessarily as informative as the list of display names.

PlugIns

After the PlugIn paths have been scanned, this menu entry turns into a submenu that lists all currently available PlugIns, like this:

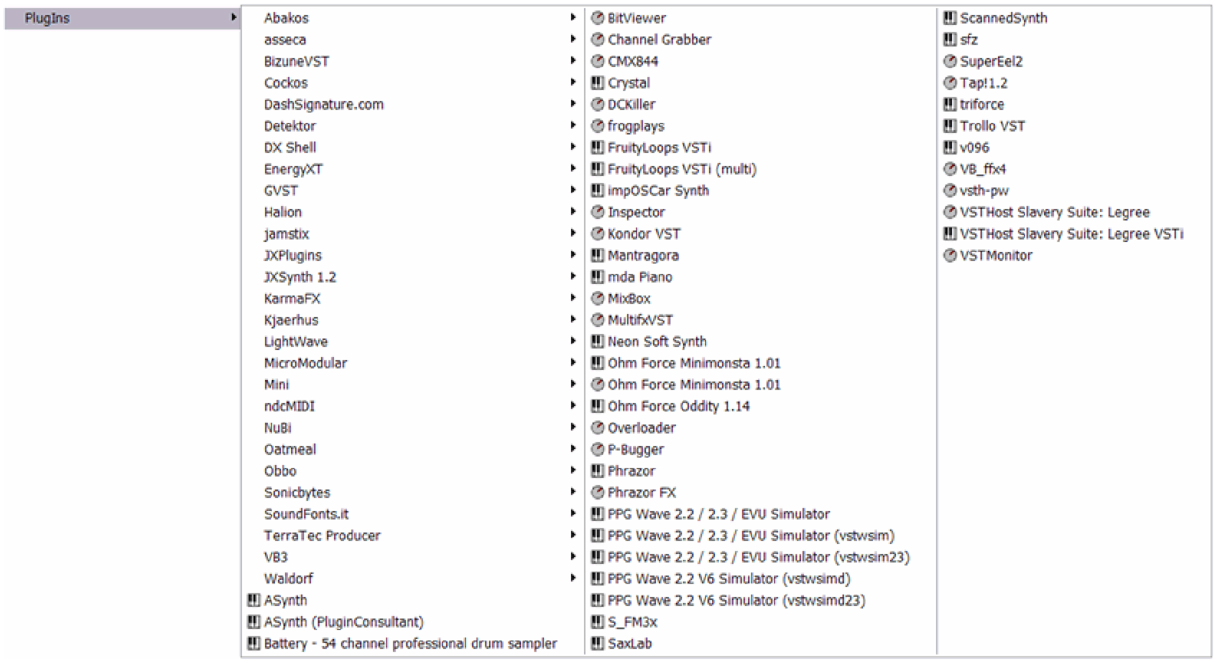


Figure 36: PlugIn menu

Effect, Instrument, and MIDI PlugIns have different icons.

As you can see, this menu can become quite big; I haven't done real stress tests yet whether some Windows versions might go Ka-Boom! after more than, say, 500 entries. Be warned.

Builtin PlugIns

Since V1.53, VSTHost also has some *builtin PlugIns*; these are an integral part of VSTHost, but can be used just like a PlugIn of the same functionality could be. When available, they are always put into the first submenu of the PlugIns menu (see above):

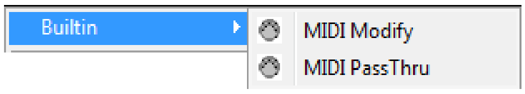
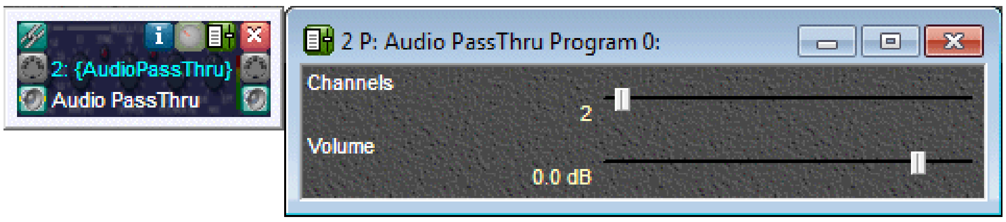


Figure 37: Builtin PlugIns submenu

Currently, the following builtin PlugIns are available:

Audio PassThru

This is a very simple PlugIn that just passes all audio data through to the next PlugIn in the chain. Its main purpose is to allow splitting or combining audio channels from various PlugIns and then treating them as a unit; this can be accomplished on the PlugIn's **Chain After** dialog (see "Chain After" on page 56 for details). The Audio PassThru PlugIn has some parameters:



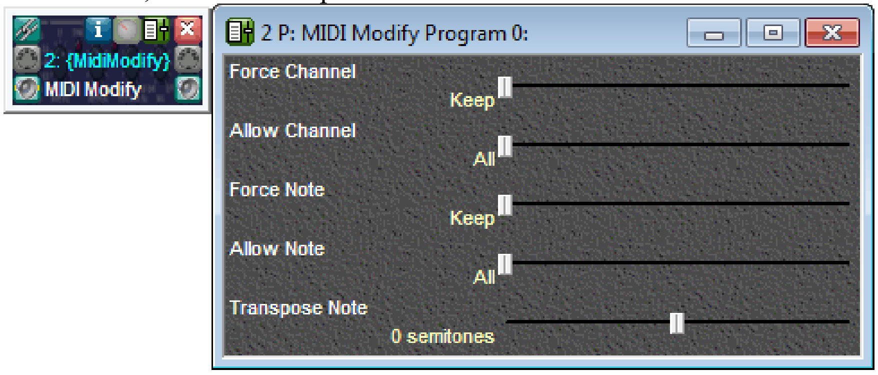
Channels 2
Volume 0.0 dB

Figure 38: Audio PassThru parameters

Channel	By default, the Audio PassThru PlugIn operates in Stereo mode (2 inputs, 2 outputs). For complex setups, it can be more convenient to have more channels, since all incoming audio channels would otherwise be mixed down to Stereo; this parameter allows to set the number of input and output channels to 1 .. 20.
Volume	Can be used to vary the output level of the PlugIn. This effects all incoming audio channels; setting up the incoming channels' volume separately can be done on the **Chain After** dialog.

MIDI Modify

MIDI Modify is an extended version of the **MIDI PassThru** builtin PlugIn (see below). Since some MIDI configuration tasks are frequently necessary, and to make configuration easier and remotely controllable, it has a set of parameters:



Force Channel: Keep
Allow Channel: All
Force Note: Keep
Allow Note: All
Transpose Note: 0 semitones

Figure 39: MIDI Modify parameters

Force Channel	Can be used to force all incoming MIDI messages to a specific channel. The default setting of “Keep” doesn't modify the channel.
Allow Channel	Only lets MIDI messages with a specific channel pass. The default setting of “All” doesn't filter messages on the other channels. **Note:** Force Channel is executed before Allow Channel, so using them in combination is not recommended – you can easily turn off *all* MIDI messages this way.
Force Note	Forces all incoming MIDI voice messages to a specific note. The default setting of “Keep” doesn't modify the note number.
Allow Note	Only lets MIDI voice messages with a specific note number pass. The default setting of “All” doesn't filter voice messages. **Note:** Force Note is executed before Allow Note, so using them in combination is not recommended – you can easily turn off *all* MIDI voice messages this way.
Transpose Note	Can be used to transpose incoming MIDI voice messages up to 4 octaves in both directions.

Using the parameters is a bit faster than setting up the PlugIn's Filter and/or Transformation settings (see “Filter Settings and Transformations” on page 42 for details), so if they are expected to change more often, this PlugIn should be used instead of the MIDI PassThru builtin PlugIn (see below). In addition, you can control the parameter settings with separate MIDI messages (see “MIDI -> Parameter” on page 48 for details) for additional flexibility.

Note: of course, you can configure additional Filter and Transformation settings for this PlugIn, too, if the simple parameter set isn't sufficient for your needs. The Filters and Transformations are executed before MIDI reaches the builtin PlugIn.

MIDI PassThru

This is a very simple PlugIn that just passes all MIDI data through to the next PlugIn(s) in the chain. It can be used for setting up complex MIDI chains, where one PlugIn should receive MIDI data from one or more MIDI inputs and/or other PlugIns, but filtered in different ways. In this case, just put two or more MIDI PassThru PlugIns before it and make sure that it only receives MIDI Input from them; then, set the MIDI PassThru PlugIn's Filter and/or Transformation settings (see “Filter Settings and Transformations” on page 42 for details) to your heart's content.

Reverb

This is a simple reverb PlugIn that's based on FreeVerb, which has been put into the public domain by “Jezar @ DreamPoint”, originally to be found at www.dreampoint.co.uk – this was back in the year 2000; unfortunately, the site is long gone. I've added it as a “poor man's reverb” - it's quite handy if you just want a bit of reverb for doodling around. Nearly as unoptimized as the original; the only additions are that you can enter parameter values directly, and it should work with varying sample rates (the original has been created for 44.1kHz only).

Once you have loaded Reverb, then simply use "Room size" to get the size of the room you want, and use the "Wet level" and "Dry level" controls to balance the reverb as you see fit. "Damping" controls the simulated "absorbency" of the room. When “Freeze mode” is selected, Reverb keeps playing the last captured buffer.

If you can get hold of “Freeverb v3” sound banks, you should be able to load them into VSTHost's built-in Reverb PlugIn as well. The older version “Freeverb v2”, on the other hand, has a different set of parameters, so sound banks for this version aren't usable.

Submixer

This is a PlugIn that allows finer control over the mixing of sound sources (audio input as well as linked PlugIns). Basically, it's a 20/5/2 mixer (up to 20 input channels, 5 busses, stereo main output) with 3 parametric EQs per stereo channel, initially set up as a typical Lo/Mid/Hi EQ.
The main benefit over using an external PlugIn like the CMX844 PlugIn is that inputs are assigned automatically to free channels if you add a link to another PlugIn.

Exit

Does what it says and terminates VSTHost. Without warning, as I might add; I hate “Are you sure?” message boxes. I *am* sure. ☺

PlugIn Menu

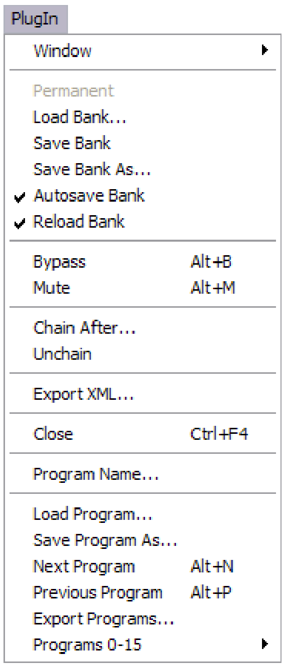


Figure 40: PlugIn Menu

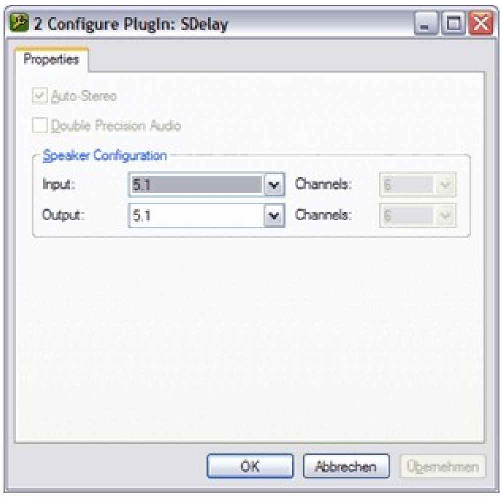
This menu is only visible if a PlugIn window is currently selected (main, edit, parameter, MIDI <-> Parameter, or info window); more on these later in the “Toolbar” section on page 75. Right-clicking on one of the PlugIn windows (except for the Edit window) shows the same menu as a popup menu.

Window

This sub-menu lets you select (or open, if it isn’t opened yet) one of the possible windows of the PlugIn. Information on most of them can be found in the “Toolbar” section on page 75. The following sub-menu entries deserve special treatment, however…:

Configure

This sub-menu entry can only be selected if it makes sense, i.e., if the PlugIn requires any of the settings that can be configured on the following window:



2 Configure PlugIn: SDelay

Properties

[✓] Auto-Stereo

[ ] Double Precision Audio

Speaker Configuration

Input:	5.1	Channels:	6
Output:	5.1	Channels:	6

Figure 41: PlugIn Configuration Window

The following settings can be changed here, if possible:

Auto-Stereo

This check box can only be selected when the current PlugIn has only one output channel. If checked, VSTHost automatically expands the PlugIn's output to 2 identical pseudo-stereo outputs.

Double Precision Audio

This check box can only be selected for PlugIns that implement this feature. In the current version, this is mainly usable for testing PlugIns that support **processDoubleReplacing()** for audio processing. In this mode, VSTHost passes audio to the PlugIn in double precision format (the much-hyped "64 bit audio processing!!!1" ☺). This, however, doesn't necessarily mean that the output sounds "better" - depending on the installed package, VSTHost might still use 32 bit audio processing internally; if so, it just converts the samples to 64 bit before calling the PlugIn and converts the result back. So, all you get is a little performance degradation; that's why I said it's mainly for testing purposes.

But then... if you're using a lot of PlugIns that support double-precision audio, and you want to create chains of them, the continuous conversion between 32- and 64-bit audio would cause more of a performance degradation than running the whole chain with 64-bit double precision audio.

Starting with V1.45, VSTHost is also available in a 64-bit version (that's 64-bit *audio*, not 64-bit *code*; the code may still be 32-bit... we live in interesting times <sigh>) that can be separately downloaded from the web site mentioned on page 2 of this document. This version uses 64-bit signal processing internally, which means that:

1. all buffers are twice as big as in the 32-bit version; each and every operation needs to move twice as many bytes around;
2. if a PlugIn does *not* support 64-bit audio processing, VSTHost now has to convert all buffers to 32-bit before and after they are passed through the PlugIn

… in short, it's slower and bigger than the 32-bit version.

While the overall sound quality *might* be a little bit better if 64-bit audio processing is used, I sincerely doubt that anyone can hear this. VSTHost is not meant to be the main vehicle of a mastering studio, where the additional quality might make a difference. Well, it's your decision... a contemporary high-end machine surely has no problem with this version.

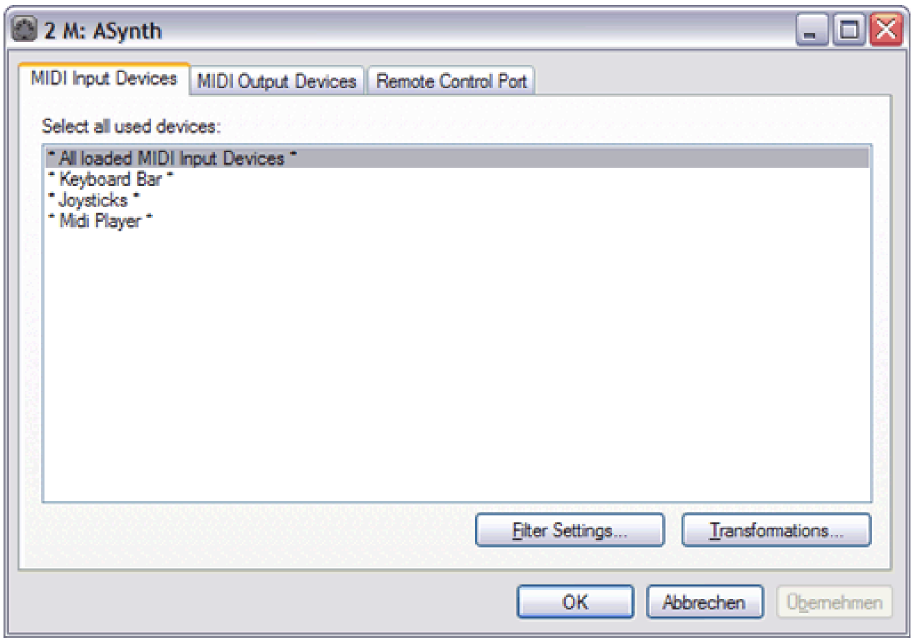
Speaker Configuration

If the PlugIn supports setting the speaker configuration, and thus the usable audio channels, you can configure the PlugIn's input and output speaker configuration here.

MIDI Settings

Selecting this menu entry opens a window that allows to configure the PlugIn's MIDI properties.

MIDI Input Devices



Select all used devices:

- * All loaded MIDI Input Devices *
- * Keyboard Bar *
- * Joysticks *
- * Midi Player *

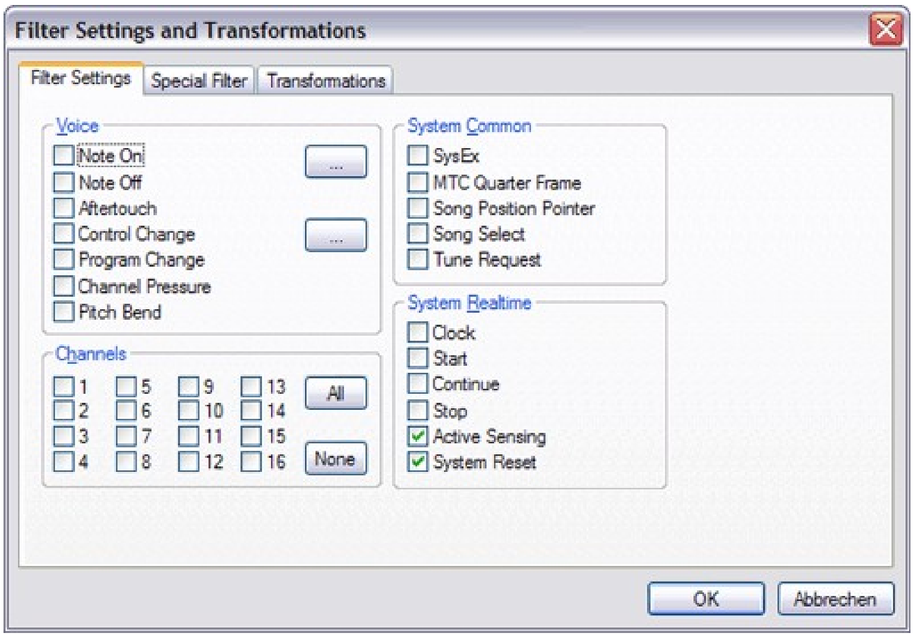
Figure 42: PlugIn MIDI Parameters Window, Input Devices Tab

On the **MIDI Input Devices** tab, you can define the MIDI Input Devices used by this PlugIn; the default is to react on messages from all loaded devices. The Keyboard Bar, configured joysticks, the MIDI Player, and the SysEx window are treated like MIDI Input devices here. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

Filter Settings and Transformations

The “Filter Settings...” and “Transformations...” buttons open a secondary dialog (both open the same dialog, they just start it on a different tab):

Filter Settings



Voice: ☐ Note On ☐ Note Off ☐ Aftertouch ☐ Control Change ☐ Program Change ☐ Channel Pressure ☐ Pitch Bend

Channels: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15 ☐ 16

System Common: ☐ SysEx ☐ MTC Quarter Frame ☐ Song Position Pointer ☐ Song Select ☐ Tune Request

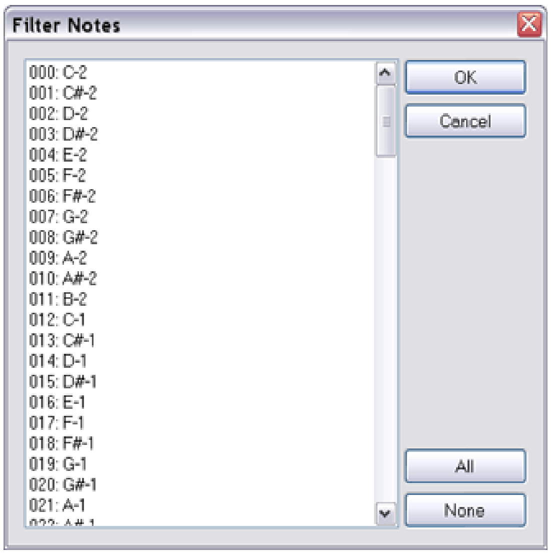
System Realtime: ☐ Clock ☐ Start ☐ Continue ☐ Stop ☑ Active Sensing ☑ System Reset

Figure 43: Filter Settings and Transformations, Filter Settings Tab

Here, you can select MIDI Messages that are *filtered*; i.e., they are removed from the MIDI stream that is sent to this specific PlugIn. Common usages include:

- Disallowing messages from specific MIDI channels; this can be used to separately control up to 16 PlugIns from a single MIDI Input Device
- Preventing Program Change messages to change the PlugIn's program
- Inhibiting certain controllers
- Preventing SysEx messages to reach the PlugIn

If you want to filter only some Note On/Off messages, you can define them by pressing the "**...**" Button on the right of the "Note On" check box, which opens the following sub-dialog:

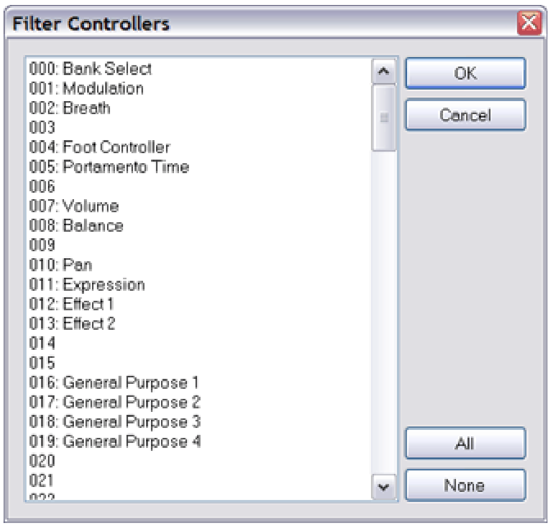

Filter Notes

000: C-2
001: C#-2
002: D-2
003: D#-2
004: E-2
005: F-2
006: F#-2
007: G-2
008: G#-2
009: A-2
010: A#-2
011: B-2
012: C-1
013: C#-1
014: D-1
015: D#-1
016: E-1
017: F-1
018: F#-1
019: G-1
020: G#-1
021: A-1

Figure 44: Filter Notes Dialog

Here, any combination of Note On/Off messages can be filtered.

If you want to filter only some Control Change messages, you can define them by pressing the "**...**" Button on the right of the "Control Change" check box, which opens the following sub-dialog:


Filter Controllers

000: Bank Select
001: Modulation
002: Breath
003
004: Foot Controller
005: Portamento Time
006
007: Volume
008: Balance
009
010: Pan
011: Expression
012: Effect 1
013: Effect 2
014
015
016: General Purpose 1
017: General Purpose 2
018: General Purpose 3
019: General Purpose 4
020
021

Figure 45: Filter Controllers Dialog

Here, any combination of Continuous Controller messages can be filtered.

Special Filter

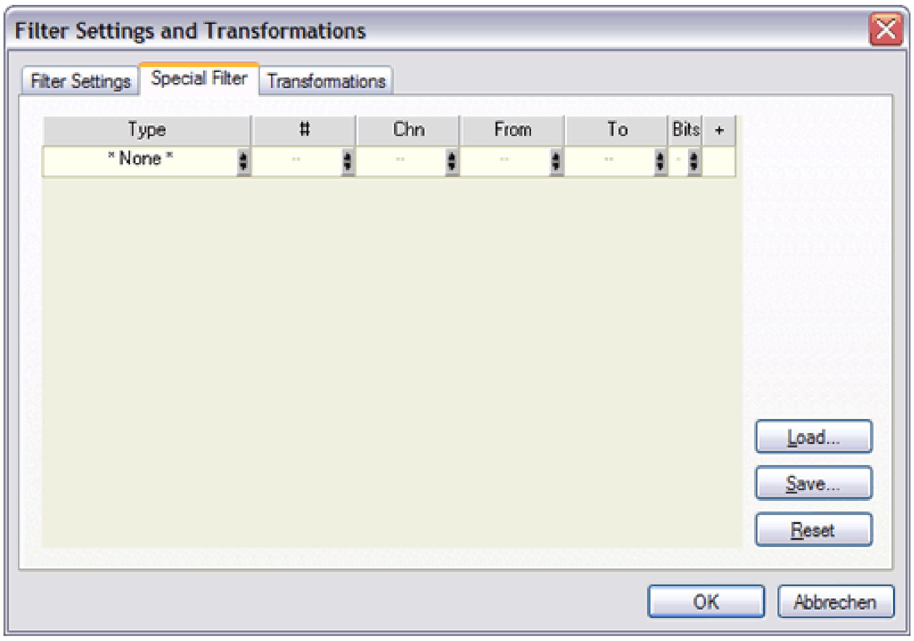


Figure 46: Filter Settings and Transformations, Special Filter Tab

On this tab, you can define special MIDI filters that aren't possible with the “normal” filter page (see above). It uses the same logic as the “MIDI -> Parameter” window (see page 48 for details); the fields are described there.

While this window allows to set up very flexible filters that can filter MIDI messages in really extreme ways, there's a downside – setting up filters this way is quite a bit slower than with the “normal” filtering mechanism, so it is better to use that for simple filtering purposes.

Of course, this becomes less important if your computer is fast enough. Hey, it's just MIDI we're talking about here – 3000 bytes per second... unless it comes from a MIDI-over-IP or virtual MIDI cable, of course.

Transformations

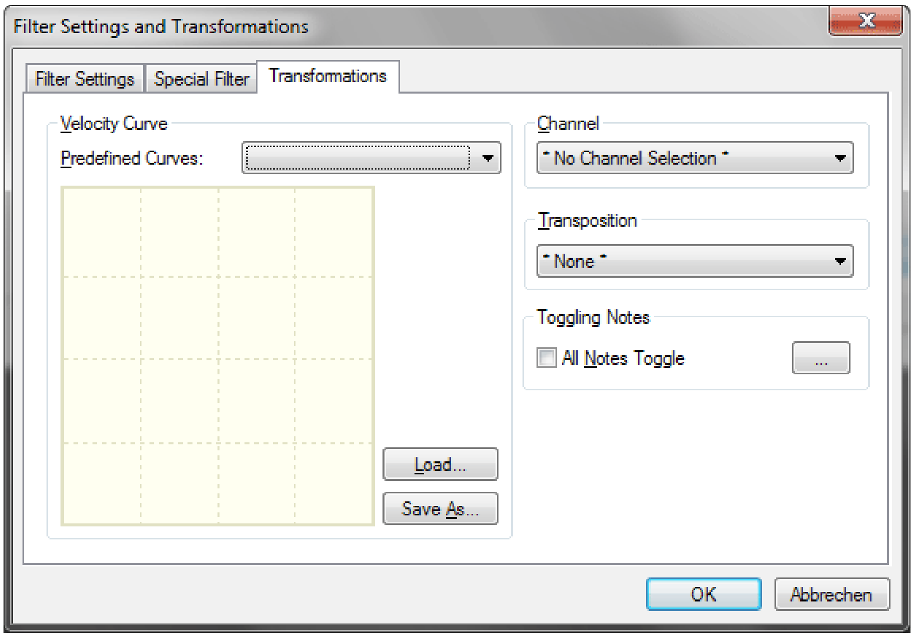


Figure 47: Filter Settings and Transformations, Transformations Tab

Here, you can define MIDI *transformations*.

Note: transformations are done *after* the MIDI filters have done their work; the filters work on the original message, not on the result of any transformation.

The following transformations can be done:

Velocity Curve

This transformation is only valid for **Note On** messages. The predefined curves that can be loaded deal with various standard situations, such as adapting an external MIDI Master Keyboard's velocity curve to your personal preferences. You *can*, however, set up completely weird velocity transformations with this.

Each curve is defined through a set of *nodes*. Each of these nodes is shown as a little rectangle on the curve. There are two types of nodes: *linear* and *spline* nodes. A linear node is just that – it creates a straight line between itself and the adjacent nodes. A spline node, in contrast, creates a curved line between itself and the adjacent nodes. The two node types are shown in different colors – grey for linear nodes and cyan for spline nodes.

You can insert a node by double-clicking somewhere in the area. The type of the node can be toggled by left-clicking on it, and then right-clicking it, too, *without* releasing the left mouse button first. That may sound complicated, but it's relatively easy to do it. Unless you're a switched Mac user who has a handicapped one-button mouse, hee hee.... ahem.

Clicking on a node shows its current position. You can drag the selected node around freely in the range set by its left and right neighbors.

A node can be deleted by left-clicking on it and pressing the *Del* key on on keyboard.

Note: the velocity transformation can also be used to turn notes off – it allows to change the velocity to **0**, which is interpreted as a **Note Off** message. This is intentionally possible, and if you drag a node to the lowest possible position, "Off" is shown to make it clear.

Channel

This transformation is valid for all "normal" MIDI messages that carry channel information. Using it, you can change the message's MIDI channel to a fixed value.

Transposition

This transposition is valid for all messages that have a note information – **Note On**, **Note Off**, and **Polyphonic Aftertouch**. Messages of this kind can be transposed up to 4 octaves in both directions.

Toggling Notes

This transformation can be done on Note On messages.

Its main purpose is this: sometimes, you may want to trigger playback of a sample by pressing a key. Normally, you'd have to keep the key pressed as long as you want the sample to play. This may not fit your workflow (say, you're a DJ and normally got your fingers somewhere else ☺); in **Toggle Mode**, you press the key once to start playback and another tine to stop it; technically, the Note Off messages are suppressed and the second Note On message is transformed into a Note Off message.

This can be done in two ways:

1. globally, i.e., for all Note On/Off messages
2. by pressing the "..." button, you can select single notes

Now let's carry on with the other tabs on the “MIDI Settings” window we started to describe on page 42...

MIDI Output Devices

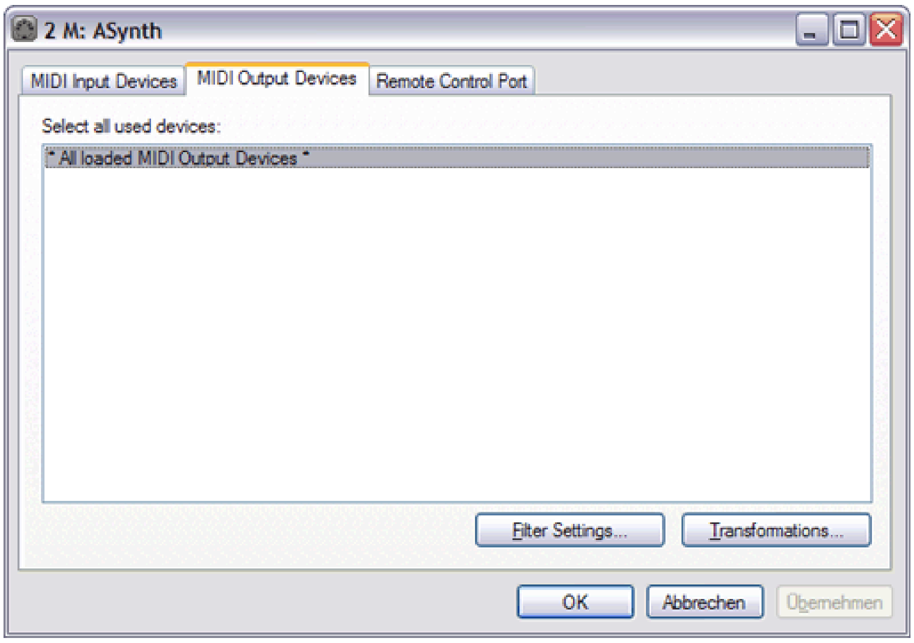


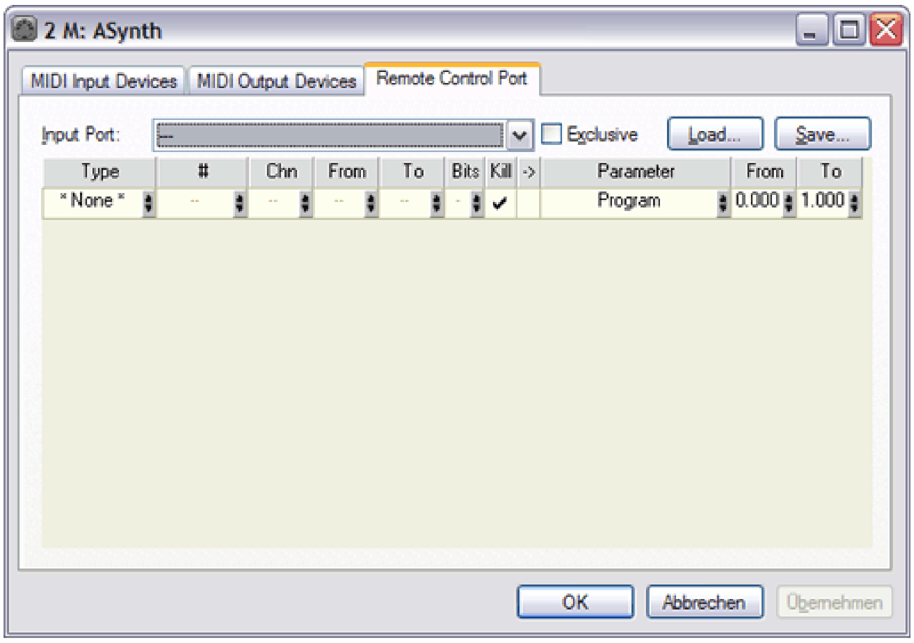
Figure 48: PlugIn MIDI Parameters Window, Output Devices Tab

On the **MIDI Output Devices** tab, you can define the MIDI Output devices that this PlugIn sends MIDI messages to. Normally, it sends to all loaded MIDI Output Devices. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

The “Filter Settings...” and “Transformations...” buttons open a secondary dialog (both open the same dialog, they just start it on a different tab). See “Filter Settings and Transformations” on page 42 for details.

Note: in earlier versions, MIDI routing between PlugIns was set up on this tab; this is now done with MIDI links (see “Chain After” on page 56 for details).

Remote Control Port



Type	#	Chn	From	To	Bits	Kill	->	Parameter	From	To
* None *	--	--	--	--	-	✓		Program	0.000	1.000

Figure 49: PlugIn MIDI Parameters Window, Remote Control Port Tab

On the **Remote Control Port** tab, you can define the PlugIn's *Remote Control*. In addition to passing MIDI messages to the PlugIns, some of the PlugIn's basic operations can be remotely controlled by MIDI messages, too. Here, you can select one of the opened MIDI Inputs or one of the MIDI PlugIns chained before this one to control the PlugIn, or one of the available special entries:

Name	**Comment**
All Loaded MIDI Input Devices	Input from any of the opened physical MIDI Input devices is used. **Note:** if used with a synth PlugIn, the **Exclusive** check box should remain unchecked in this case, otherwise the PlugIn won't see a single MIDImessage.
Midi Player	Input from the MIDI Player is used.
Keyboard Bar	Input from the Keyboard Bar is used.
Joysticks	Input from attached joysticks is used.
SysEx Window	Input from the SysEx window is used.
All linked PlugIns	Input from any PlugIn that is chained before the remotely controlled PlugIn is used.

The default setting of "---" means that there's no Remote Control port.

If the **Exclusive** check box is checked, all MIDI messages from this port are used for Remote Control only. If not, the PlugIn sees them, too (unless "Kill" is selected in the actions list below)..

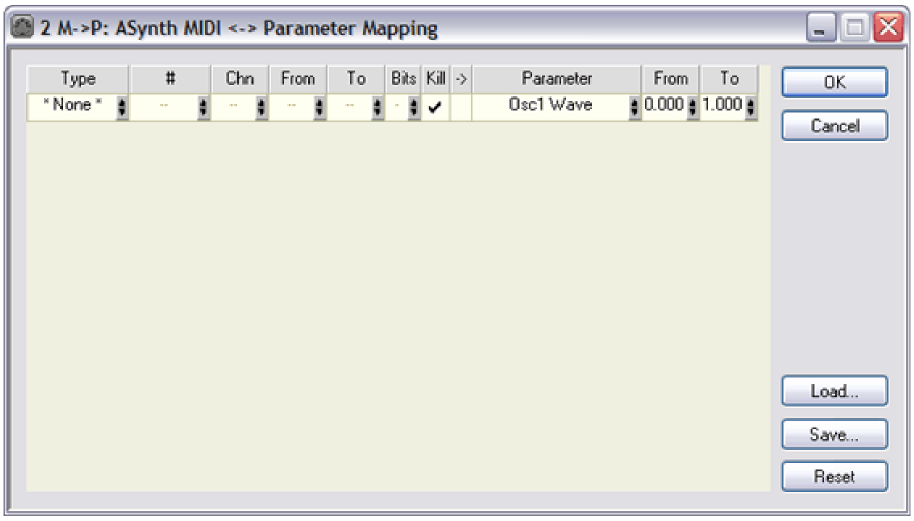
Below the port, you can configure the action for each of the PlugIn's settings that is remote-controllable. This list is of the same type as the one used in the **MIDI -> Parameter Mapping** window (see "MIDI -> Parameter" on page 48 for details on editing it); the difference is that the **From** and **To** settings on the **Parameter** side represent the full range for the parameter (given below) expressed as a floating-point value in range 0.0 .. 1.0. Unless you're really sure what you're doing, it is probably a good idea to leave these settings alone.

Currently, the following PlugIn parameters can be remotely controlled:

Parameter	Type	Range	Comment
Program	Numeric	PlugIn-Dependen t	Selects one of the possible programs of the PlugIn.
Bypass	Switch	0-1	Turns Bypass on or off.
Mute	Switch	0-1	Turns Mute on or off.
Close	Switch	0-1	Closes the PlugIn if the value is in the upper range.
Next Program	Switch	0-1	Switches to the next program if the value is in the upper range.
Previous Program	Switch	0-1	Switches to the previous program if the value is in the upper range.

MIDI -> Parameter

Selecting this menu entry opens a window that allows the mapping of incoming MIDI messages to VST Automation parameters for the PlugIn. Most contemporary PlugIns can handle incoming MIDI Controller messages themselves, in more or less sophisticated ways; for those that cannot, this dialog and its companion below ("Parameter -> MIDI") have been added.


2 M->P: ASynth MIDI <-> Parameter Mapping

Type	#	Chn	From	To	Bits	Kill	->	Parameter	From	To
* None *	--	--	--	--	-	✓		Osc1 Wave	0.000	1.000

Figure 50: MIDI -> Parameter Mapping Window

This is one of the more complex windows in VSTHost, since there are quite a lot of possibilities.

Nearly all of the fields here are spin controls; i.e., they got a *spin button* on their right side that allows scrolling through the possible values by clicking in on the upper/lower half. Dragging the mouse up or down allows to change the speed at which the selection changes. Wherever possible, clicking the item with the right mouse button offers a *context menu* with all possible settings. Some of the fields can be *edited* directly by double-clicking them.

As soon as you change the value of the last line's MIDI Type from ***None*** to anything else, a new ***None*** line is added to the list. This allows the definition of as many lines as you like. All lines containing a type of ***Learn*** or ***None*** are discarded when the window is closed with **OK**.

The window has two parts; the left part defines the incoming MIDI message(s), the right part defines which parameter is to be modified by them, and how. The two parts are discussed below.

There are some additional buttons on the window. **Reset** simply resets the list. **Load…** can be used to load a new mapping from a file, whereas **Save…** can be used to save the current mapping to a file.

Attention: VSTHost does *not* check the PlugIn type when loading a mapping from a file; since only the Parameter *number* is saved, mappings created for a completely different PlugIn will be happily loaded, but may result in undesirable mappings, since each PlugIn has its own idea about which parameter is at which position.

Incoming MIDI Message

This side defines the incoming MIDI message to be mapped to a parameter. It consists of the following fields:

Type This field defines the type of the MIDI message(s) processed for this line. Aiming to be as versatile as possible, there are quite a lot of choices here:

Learn	If this type is selected, VSTHost uses the next incoming MIDI message to define the type of the MIDI message.
None	This is the default value; lines of this type are ignored by MIDI processing.
Bank	React on an incoming CC#0 (and eventually CC#32) message. This can be either a 7-bit or 14-bit message.
Program	React on an incoming Program Change message.
CC	React on an incoming Continuous Controller message. If the controller number is below 32, this can be either a 7-bit or 14-bit controller.
RPN	React on an incoming RPN message bundle. Both Increment/Decrement and Data Entry are processed.
NRPN	React on an incoming NRPN message bundle. Both Increment/Decrement and Data Entry are processed.
Pitch	React on an incoming Pitch Wheel message
Note On Key	React on an incoming Note On message's key. # in this case defines the velocity.
Note On Velocity	React on an incoming Note On message's velocity. # in this case defines the key.
Note Off Key	React on an incoming Note Off message's key. # in this case defines the velocity.
Note Off Velocity	React on an incoming Note Off message's velocity. # in this case defines the key.
Note On/Off Key	React on an incoming Note On/Off message's key. # in this case defines the velocity, where Note Off is interpreted as velocity 0.
Note On/Off Velocity	React on an incoming Note On or Off message's velocity, where Note Off is interpreted as velocity 0. # in this case defines the key.
Poly Aftertouch	React on an incoming Polyphonic Aftertouch message's pressure. Not many attached keyboards will be able to deliver this. # in this case defines the key.
Poly Aftertouch Key	React on an incoming Polyphonic Aftertouch message's key. Not many attached keyboards will be able to deliver this. # in this case defines the pressure.
Channel Pressure	React on an incoming Channel Pressure message.
Clock	This, actually, isn't a MIDI message; VSTHost can determine the clock speed from a set of incoming MIDI Clock (F8) realtime messages, and use this as an input value for all kinds of MIDI <-> parameter operations. The **From** and **To** fields are set to VSTHost's minimum and maximum clock speeds in this case.
Start, Continue, Stop	These correspond to the MIDI Realtime messages of

the same name. Since they can only send exactly one value (1), they aren't really usable for MIDI <-> Parameter conversions, unless setting the parameter triggers an action, but they can be very useful for Remote Control (see "Remote Control Port" on page 19).

Then, there are the "CC Relative" types; these are not part of the official MIDI specification, but have been added by some companies to augment their products' capabilities. They were implemented to use the new features provided by rotary encoders, something that simply wasn't available when the MIDI standard was created. Using these encoders, you can pass *relative* controller changes to the program. This is a very nifty feature – you can send "increment the value a little" or "decrement the value a little more" messages from an external controller. Unfortunately, there's no standard for this kind of message, so just about each major player did it in his own way… that's why the modern controllers that can send Relative CC (for example, Behringer BCR-2000/BCF-2000, Doepfer Pocket Dial) normally provide more than one way to send them. Since I happen to own a Behringer BCR-2000, the types below correspond to the BCR-2000's "Relative 1", "Relative 2", and "Relative 3" modes in their order.

CC Relative 2C	Relative changes are sent as 2's-complement numbers. In 7-bit mode, bit 6 is the sign bit, and in 14-bit mode, bit 13 is the sign bit. This is the mode used by Steinberg products, for example.
CC Relative Bin	Relative changes are sent as binary values, with an offset (64 in 7-bit mode and 2048 in 14-bit mode).
CC Relative SB	Relative changes are sent with a dedicated *sign bit*; in 7-bit mode, bit 6 is the sign bit, and in 14-bit mode, bit 13 is the sign bit. If set, the number is negative. This is the mode used by Apple/eMagic Logic, for example.

#	For some types, an additional number can be given; for example, for CC messages, this is the controller number, while it is the note number for Note On/Off and Polyphonic Aftertouch messages. ***All*** can be used to react on the full range indiscriminately.
Chn	Can be used to set the MIDI channel. ***All*** can be used to react on the full range indiscriminately.
From **To**	These define the MIDI value range. For 7-bit types, this is normally 0..127 (except for the relative CC types, where it is 0..64), whereas it is 0..16383 for 14-bit types (except for the relative CC types, where it is 0..8192). This can be used to further narrow the range of incoming messages; you can, for example, decide to only process Note On messages with a velocity between 64 and 127. If the range is *reversed* (i.e., **To** is lower than **From**), the values between **To** and **From** are *excluded* from processing; i.e., defining the range as 126..64 would only process incoming values of 0..63 and 127.
Bits	For some types, you can define whether they are treated as 7-bit or 14-bit entities
Kill	This flag defines whether the MIDI message is "killed", i.e., removed from the MIDI events list. This defaults to yes; normally, if you transform a MIDI message into a parameter, you won't need to pass the MIDI message to the PlugIn any more. If you want to pass the MIDI message anyway, a simple mouse click on the "Killing field" allows this.

Translation to...

This field, which has the header text "**->**", can be used to define a complex set of changes – it can be used to create a **conjunction**. If you click into this field, a "+" sign appears, and the outgoing parameter change fields (see below) disappear. In this mode, the incoming MIDI message is parsed, but is not used to change a parameter; VSTHost merely remembers whether the last message of the given type and channel would match the other criteria.

This result is then ANDed with the *next* line. Only if both lines' criteria are met, the incoming MIDI message is translated into a parameter.

Note: you can set up as many ANDed lines as you like, but they have to be followed by a line which finally determines which parameter is to be changed. If this final line is missing, all ANDed lines are discarded when the setup is saved.

Outgoing Parameter Change

This side defines which of the PlugIn's parameters is to be modified by the incoming MIDI message. It consists of the following fields:

Parameter Here, you can select one of the PlugIn's VST Parameters.
If ***Learn*** is selected, VSTHost uses the parameter from the Automation value change that comes in; this allows you to select ***Learn***, then switch to the PlugIn's Editor window, twiddle the desired knob there, and (provided this *is* an automatable parameter) instantly have the corresponding parameter selected.

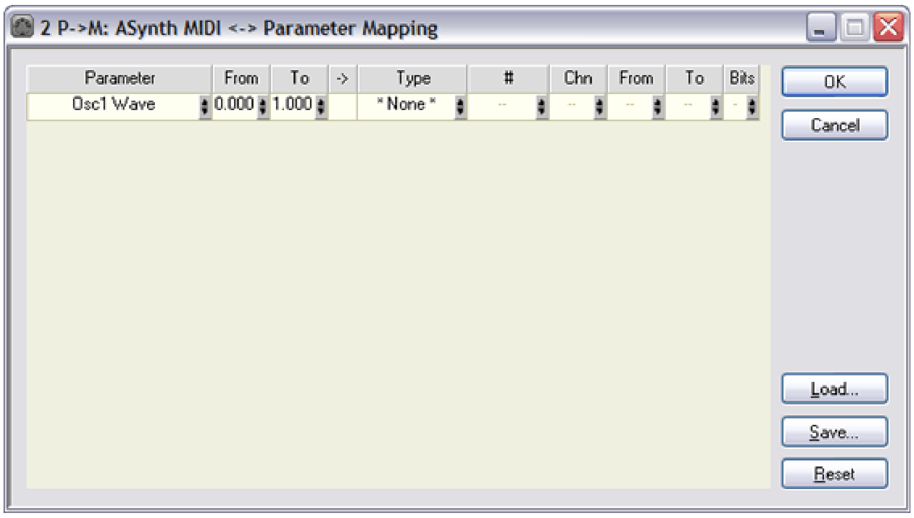
Mode Here, you can define the output mode.
The following modes are currently defined:

- **Set** In this mode, the incoming MIDI message's value range is converted into a possible range of 0.000…1.000, which is then expanded into the value range defined by **From** and **To**.
If the range is *reversed* (i.e., **To** is lower than **From**), the output values are *reversed*, too; i.e., by specifying a range of 1.000..0.000 here, an incoming value of 0.1 would result in a parameter value of 0.9 sent to the PlugIn.
- **Toggle** In this mode, the incoming MIDI message's value is ignored; instead, for each matching MIDI message, VSTHost *toggles* the parameter between the values given in **From** and **To**. This can, for example, be used to start and stop playback of a sample by pressing a foot switch twice.
As soon as you set the mode to **Toggle**, VSTHost will try to set up the Incoming MIDI message part to sensible values for the most likely application – a foot switch that sends CC messages.
- **Relative** Similar to **Set** mode, but after conversion the output parameter value is not confined to the range set by **From** and **To**; instead, the whole parameter range is used.
The main purpose of this mode is to allow fine-tuning a parameter by setting **To** to a smaller value than 1.000; using 0.100, for example, leads to a 10x finer resolution.
This mode works best with Relative CCs, but isn't limited to them.
- **From, To** In these modes, the incoming MIDI message's value is ignored; instead, for each matching MIDI message, VSTHost sends the configured **From** or **To** value. This can, for example, be used to trigger a special value whenever a **Note On Velocity** message came in.

From To Here, you can select the value range that is sent to the PlugIn. See the discussion of **Mode** above for the meaning of the fields.

Parameter -> MIDI

Selecting this menu entry opens a window that allows the mapping of incoming VST Automation parameter changes to outgoing MIDI messages for the PlugIn. Most contemporary PlugIns can handle incoming and outgoing MIDI Controller messages in more or less sophisticated ways; for those that cannot, this dialog and its companion above ("MIDI -> Parameter") have been added.



Parameter	From	To	->	Type	#	Chn	From	To	Bits
Osc1 Wave	0.000	1.000		* None *	--	--	--	--	-

Figure 51: Parameter -> MIDI Mapping Window

See "MIDI -> Parameter" above for a general description of the editing possibilities on this window.

The window has two parts; the left part defines the incoming VST Parameter change, the right part defines which set of MIDI messages is to be generated by them, and how. The two parts are discussed below.

There are some additional buttons on the window. **Reset** simply resets the list. **Load…** can be used to load a new mapping from a file, whereas **Save…** can be used to save the current mapping to a file. **Attention:** VSTHost does *not* check the PlugIn type when loading a mapping from a file; since only the Parameter *number* is saved, mappings created for a completely different PlugIn will be happily loaded, but may result in undesirable mappings, since each PlugIn has its own idea about which parameter is at which position.

Incoming Parameter Change

This side defines which of the PlugIn's parameters should generate a (set of) MIDI message(s). It consists of the following fields:

Parameter	Here, you can select one of the PlugIn's VST Parameters. If ***Learn*** is selected, VSTHost uses the parameter from the Automation value change that comes in; this allows you to select ***Learn***, then switch to the PlugIn's Editor window, twiddle the desired knob there, and (provided this *is* an automatable parameter) instantly have the corresponding parameter selected.
From **To**	Here, you can select the value range that's accepted from the PlugIn. The defined maximal value range for VST parameters is 0.000…1.000. If the range is *reversed* (i.e., **To** is lower than **From**), the values between **To** and **From** are *excluded* from the generation; i.e., defining the range as 1.000..0.500 would only process incoming values between 0.000 and 0.49°.

Translation to...

This field, which has the header text "**->**", can be used to define a complex set of changes – it can be used to create a **conjunction**. If you click into this field, a "+" sign appears, and the outgoing MIDI message fields (see below) disappear. In this mode, the incoming parameter change is parsed, but is not used to create a MIDI message; VSTHost merely remembers whether the last change of the given parameter would be in the given range.

This result is then ANDed with the *next* line. Only if both lines' criteria are met, the incoming parameter change creates a MIDI message.

Note: you can set up as many ANDed lines as you like, but they have to be followed by a line which finally determines which MIDI message is to be generated. If this final line is missing, all ANDed lines are discarded when the setup is saved.

Outgoing MIDI Message

This side defines the (set of) MIDI Message(s) generated by the parameter change. These messages are then treated just like original MIDI messages originating from the PlugIn – they can be sent to all configured MIDI Outputs, or to another PlugIn (where they could even be modified to VST Parameter changes again, allowing rather bizarre inter-PlugIn modulations). It consists of the following fields:

Type This field defines the type of the MIDI messages. Aiming to become as versatile as possible, there are quite a lot of choices here:

Learn	If this type is selected, VSTHost uses the next incoming MIDI message to define the type of the MIDI message (this is a bit of a hack; an *incoming* MIDI message is used to define the type of an *outgoing* MIDI message… oh well, it works…).
None	This is the default value; lines of this type are ignored by MIDI processing.
Bank	Creates an outgoing CC#0 (and eventually CC#32) message. This can be either a 7-bit or 14-bit message.
Program	Creates an outgoing Program Change message.
CC	Creates an outgoing CC message. This can be either a 7-bit or 14-bit message.
RPN	Creates an outgoing RPN message bundle.
NRPN	Creates an outgoing NRPN message bundle.
Pitch	Creates an outgoing Pitch Wheel message
Note On Key	Creates an outgoing Note On message's key. The velocity is defined by #.
Note On Velocity	Creates an outgoing Note On message's velocity. The key is defined by #.
Note Off Key	Creates an outgoing Note Off message's key. The release velocity is defined by #.
Note Off Velocity	Creates an outgoing Note Off message's velocity. The key is defined by #.
Note On/Off Key	Creates an outgoing Note On or Off message's velocity. The key is defined by #. An outgoing velocity of 0 creates a Note Off message, other values create a Note On message.
Note On/Off Velocity	Creates an outgoing Note On or Off message's key. The release velocity is defined by #. An outgoing velocity of 0 creates a Note Off message, other values create a Note On message.
Poly Aftertouch Key	Creates an outgoing Polyphonic Aftertouch message's key. Not many attached keyboards will be able to deliver this. The aftertouch pressure is defined by #.
Polyphonic Aftertouch	Creates an outgoing Polyphonic Aftertouch message. Not many attached keyboards will be able to deliver this. The key is defined by #.
Channel Pressure	Creates an outgoing Channel Pressure message.
Clock	This doesn't really make much sense – although a

	specially crafted PlugIn might put it to use. The parameter value, whatever it is, triggers a single MIDI Clock (F8) realtime message.
Start, Continue, Stop	These also don't make much sense in a normal environment. The parameter value, whatever it is, triggers a single MIDI Start, Continue, or Stop realtime message.

Then, there are the "CC Relative" types; these are not part of the official MIDI specification, but have been added by some companies to augment their product's capabilities in a makeshift, non-standardized way. They were implemented to use the new features provided by rotary encoders, something that simply wasn't available when the MIDI standard was created. Using these encoders, you can pass *relative* controller changes to the program. This is a very nifty feature – you can send "increment the value a little" or "decrement value a little more" messages from an external controller. Unfortunately, there's no standard for this kind of message, so just about each major player did it in his own way… that's why the modern controllers that can send Relative CC (for example, Behringer BCR-2000/BCF-2000, Doepfer Pocket Dial) normally provide more than one way to send them. Since I happen to own a Behringer BCR-2000, the types below correspond to the BCR-2000's "Relative 1", "Relative 2", and "Relative 3" modes.

CC Relative 2C	Relative changes are sent as 2's-complement numbers. This is the mode used by Steinberg products, for example.
CC Relative Bin	Relative changes are sent as binary values, with an offset (64 in 7-bit mode and 2048 in 14-bit mode).
CC Relative SB	Relative changes are sent with a dedicated *sign bit*; in 7-bit mode, bit 6 is the sign bit, and in 14-bit mode, bit 13 is the sign bit. If set, the number is negative. This is the mode used by Apple/eMagic Logic, for example.

#	For some types, an additional number can be given; for example, for CC messages, this is the controller number, while it is the note number for Note On/Off Velocity and Polyphonic Aftertouch messages.
Chn	Can be used to set the MIDI channel.
From **To**	These define the MIDI value range. For 7-bit types, this is normally 0..127 (except for the relative CC types, where it is 0..64), whereas it is 0..16383 for 14-bit types (except for the relative CC types, where it is 0..8192). This can be used to further narrow the range of incoming messages; you can, for example, decide to only process Note On messages with a velocity between 64 and 127. If the range is *reversed* (i.e., **To** is lower than **From**), the values between **To** and **From** are *reversed*, too.
Bits	For some types, you can define whether they are treated as 7-bit or 14-bit entities

Permanent

This menu entry is reserved for future use. Just ignore it ☺

Load Bank

Selecting this menu entry opens a dialog where you can load a program bank (normally a file with extension ".fxb") into the current PlugIn. Once you specify one and save the performance, VSTHost loads this bank into the PlugIn automatically whenever the performance containing the PlugIn is loaded. If the PlugIn banks are saved automatically (see "Autosave PlugIn Banks" on page 64 for details), VSTHost treats this as an *import*; as soon as the performance is saved, the loaded bank is saved into VSTHost's data directory for the current bank, and this copy is used from then on.

For VST3 PlugIns, VSTHost can also load the VST3 standard file format (with extension ".vstpreset").

Save Bank

Selecting this menu entry saves the current PlugIn's program bank into the file. If there is no current program bank defined for the PlugIn (i.e., no **Load Bank** operation has been done before), it acts like **Save Bank As**.

Save Bank As

Selecting this menu entry opens a dialog where you can select a new file name (normally a file with extension ".fxb") to save the current PlugIn's program bank into.

Since V1.53, VSTHost defaults to the .vstpreset format for VST3 PlugIns, but this can be changed to .fxb format; this, however, is no true VST 1/2 bank file, but an encapsulated .vstpreset-format file.

In both cases – the "banks" created by VST3 PlugIns are in reality single presets; I haven't found out yet how to get the PlugIns to save complete banks. I'm not even sure whether this is possible at all.

Autosave Bank

This menu entry defines whether the PlugIn's program bank is automatically saved with the performance. Initially, it is checked; however, there may be circumstances where you don't want this to happen. In this case, turn it off.

Reload Bank

This menu entry is nearly synonymous to "Autosave Bank" above, but it covers the other way – if it is checked, the PlugIn's program bank is automatically loaded when the PlugIn is part of a performance that's just being loaded. Initially, it is checked; however, there may be circumstances where you don't want this to happen. In this case, turn it off.

Bypass

Selecting this menu entry toggles the Bypass mode for the effect on and off. In contrast to **Mute** (see below), bypassing an effect doesn't turn off the whole chain, since all effects that are chained after the bypassed one still receive its input.

Note: bypassing an effect does *not* turn it off; it still receives input, and it still generates output (which is silently discarded), since it has to deliver the correct output as soon as Bypass is turned off again. So, no performance gain here ☺.
In V1.44, this behavior has been refined a bit; if the PlugIn reports that it can be bypassed (i.e., if canDo("bypass") returns 1), VSTHost calls the PlugIn's setBypass() method to let it define whether bypassing turns processing off completely or whether the PlugIn does a "soft bypass" on its own.

Mute

Ah yes, a very important menu entry. Selecting this (un)mutes the current effect. In contrast to Bypass (see above), this completely mutes the effect's output; this means that all effects that are chained to the muted one receive only silence as input.

Note: muting an effect does *not* turn it off; it still receives input, and it still generates output (which is silently discarded), since it has to deliver the correct output as soon as Mute is turned off again. So, no performance gain here ☺.
In V1.44, this behavior has been refined a bit; if the PlugIn reports that it can be bypassed (i.e., if canDo("bypass") returns 1), VSTHost calls the PlugIn's setBypass() method to let it define whether bypassing turns processing off completely or whether the PlugIn does a "soft bypass" on its own.

Chain After

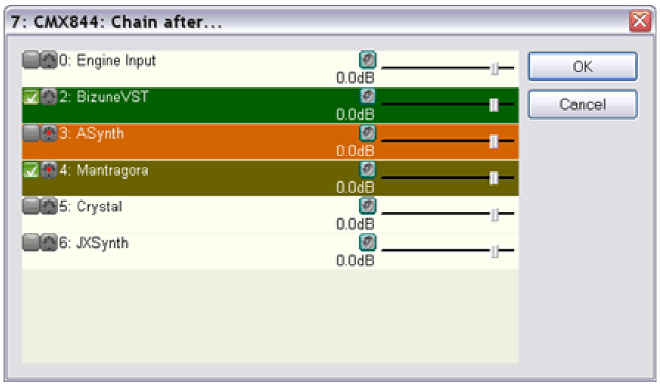
Selecting this menu entry allows to define PlugIn *Chains*; a chain, in VSTHost, is a sequence of PlugIns that are linked together.

The **{In}** built-in PlugIn provides audio input from VSTHost to a PlugIn (unless it has no inputs), then the PlugIn's output is passed on to the next element(s) in the chain, and so on, until the **{Out}** built-in PlugIn has been reached; this PlugIn's output generates the real VSTHost audio output.

Note: versions earlier than V1.46 used a rather complicated setup with *Send* and *Insert* links; this is not necessary any more, since there are dedicated audio input and output PlugIns.

You can set up complicated setups this way. Each PlugIn can be linked to a multitude of other PlugIns.

Selecting the **Chain After** menu entry opens the following dialog:



7: CMX844: Chain after...

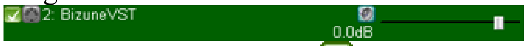
0: Engine Input 0.0dB
2: BizuneVST 0.0dB
3: ASynth 0.0dB
4: Mantragora 0.0dB
5: Crystal 0.0dB
6: JXSynth 0.0dB

Figure 52: Chain PlugIn After Dialog

This dialog lists all PlugIns that the current PlugIn can be "chained after", or "linked to". It does not include PlugIns that include the current PlugIn in their predecessor chains, because that would lead to recursive setups – and this would kill VSTHost.

There are some buttons available for each entry:

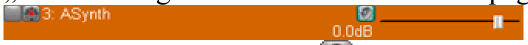
- this button is used to link the current PlugIn's *Audio channels* after the selected one. Selected PlugIns look like this:



2: BizuneVST 0.0dB

The button has changed to , and the line is shown in a different color. This button is only available if the PlugIn can deliver audio output.

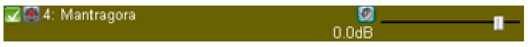
- this button is used to link the current PlugIn's *MIDI Input* after the selected one. If selected, any MIDI output generated by the selected PlugIn is sent to the current PlugIn (unless it is filtered – see „Filter Settings and Transformations" on page 42 for that). Selected PlugIns look like this:



3: ASynth 0.0dB

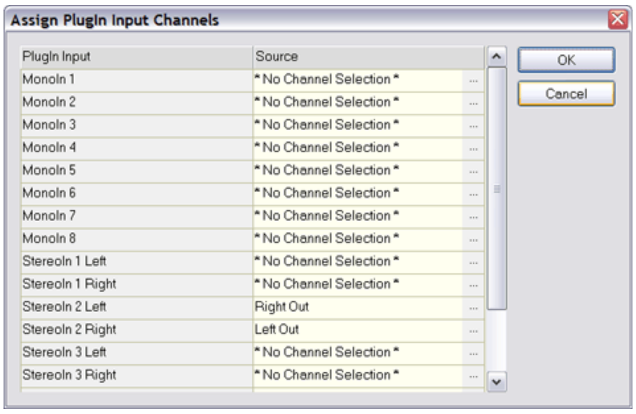
The button has changed to , and the line is shown in a different color. This button is only available if the current PlugIn can accept MIDI input.

If both Audio and MIDI data are linked to the PlugIn, the line color is a mixture between the two:



4: Mantragora 0.0dB

- this button is used to define the Input Channel assignment for the link. You can assign the chained PlugIn's output channels to the current PlugIn's input channels here. Here's a more complicated setup:



Assign PlugIn Input Channels

PlugIn Input	Source
MonoIn 1	* No Channel Selection *
MonoIn 2	* No Channel Selection *
MonoIn 3	* No Channel Selection *
MonoIn 4	* No Channel Selection *
MonoIn 5	* No Channel Selection *
MonoIn 6	* No Channel Selection *
MonoIn 7	* No Channel Selection *
MonoIn 8	* No Channel Selection *
StereoIn 1 Left	* No Channel Selection *
StereoIn 1 Right	* No Channel Selection *
StereoIn 2 Left	Right Out
StereoIn 2 Right	Left Out
StereoIn 3 Left	* No Channel Selection *
StereoIn 3 Right	* No Channel Selection *

Figure 53: Assign Chained Effect Input Channels Dialog

This example is taken from the chain between 4**: Mantragora.dll** and 7**:cmx844.dll** in the following VSTHost performance:

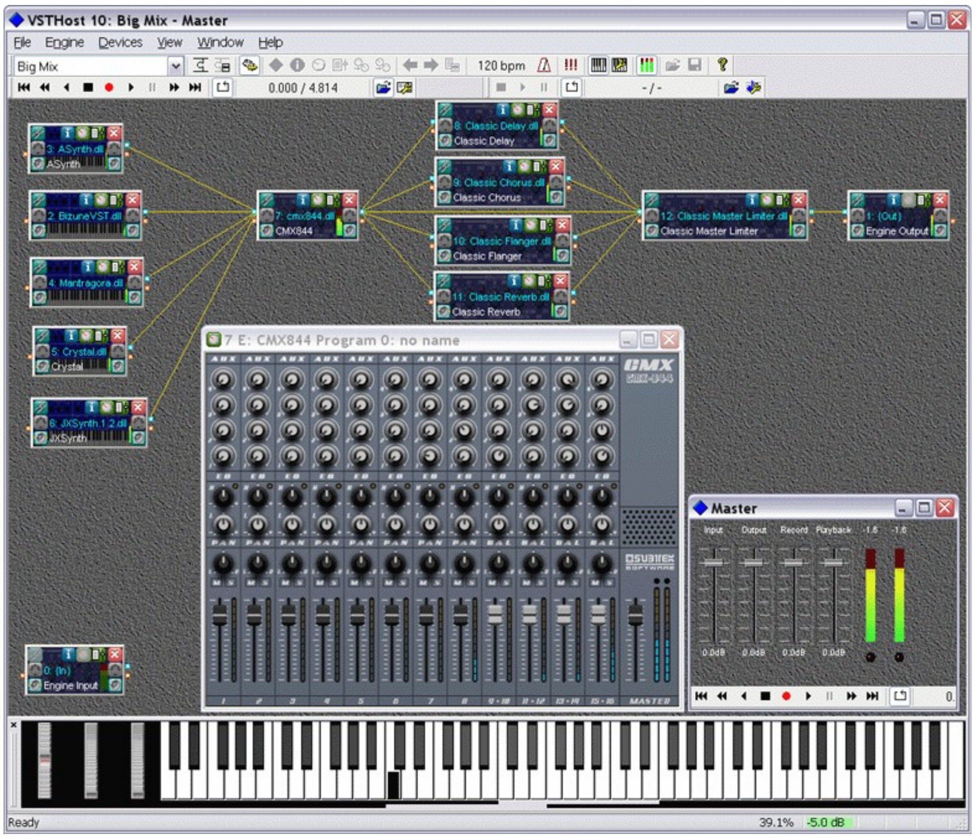


Figure 54: complicated setup with multichannel mixer

Then, there's a little slider that allows to define the level passed through this link; if, for example, you want to chain a reverb PlugIn after an Instrument PlugIn, you would define the link as a Send Link and reduce the level in this link to, say, -10dB. In this way, both the original instrument and the reverb are heard, but the reverb contributes much less to the overall audio output.

Note: if you already linked some PlugIns, you can activate the "Chain After" dialog of the target PlugIn by double-clicking on a link line on the main window.

Unchain

This is a bit tricky… the **Chain After** dialog can be used to set up the PlugIn(s) that a PlugIn is linked to. Deselecting the link on that dialog removes it, breaking the chain if there's any other PlugIn linked to the current one.

Selecting the **Unchain** menu item, however, removes all links to and from the current PlugIn – but it leaves the rest of the chain intact and "glues" predecessors and successors together. That is, all predecessors and successors remain linked, just the current PlugIn is entirely removed from the chain.

Note: the effect can be quite dramatic... if you unchain PlugIn 7: CMX844 from the performance shown above, 20 new links suddenly appear! So, please use this with caution.

Export XML

Starting with the VST SDK 2.4, Steinberg added a new feature to the VST specification – an XML definition to refine the parameter definitions of a PlugIn. Normally, the parameters are displayed as a rather non-descriptive bunch of short strings and attached values (see "Toolbar" on page 75 for details). To quote the VST SDK: "The VST Parameters Structure XML definition provides an easy way to structure parameters of existing VST Plug-Ins hierarchically, without having to recompile the Plug-In binary." Well, in case of VSTHost, this doesn't really apply yet (the hierarchical definitions are ignored), but at least it can be used to give the parameters more descriptive names, add tags to various value ranges, and the like. If a .vstxml file or embedded resource is available with a PlugIn, VSTHost uses it automatically.

Since most PlugIns don't come with an associated .vstxml file (the only one I'm currently aware of is Terratec's KOMPLEXER), VSTHost allows the generation of such files. It uses all data about the parameters that it can gather from the PlugIn to create a .vstxml file which you can adjust to your taste (see the VST SDK for the Parameters Structure XML definition). This file has to have the same filename and path as the PlugIn, just with the extension .vstxml. Here's a small example for Steinberg's Neon synthesizer, which can now be downloaded for free – and which, as one of the first examples of a VSTi, has an exceptionally dumb (and short, which makes it a good candidate for this discussion) parameter set:

```
<VSTPluginProperties>
  <VSTParametersStructure>
    <Param id="0" name="OscRang" label="amount" />
    <Param id="1" name="OscWave" label="wave" />
    <Param id="2" name="Osc2Det" label="amount" />
    <Param id="3" name="LfoFreq" label="amount" />
    <Param id="4" name="VcfCut" label="amount" />
    <Param id="5" name="VcfReso" label="amount" />
    <Param id="6" name="VcfAtt" label="amount" />
    <Param id="7" name="VcfDec" label="amount" />
    <Param id="8" name="VcfSus" label="amount" />
    <Param id="9" name="VcfRel" label="amount" />
    <Param id="10" name="VcaAtt" label="amount" />
    <Param id="11" name="VcaDec" label="amount" />
    <Param id="12" name="VcaSus" label="amount" />
    <Param id="13" name="VcaRel" label="amount" />
  </VSTParametersStructure>
</VSTPluginProperties>
```

Figure 55: Neon.vstxml in its original form

Here’s an example how that could be restructured to make things a bit more readable:

```
<VSTPluginProperties>
  <VSTParametersStructure>
    <!-- Value Types: -->
    <ValueType name="OscRang" label="'">
      <Entry name="16" />
      <Entry name="8" />
      <Entry name="4" />
    </ValueType>
    <ValueType name="OscWave" label="">
      <Entry name="Triangle" />
      <Entry name="Sawtooth" />
      <Entry name="Rectangle" />
    </ValueType>

    <Group name="Oscillator">
      <Param id="0" name="Osc Range" shortName="OscRng" numberOfStates="3"
             type="OscRang"  label="'" />
      <Param id="1" name="Osc Waveform" shortName="OscWv" numberOfStates="3"
             type="OscWave" label="" />
      <Param id="2" name="Oscillator 2 Detune" label="" shortName="Os2Det" />
    </Group>
    <Param id="3" name="LFO Speed" label="" shortName="LfoFreq" />
    <Group name="VCF">
      <Param id="4" name="VCF Cutoff" label="" shortName="VcfCut" />
      <Param id="5" name="VCF Resonance" label="" shortName="VcfRes" />
      <Param id="6" name="VCF Attack" label="" shortName="Att" />
      <Param id="7" name="VCF Decay" label="" shortName="Dec" />
      <Param id="8" name="VCF Sustain" label="" shortName="Sus" />
      <Param id="9" name="VCF Release" label="" shortName="Rel" />
    </Group>
    <Group name="VCA">
      <Param id="10" name="VCA Attack" label="" shortName="VcaAtt" />
      <Param id="11" name="VCA Decay" label="" shortName="VcaDec" />
      <Param id="12" name="VCA Sustain" label="" shortName="VcaSus" />
      <Param id="13" name="VCA Release" label="" shortName="VcaRel" />
    </Group>

  </VSTParametersStructure>
</VSTPluginProperties>
```

Figure 56: Neon.vstxml, modified

VSTHost doesn’t use the groups yet, it still displays all parameters in numerical order; but all other settings are used the next time you load the Neon PlugIn.

VSTXML Format Extension

Since V1.53, VSTHost uses an extended version of the VSTXML format for VST2 Shell, VST Module Architecture, and VST3 PlugIns; in the VST SDK 2.4 definition, the **name** and **id** attributes of the VstParametersStructure element are not available. This, however, precludes the use of .vstxml files for Shell PlugIns; there would be no way to add more than one PlugIn's parameters to the file, even if the PlugIn supports dozens of internal PlugIns.

The **id** attribute helps VSTHost to maintain separate VstParametersStructure elements for each of the PlugIns in the Shell PlugIn. This works for VST2 Shell PlugIns, VST Module Architecture PlugIns, and VST3 PlugIns, by the way – Steinberg may have decided to drop and replace the format with VST 3.5, but I certainly haven't ☺.

Note: Since this is a nonstandard extension, it might cause problems with other hosts that include support for the VSTXML format. To minimize the possibility, VSTHost always puts the last exported definition first in the VSTXML file, followed by eventually existing definitions for other PlugIns in the same module. That should, in theory, ensure that this one is seen by other hosts. If that isn't enough to stay compatible with your host, you can add the **VSTXML_Ext=0** setting to VSTHost's main initialization file (see “VSTXML_Ext=1” on page 90 for details).

Close

Selecting this menu entry closes the currently selected PlugIn and all of its windows if the main window of the PlugIn is active; otherwise, only the respective window is closed.

Program Name

Selecting this menu entry opens a little dialog where you can enter a new name for the current program used in this PlugIn:

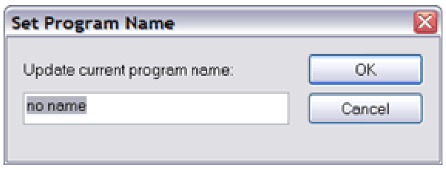


Figure 57: Set Program Name Dialog

Please note that while the change is instantly visible after you have pressed OK, you need to save the PlugIn’s Bank or Program to a file to really make it permanent. If PlugIn sound banks are automatically saved (see “Autosave PlugIn Banks” on page 64 for details), this is taken care of when the performance is saved.

Load Program

Selecting this menu entry opens a dialog where you can load a program (normally a file with extension “.fxp”) into the current PlugIn.

For VST3 PlugIns, VSTHost can also load the VST3 standard file format (with extension “.vstpreset”).

Save Program As

Selecting this menu entry opens a dialog where you can save the current program of the current PlugIn into a file (normally a file with extension “.fxp”).

Since V1.53, VSTHost defaults to the .vstpreset format for VST3 PlugIns, but this can be changed to .fxp format; this, however, is no true VST 1/2 program file, but an encapsulated .vstpreset-format file.

Next Program

Selecting this menu item changes the PlugIn’s current program to the next program in the list.

Previous Program

Selecting this menu item changes the PlugIn’s current program to the previous program in the list.

Export Programs

Selecting this menu item opens a dialog where you can select a folder; VSTHost then saves all programs of the PlugIn into this folder. Each program is saved under an automatically generated name of the form ***PlugInName_ProgramNumber.ProgramName*.fxp** – looks rather complicated when written in this form, but if you look at an example, like “ASynth_001.PWBass.fxp”, it becomes fairly obvious.

Programs mm-nn

A PlugIn can define how many programs it supports. Some have no program, some have one, some have 10, others have 128… and so on. Since a single list of potentially thousands of programs would be rather awkward to use, VSTHost splits it into manageable parts and displays a list of submenus for these. Selecting one of the items on the submenu loads the selected program into the PlugIn.

The above three menu items change the current program for a PlugIn; VSTHost remembers this program number, together with an eventually loaded Program Bank. VSTHost loads this program into the PlugIn automatically whenever the VSTHost performance containing the PlugIn is loaded.

Note: VSTHost does not automatically save the PlugIn's program bank. If the PlugIn relies on a specific setup that's stored in a bank file, please remember to save that before you save the performance. Since V1.43, this can be changed (see "Autosave PlugIn Banks" on page 64).

Performance Menu

This menu contains entries that deal with performance operations.

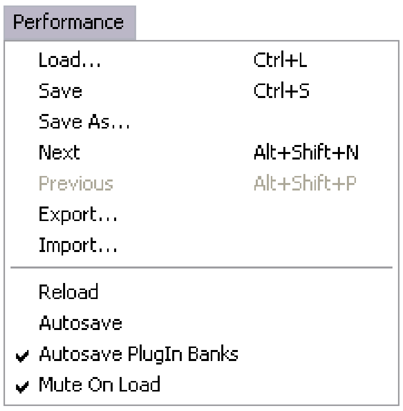
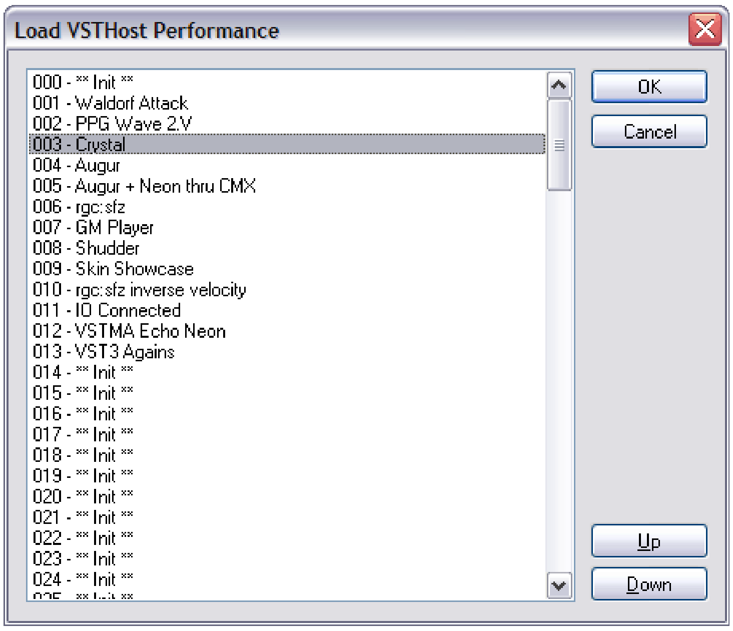


Figure 58: Performance Menu

Load

This menu entry opens the following dialog:



000 - ** Init **
001 - Waldorf Attack
002 - PPG Wave 2.V
003 - Crystal
004 - Augur
005 - Augur + Neon thru CMX
006 - rgc:sfz
007 - GM Player
008 - Shudder
009 - Skin Showcase
010 - rgc:sfz inverse velocity
011 - IO Connected
012 - VSTMA Echo Neon
013 - VST3 Agains
014 - ** Init **
015 - ** Init **
016 - ** Init **
017 - ** Init **
018 - ** Init **
019 - ** Init **
020 - ** Init **
021 - ** Init **
022 - ** Init **
023 - ** Init **
024 - ** Init **

Figure 59: Load VSTHost Performance Dialog

Here, you can select one of the 129 possible performances in the current bank (see "Use Bank..." above).

This operation can also be performed by sending a **Program Change** MIDI message to the Remote Control Channel, with one exception: performance **000** is a special program; this cannot be selected by remote operation. Unless **Reload Performance** is checked on the File menu, VSTHost loads this performance as its initial setup. This way, you can define a nice default environment.

A performance's initial name is "** Init **" – not very inventive, I have to admit – and can be changed if you save it with **Save As…** (described below).

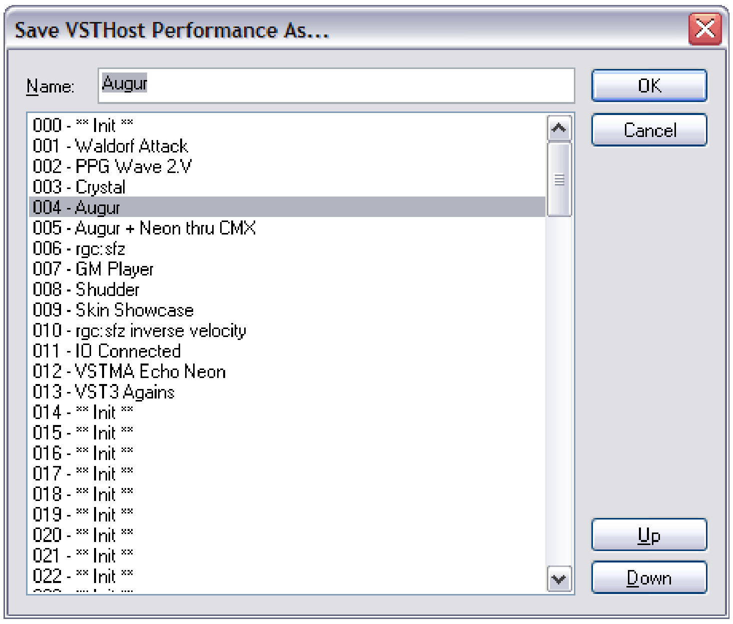
The **Up** and **Down** buttons can be used to reposition the selected performance in the current bank. The **Delete** button can be used to delete the selected performance from the bank.
Note: these action takes place immediately; it can **not** be undone by pressing the Cancel button.

Save

Selecting this menu entry saves the current performance. If **Autosave Performance** (see below on that) is turned on, and if the **/nosave** parameter is not given, VSTHost always saves the current performance when it exits. When another performance is loaded, the current performance is saved in any case before loading the new one.

Save As

This menu entry opens the following dialog:



Name: Augur

000 - ** Init **
001 - Waldorf Attack
002 - PPG Wave 2.V
003 - Crystal
004 - Augur
005 - Augur + Neon thru CMX
006 - rgc:sfz
007 - GM Player
008 - Shudder
009 - Skin Showcase
010 - rgc:sfz inverse velocity
011 - IO Connected
012 - VSTMA Echo Neon
013 - VST3 Agains
014 - ** Init **
015 - ** Init **
016 - ** Init **
017 - ** Init **
018 - ** Init **
019 - ** Init **
020 - ** Init **
021 - ** Init **
022 - ** Init **

Figure 60: Save VSTHost Performance As... Dialog

Here, you can save the current configuration to a(nother) performance. After having selected the new position in the list box, you can give the performance a descriptive name. Pressing OK saves the performance to the new position and automatically uses it as the new current performance.

The **Up** and **Down** buttons can be used to reposition the selected performance in the current bank. The **Delete** button can be used to delete the selected performance from the bank.
Note: these actions take place immediately; it can **not** be undone by pressing the Cancel button.

Next

This menu entry loads the performance with the next higher number.

Previous

This menu entry selects the performance with the next lower number.

Export

Loading and saving performances works nice as long as only one VSTHost instance on one machine is concerned, but it has one big problem: sharing performances between machines and/or users is quite difficult, since VSTHost uses a very simple scheme to store performances inside the bank. “Simple” for VSTHost, but not so simple to share, since it uses a (potentially large) number of files plus a set of entries in the performance bank file, which would have to be assembled by hand – and reinserted on the target machine by hand, too, including tedious file renaming if the performance is to be stored under another number.

Since V1.49, VSTHost contains an Export/Import Performance feature which eases things quite a lot. A complete performance can be exported into one file, which can be easily shared.

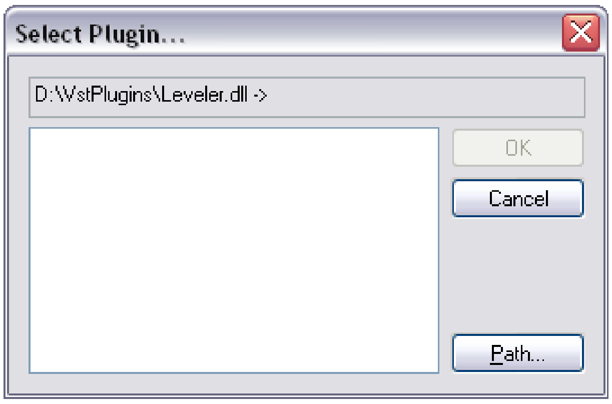
This menu entry opens a standard file dialog where you can select the file name of a “VSTHost Performance File” (with the unmistakable extension .vsthostperf) to store the currently loaded performance to. After having pressed OK, the complete performance and the current banks of all loaded PlugIns are stored into this file; that means that it can become quite large.

This performance file can then be easily sent to others, or stored in a performance library.

Import

This menu entry opens a standard file dialog where you can select the file name of a “VSTHost Performance File” (with extension .vsthostperf) to be loaded into the current performance (see “Export” above on the topic of performance exports).

VSTHost does not include the PlugIns themselves in the exported performance, only their location on the machine where the performance is exported. If the PlugIn is not at the same location on the target machine, VSTHost tries its best to find PlugIns of the same name in the configured PlugIn path and then shows the following dialog, which contains the original path and the found alternatives:



D:\VstPlugins\Leveler.dll ->

Figure 61: PlugIn Selection Dialog

where you can select the corresponding PlugIn. If there's no PlugIn of the same name available, you can use the “Path...” button to select one from another location – but it should better be the same PlugIn, otherwise the bank stored in the performance won't work with it. Pressing Cancel instead removes the PlugIn from the imported performance.

Note: in contrast to loading a performance (see “Load” on page 61 for details), the imported performance does not *replace* the previously loaded one; it is *added* to the current setup instead. This allows to use the exported performances as “building blocks” that contain a complete set of preconfigured PlugIns for a specific task.

Reload

This menu entry can be toggled; if it is checked, VSTHost reloads the last used performance when it is started the next time (unless the **/noload** parameter is given, of course). If it is unchecked, VSTHost always loads the default performance (number **000**) when it starts.

Autosave

This menu entry can be toggled; if it is checked, VSTHost saves the current performance whenever another performance is loaded, or if VSTHost is terminated.

Autosave PlugIn Banks

Starting with V1.43, VSTHost can automatically save the current settings of all PlugIns of a performance. In previous versions, you had to do it on your own – if you loaded a PlugIn, and changed any sound parameters, you had to save the PlugIn's bank. VSTHost just remembered the currently loaded bank's name with the performance. This is still the default, but, unless you're working in an environment with *very* little free space on your hard disk, you might consider turning this Autosave mode on. It adds a lot of comfort.

In order for this to work, VSTHost allocates a sub-directory for each bank (see "Use Bank…" on page 30) in its Data directory and stores the banks for each performance there.

Mute On Load

This menu item can be toggled to determine whether VSTHost should mute the output while a new performance is being loaded. Normally, this is turned on. Turning it off reduces the "silent time" while the performance is loaded, but, depending on the PlugIns used, it can lead to quite audible distortions and/or dropouts.

Engine Menu

This menu contains entries that control the overall operation of the VST Audio Engine.

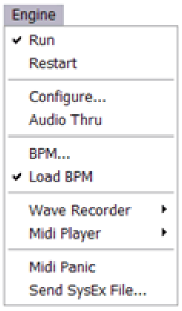


Figure 62: Engine Menu

Run

Selecting this menu entry toggles the engine's run mode. When VSTHost is started the first time, the engine is turned on; selecting this menu entry, or clicking on the corresponding toolbar button, turns it off.

This menu entry is primarily used for debugging purposes; sometimes, if you just want to debug various display aspects of a PlugIn, it's not necessary to keep the full audio engine running in the background, consuming tons of precious CPU cycles.

Restart

Stops and restarts the audio engine. Mainly useful if something goes wrong (buffer size too small, for example, leading to synchronization errors between VSTHost and the ASIO driver).

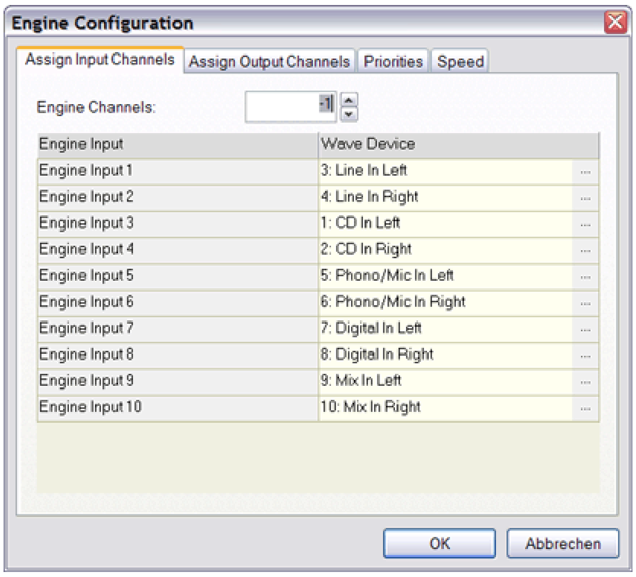
If Player Sync is not checked (see “Player Sync” on page 70 for details), this can be used to reset the current position.

Configure

This is one of the many tabbed dialogs in VSTHost. It has the following tabs:

Input Assign

Selecting this tab opens the following dialog:



Engine Channels: -1

Engine Input	Wave Device
Engine Input 1	3: Line In Left
Engine Input 2	4: Line In Right
Engine Input 3	1: CD In Left
Engine Input 4	2: CD In Right
Engine Input 5	5: Phono/Mic In Left
Engine Input 6	6: Phono/Mic In Right
Engine Input 7	7: Digital In Left
Engine Input 8	8: Digital In Right
Engine Input 9	9: Mix In Left
Engine Input 10	10: Mix In Right

Figure 63: Engine Configuration, Assign Input Channels Tab

Just as a PlugIn can have its inputs reassigned (see “Chain After” on page 56), so can VSTHost’s Audio Engine.

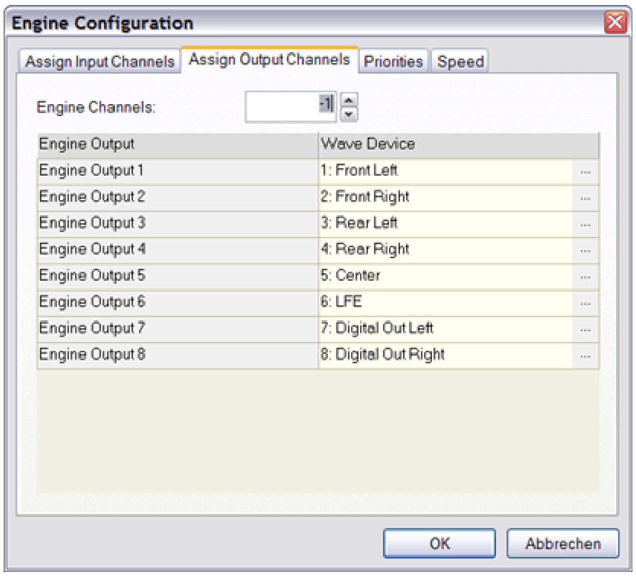
You can define the number of audio input channels that VSTHost's engine uses internally; the default setting of -1 means “use as many channels as provided by the current audio input device”. If you want a consistent setup for multiple audio devices, like “the internal engine uses 2 input channels, no matter what the audio interface provides”, you can set it up here.

On the left side, the channels used by VSTHost’s VST audio engine are listed; on the right side, you can select one of the channels provided by the loaded Wave Input device. Click on the “**…**” on the right side of the Source column to select from the available channels.

This allows a reassignment, or removal of certain unwanted channels. See the above figure – the DMX 6fire 24/96 ASIO driver presents the **CD In Left** and **Right** channels in positions 1 and 2; I prefer to have the Line Inputs there so that loaded Effect PlugIns automatically use these if their input assignment is not specifically set.

Output Assign

Selecting this tab shows the following, already familiar, dialog:


Engine Configuration

Assign Input Channels | Assign Output Channels | Priorities | Speed

Engine Channels: -1

Engine Output	Wave Device
Engine Output 1	1: Front Left
Engine Output 2	2: Front Right
Engine Output 3	3: Rear Left
Engine Output 4	4: Rear Right
Engine Output 5	5: Center
Engine Output 6	6: LFE
Engine Output 7	7: Digital Out Left
Engine Output 8	8: Digital Out Right

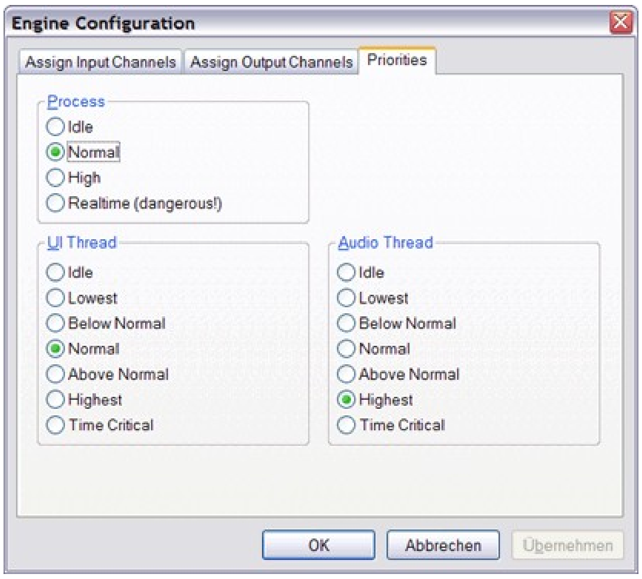
Figure 64: Engine Configuration, Assign Output Channels Tab

This works just like **Input Assign** above, but in the other direction. Here, you can assign an output channel provided by the Wave Output device to each of the VSTHost audio engine’s internal channels.

You can define the number of output audio channels that VSTHost's engine uses internally; the default setting of -1 means “use as many channels as provided by the current audio output device”. If you want a consistent setup for multiple audio devices, like “the internal engine uses 2 output channels, no matter what the audio interface provides”, you can set it up here.

Priorities

Selecting this tab shows the following dialog:


Engine Configuration

Assign Input Channels | Assign Output Channels | Priorities

Process: Idle [✓ Normal] High Realtime (dangerous!)

UI Thread: Idle Lowest Below Normal [✓ Normal] Above Normal Highest Time Critical

Audio Thread: Idle Lowest Below Normal Normal Above Normal [✓ Highest] Time Critical

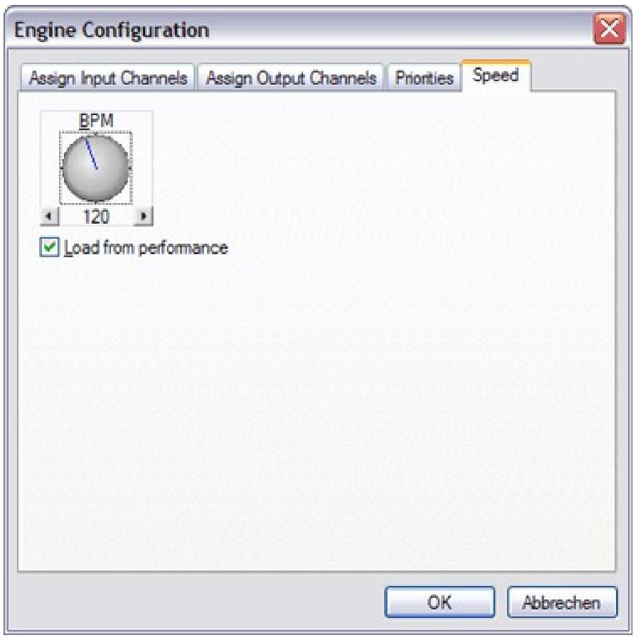
Figure 65: Engine Configuration, Priorities Tab

Normally, this can be left untouched; VSTHost automatically sets the priority to “very high” before loading an ASIO driver and then reverts to the configured setting. This leads to a reasonable behavior in most cases. If the default settings don’t work satisfactorily with your specific configuration, you can play with VSTHost’s settings until you find a solution that works. Be careful, however – setting the process priority to **Realtime** and the thread priority to **Time Critical** can lead to situations where VSTHost consumes all of the computer's CPU time and doesn't let anyone else work – the computer freezes. Especially dangerous on slower machines. You've been warned – "Don't press this button!" ☺

Since V1.54, there's a check box labeled "Use MMCSS" which only appears on Windows systems starting at Vista / Server 2008. If checked, the audio processing threads use the *Multimedia Class Scheduler Service* (MMCSS) available on these systems to set the thread class to "Pro Audio" (or "Audio", if the "Pro Audio" class is not defined). VSTHost only does this for its own audio processing threads; those created by ASIO drivers are not touched, "thanks" to a fundamental flaw in the MMCSS system which makes it impossible to determine the current class of a thread, and whether it's set by someone else or not.
Please see the Microsoft documentation on MMCSS for further details.

Note: you need to restart VSTHost to activate changes to this setting; if it's active, changes to the Audio Thread Priority require a restart, too.

Speed

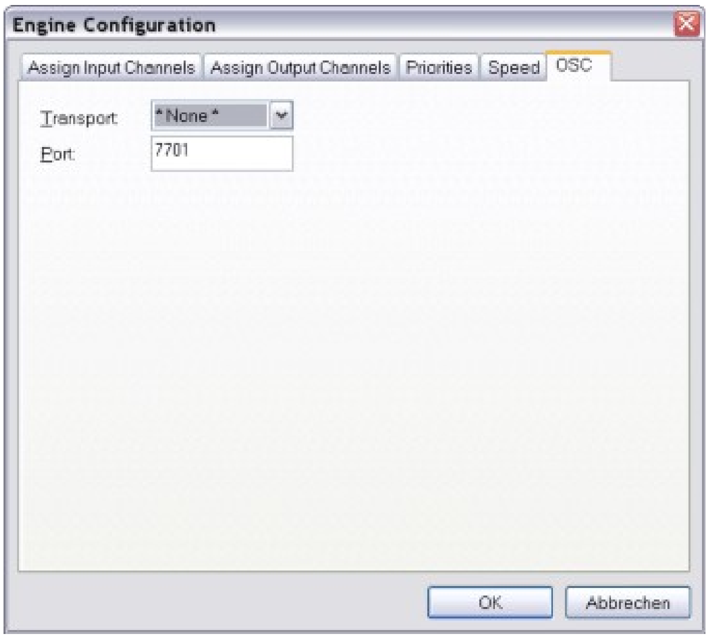


☑ Load from performance

Figure 66: Speed Tab

If you don't have the main toolbar (see "Toolbar" on page 75 for details) activated, you can define VSTHost's current BPM rate using this tab. With this, you can define the speed that VSTHost reports to the loaded PlugIns. The **Load from performance** check box duplicates the function of the "Load BPM" menu entry (see below).

OSC



Transport: *None*
Port: 7701

Figure 67: OSC Tab

OSC is the acronym for "Open Sound Control"; this is a transport protocol specification that allows to control many aspects of VSTHost over a network connection. The OSC specification can be retrieved from http://opensoundcontrol.org.

VSTHost currently offers a rather limited implementation; for details, see "Appendix B: OSC Implementation" on page 93.

On this tab, you can configure the network connection VSTHost uses for the OSC service.

VSTHost implements the following network protocols, so that it should interface with the widest variety of OSC controllers (Jazzmutant Lemur, iPad, …), which you can select from the **Transport** combo box:

UDP	The most commonly used protocol, where OSC messages are transmitted as UDP packets
TCP	OSC 1.0-compatible TCP transport, where the packets are transmitted with a leading 4-byte length information in binary form.
TCP Slip	OSC 1.1/2.0-compatible TCP transport which uses SLIP frames to delimit the packets, which is a more robust form

Since OSC only defines the protocol of the packets traveling around, without limiting the underlying transport mechanism, you have to find out which transport method suits your controller best.

Port defines the UDP/TCP port to use. A commonly used value, 7701, is used as default value, but you can use anything you like (… if you know what you're doing! ☺).

Note: activating one of the network transports will most likely trigger the Windows firewall, if you are using any post-Windows 2000 operating system; you'll be asked whether you really want to allow VSTHost to access the network. This is normal, since VSTHost installs a *network service* in this case that allows other computers to access it – so you'd better allow it, or other PCs and/or OSC-compatible controllers won't be able to access VSTHost.

Audio Thru

This menu entry can be toggled to define whether VSTHost directly passes its Audio input to the output. If checked, the audio input is not only sent through eventually loaded PlugIns, but also directly to the Wave Output device. In versions before V1.40, this was the default (and only) behavior; now, the default setting is **Off** to prevent audio feedback loops.

Since V1.46, checking this item has the result that VSTHost automatically creates a link between the **{In}** and **{Out}** built-in PlugIns. Of course, you can set this by hand as well – this menu item might disappear in the next version, as it's not really necessary any more.

Note: this setting is stored with the current performance, since it depends on the used PlugIns whether it makes sense.

Soft Clipping

Digital audio processing has its problems. One of them is that the sound card has a fixed volume range; if you try to play something louder than the sound card allows, the loudest parts are *clipped* – they are reduced to the highest possible level. In contrast to audio mixing consoles, where there's always a bit of additional headroom before audible distortion sets in, this digital clipping starts immediately and is quite audible, since it introduces quite some overtones.

In versions before V1.54, VSTHost didn't care about that at all – after all, it's easily cured by turning down the output volume a bit, so a little bit of consideration when setting up a processing chain is enough. Now, you can also turn on “Soft Clipping”, which tries to soften the clipping effect.

This has its merits: slight distortions become unheard, and the output level never gets too high. But it has its drawbacks, too: it costs a bit of the precious CPU time, although on any machine that's capable of using SSE the additional burden is negligible, and introduce a bit of distortion on its own.

BPM

Selecting this menu entry opens the Speed page of the Engine Configuration window (see “Speed” on page 67 for details).

Load BPM

This menu entry defines whether VSTHost loads the BPM settings from the performance or not. Sometimes, you might want to automatically adjust the speed for a performance’s PlugIns, sometimes this is not needed; you can turn this on and off here.

Recorder

This is a submenu to configure and run VSTHost’s built-in Wave Player and Recorder.

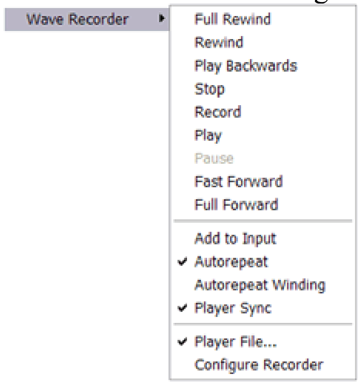


Figure 68: Recorder Submenu

VSTHost contains two separate entities for that: a **Wave Player** and a **Wave Recorder**. The Wave Recorder is inserted into the audio engine just before the sound data are sent to the output device; the

Wave Player can be inserted there, too, or in parallel to the audio engine input. The accumulated output can then be recorded by the Wave Recorder, allowing ping-pong style recordings.

The same menu is also available in form of a toolbar, which additionally offers a display of current and total time:

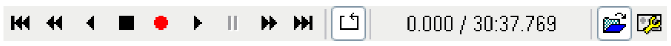


Figure 69: Recorder Toolbar

I admit freely that this is not a very elegant solution, but there are lots of sophisticated sequencer packages on the market. This little one-man spare time project called VSTHost doesn't, and can't compete with them in their own arena. If you need nifty audio recording features, VSTHost isn't the right program. The Wave Recorder and Player are just little additions that allow capturing a jam session, for example, or allow the playback of a prerecorded track while you play some VSTi PlugIns to it, or run a prerecorded track through a (set of) effect(s).

The Wave Player mimics a tape recorder, just like the ones you all might know since early childhood, with some little add-ons – you can, for example, play the loaded file backwards, and you can record and playback at the same time.

Whenever the **Stop** button or menu entry is clicked while recording, VSTHost allows you to determine whether and under which name the recording should be saved.

Some of the menu items, however, do require a little explanation:

Add to Input

This menu entry can be used to toggle the Wave Player's position. If it is checked, a played audio file is played in parallel to the audio engine's *input* so that you can run it through (chains of) loaded effects. If it is unchecked, a played audio file is played in parallel to the accumulated *output* of all loaded PlugIns.

Autorepeat

This menu entry can be used to toggle between normal playback mode, in which the Player stops when it reaches the end of the input file, and auto-repeat mode, where it automatically restarts playback.

Autorepeat Winding

This menu entry can be used to toggle between normal winding mode, in which the Player stops when it reaches the end of the input file, and auto-repeat mode, where it automatically restarts winding.

Player Sync

This menu entry can be used to change the semantics of the Wave Player a bit.

If unchecked, the player is treated as a separate sound generation device, and VSTHost uses a free-running transport information sent to the PlugIns (i.e., it always reports "playback is running", and the current position is incremented).

If checked, however, the Wave Player acts as a simple transport control for the VST engine. If you load a PlugIn that has sequencing capabilities (Phrazor comes to mind, or Jamstix), this can be used to control the Start/Stop/Position information sent to the PlugIn. This functionality also works if no file is loaded into the Wave Player; in this case, it just "plays" silence until Stop is pressed, and **Full Forward** cannot be selected (there's no defined end position).

This is not a very elaborate transport control yet (you can't, for example, set loop positions), but sufficient for basic transport control purposes.

Player File

Here, you can define the file that the Wave Player uses. Most of the transport menu entries / toolbar buttons will be grayed out until a valid Wave file has been loaded. Before V1.43, this was a global setting; now, it is stored with the current performance.

Normally, VSTHost loads only .wav files; you can, however, teach it to load .mp3 files as well. VSTHost can use the mpg123 package for this. You can find it at http://www.mpg123.org.

Since there might be "interesting" licensing problems with the MPEG consortium (not with the libmpg123 creator, as this is licensed under the LGPL, so I *could* embed it without problems) if VSTHost simply included this package, I've decided against doing it. You have to download and install it yourself – this way, there should be no licensing problems.

Here's how to get it, if you haven't installed it already:

1. You have to download a version from http://www.mpg123.org - on their download page, there's this nice little paragraph:

Win32 and Win64 binaries You Windows folks are lucky since version 1.6.0: Patrick joined the team as a Windows developer and is providing binaries regulary, see download/win32/! Also, JonY chipped in with builds for 64bit Windows, to be found in download/win64/. The latter files are signed with JonY's GPG key. He likes to play with freshest toolsets, p.ex. 1.12.4 binaries are built with gcc 4.6 and link time optimization.

   So, go to the Win32 or Win64 download directory now, depending on the version of VSTHost that you're using. There's a whole range of files of different versions there; when I wrote this paragraph, I used http://www.mpg123.org/download/win32/mpg123-1.13.0-x86.zip and http://www.mpg123.org/download/win64/mpg123-1.13.0-x86-64.zip. At the time you read this, there might be a better version available; as long as the .zip contains a file called "libmpg123-0.dll", you should be able to use the latest&greatest version.
2. Once you decided on and downloaded a file, all you need to do is to unzip the file libmpg123-0.dll contained in the archive to a position that VSTHost finds in the library search path. I put it into the Windows system directory, but that's not really necessary; the easiest place, if you don't need libmpg123-0.dll in any other product, is the directory where you installed VSTHost.
   Of course, you can unzip the complete package and enjoy the nice little MP3 player application it contains, but... well, you already got the Windows Media Player, and/or WinAMP, and/or... still, you can. If you want to look at the license, or add the DLL to your own programs, you find everything you need in the package.
3. Once you installed the libmpg123 package so that VSTHost can find it, and restarted VSTHost if it was running, it should be able to load .mp3 files, too; the dialog should show come up with the file type "Audio Files (*.wav; *.mp3)" now.

Note: I just tried version 1.23.8, and obviously they changed something; the 32-bit version of libmpg123 also needs libgcc_s_sjlj-1.dll from the .zip file in order to load.

Configure Recorder

Selecting this menu item brings up the following dialog:

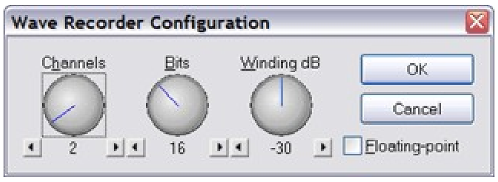


Figure 70: Wave Recorder Configuration Dialog

Here, you can define the format of files that are *recorded* by VSTHost. The default setting is rather conservative – 2 channels, 16 bit integer. This format has the big advantage that the generated files are comparatively small and can be read by virtually every wave file editor package in existence. It isn't the best format, however…

Most modern sound cards for musicians can do much better. They can deliver accurate sampling and playback of 24 bit audio streams, on potentially dozens of channels – far more than VSTHost's CD-compatible default format permits.

The **Channels** setting should not exceed the available number of output channels in the VSTHost audio engine – while you can set it to up to 32 channels, most of them would simply contain silence. A rather costly silence, since each little sample of silence occupies at least a byte on your hard disk, more likely two, or even four bytes.

The **Bits** setting is a bit misleading. You can set the number of bits per sample, but internally VSTHost treats them the following way:

- **8** generates 8-bit unsigned samples; like in the old SoundBlaster 1 days ☺
- **9-16** generates 16-bit signed samples
- **17-24** generates 24-bit signed samples
- **25-32** generates 32-bit samples

Floating-point, if selected, overrides the **Bits** setting. In this case, the 32-bit floating point data that are used internally by VSTHost are directly recorded. This provides the most accurate recording that also deals very gracefully with clipping, but produces rather large recordings.

Winding dB is actually a setting for the Wave Player. While rewinding or fast forwarding in the wave file, you can listen to the data currently being under the "virtual head" of this simulated tape recorder. With this setting, you can define the playback level which is used while winding. Setting this to **-60** dB disables the feature, thereby saving some CPU cycles.

Pre-Fader Recording

In versions before V1.54, VSTHost always did a "pre-fader recording" - i.e., if you record to a file, the output is recorderd *before* the **Output** fader (see "Master" on page 81 for details) takes effect. If this setting is turned off, VSTHost switches to "post-fader recording", taking the recording after the output level has been set and soft clipping has been applied.

Note: if you use post-fader recording, you might want to make sure that the **Record** fader (see "Master" on page 81 for details) is set to its default value of 0dB; if it isn't, it is applied *after* the output level / soft clipping (see "Soft Clipping" on page 69 for details) operations.

MIDI Player

This is a submenu to configure and run VSTHost's built-in MIDI Player.

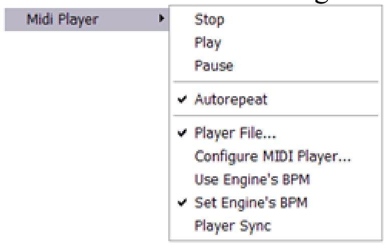


Figure 71: MIDI Player Submenu

Since V1.40, VSTHost contains a MIDI File Player. This relatively simple player allows to load MIDI sequences and to send them to the loaded PlugIns and/or to the opened MIDI Output devices.

The same menu is also available in form of a toolbar, which additionally offers a display of current and total time:

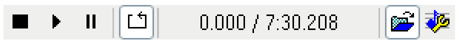


Figure 72: MIDI Player Toolbar

The display is in time format (hh:mm:ss.mmm), just like the Wave Player's.

I admit freely that this is not a very elegant solution, but there are lots of sophisticated sequencer packages on the market. This little one-man spare time project called VSTHost doesn't, and can't compete with them in their own arena. If you need nifty MIDI recording/editing/playback features, VSTHost isn't the right program.

Note: the MIDI Player built into VSTHost isn't complete yet; if you try to load MIDI files that contain SMPTE time information or Type 2 files that contain different speed settings for the contained tracks, chances are high that the results are a bit… well, unexpected ☺.

The meaning of the **Stop**, **Play**, and **Pause** menu entries should be clear to anybody. If not, tell me ☺.

Autorepeat

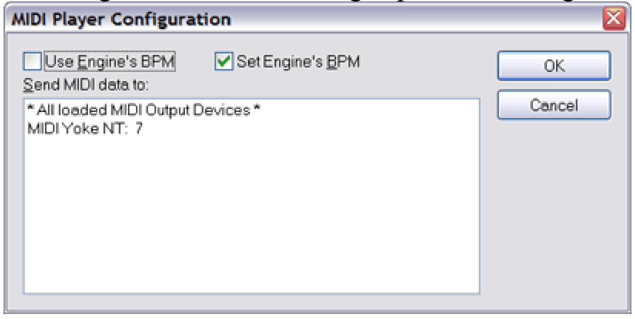
This menu entry can be used to toggle between normal playback mode, in which the Player stops when it reaches the end of the input file, and auto-repeat mode, where it automatically restarts playback.

Player File

Here, you can define the file that the MIDI Player uses. Most of the transport menu entries / toolbar buttons will be grayed out until a valid MIDI file has been loaded. Before V1.43, this was a global setting; now, it is stored with the current performance.

Configure MIDI Player

Selecting this menu item brings up the following dialog:


MIDI Player Configuration

- [ ] Use Engine's BPM
- [x] Set Engine's BPM

Send MIDI data to:

* All loaded MIDI Output Devices *
MIDI Yoke NT: 7

Figure 73: MIDI Player Configuration Dialog

Here, you can define various settings. **Use Engine's BPM** and **Set Engine's BPM** correspond to the menu entries described below. **Send MIDI data to:** defines the MIDI devices that the MIDI Player sends to; by default, MIDI data are only passed to interested PlugIns. You can select one of them by simply clicking on it; to select a range, click on the first and then shift-click on the last; to add or remove a specific device, control-click on it.

Use Engine's BPM

If this menu item is checked, VSTHost overrides the BPM settings in the MIDI files with its own that you can define on the main toolbar (see the corresponding field in the toolbar discussion on page 76 for details).

Set Engine’s BPM

If this menu item is checked, VSTHost adapts its BPM settings to the ones that are used in the MIDI file. This can be important for PlugIns that, for example, adjust LFO or delay settings to the used BPM rate.

Player Sync

This menu entry defines whether the MIDI Player is treated as a separate entity or controlled with the Wave Player’s transport control buttons. Since the MIDI Player in its current incarnation is a bit restricted (you can’t, for example. move to a specific position), checking this menu item modifies the transport controls of the Wave Player, too – you can’t select things any more that aren’t possible for MIDI playback.

Midi Panic

This menu entry is only there for emergencies. When you need it, you need it badly ☺. When selected, VSTHost tries its best to reset all loaded VSTi PlugIns, MIDI-capable effect PlugIns, and all MIDI devices attached to the configured MIDI Output ports to a known state. It turns off all notes on all channels, resets all controllers and pitch wheel information.

Send SysEx File

This menu entry can be used to send a SysEx file (.syx format – the simplest possible format, just a bunch of SysEx messages) to all MIDI devices that have been configured on the SysEx window (see “SysEx” on page 82 for details).

Devices Menu

All entries of this menu have already been discussed in the Configuration section (see “Configuration” on page 13 for details).

View Menu

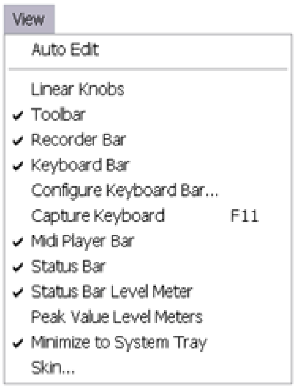


Figure 74: View Menu

This menu can be used to configure VSTHost’s general layout.

Auto Edit

This menu entry defines how new PlugIns are treated; when it is checked, and you load a new PlugIn that allows to open an Editor window (see “Toolbar” below), this editor window is opened automatically.

Linear Knobs

This menu entry can be used to toggle between circular (default) and linear knobs (if the respective PlugIn's editor window supports this). A “knob” is the on-screen representation of a rotating potentiometer, which you'll find in quite a lot of PlugIns (and some in VSTHost, too, for example on the Speed property sheet.

In Circular Mode, whenever you want to change a knob's value, you have to click on the knob and then determine the new value by dragging the indicator on the knob to the new position in a circular fashion – the indicator always points into the direction of the mouse pointer.

In Linear Mode (that's the Steinberg term – in VSTHost, I labeled it “Vertical Linear Relative Mode”, which is what it really does), you click on the knob and then modify the value by dragging the mouse up to increase the knob's value or down to decrease it.

Toolbar

This menu entry toggles the main toolbar display. This is the main toolbar:

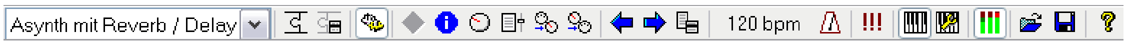


Figure 75: Main Toolbar

First, obviously, there’s a combo box that allows direct selection of a VSTHost performance of the current bank. This works just like the **Load Performance** menu entry in the **File** menu (see “Load” on page 61 for details).

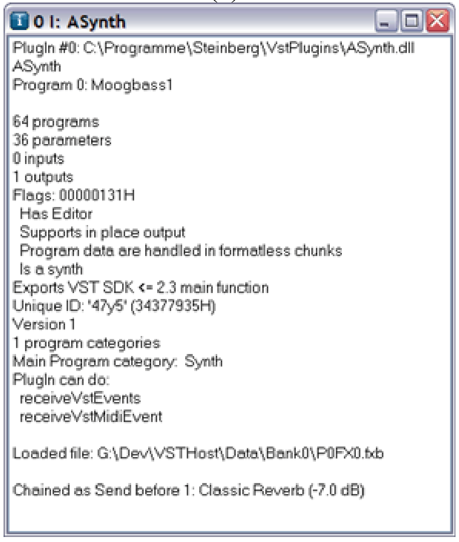
acts like the **New PlugIn** menu entry (see „New PlugIn“ on page 32 for details).

This button opens a popup menu with the contents of the **PlugIns** menu entry (see “PlugIns” on page 37 for details) to allow for convenient selection of one of the PlugIns known to VSTHost.

acts like the **Run** menu entry (see „Run“ on page 64 for details).

activates the main window of a PlugIn (see “New ” on page 32 for details)

Opens or activates the currently selected PlugIn’s **Information Window**; this window contains valuable(?) information about the PlugIn and its properties, like this:



```
0 I: ASynth
PlugIn #0: C:\Programme\Steinberg\VstPlugins\ASynth.dll
ASynth
Program 0: Moogbass1

64 programs
36 parameters
0 inputs
1 outputs
Flags: 00000131H
 Has Editor
 Supports in place output
 Program data are handled in formatless chunks
 Is a synth
Exports VST SDK <= 2.3 main function
Unique ID: '47y5' (34377935H)
Version 1
1 program categories
Main Program category:  Synth
PlugIn can do:
 receiveVstEvents
 receiveVstMidiEvent

Loaded file: G:\Dev\VSTHost\Data\Bank0\P0FX0.fxb

Chained as Send before 1: Classic Reverb (-7.0 dB)
```

Figure 76: PlugIn Information Window

Opens or activates the currently selected PlugIn’s **Editor Window**; this window is provided by the PlugIn for configuration purposes. Since it’s provided by the PlugIn, the layout of this window can vary. Greatly. And since the window behavior is controlled by the PlugIn, this can vary greatly, too… anyway, here’s an example:

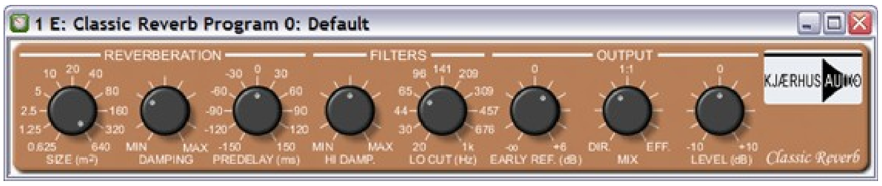
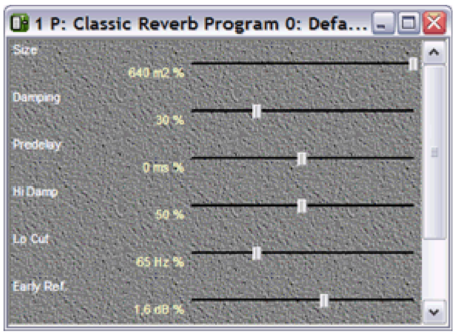


Figure 77: Example PlugIn Editor Window

Opens or activates the currently selected PlugIn's **Parameter Window**; since not all PlugIns provide an Editor window, this can be the only possibility to set the PlugIn's parameters. Some PlugIns can only be configured on the Parameter window; others refuse that completely and only accept input from the Editor window. Anyway, you can open both in VSTHost. Here's an example:


1 P: Classic Reverb Program 0: Defa...

Size	640 m2 %
Damping	30 %
Predelay	0 ms %
Hi Damp	50 %
Lo Cut	65 Hz %
Early Ref.	1,6 dB %

Figure 78: Example PlugIn Parameter Window

The displayed parameters and their values, of course, vary from PlugIn to PlugIn; while the layout is done by VSTHost, the parameters, their value range and display are provided by the PlugIn. If the PlugIn has more than 100 parameters, the window contains a menu at the top that allows to select a parameter range to be displayed.

Note: by double-clicking the displayed value, you can enter new values directly. If the PlugIn supports it, the PlugIn handles the entered values; if not, VSTHost provides a default implementation which accepts the input of floating-point values in the range 0..1.

VSTHost remembers the opened windows and their positions for each PlugIn in the performance.

Opens the PlugIn's **MIDI->Parameter Mapping** window (see "MIDI -> Parameter" on page 48 for details).

Opens the PlugIn's **Parameter->MIDI Mapping** window (see "Parameter -> MIDI" on page 52 for details).

These buttons correspond to the **Previous Program** and **Next Program** menu entries (see "Next Program" and "Previous Program" on page 60 for details).

This button opens a popup menu for the current PlugIn that allows selection of a specific program. It corresponds to the **Program mm-nn** menu entries in the **PlugIn** menu, but is displayed over the active PlugIn's currently selected window.

120 bpm This field shows the currently defined speed. The default used by VSTHost is 120 BPM. This value is reported to all loaded PlugIns. Clicking on the speed allows you to directly enter a new BPM value, or modify the current using the mouse wheel.

This button, in case you didn't find that out by yourself, resembles a metronome. It opens the Speed Setup dialog (see "BPM" on page 69 for details).

!!! This button corresponds to the **Midi Panic** menu entry (see "Midi Panic" on page 74 for details).

This button shows or hides VSTHost's **Keyboard Bar**. See "Keyboard Bar" below for details.

This button is used to configure the Keyboard Bar. See "Configure Keyboard Bar" on page 78 for details.

This button opens the **Master** window. See "Master" on page 81 for details.

This button is used to load a program bank into the currently selected PlugIn. See "Load Bank" on page 54 for details.

This button is used to save the current program bank of the currently selected PlugIn to disk. See "Save Bank" on page 55 for details.

The most important button of them all. See "About VSTHost" on page 84 for details.

Recorder Bar

Selecting this menu item hides or shows the Recorder toolbar display. The Recorder toolbar has already been discussed (see “Recorder” on page 69 for details).

Keyboard Bar

Selecting this menu item hides or shows the Keyboard bar. The Keyboard bar, when opened for the first time, looks like this:

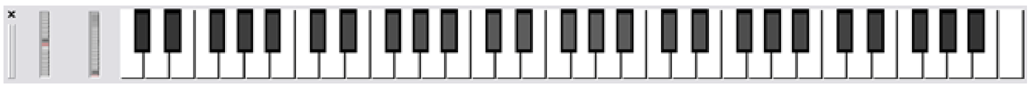


Figure 79: Keyboard Bar

It comes up with a Pitch Wheel, a Mod Wheel, and a keyboard with 61 keys, covering the bottom area of VSTHost’s main window. This bar can be configured to a very high degree (see “Configure Keyboard Bar” below for details), and you can grab it with the mouse and fix it on top of the window area or on the bottom (default), or anywhere else on the screen if you want to. VSTHost remembers the position.

The Keyboard bar can be used as a “poor man’s MIDI keyboard”; you can enter MIDI messages by mouse or (computer) keyboard with it. You can configure for each PlugIn whether it reacts on messages from the Keyboard Bar (see “MIDI Input Devices” on page 42 for details).

The following keys on the PC keyboard can be used to trigger MIDI Notes, if the Keyboard Bar is active (i.e., activated by clicking on it with the mouse):

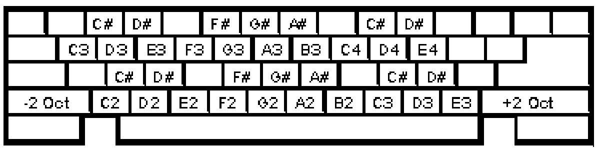

C# D# F# G# A# C# D#
C3 D3 E3 F3 G3 A3 B3 C4 D4 E4
C# D# F# G# A# C# D#
-2 Oct C2 D2 E2 F2 G2 A2 B2 C3 D3 E3 +2 Oct

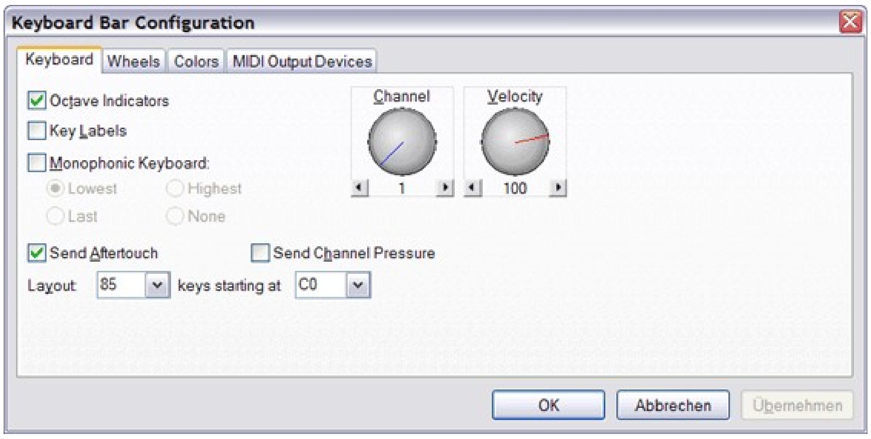
Figure 80: PC keyboard keys used for MIDI Note generation

In addition, the following keys can be used:

Left shift, Right shift	transposes the PC keyboard's range two octaves down/up
Ins, Del	increment/decrement pitch wheel data
Home, End	increment/decrement modulation wheel
PgUp, PgDn	increment/decrement key velocity
Left, Right	decrement/increment upper keyboard octave
Down, Up	decrement/increment lower keyboard octave

Configure Keyboard Bar

Selecting this menu entry opens the following dialog:



[✓] Octave Indicators
[ ] Key Labels
[ ] Monophonic Keyboard:
[● Lowest] Highest
Last None

Channel 1
Velocity 100

[✓] Send Aftertouch
[ ] Send Channel Pressure

Layout 85 keys starting at C0

Figure 81: Keyboard Bar Configuration Dialog, Keyboard Tab

Huh. Yet another of these tabbed configuration dialogs. Isn't it depressing to see how many options there are in such a simple program? ☺

Anyway, this is the **Keyboard** tab where you can define the general layout of the Keyboard Bar.

Octave Indicators

If this item is checked, the Keyboard Bar shows 2 **octave indicators** below the keyboard. These are two (normally gray) bars that indicate the keys that can be played on your PC's keyboard. You can drag these bars around with the mouse to change the octaves used by the upper and lower key range on your PC keyboard (see "Keyboard Bar" above for the usable keys).

Key Labels

Gimmick for people who don't use keyboards very often. You can display the note names on the keys.

Monophonic Keyboard

This check box can be used to switch between polyphonic and monophonic keyboard mode.

In monophonic keyboard mode, every pressed key terminates the previous note. The radio buttons govern what happens when the current note is released, and there are still other notes held:

Lowest	the lowest currently pressed key determines the current note
Highest	the highest currently pressed key determines the current note
Last	the last note pressed before the terminated note determines the current note
None	still pressed keys are ignored

Channel

This knob defines the MIDI channel used for MIDI messages generated by the Keyboard Bar.

Velocity

This knob defines the velocity used if you trigger notes with the PC keyboard, which cannot send velocity information (unfortunately… I'd *love* a keyboard where the attack can be used to define whether a character is printed **bold** in a word processor, or where the pressure defines the auto-repeat rate, or… ☺). The velocity can be redefined by adding a **Velocity Wheel** to the keyboard, or by the PgUp/PgDn keys.

Send Aftertouch

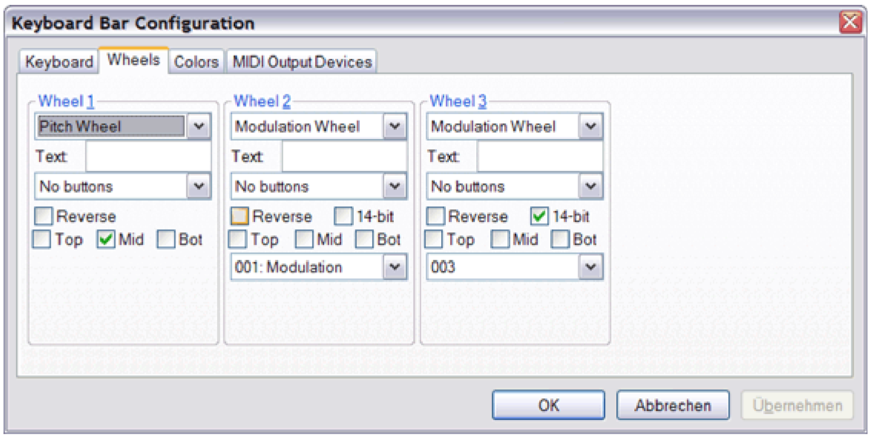
This check box can be used to activate the sending of (Polyphonic) Key Aftertouch MIDI messages if you slide the mouse up and down a key while keeping one of the mouse buttons pressed. Note that not all PlugIns will be able to react on Key Aftertouch, since devices that offer it are relatively rare.

Send Channel Pressure

This check box can be used to activate the sending of Channel Pressure MIDI messages if you slide the mouse up and down a key while keeping one of the mouse buttons pressed.

Layout

Here, you can define how many keys starting at which key are displayed on the Keyboard Bar. If the predefined values in the combo boxes don't suit your needs, you can enter any reasonable value you like.



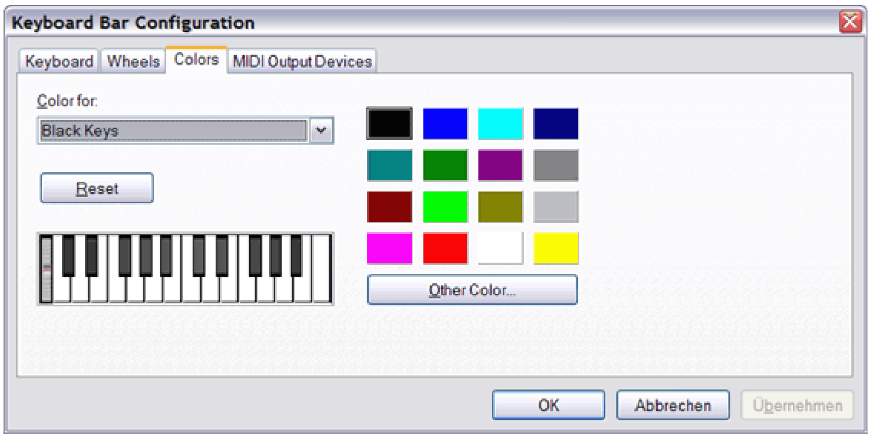
Wheel 1: Pitch Wheel; Text: ; No buttons; [ ] Reverse; [ ] Top [✓ Mid] [ ] Bot
Wheel 2: Modulation Wheel; Text: ; No buttons; [ ] Reverse [ ] 14-bit; [ ] Top [ ] Mid [ ] Bot; 001: Modulation
Wheel 3: Modulation Wheel; Text: ; No buttons; [ ] Reverse [✓ 14-bit]; [ ] Top [ ] Mid [ ] Bot; 003

Figure 82: Keyboard Bar Configuration Dialog, Wheels Tab

On this tab, the wheels shown by the Keyboard Bar can be configured. There are three types of wheels:

Pitch Wheel	Can be used to send Pitch Wheel MIDI messages. Auto-centers when the wheel is released.
Modulation Wheel	Can be used to send a configured Continuous Controller MIDI message. By default, this is set to send **Mod Wheel** data (CC#1), but it can set to any other CC# you like (or need).
Velocity Wheel	Can be used to increase or decrease the velocity for MIDI messages generated with the PC keyboard.

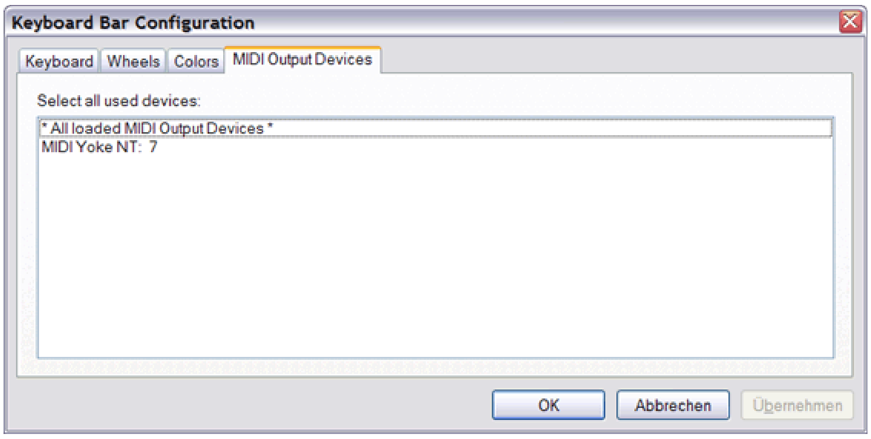
You can set quite a lot of options for these wheels; have fun experimenting!



Color for: Black Keys

Figure 83: Keyboard Bar Configuration Dialog, Colors Tab

Here, you can redefine the color of the black and white keys, and the background color of the wheel area, to any color scheme you like. Again, have fun experimenting!


Keyboard Bar Configuration

Select all used devices:

* All loaded MIDI Output Devices *
MIDI Yoke NT: 7

Figure 84: Keyboard Bar Configuration Dialog, MIDI Output Devices Tab

Normally, the Keyboard Bar is used to send MIDI messages to the loaded PlugIns. It can, however, be used to send MIDI messages to attached MIDI devices that are connected to one of the configured MIDI Output ports, too. Here, you can define these.

Capture Keyboard

This menu entry can be used to switch VSTHost's Keyboard Capturing Mode. "Keyboard", in this case, is the alphanumeric input device with the 101 or more little buttons attached to the computer, not a musical device. When this item is checked, VSTHost sends all keys that are pressed or released to the Keyboard bar (see "Keyboard Bar" on page 77 for details), if they trigger an action there. If it is not checked, the Keyboard bar only receives any keyboard activity when it has the input focus. This allows you to play with a PlugIn's settings on its editor window and still be able to play some notes with the computer keyboard.

Note: this also works if the Keyboard bar is currently hidden.

Attention: activating this can have unintended side effects; the keys are passed to the keyboard bar regardless of the state that VSTHost is in – even if, for example, a file save dialog is open and you want to enter a file name there. It would be a good idea to disable keyboard capturing before such operations.

MIDI Player Bar

Selecting this menu item hides or shows the MIDI Player toolbar display. The MIDI Player toolbar has already been discussed (see "MIDI Player" on page 72 for details).

Status Bar

This menu entry can be used to toggle the Status Bar on the bottom of VSTHost's main window on or off.

Status Bar Level Meter

The status bar can be used to show a little level meter, if you don't use the **Master** window for that (see "Master" below). Since this can be a bit irritating, it can be turned on or off with this menu entry.

Peak Value Level Meters

This setting configures how the level meters on status bar, the Master window, and the main windows of the loaded effects work. If this setting is not checked, they display the level in RMS format. This is the default since V1.38, since it uses less CPU cycles. When checked, the peak level (i.e., the level of the loudest sample in the buffers running through the engine) is displayed.

Minimize to System Tray

Normally, when the VSTHost main window is minimized, it appears in the task bar, just like a normal application. If this menu item is checked, however, it is minimized into the *system tray* of the task bar, leaving only a little icon visible. Double-clicking this icon restores the VSTHost main window; right-clicking it brings up a popup menu, which contains the normal VSTHost menu entries, plus a “Restore” item, which does the same as double-clicking the icon.

This feature just saves some space on the task bar; I've been asked for it, and had the code at hand, so I added it... decide for yourself whether it makes sense.

Skin

Since V1.44, the GUI of VSTHost can be radically changed. This has been called “skinning” in the IT world for quite some time now, so I’ve adopted the (slightly rubbish IMO) term. Here, you can select a “Skin file” (which is just a special .INI file) which holds all entries that define the current “look” of VSTHost. Included in VSTHost.zip, you should find a sample skin definition in the subdirectory Data\DefaultSkin. The Skin.ini in this directory contains a complete description of all parameters that can be modified.

After having selected a new skin for VSTHost, you have to close the application to put it into effect; while new windows opened in VSTHost will already show the new skin, pre-existing windows and the background won’t.

Vera Kinter has created some skins (see http://www.artvera-music.com for some more fine examples of her creativity); these can be found on VSTHost’s web site (see page 2 for this).

Window Menu

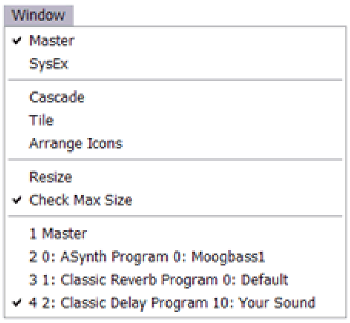

Window
✓ Master
SysEx
Cascade
Tile
Arrange Icons
Resize
✓ Check Max Size
1 Master
2 0: ASynth Program 0: Moogbass1
3 1: Classic Reverb Program 0: Default
✓ 4 2: Classic Delay Program 10: Your Sound

Figure 85: Window Menu

The contents of this menu vary with the number of loaded PlugIns and their various opened windows. The first two menu entries, however, are always there:

Master

Selecting this menu entry opens or activates the **Master** window:

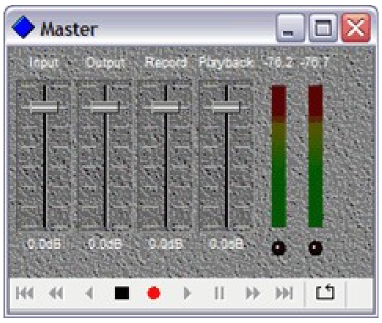


Figure 86: Master Window

The number of level meters on the right varies with the Wave Output device (and/or ASIO Channel selection); there is one meter for each available audio channel. The faders on the left side are always there. Each level meter has a little text display above it that shows the maximum output level sent to this channel; clicking on one of these texts resets them all.

The **Input** fader can be used to set the overall input level of VSTHost's audio engine.
The **Output** fader can be used to set the overall output level of VSTHost's audio engine.
The **Record** fader can be used to set the recording level of the Wave Recorder.
The **Play** fader can be used to set the Wave Player's level. This is independent of the setting of the Master fader.

On the bottom, the Master window has a copy of the Recorder Toolbar for convenient tape recorder operation; if you prefer the Master window, you can hide the Recorder Toolbar and vice versa.

SysEx

Selecting this menu entry opens or activates the **SysEx** window:

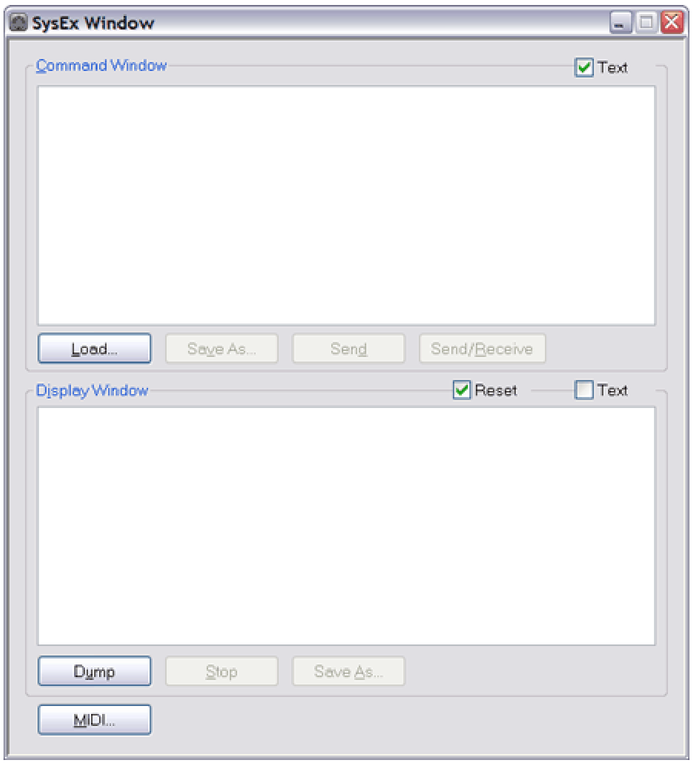


Figure 87: SysEx Window

Here, you can load and/or save SysEx files in .syx format. This is a very simple file format, also used by Midi-OX, for example; it's just a set of SysEx messages without any protocol overhead.

There are two important windows here: the *Command Window* and the *Display Window*. Both accept and display data in hexadecimal format, and, if the **Text** box is checked, in text format, too. You can use the Tab and Backtab keys to switch between the two areas, if necessary.

The ***Command Window*** contains SysEx messages (and other interspersed MIDI messages – VSTHost is agnostic when it comes to sending messages from this window ☺) to be sent to the configured MIDI devices and/or to interested PlugIns. Pressing the **Load** button opens a file selection window where you can select a file to be loaded (surprise, surprise…). The contents of this file are taken 1:1; VSTHost doesn't check the contents, neither when loading it, nor when sending the data. You can use this to send out complete garbage; be warned.

As soon as data have been entered or loaded from a file, the other buttons are activated. **Save As**... well, I'll let you find out what it does ☺. **Send** sends out the contents of the Command Window, but doesn't check for any responses from the MIDI devices; **Send/Receive** sends them, too, but also turns on reception of SysEx messages into the Display Window.

The ***Display Window*** contains messages received from the MIDI devices and/or PlugIns. Only SysEx messages are processed; this works the same way as in Midi-OX (the whole SysEx window is modeled after the Midi-OX SysEx window, just differing in details), and Jamie and Jerry know their stuff pretty well, so I used the same logic.

Reception of MIDI data into the Display Window can be started in two ways. The first way, using the **Send/Receive** button, has already been discussed above. The second way would be to press the **Dump** button. This is useful if a MIDI device can only send manual dumps, triggered on the device itself. In both cases, VSTHost starts to write incoming SysEx messages into the Display Window. If the **Reset** box is checked, the previous contents of the window are cleared when reception starts; if not, they are kept and new messages are simply appended.

As soon as reception starts, the **Stop** button is activated and a text field appears that informs you how many bytes of SysEx data have currently been received into the Display Window. Pressing the **Stop** button terminates SysEx reception – VSTHost doesn't know or care about the incoming MIDI messages' format, since this is completely generic, so it can't determine from the incoming data when the transmission has been completed. I could, of course, add a timeout, following the logic: "If nothing happened for 10 seconds, it looks like the transmission is over", but that's a bit unreliable; the whole procedure needs manual operation, so having to press the Stop button is OK in my opinion.

Save As... does the same as on the Command Window, just for the Display Window's contents.

Pressing the **MIDI…** button opens a dialog where you can select the MIDI devices that VSTHost sends to and receives SysEx from; this is also used for files sent directly using the **Send SysEx File** menu command (see "Send SysEx File" on page 74 for details). VSTHost normally sends SysEx messages to and receives them from all interested PlugIns, too. *Sending* SysEx messages from the SysEx window to a PlugIn can be suppressed on the respective PlugIn's MIDI configuration window (see "MIDI Settings" on page 42 for details),*receiving* SysEx messages from PlugIns into the SysEx Display Window can be suppressed by deselecting "All loaded MIDI Input devices" here.

Help Menu

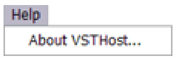
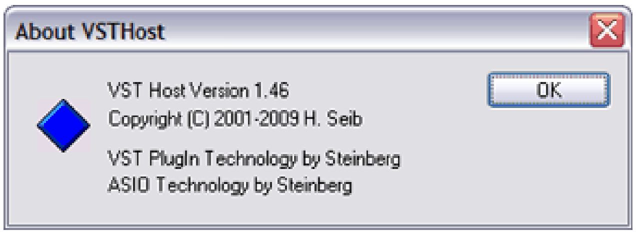


Figure 88: Help Menu in its entire glory

This menu is not extremely helpful at all; as this is a spare time project, I haven't found the time yet to create a help file (don't ask how long it took to write this *manual*!), so it contains only one entry:

About VSTHost

Selecting this menu entry opens the most important dialog of the whole program, the thing you've all been waiting for:



VST Host Version 1.46
Copyright (C) 2001-2009 H. Seib
VST PlugIn Technology by Steinberg
ASIO Technology by Steinberg

Figure 89: the equally glorious About dialog

… and with this extremely important information I'll end this document.

… ahem...
… well...
… no. There's still more.
I added another menu item:

Manual

If you download VSTHost.pdf from the web site and put it into the same directory as the VSTHost executable, this menu item will allow you to directly open the .pdf.

OK, but now it's really over.
Nearly.
There's one more item:

Donate

This menu item opens a little dialog that details how to send a donation. You will also see this dialog once each time you install a new VSTHost version.

OK, but now it's really over.

Have fun using VSTHost!

Hermann Seib
Vienna, December 9th, 2016

Appendix A: Things you should never need

But if you do... you might need them desparately.

VSTHost got quite some features “under the hood” that are only useful in rare situations. Consequently, there's no directly accessible user interface for them. They are detailed in this appendix.

Exception Handling

Shit happens.
It tends to happen quite often in an open environment such as VSTHost, where more than one program and lots of PlugIns from many different manufacturers are put to work. VSTHost itself may contain errors I haven't found yet, the PlugIns may contain errors, there may be subtle “misunderstandings” in some features of the notoriously underdocumented VST implementation, … the list is long.

VSTHost got some features that try to deal with this kind of problems.

The first one is that there is a special tracing version (see “tvsthostx86.zip” and “tvsthostx64.zip” on page 11 for more details). If you run into a recurring problem, this can be used to produce detailed diagnostics of what is done, where it's done, and (hopefully) what the error might be.

Sometimes, however, things can't be reproduced. If VSTHost dies a sudden death (“an unhandled exception is raised”, in tech-speak), it tries to output a message box containing details about the cause and location of the problem. People tend to send me a screen shot of this, which can be quite large – and in previous versions, the contents could easily be too long to fit inside the message box anyway. Since V1.55, VSTHost also copies the full message box text into the clipboard; you can simply fire up your email program and paste them into the angry email you're about to send to me ☺. Much shorter (in size) and potentially much longer (in content) than the screen shot.

If one of VSTHost's bridging programs (see “Bridging” on page 34 for details) dies, it can't easily output a message box, since (a) it's running invisibly in the background and (b) it might interfere with the completely asynchronous processing in VSTHost. The tracing version, however, dutifully logs the exceptions, and all versions paste them to the clipboard.

Additional .ini Files and Sections

VSTHost checks for additional .ini file entries in quite some situations. Some of the files checked are self-documenting – see the files Data\effCanDos.ini and Data\hostCanDos.ini, which come with the VSTHost package. These contain a header that details what you can accomplish with them.

The main initialization file, Data\vsthost.ini (or however it's really called – see “Set Data Path” on page 30 for the reason behind this cautious wording ☺) is created dynamically, however, and not all sections that can be used are allocated in advance – in most installations, they are absolutely unnecessary. You can easily enter them by hand; the Notepad editor that comes with Windows is absolutely sufficient.

.ini File Layout

A section in the .ini file, in case you're new to this, is always started with a header that contains the name of the section in square brackets, like **[Settings]**, for example. Section names are unique – there must not be more than one section with the same name in the .ini file. If VSTHost encounters this in a file changed by hand, the sections are merged into one. Leading and trailing blanks in the section name are ignored, and it's treated case-insensitive.

Each section contains a set of entries, each one on a single line, and in the form *entry*=*value*. Leading and trailing blanks in the entry are ignored, and it's treated case-insensitive. Entries are unique, too – if VSTHost encounters this in a file changed by hand, only the first entry is used.

Main .ini File

Here, now, are the sections and entries that VSTHost understands, but which are not automatically added to the main initialization file, together with their default values:

[Settings]

Note: this section is always there, so you should search it in the main initialization file (see "Set Data Path" on page 30 for details) and add your entries there, instead of adding a new section.

AsioPanel *drivername=program path*

AsioPanel32 *drivername=program path*
AsioPanel64 *drivername=program path*

Yes, there's a blank in the entry name. At least one ☺
When an ASIO driver has been loaded, VSTHost allows to open its control panel using the ASIO Control Panel menu entry (see page 15 for details). This, however, sometimes does not work – either because the driver doesn't *have* a control panel, or because the control panel only works in 32bit applications, or... whatever. There are plenty of possible reasons.

If the sound card comes with a separate application that provides the configuration capabilities, you can instruct VSTHost to use this application instead of the driver's control panel. ***drivername*** is the name of the driver as it is shown in VSTHost's Wave Device selection dialog (see page 13 for details), just without the leading "ASIO: " text; ***program path*** is the complete file name of the configuration program (%-delimited environment variables are automatically expanded).

The variant with appended "32" or "64" overrides the base setting in the corresponding (32 or 64 bit) VSTHost. This allows to deal with the special case that a 32bit VSTHost can open the ASIO Control Panel, whereas the 64bit variant cannot (because of a faulty 64bit ASIO driver) or vice versa, so that both programs can use the same initialization file.

AutoMidi=0

This setting can be used to force VSTHost to automatically load the first usable MIDI input and output device. Can be overridden by specifying **/[no]automidi** on the command line.

BankSaveVersion=2

The VST SDK 2.4 defined an extended bank save format with a version number of 2; since V1.49, VSTHost uses this format to save .fxb files. By setting **BankSaveVersion=1**, you can use the old format.

BgTickmult=3

If VSTHost determines that it's running in the background (i.e., it's not the foreground window), it reduces the screen updates a bit. This is mainly "thanks" to the WINE environment, which allows VSTHost to be run on x86-based Linux systems; in this environment, frequent redraws in background windows seriously ruin the overall system performance, so VSTHost does what it can to circumvent the problem. Setting this value to 1 causes it to redraw as fast in the background as in the foreground; any higher value multiplies the interval between the idle calls (see IdleMSecs below) by the given amount when running in the background, so given the default values, VSTHost will only update the screen about 6 times per second. No need to burn precious CPU cycles for something that isn't seen anyway, since another window is currently on top...

Bridge32=<app start directory + AppName + "Bridge32.exe">

Bridge64=<app start directory + AppName + "Bridge64.exe">

These two settings can be used to define the names of the bridge programs used by VSTHost (see "Bridging" on page 34 for details). In the default value, *AppName* is normally "VSTHost", but if you rename it to anything else, this would be the name prepended to “BridgeXX.exe” - and VSTHost wouldn't find the bridge programs any more, unless you rename these, too. Either rename them appropriately, or define their names (plus eventually additional parameters) here.

Bridge32Trace=<app start directory + AppName + “Bridge32.exe”>

Bridge64Trace=<app start directory + AppName + “Bridge64.exe”>

Same as above, but for the tracing version of VSTHost – this allows you to keep the normal and tracing versions of VSTHost in the same directory, by renaming the tracing bridge programs. The easier way would be to keep the tracing version in a separate directory and just set its initial VSTHost.ini's data path to the same data directory as the normal version's (see “Set Data Path” on page 30 for details).

ExceptionsFile=%DataPath%\Exceptions.ini

This setting can be used to override the name of the Exceptions file which is filled during PlugIn scans (see “Exceptions.ini” on page 91 for details). This setting could, in theory, be used to define various PlugIn subsets by filtering the unwanted PlugIns in each, but that's a really tedious method – you'd have to create an exceptions file with the PlugIns to be filtered, then adjust the exceptions file name here, then restart VSTHost, and then do a Fast Rescan to activate the new setup.

IdleMSecs=50

This setting defines the interval between 2 successive calls to the PlugIns' idle() functions, which are used to update the PlugIns' editor windows. This defaults to 50ms, i.e., 20 times per second. Good enough for me, but some people like faster updates. On modern machines, going down to 20 (i.e., 50 updates per second) should be no real problem – but keep in mind that it will increase the processor load.

KillVSTKeys=1

Better leave this at its default setting. It can seriously disturb PlugIns that are not prepared for it. That said... normally, VSTHost translates incoming keys into their VST counterpart when possible, and then removes the key from the normal processing loop. When set to 0, the key is passed on as a Windows message, too. Can be overridden by the /nokillvst command line parameter (see page 25 for more details on this).

LevelMSecs=500

This setting defines the interval between 2 successive displays of the current output level in the status bar (if that's activated – see “Status Bar Level Meter” on page 80 for details).

MainBgConnSize=5

VSTHost can display little “connectors” on the sides of the PlugIns' main windows that allows to set connections between PlugIns to be set with the mouse (see “New PlugIn” on page 32). On today's vastly different monitors, this size can be too small to “hit” with the mouse in an easy way, so I made it configurable.
If you don't want to see the connectors at all, set it to 0 or less; in this case, connections can only be changed on the "Chain After" windows (see page 56).

MainBgLinkOffs=5

If connectors are displayed (see above), this setting can be used to determine how far apart they are put. Default is (MainBgConnSize / 2) + 3 (i.e., 5, if unmodified) to give a little gap.

MaxChannels=32

Normally, VSTHost's audio engine uses a maximum of 32 for the number of channels. That's sufficient for most configurations; sometimes, however, this limit may be too low. With this setting, the maximum number of channels can be set to anything between 2 and 256. Can be overridden by the /maxchn command line parameter (see page 25 for more details on this).

MenuBarBreak=30

When displaying the PlugIn menu, VSTHost normally inserts a menu bar break (i.e., a switch to a new column) every 30 entries; you can customize this here, if (a) that many items don't fit on the screen vertically or (b) many more items would fit on the screen vertically and you don't want to waste the space. This setting is only marginally checked by VSTHost; you can...

- totally ruin the menu layout by entering values below 4
- force VSTHost to display a single-column menu by entering a value like 9999

… so use this with care.

NoteOffVel=0x40

When generating **Note Off** MIDI messages, VSTHost uses this value as the velocity. Nearly all PlugIns and external devices ignore this velocity information anyway.

NumProcessors=*physical # processors*

This setting can be used to override the number of processors used by VSTHost. Normally, all available cores and processors are used, but you can set a different maximum here. This setting can be overridden with the **/numProcessors** command line parameter (see page 25 for more details on this setting).

OptRunningStatus=1

When set to anything other than 0, VSTHost tries to optimize outgoing MIDI messages for Running Status usage – i.e., **Note Off** messages are translated to **Note On** messages with a velocity of 0 if appropriate, so that intelligently written MIDI drivers (hee hee...) can optimize the MIDI output stream a bit.

PercMSecs=750

This setting defines the interval between 2 successive displays of the CPU percentage used by VSTHost.

PluginsPerBridge=1000

This setting can be used to configure how many PlugIns VSTHost loads into one instance of the bridge program (see “Bridging” on page 34 for details) before starting a new instance. The default setting essentially means “keep it down to one bridge program”.

Lowering this setting to 1 would force each PlugIn into a separate bridge program – which would mean maximum overhead, but each PlugIn would have the maximum of available memory... but there's the **/forceBridged** command line parameter and the corresponding entry in effCanDos.ini for that (see page 25 for more details on this) which allow a finer control, so changing this setting is not really recommended.

SysExBufSize=256

SysExBufWait=60

These two settings are used to configure the SysEx window settings (see “SysEx” on page 82 for details). When sending out the contents of the SysEx window, VSTHost splits the SysEx messages into chunks of the maximum size given in **SysExBufSize**; after each buffer, it waits **SysExBufWait** milliseconds before sending the next one.

These settings can become vital for Windows XP users; the Windows 2000/XP standard MIDI driver (which is used by a lot of [especially cheap] USB MIDI devices) is severely buggy and doesn't play nice when confronted with partial SysEx messages. This can result in faulty messages being sent out to the device. If you got such a setup and have to transmit SysEx messages that are longer than the default value of 256, setting **SysExBufSize=65530** can cure the problem.

TraceBase=0x60000000

TraceMask=0x7FFFFFFF

These two settings are *only* interesting for the tracing version of VSTHost; the normal version simply ignores them. Together, they determine what VSTHost traces, and how. Normally, you won't need this, but if you're trying to correct a problem with my help, I might request a trace file from you, and in this case, the settings might become interesting.

The tracing version of VSTHost contains a lot of texts that can be written to the trace file while the program is running, thereby creating a rather precise "trace" of the program functionality. The trace output can be expanded or reduced by setting up these settings.

Each trace output falls into one or more categories, each of which takes up one bit in a 32-bit word. When writing the traces, VSTHost first adds the settings in **TraceBase** to this word, and then removes those bits from the word that are *not* set in **TraceMask**. VSTHost only outputs traces that come out with at least one bit between position 0 (i.e., lowest bit) and 27 set in the result; the uppermost 4 bits are used to determine the trace output format.

Here are the bits currently defined for VSTHost:

Bit number	Setting
0	"Anything else" - i.e., anything that doesn't fall in one of the below categories.
1	Organizational details
2	ASIO-related traces
3	MME-related traces
4	DirectSound-related traces
5	MIDI-related traces
6	Audio processing related traces
7	VST related traces
8	High-resolution timer related traces
9	Slave-processing related (see separate "Slave Mode" document)
10	Window painting system related traces
11	Joystick-related traces
12	OSC-related traces
13	User exit related traces
28	Add the process ID to the trace file name
29	Prepend the thread ID to the trace file entry
30	Prepend timestamp to the trace file entry
31	Flush trace file after writing this entry Normally, the traces are buffered; i.e., they are only written to disk when a fair amount of text has been collected. This ensures that the tracing process doesn't slow down the system too much. VSTHost uses this flag on some of the "hairier" traces when it might be possible that the next activities kill the program; if it is set permanently, it gives a highly accurate trace, since VSTHost can't die without the latest traces having been written out to disk,

Bit number	Setting
	but it also means permanent disk activity which slows down everything.

TranslateNoteOff=1

This setting can be used to define whether VSTHost translates incoming **Note On** MIDI messages with a velocity of 0 into **Note Off** messages before passing them to the loaded PlugIns. Normally, this is done, and I'd leave it at that... but you can change it here by setting the value to 0.

UserExit=

UserExit32=

UserExit64=

This setting can be used to force VSTHost to load a specific User Exit DLL. Currently only one User Exit DLL has been created for the Lionstracs Mediastation (see www.lionstracs.com for details) to allow a better integration into this environment. This setting can be overridden by the **/userexit** command line parameter (see page 25 for more details on this).

If both the 32- and 64-bit version of VSTHost use the same .ini file, you should use the **UserExit32=** and **UserExit64=** notation, since VSTHost can only load User Exit DIIs of the same "bitness" as the main program.

VSTXML_Ext=1

Normally, VSTHost exports XML Definitions in an extended VSTXML format (see "Export XML" on page 58 for details) for VST2 Shell PlugIns, VST Module Architecture PlugIns, and VST3 PlugIns. Since this might interfere with other host's interpretations of VSTXML files, you can force VSTHost to use the original VST 2.4-compatible format by adding the setting
VSTXML_Ext=0
to the section.

Note: VSTXML_Ext=0 limits the VSTXML files to one single PlugIn definition – even if a Shell or VST3 PlugIn contains many different internal PlugIns, only the currently loaded one is written into the file. Pre-existing definitions for others are lost, and when the file is loaded for *another* one of these internal PlugIns, the definitions might be totally wrong if a parameter has the same ID, but different name and/or type and/or range in the PlugIns. In short, only do this if it's *really* necessary.

VUFadeMSecs=1700

This setting defines the time in milliseconds that the VU meters in VSTHost take to "fade" from maximum to zero. Always displaying an accurate value would give a very jumpy display – and you might miss some short peaks, so VSTHost – like practically any other audio-processing program, and like hardware mixing consoles – lets the meter rise very quickly if a higher value is to be displayed, but lets it fall rather slowly. Shorter values give a more precise, but also much more "nervous" display.

VUMaxMSecs=1000

This setting defines the time in milliseconds that the VU meters in VSTHost remember the current maximum value.

WSetMin=4194304

WSetMax=41943040

These two can be used to change the *working set size* used by VSTHost. These two are mainly included because I like to have an "adjusting screw" for every possible setting. Normally, best left alone; if you really want to know what this is about, google for **SetProcessWorkingSetSize**.

[ASIOignore]
[DSoundignore]
[MMEignore]
[MIDIignore]

These sections are normally not there; they are only necessary when a specific audio or MIDI driver ruins your “experience”, as they say nowadays...

VSTHost is a bit peculiar in one respect: it always checks all available audio and MIDI drivers when it starts up and tries to determine their capabilities. Sometimes, it comes across a driver that's still installed in your system – but the corresponding hardware device has long been abandoned... and this can cause some of these drivers to crash. In such a case, you can force VSTHost to ignore the driver by adding an entry for it to the matching section. Let's say that you got an ASIO driver for a “Meetoo 895 ASIO” device and this crashes VSTHost. In this case, adding the section

```
[ASIOignore]
Meetoo 895 ASIO=1
```

to VSTHost's main initialization file should prevent it from being seen by VSTHost.

Now, the trick of course is to find out *which* driver kills VSTHost, and its name... for this, you can use the tracing version of VSTHost (see VSTHost's web site for this – address is given at the start of this document). VSTHost should trace the names of the drivers it's trying to load, and this should lead you to the killer and name it, too.

… and while you're at it, you might want to remove the killer from your system in the same session which would make adding the section irrelevant ☺… but you can't always easily do that, that's why VSTHost can be customized to ignore the bugger.

[ASIOForcePreferred]

This section is normally not there; it's checked to cure a *very* peculiar problem with some ASIO drivers.

Normally, ASIO drivers tell the host something like “minimal buffer size 16, maximal buffer size 1024, preferred buffer size 256” - i.e., they let the host choose which buffer size it wants to use, within certain constraints. *Some* drivers, however, tell that they can use a wide range of buffer sizes – but refuse to work if anything but the preferred buffer size is set.

Let's say that you got an ASIO driver for a ZOOM G7 device (that's what the option was added for) and this doesn't work if you define an “unwanted” buffer size. In this case, adding the section

```
[ASIOForcePreferred]
ZOOM G Series ASIO=1
```

to VSTHost's main initialization file should prevent it from being set to anything but its preferred buffer size by VSTHost.

Exceptions.ini

This file is created in VSTHost's Data path (see “Set Data Path” on page 30 for details) during the PlugIn scans (see “Rescan PlugIns” and “Fast Rescan PlugIns” on page 36 for details). The file name can be overridden with the “ExceptionsFile” setting (see page 87 for details).

[PlugIns]

This section should normally be empty. If, however, VSTHost encounters serious problems while loading and checking a potential PlugIn file, it adds this file to the list of “known enemies” - files it cannot reliably load (technically spoken, it adds the file names before checking and removes them after all went well). When the scan operation is tried again, VSTHost knows it can't load this file, and doesn't try again.

There are two forms a line can have:

`<PlugInName>=bad`	The file causes problems when VSTHost tries to load and examine it.
`<PlugInName>=unusable`	The file is not of a type that can be loaded as a PlugIn into VSTHost. Normally, this means it's a support DLL for a PlugIn.

This has consequences, of course; if you install an updated version of the PlugIn that *can* be loaded into VSTHost, the scan still ignores it, so it never appears in VSTHost's PlugIn menu. In such a case, you can locate the line

```
  <file name of your Plugin>=reason
```

in the [PlugIns] section of Exceptions.ini and remove it by hand. The next time VSTHost is told to rescan the PlugIn list, it will find (and, if all goes well, add) the PlugIn.

Since V1.56, VSTHost also checks whole directories against this list; this, however, is not configurable from the UI. To exclude a complete directory from the scanning process, you have to add it manually by adding a line to the [PlugIns] section in the form

```
<DirectoryPart>=whatever
```

The right part after the '=' in all cases is completely irrelevant to VSTHost; it just has to be there and contain some text. The `bad` and `unusable` texts are useful diagnostic tools, but not mandatory for your own entries.

Appendix B: OSC Implementation

This appendix details VSTHost's OSC implementation.

What is OSC?

Open Sound Control (OSC) is a general protocol for encapsulating and organizing control among multi-layered systems for musical applications and is gaining increasing attention; especially new input devices like the iPad or the JazzMutant Lemur make it increasingly interesting. OSC is developed at The Center for New Music and Audio Technology (CNMAT) at UC Berkeley by Matt Wright and others.

OSC defines the layout of messages that can be sent between OSC-conforming applications. These messages have a simple syntax – they define an address and optional parameters. The address is given in the form of a hierarchical string, delimited by forward slashes ('/'). For details regarding the protocol, please visit http://opensoundcontrol.org.

Unfortunately, OSC is a very loosely specified protocol – only the bare necessities, like "how must a message look to be OSC-conforming", are defined, but not a bit above that. The greatest problem is that there's no request/response mechanism is defined, so it's up to the OSC-conforming applications to define their own... which quite some have already done.

VSTHost has built-in support for the following OSC parameter types:

Type	**Content**
`i`	32-bit big-endian two's complement integer
`f`	32-bit big-endian IEE 754 floating point number
`s,S`	OSC string (see OSC documentation on this)
`b`	OSC blob (see OSC documentation on this)
`T,F,N,I`	True / False / Nil / Impulse
`t`	OSC timetag in NTP format
`h`	64-bit big-endian two's complement integer
`d`	64-bit big-endian IEE 754 floating point number
`c`	32-bit big-endian character
`r`	RGBA value
`m`	4-byte MIDI message (port ID, status byte, data 1, data 2)

although only some are used at the moment. VSTHost tries its best to convert incoming parameters into the format required internally.

VSTHost uses a slightly reduced version of the system introduced by Open Sound World (see http://osw.sourceforge.net for details), which looked like a good compromise between complexity and capabilities to me.

VSTHost acts as a passive server - it doesn't actively send OSC messages around, but receives queries and sends responses to these back to the caller. Each query is followed by one or more responses.

VSTHost Address Space

If you're not sure what an address space is in OSC, please visit http://opensoundcontrol.org – it's all explained there, and I don't feel the pressing need to copy the original text into VSTHost's documentation.

/engine

The /engine container holds all settings of the VSTHost engine. At the moment, there aren't many, but this will surely change.

Returns: the number of available entries in the /engine container.

/engine/bpm [bpm]

The /engine/bpm address returns the currently configured BPM rate. A new BPM rate can be passed (either as an integer or floating-point value).
Returns: the currently set BPM rate.

/engine/channels

The /engine/channels container holds the engine's I/O configuration.
Returns: the number of available entries in the /engine/channels container.

/engine/channels/in [inputs]

The /engine/channels/in method returns the number of engine input channels. A new number of inputs can be passed as an integer value.
Returns: the currently configured number of engine inputs.

/engine/channels/out [outputs]

The /engine/channels/out method returns the number of engine output channels. A new number of outputs can be passed as an integer value.
Returns: the currently configured number of engine outputs.

/engine/run [on]

The /engine/run method returns whether the engine is running. A new state can be passed as an integer or boolean value.
Returns: the current state in boolean form (T/F).

/plugin

The /plugin container allows access to all currently loaded PlugIns, labeled 0..(n-1). PlugIns **0** and **1** are always available; these are the Input and Output built-in PlugIns.
Returns: the number of currently loaded PlugIns (at least 2).

/plugin/*n*

The /plugin/*n* container (where n is a number between 0 and the number of currently loaded PlugIns – 1) allows access to a PlugIn's settings.
Returns: the PlugIn's DLL path

/plugin/*n*/path

The /plugin/*n*/path method returns the PlugIn's DLL path, if it has one (the built-in PlugIns don't).
Returns: the PlugIn's DLL path

/plugin/*n*/displayname

The /plugin/*n*/displayname method returns the PlugIn's display name (i.e., the displayed name).
Returns: the PlugIn's displayed name

/plugin/*n*/numparameters

The /plugin/*n*/numparameters method returns – guess – the number of parameters in this PlugIn.

/plugin/*n*/numprograms

The /plugin/*n*/numprograms method returns the number of programs in this PlugIn.

/plugin/*n*/bypass [on]

The /plugin/*n*/bypass method returns a PlugIn's Bypass state (if this is possible – for PlugIns without any audio inputs and outputs, it isn't). A new state can be passed as an integer or boolean value.
Returns: the current state in boolean form (T/F).

/plugin/*n*/mute [on]

The /plugin/*n*/mute method returns a PlugIn's Mute state. A new state can be passed as an integer or boolean value.
Returns: the current state in boolean form (T/F).

/plugin/*n*/parameter

/plugin/*n*/parameter is the container for the PlugIn's parameters; labeled 0..(numparameters-1).
Returns: the number of parameters in this PlugIn, followed by their names (since they're all numeric, the abbreviation "0" ".." "numparameters-1" is used if there are more than 2).

/plugin/*n*/parameter/*p* [value]

/plugin/*n*/parameter/*p* is a method as well as a container; as a method, it returns the parameter's current value as a floating-point value. A new value can be optionally passed in, also in floating-point format.
p contains the parameter number in the range 0 to (number of parameters – 1).
Returns: the (current or new) value of the parameter

/plugin/*n*/parameter/*p*/name

The /plugin/n/parameter/p/name method returns the name of the parameter.

/plugin/*n*/parameter/*p*/label

The /plugin/*n*/parameter/*p*/label method returns the label of the parameter.

/plugin/*n*/parameter/*p*/display

The /plugin/*n*/parameter/*p*/display method returns the display value of the parameter.

/plugin/*n*/program [current]

/plugin/*n*/program is a container for the PlugIn's programs, labeled 0..(numPrograms-1), as well as a method; the new current program can be passed in as a parameter.
Returns: the current or new program number

/plugin/*n*/program/*p*

The /plugin/*n*/program/*p* container holds a program's settings; *p* is the number of the program in the range (0..numPrograms-1).
Returns: Name of the program

/plugin/*n*/program/*p*/name

The /plugin/*n*/program/*p*/name method returns the name of program *p*.