

CUBASE

VST

Using Cubase VST/32
with DSP Factory

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About the Yamaha DSP Factory

The Yamaha DSP Factory is an audio hardware system for professional digital multi-track recording and mixing on personal computers. The core of this system is the DS2416 Digital Mixing Card, a PCI-bus audio card with professional specifications, extensive mixing capabilities and on-board EQ, dynamics and effects. It is possible to install and digitally connect two DS2416 cards in one computer. Each card can also be used with one or two optional AX44 Audio Expansion Units, for up to eight additional analog inputs and outputs per card.

This manual assumes that you have at least one DS2416 installed, tested and running under Windows 98/2000 or later.

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- **For information about how to install, test and troubleshoot the DS2416, please refer to the documentation supplied with the card. There you will also find detailed information about audio hardware specifications and features.**
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The DSP Factory in Cubase VST

By using the DSP Factory in conjunction with Cubase VST, you get a complete graphical interface with full control over the card's features. The DS2416 audio card will behave like an external digital mixer, feeding digital signals into VST's inputs and accepting digital signals from VST's output buses. All controls can be automated in the same way as with VST's internal Channel Mixer.

The Cubase VST/DSP Factory combination allows you to:

- **Record and play back using multiple inputs and outputs.**
By itself, the DS2416 provides four inputs and outputs (two analog and two digital). Each AX44 unit adds four analog inputs and outputs, and there is also support for upcoming 8 in/8 out units (up to two per DS2416 card, for a total of 20 inputs and outputs in a one DS2416 configuration).
- **Use the DS2416 EQ, dynamics and effects for separate VST channels or for combinations of channels.**
- **Route DSP Factory outputs to external effects, accessible from the VST effect sends.**
- **Synchronize audio playback to external wordclock.**

Setting up Cubase VST for use with DSP Factory

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- ❑ **Again, this assumes that you have installed the DSP Factory hardware according to the instructions in the supplied manual, and tested that it runs properly under Windows. Also, please note that the DSP Factory windows require a screen resolution of at least 1024 x 768 to be fully viewable.**
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Before you can start working, you need to make a few settings:

- 1. Pull down the Options menu and select Audio Setup - System.**
The Audio System Setup dialog appears.
- 2. Make sure the "ASIO SW+DS32" is selected on the ASIO Device pop-up menu.**
See the note below about the two ASIO Devices.
- 3. In the Audio System Setup dialog, make sure that the "Global Disable" Monitoring option is selected.**
We recommend that you monitor the recorded signals "directly" through the DS2416 instead, as described on [page 32](#).
- 4. Click OK to close the Audio System Setup dialog.**

About the Two ASIO Devices

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- ❑ **The ASIO drivers described below may have been included with the Yamaha DS2416 package. However, make sure to check Yamaha's web site for updated drivers!**
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There are two ASIO Devices for the Yamaha DS2416, "ASIO SW+DS32" and "ASIO SW+DS16". Which one to select depends on your computer power and whether you need 24 bit recording or not:

- **If you want to record and play back 24 bit audio, you need to select the 32 bit device ("ASIO SW+DS32").**
It is possible to record in 24 bit mode with the 16 bit device selected, but the created audio files will only have 16 bit accuracy.
- **If you experience performance problems with the 32 bit device (and don't use 24 bit audio), you should select the 16 bit device ("ASIO SW+DS16").**
The data transfer between the program and the audio card requires quite a lot of computer power. This load is drastically reduced if you use the 16 bit device.

Using the “DSP Factory Songs”

With Cubase VST you find two template Song files called “dspfactory16channel.all” and “dspfactory32channel.all”. These contain no music, but rather proper routing settings for 1 card and 2 card configurations, respectively. You can use these Songs as start templates when you want to create a new Song (you may even consider copying one of these Songs to your program folder and renaming it to “Def.All”, to have it automatically loaded on startup).

- **If you use one of these template Songs, you don’t need to manually perform the settings described on the following three pages.**

However, we still recommend that you read these pages to get a good understanding of the routing between VST and the DSP Factory system.

Routing Audio between VST and the DSP Factory

Audio routing with the DSP Factory is extremely flexible, allowing you to connect channels, aux sends and buses to various physical outputs and inputs. This is done in the special DSP Factory windows, as described on [page 29](#). However, first you need to “connect” VST to the DSP Factory:

Activating Inputs

1. Pull down the Panels menu and select VST Inputs.

The VST Inputs window appears. There are four Input pairs for each installed DS2416 card.



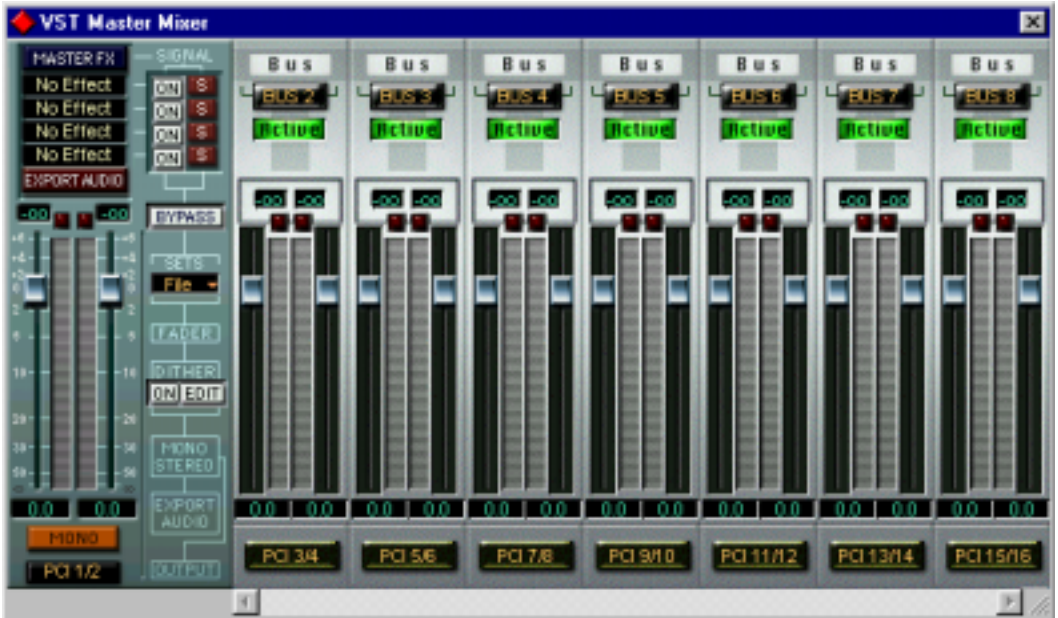
2. Activate the Input pairs by clicking on the green buttons in the Active column.
3. If you like, rename the eight inputs by clicking in the Label column and typing in new names.
The names you specify will be shown on the Input pop-up menus in VST.
4. Press [Return] to close the Inputs window.

You have now assigned Cubase VST to accept the digital signals from the DS2416 card as input sources.

Activating and Assigning Output Buses

1. Pull down the Panels menu and select VST Master Mixer.

The VST Master window appears. In a single DS2416 card configuration, there are eight buses including the Master bus.



2. Activate all buses by clicking on their Active buttons.

3. Pull down the pop-up menus at the bottom of each Bus channel strip and check that each bus is assigned to the desired DS2416 output.

To avoid confusion, we recommend that you keep the default order of the outputs, so that the Master bus is connected to the DS2416 PCI #1/2 output, the second Bus is connected to the DS2416 PCI #3/4 output, and so on.

- These PCI outputs are not the physical outputs of the audio hardware, but rather “output lines” connecting VST to the DS2416. The actual routing to physical outputs is done in the DSP Factory windows, as described on [page 31](#).

4. If you like, rename the buses by clicking in their name fields (above the Active buttons) and typing in new names.

These names will be shown on the Output pop-up menus in VST.

5. Press [Return] to close the Master window.

Selecting Inputs and Outputs for the Audio Channels

This description assumes that you have set the number of audio channels so that it corresponds with the number of output bus channels (16 if you have one DS2416 card installed). It also assumes that you want each audio channel in VST assigned to a separate mixer channel strip in the DS2416 console. Of course, there are other possible routings (you may want to send a combination of audio channels to a Group or directly to the same DS2416 channel strip, you may want to reserve some DS2416 channels for use as effect sends, etc).

- 1. Open the VST Channel Mixer.**
- 2. Select Inputs for the channels by pulling down the Input pop-up menus at the top of the channel strips.**

There should be eight Inputs available for each installed DS2416 card (four stereo Input pairs). If Inputs are missing on the pop-up menu, make sure you have activated them in the VST Inputs window on the Panels menu.
- 3. Route each audio channel pair to a separate Output Bus, by using the pop-up menus at the bottom of the channel strips.**
- 4. Pan the channels in each pair hard left/right, alternatingly.**

Now, each audio channel is assigned to a separate channel strip in the DS2416 console.

Assigning Groups to the DS2416

You can assign the outputs of the Groups in the Group Mixer to the DS2416 buses in the same way as with the audio channels, by using the pop-up menus at the bottom of the Group Mixer strips.

- The normal setting would be to select the same Output Bus for the two sides, and then pan the sides hard left/hard right.**

Assigning Effect Sends to the DS2416

By assigning VST Effect Sends to one of the Output Buses, you route the send to a channel strip in the DS2416 console. Note that this assignment is done individually for the effect sends of each audio channel (by using the pop-up menus below the send level knobs in the VST Channel Settings window). You can use this feature to address the on-board effects in the DS2416, to create several different monitor mixes during playback, etc.

The Default Signal Routing

This section describes how signals are routed by default, when you first start using the DS2416 card with Cubase VST. If you wish you can change the signal routing, as described on [page 29](#). However, this default routing allows you to perform basic playback and recording, and to use the built-in effects without having to change the routing.

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- **For additional info, please refer to the diagrams and list in the DS2416 documentation.**
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About the DS2416 “Channels”, Buses and Sends

Before we describe the actual signal routing, here’s some information about how the DS2416 is configured:

- **Each DS2416 card handles 24 separate mixer channels.**
To separate these from the audio channels in VST, we will call them “DS channels” from now on.
- **There is one main stereo mix out and eight Bus Sends (four stereo pairs).**
Each DS channel can be assigned to any combination of the buses and the stereo mix.
- **There are six Aux Sends.**
Each DS channel has send levels and pre/post fader switches for the sends.

The Default Routing of signals from VST to DS2416

There are sixteen separate “lines” from Cubase VST to the DS2416. In VST, these appear as Output Buses (see [page 7](#)). In the DSP Factory Input Console window, the “lines” from VST are by default connected to DS channel 1 to 16, as follows:

VST Output (and default Output Bus)	DS2416 Channel
DS2416 PCI 1 (Master Left)	DS Channel 1
DS2416 PCI 2 (Master Right)	DS Channel 2
DS2416 PCI 3 (DS3/4 L)	DS Channel 3
DS2416 PCI 4 (DS3/4 R)	DS Channel 4
⋮	⋮
DS 2416 PCI 15 (DS15/16 L)	DS Channel 15
DS 2416 PCI 16 (DS15/16 R)	DS Channel 16

- **Please note that the Output assignment (DS2416 #1 etc) for each Output Bus (Master, BUS 2, etc) can be changed, as described on [page 7](#).**
To avoid confusion, we recommend that you keep the default order of the outputs.

The Default Routing of signals from DS2416 into VST

There are eight separate “lines” from the DS2416 card into Cubase VST. In VST, these correspond to the four Audio Input pairs (see [page 6](#)). In the DSP Factory Input Console window, the default configuration uses the eight bus sends to route signals from the audio card into VST (for recording). The following default routing scheme is used:

DS 2416 Bus Send	VST Input
Bus 1	DS2416 PCI REC 1/2 1 (DS1L)
Bus 2	DS2416 PCI REC 1/2 2 (DS1R)
Bus 3	DS2416 PCI REC 3/4 1 (DS2L)
Bus 4	DS2416 PCI REC 3/4 2 (DS2R)
Bus 5	DS2416 PCI REC 5/6 1 (DS3L)
Bus 6	DS2416 PCI REC 5/6 2 (DS3R)
Bus 7	DS2416 PCI REC 7/8 1 (DS4L)
Bus 8	DS2416 PCI REC 7/8 2 (DS4R)

This means that to record something through the DSP Factory into VST, you only need to activate the appropriate Bus Sends for the desired DS Channels. From that point, the recording procedure is the same as when you run Cubase VST with “standard” audio hardware.

Physical Inputs and Outputs

By default, the physical inputs and outputs of the DSP Factory system are connected to the DS channels in the following way:

Inputs

Physical Input	DS Channel
DS2416 Analog In Left	17
DS2416 Analog In Right	18
DS2416 Digital In Left	19
DS2416 Digital In Right	20

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