Ear Training Tip:
Inserting A Free Spectrum Analyzer Plugin
Across All Computer Audio

Make the most of time spent at the computer with an 'always on' spectrum analyzer across all audio: local music files, audio or video streams, CDs, DVDs, movies... Everything.

In This Guide...

Background

Listening With Your Eyes

In both live and studio settings, a spectrum analyzer is a valuable tool for gauging the tonal balance of a mix. Like putting a face to a name (in this case, Frequency, Amplitude, and Time), spectrum analyzers can help you see what a mix or environment is doing – or what it can do better.

Analyzers can also be a great tool for training your ears with prerecorded material. They can help you get familiar with the frequency range of different instruments and voices (including their harmonics), or help you put your finger on the sonic signature of a particular artist, genre, style, era, or format (music, film, TV, radio, etc.).

Screenshot of Voxengo's SPAN plugin.

The Old Way (And Not Always Practical 'New Ways')

Unless you had a dedicated hardware analyzer, studying prerecorded audio from a computer was a somewhat tedious process. Often, it meant ripping and/or converting audio, importing to a DAW or editor, slapping an analyzer plugin across the output, and, finally, studying the results.

Even if this approach worked for local media, what if most of your listening happens via streaming, or while you're busy doing other things?

While you can now use a smartphone or tablet as an analyzer, this too involves extra steps and connections. You may also need extra hardware for the results to be meaningful, like an external audio interface or a quality measurement mic (and an understanding of your room's acoustics). And you may not always have these on hand.

For the extra geeky, there are even a small handful of media players that support addons (known as "wrappers") to incorporate pro audio-caliber plugins. But again, this means extra steps and going outside of your normal routine (read: less likely to bother). And it still doesn't help for streaming services that don't support external players.

How This In-The-Box Setup Works

Learn While You Work (Or Play)

This guide will show you how to insert a totally in-the-box – and free – spectrum analyzer across all computer audio, regardless of the source (local files, audio or video streams, a CD or DVD). This way, you can glance at an analyzer any time you hear something interesting, regardless of whether you're actively listening, working, or surfing the web – no matter where you are.

It's also a great way to get a better approximation of what's really happening when your playback system or environment is less than optimal (poor laptop speakers, low-quality earbuds or headphones, an especially bad room).

Keeping up with SoundGirls.org on a laptop while listening to music and analyzing audio.

About The Tools & How They Work Together

The tools described in this guide will form a virtual patchbay between the audio source (any program playing audio on your computer) and your playback system (your preferred soundcard, speakers, and headphones).

One-time setup involves installing and configuring 3 basic components:

1. A **virtual audio device,** to intercept all computer audio before your soundcard.

2. A **spectrum analyzer plugin**.

3. A **plugin host**, a simple piece of software to receive the audio from the virtual audio device, pass it through the analyzer plugin, and finally pass it back to your sound card, headphones, and/or speakers, all with minimal latency.

Once your system and software are configured, you can leave things 'always on,' or you can easily switch between your analyzer setup and your normal setup with just a few clicks.

How Long Does This All Take?

About 10 minutes from setup start to finish. Even the downloads are modestly-sized.

About The System And Tools Used Here

While this guide uses terminology and screenshots for a system running **Windows 7** (64-bit), the same basic concepts apply to a Mac or other versions of Windows.

The specific software tools used in the examples were chosen because they are free or donation-based, simple to use, and minimally-invasive (i.e., they're small, efficient, make minimal modifications to your system, don't include any adware or bloat, and are easy to turn on or off). See the bottom of the **Downloads section** for a list of alternative tools for both Windows and Mac platforms.

More Than A One-Trick Pony

This guide focuses on getting you up and running with a single spectrum analyzer plugin. However, these tools allow you to run any type of plugin and create any effect chain you'd like. You can even run multiple analyzer and metering plugins side-by-side, each with its own settings. Or you can add effects (compressors, limiters, reverbs, delays, etc.). For a glimpse of what's possible, see the section on taking things to the next level, towards the end of this guide.

Something else important to keep in mind: these thoughtfully-developed tools can be used for much, much more than just inserting plugins. Learning more about each program's features and exploring their full sonic and music-making potential is highly recommended. Be sure to check out the developers' sites and help resources (referenced throughout this guide).

Already A PC Audio Pro?

If you're already familiar with tweaking computers for audio, downloading the three main components may be all you need to get on your way. For the rest, continue reading and we'll cover all the bases.

Let's get started.

Downloads

First, we'll gather all of the necessary components. Installation and setup will be addressed in later steps.

> *IMPORTANT REMINDER:* These free or donation-based tools are intended for non-commercial use. Do right by their creators and honor this privilege. Also, if you keep these tools installed and use them, remember to show your thanks and support by donating to the developers. Links are included below.

Virtual Audio Device

In this guide, we'll use **VB-Audio's** *VB-Cable* for Windows.

Direct download (Windows):
http://vbaudio.jcedeveloppement.com/Download_CABLE/VBCABLEDriver_Pack42b.zip

Product info and donations:
http://vb-audio.pagesperso-orange.fr/Cable/index.htm

Spectrum Analyzer Plugin

Here we'll use the VST version of **Voxengo's** *SPAN* plugin (free edition).

Direct download (Windows):
http://www.voxengo.com/files/VoxengoSPAN_29_Win32_64_VST_VST3_setup.exe

Product info and links to Mac version:
http://www.voxengo.com/product/span/

Plugin Host

We'll be using **Niall Moody's** *Pedalboard2* for Windows.

Direct download (Windows):
http://downloads.niallmoody.com/Pedalboard2-2.14-windows.zip

Product info, donations, and links to Mac version:
http://www.niallmoody.com/apps/pedalboard2

Software Alternatives (Mac & Windows)

The table below (by no means exhaustive) contains a brief list of alternatives for both Mac and Windows systems, including those used in this guide (referenced above). Click the software name to visit the developer or project website.

If you use the software, don't forget to donate (where applicable). Also be sure to check out their other products.

| Virtual Audio Devices	Mac	Windows	Cost
VB-Cable (VB-Audio)	✗	✓	Free / Donation
JACK Audio Connection Kit	✓	✓	Free
Soundflower (Rogue Amoeba)	✓	✗	Free
Virtual Audio Cable (VAC) (Eugene Muzychenko)	✗	✓	$25 - $50 (free demo)
Sound Siphon (Static Z)	✓	✗	$29.99 (free demo)
WireTap Anywhere (Ambrosia Software)	✓	✗	$129 (free trial)
Plugin Hosts			
Pedalboard2 (Niall Moody)	✓	✓	Free / Donation
VSTHost (Hermann Seib)	✗	✓	Free / Donation
Carla (KSStudio)	✓	✓	Free / Donation
Plugins			
SPAN (free edition) (Voxengo)	✓	✓	Free
AnSpec (Voxengo)	✓	✓	Free
FreqAnalyst (Blue Cat)	✓	✓	Free
T-RackS CS Metering (IK Multimedia)	✓	✓	Free
virtual studio (beyerdynamic)	✓	✓	Free

Step 1: Setting Up A Virtual Audio Device

A virtual audio device like *VB-Cable* will allow you to intercept your computer's audio before it reaches your preferred sound card.
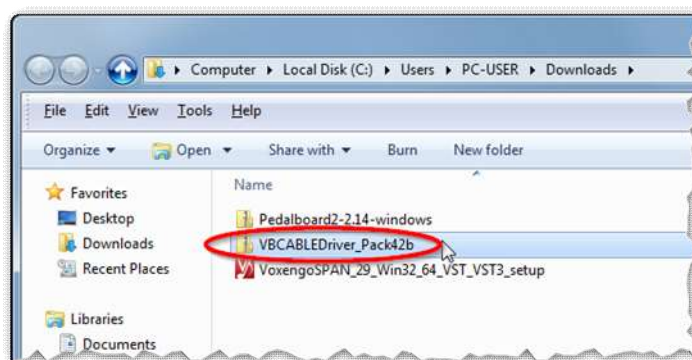
Installing The Virtual Audio Device

1. Be sure you are logged-in to Windows as a user with *Administrator* rights.

*Tip: Not sure if you're an Administrator? Go to **Control Panel\All Control Panel Items\User Accounts\Manage Accounts**. Beneath your username, it should say "Administrator."*
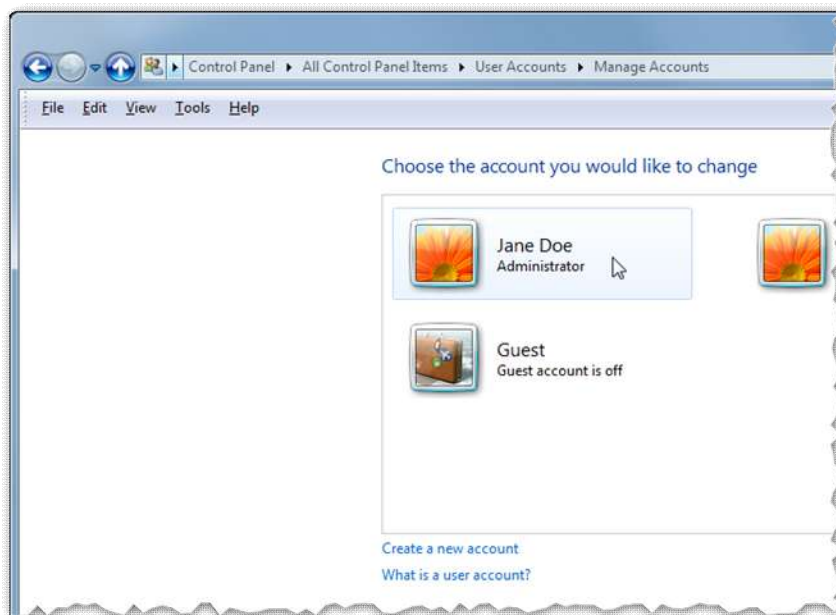
2. **Locate the zip file** you downloaded for *VB-Cable*.

3. **Extract the zip file** to your desktop or another temporary location.

4. In the extracted folder, **run the correct setup file** for your version of Windows.

   For 64-bit Windows, run **VBCABLE_Setup_x64**.

   For 32-bit Windows, run **VBCABLE_Setup**.
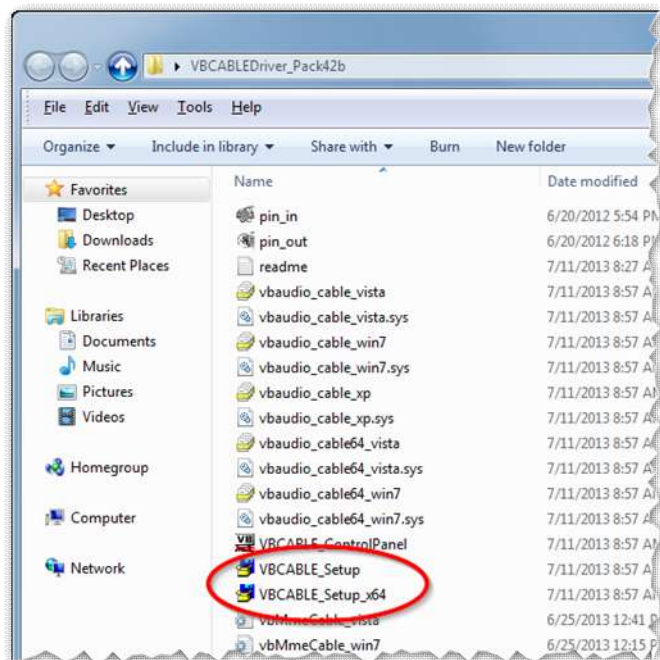
Tip: Not sure if your version of Windows is 32-bit or 64-bit? Go to **Control Panel\All Control Panel Items\System**. Look for the entry **System Type** to confirm your version. In this example, the system is 64-bit:
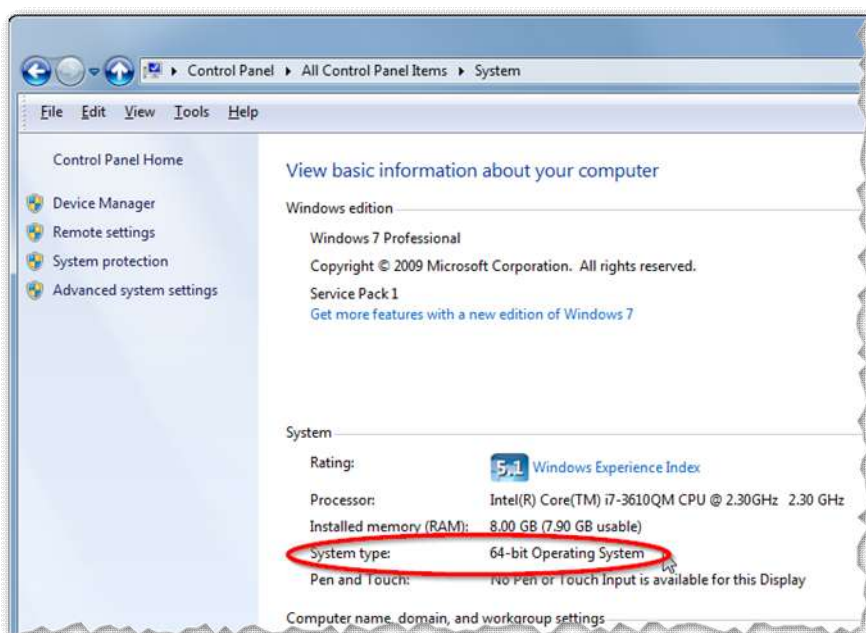
5. **Follow the prompts** to install the driver.

   During installation the program may show as "not responding" for a few seconds. This is normal -- just wait for the dialog box confirming the installation has finished. A reboot of your system is recommended after installation.
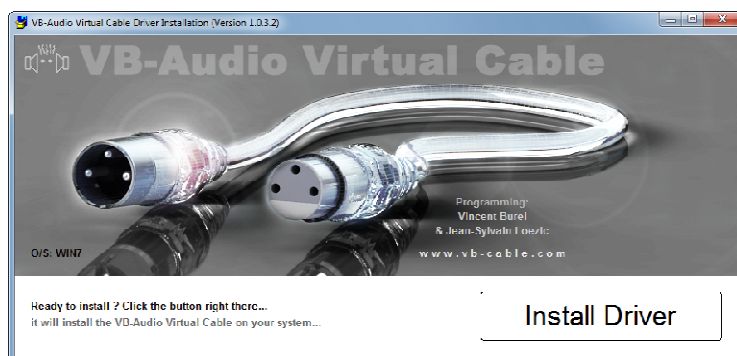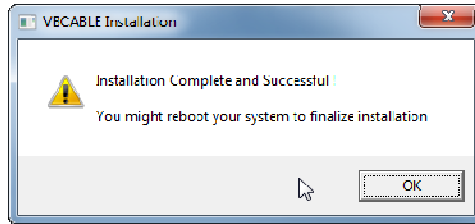
Enabling The Virtual Audio Device

Next you'll re-configure Windows to pass audio to the virtual audio device (instead of directly to your soundcard).

1. **Right-click** the **speaker icon** in the notification area (bottom right of your taskbar) and click **Playback Devices**. A new window will open.

2. In the *Sounds* window, in addition to your soundcard(s), you'll see a new device called **CABLE Input, VB-Audio Virtual Cable**.

   **Right-click** the device and choose **Set as Default Device**.

   > *Note:* *If you were already listening to audio when you make this change, your system will go silent. This is normal, until you finish re-routing the audio in the next steps. However, the meters to the right of the CABLE-Input device should reflect that an audio source is still playing back.*
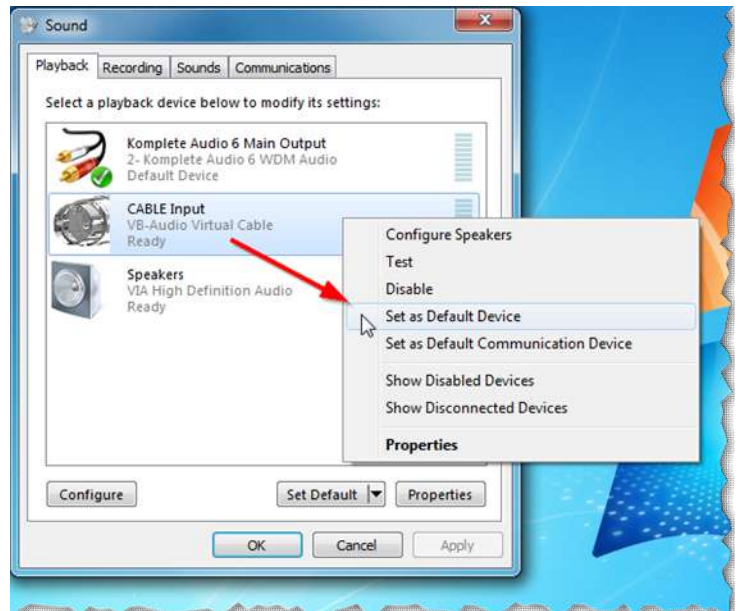
3. Click **OK** to close the list of playback devices.

Step 2: Installing A Spectrum Analyzer Plugin

1. **Locate the installer** you downloaded for Voxengo's *SPAN* plugin.
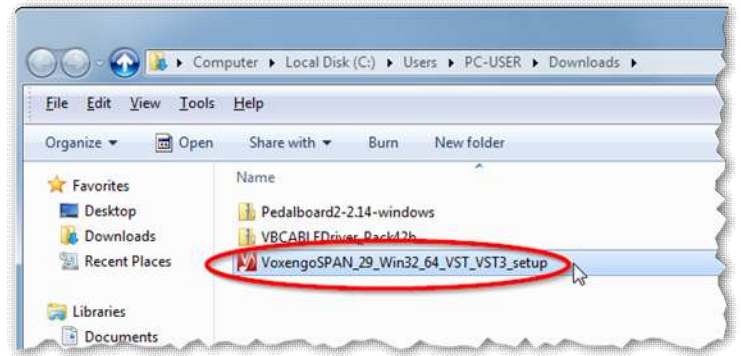
2. **Run the installer** and follow the prompts to complete the installation. Unless you already use plugins and have a custom process for managing them, leave the default install options as-is (the installer will detect your system's bit depth and pre-select 32- or 64-bit versions of the *SPAN*, and uses industry-standard folders for the installation).

   No system restart is needed after installing *SPAN*.

Step 3: Setting Up A Plugin Host

You'll setup the plugin host to receive audio from the virtual audio device, pass it through the analyzer plugin, and finally pass it back to your sound card.

Installing The Plugin Host

The plugin host we'll use, *Pedalboard2,* does not need to be installed in the traditional sense. It follows the "portable" software model, where you simply extract the program files to a folder, and launch the program from there.

1. **Locate the zip file** you downloaded for Niall Moody's *Pedalboard2.*
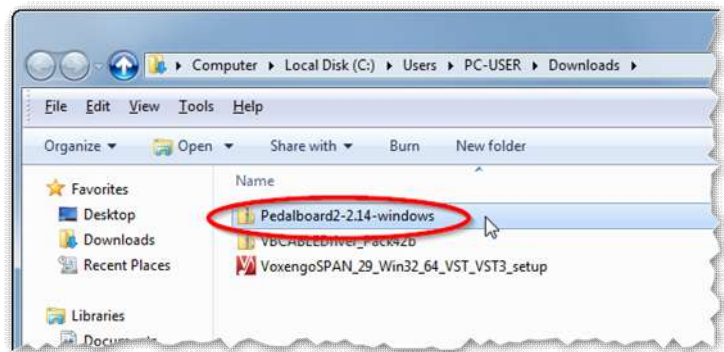
2. **Extract the zip file** to a folder where you want to keep the program, such as your desktop.

Launching The Plugin Host For The First Time

1. **Open the extracted folder** and **launch the correct version** of *Pedalboard2* for your system. For a 64-bit system, use the version named **Pedalboard2-64bit**. For 32-bit, use the version named **Pedalboard2**.
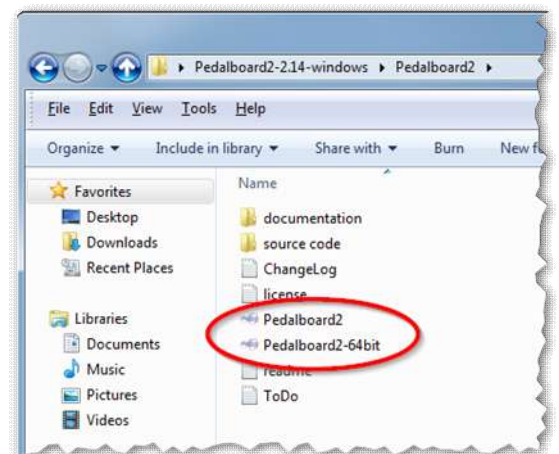
2. When launching *Pedalboard2* for the first time, you may receive a *Windows Firewall* prompt to grant *Pedalboard2* network access. This is because *Pedalboard2* has additional, network-dependent features that are beyond the scope of this guide. If you plan to explore those features later, consider granting whichever level of network access you are comfortable with. If you deny all network access, the plugin features we'll be using here will still function correctly.
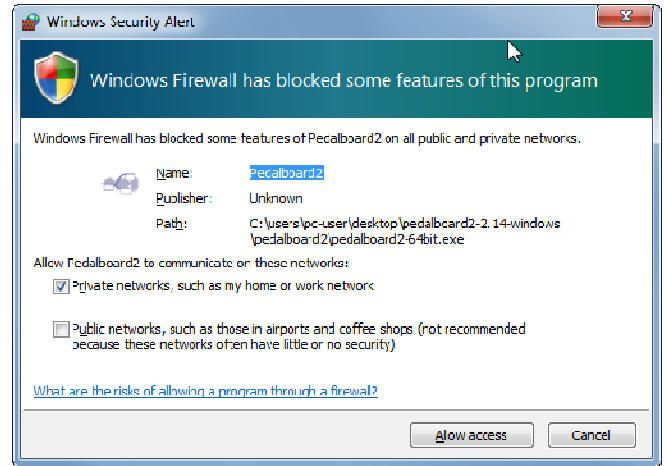
Setting The Input And Output

Next you'll configure *Pedalboard2* to receive all computer audio from the virtual audio device, *VB-Cable*, and then hand off the audio to your preferred sound card (onboard, USB, etc.).

1. In the *Pedalboard2* app, go to **Options > Audio Settings**. A new window will open.
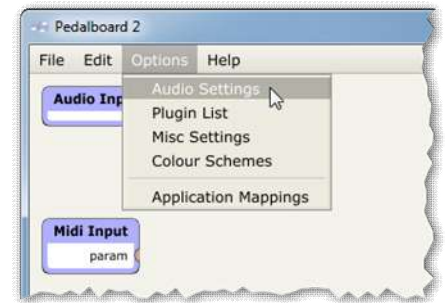
2. Set the **Audio Device dropdown** to **DirectSound.**

3. Set the **output dropdown** to your preferred soundcard. In the example to the right, the system will use Native Instruments' Komplete Audio 6.

4. Click the **Test button** to ensure that *Pedalboard2* is sending audio to the soundcard you chose. You should here a short test tone. If you don't, check your soundcard, volume controls, speakers, and/or headphones to ensure that all are connected, powered on, and working properly.

5. Set the **input dropdown** to **CABLE Output (VB-Audio Virtual Cable)**.

6. Leave all other settings at their defaults.
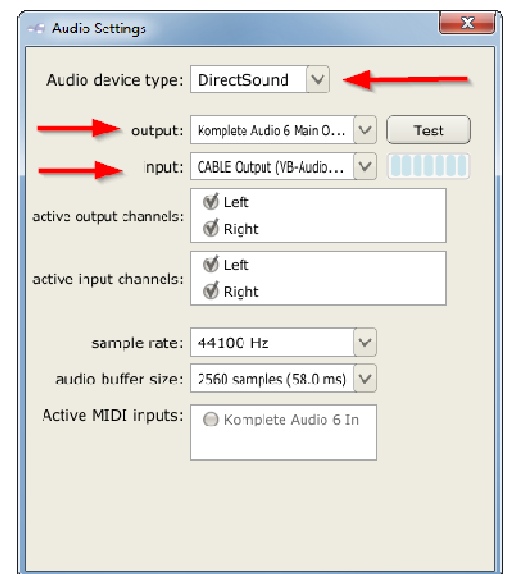
7. Close the **Audio Settings**.

Scanning Your System For Plugins

Next you'll have *Padalboard2* scan your system for plugins, including our spectrum analyzer, Voxengo's *SPAN* (any other plugins you may have installed previously will also be scanned):

1. From the *Pedalboard2* app, go to **Options menu > Plugin List**. A new window will open.
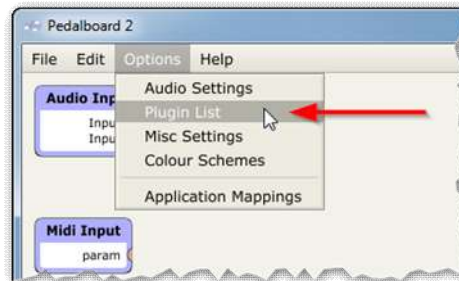
2. The default list of **Available Plugins** will usually show only a handful of plugins that are included in *Pedalboard2*.

   If you don't see *SPAN*, click the **Options button** on the lower left, and choose **Scan for new or updated VST plugins**. A new window will open.
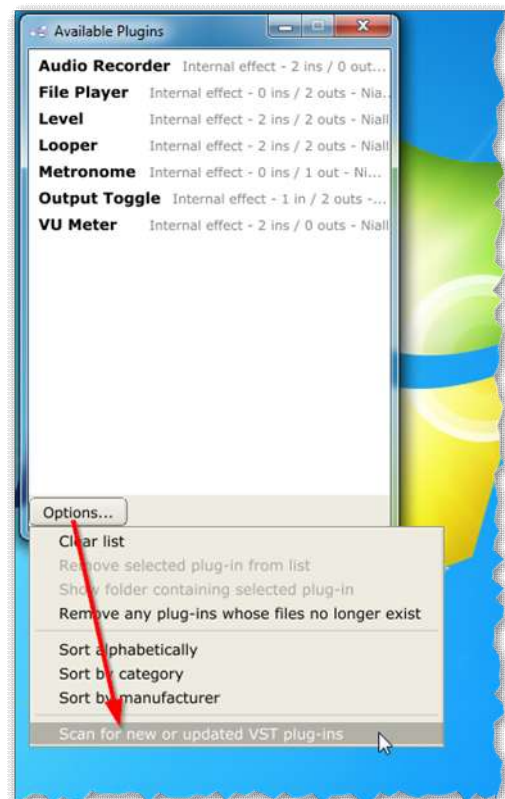
3. In the new window, you'll see the industry-standard location where *Pedalboard2* will scan for plugins. The location you see depends on the version you are running (64-bit or 32-bit). The installer for our spectrum analyzer plugin, *SPAN*, follows the same industry-standard locations. So, unless you used custom locations during installation, you do not need to change the list of folders.

   If you did install *SPAN* into a custom location, click the **"+" button** to locate that folder and add it to the list.

   In the example on the right, we're using the 64-bit version of *Pedalboard2*, which by default correctly lists the standard location for 64-bit plugins.

4. When you're finished verifying and/or adding plugin folders, click the **Scan button** to update the list of plugins. In the example on the right (taken from a DAW PC), *Pedalboard2* is finding all installed plugins (not just our analyzer).

   Follow the prompts to finish the scanning process and return to *Pedalboard2's* main window.
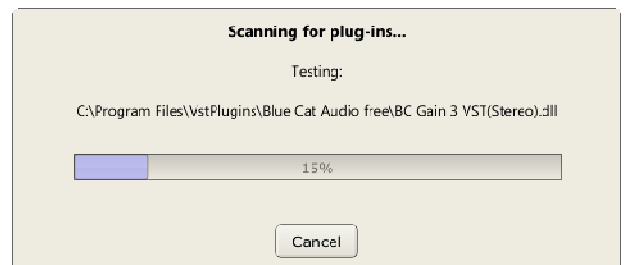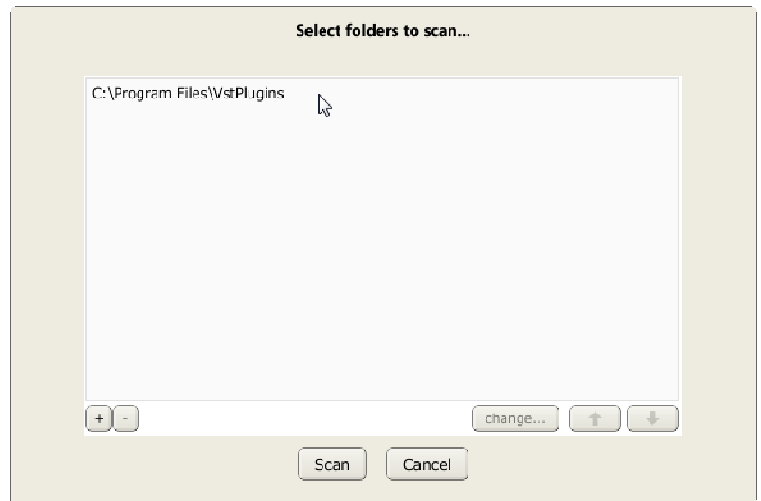
Inserting A Spectrum Analyzer

Now you're ready to insert the spectrum analyzer into the audio path.

1. **Double-click** anywhere in the main window of *Pedalboard2* to bring up the list of available plugins.

   In the example on the right, *Pedalboard2* shows a variety of plugins that were already installed on the PC.

2. Choose *SPAN* from the list. This will add *SPAN* as a virtual device on the main window. You can move the devices around by simply dragging and dropping.
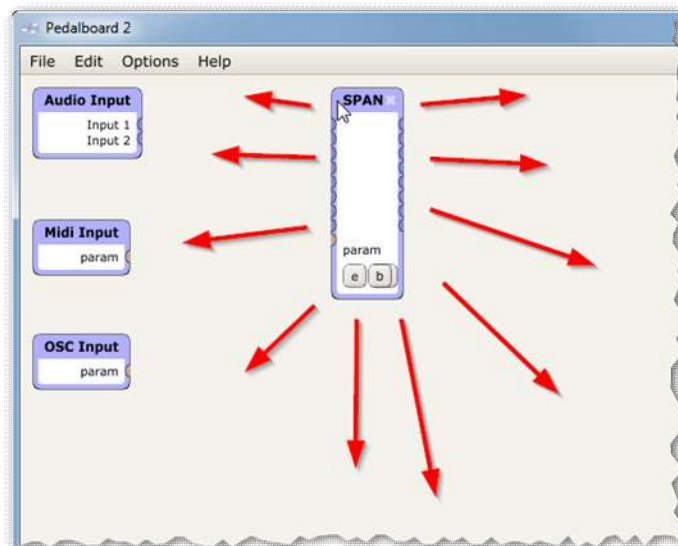
# Finalizing The Plugin Chain And Completing The Signal Path

Remember: We've already configured *VB-Cable* (our virtual audio device) as the first stop for computer audio. We did this in both Windows (*Sound settings*) and *Pedalboard2 (Audio Settings)*. We also configured *Pedalboard2* to send its output to your preferred soundcard.

Now we need to finish routing the audio inside *Pedalboard2*.

The way we'll do this is by drawing virtual cables to connect the devices in *Pedalboard's* main window. We'll connect the Audio Input device, *SPAN*, and the Audio Output device.

We'll start with *Pedalboard2's* **Audio Input** device (top left of the window).

1. From the **Audio Input** device, **click and hold** the jack labeled **Input 1**, and **draw a virtual cable** to *SPAN's* **first input jack** (on its left side).

2. Repeat to connect **Audio Input 2** to *SPAN's* **second input jack**.
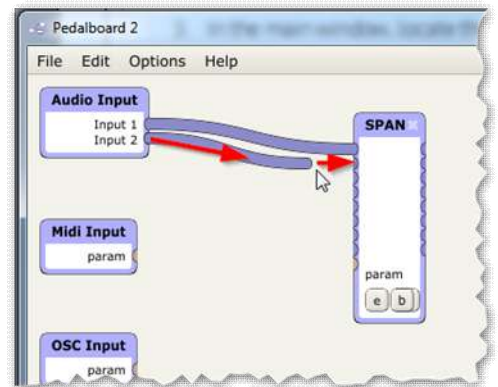
3. In the same way, draw a cable from the *SPAN's* **first output jack** (on its right side) to **Output 1** on the **Audio Output** device (top right of the window). Repeat for the second output.
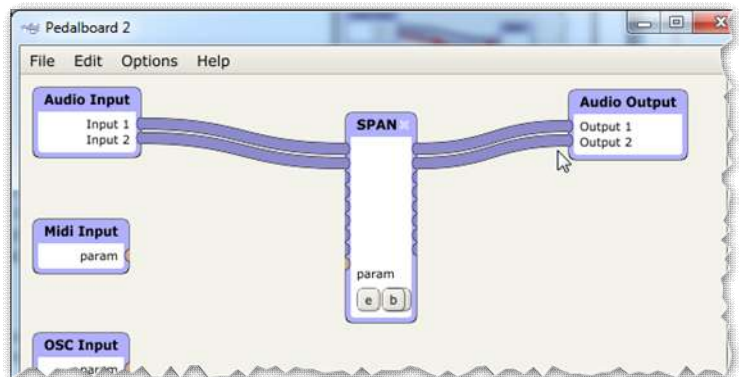
   We're now done with our connections.

   > **Note:** *If you were playing back audio when you began setup, you may begin to hear it again as soon as you make the output connections.*

4. Finally, click the **e button** on *SPAN* to open the plugin window.
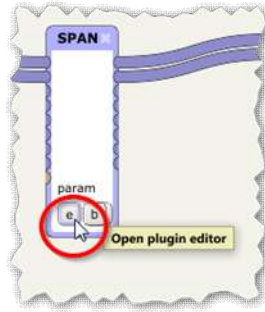
Note: *If you were already playing audio, SPAN's spectrum graph and meters will be in full effect. Otherwise, you will see no graph or meter activity until you start playback in the next steps.*
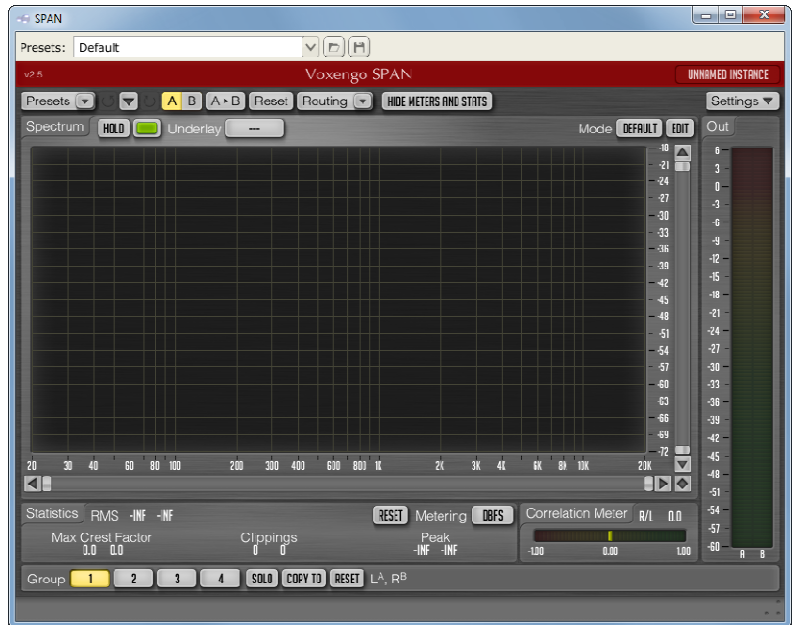

Your signal path is now ready for playback and tweaking the behavior of the spectrum analyzer to suit your needs and taste.

Testing Playback

1. Launch any music player, video player, stream, CD, or DVD.

   > **Tip:** To keep the audio from stopping while you get familiar with the new setup (or if you have to troubleshoot), choose a source that will provide uninterrupted audio for as long as possible (a reliable stream, a long playlist, an album, a long video, etc.).

2. You should hear the audio immediately. If you don't, go back to earlier steps and double-check your connections.

3. Now go to the window for the *SPAN* plugin, which should be displaying the audio you're playing.
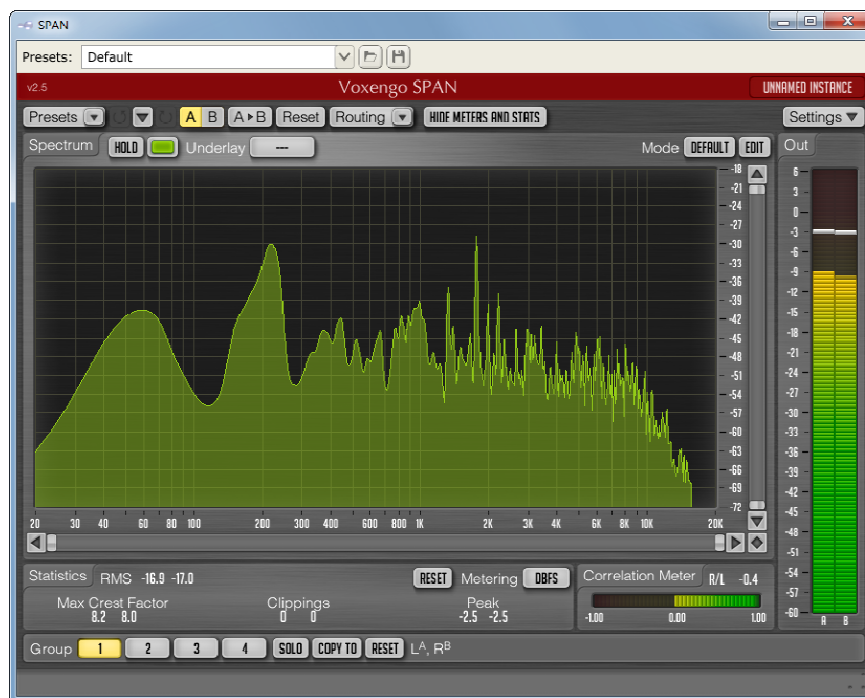
Congrats! You're done with setup and ready to enjoy your new spectrum analyzer.

Basic Tweaks

Tweaking SPAN

SPAN is highly-configurable, from size and colors to metering types and scales, sensitivity, and speed. For help tweaking, consult the developer's PDF user guides, located in the plugin install folder.

>   For 64-bit versions, look for the Voxengo folder in **C:\Program Files\Vstplugins**

>   For 32-bit versions, check **C:\Program Files (x86)\VSTPlugins**

Tweaking *Pedalboard2*

To automatically load your specific chain of plugins every time you start *Pedalboard2*, save them as your default preset by going to **File > Save As Default**.
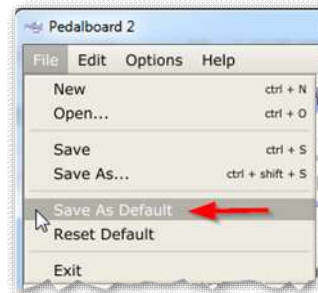
For additional help configuring and using *Pedalboard2*, as well as exploring everything else it can do, go to the program folder and see the subfolder named **Documentation**.

Turning Your Analyzer Setup Off And On

Once you are finished with initial setup, switching your new audio path off or on is easy. You can also configure your system so that your analyzer setup automatically starts with Windows.

Manual Off / On

Since your setup is already ON, first we'll address turning it off.
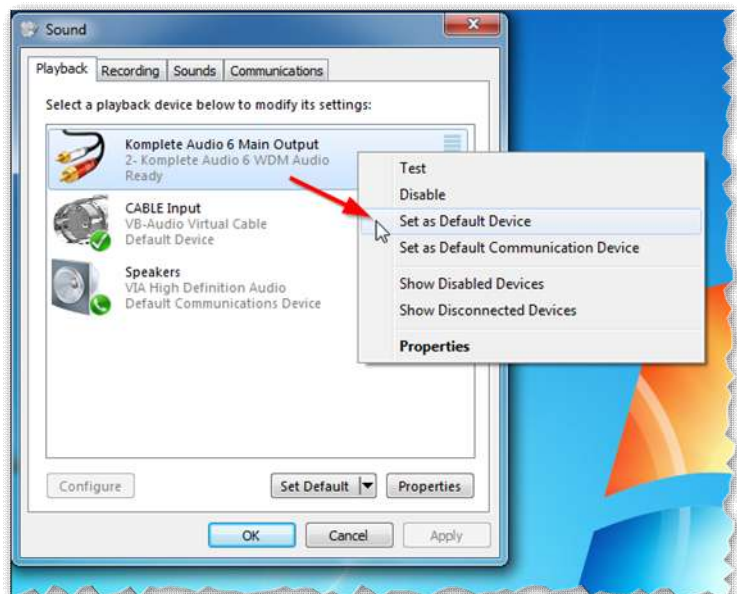
Turning your analyzer setup OFF involves just two steps: changing Windows to use your soundcard directly (i.e., re-enabling it, just as it was before), and quitting *Pedalboard2*.

1. **Right-click** the **speaker icon** in the notification area (bottom right of your taskbar) and click **Playback Devices**. A new window will open.

2. In the *Sounds* window, find your preferred soundcard, **right-click,** and choose **Set as Default Device**.

   Then click **OK** to close the list of playback devices.

3. Got to *Pedalboard2* and choose **File > Exit**.

4. **To turn your analyzer setup back on**, just reverse the steps above, this time choosing *VB-Cable* as your default sound device.

Configuring Your Setup To Start With Windows

Doing this involves two basic steps: turning your analyzer setup ON and setting *Pedalboard2* to start with Windows.

1. Turn your analyzer setup **ON** (see the steps above)

2. Go to the **Windows startup folder**:

   C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup

   Keep this window open.

3. Now go to the *Pedalboard2* program folder.

4. **Right-click** the program file for the version of *Pedalboard2* you are using (64-bit or 32-bit). From the right-click menu, choose **Create Shortcut**.

5. Drag and drop the shortcut to the **Windows startup folder**.

Pedalboard2 will now start automatically every time you start your PC.
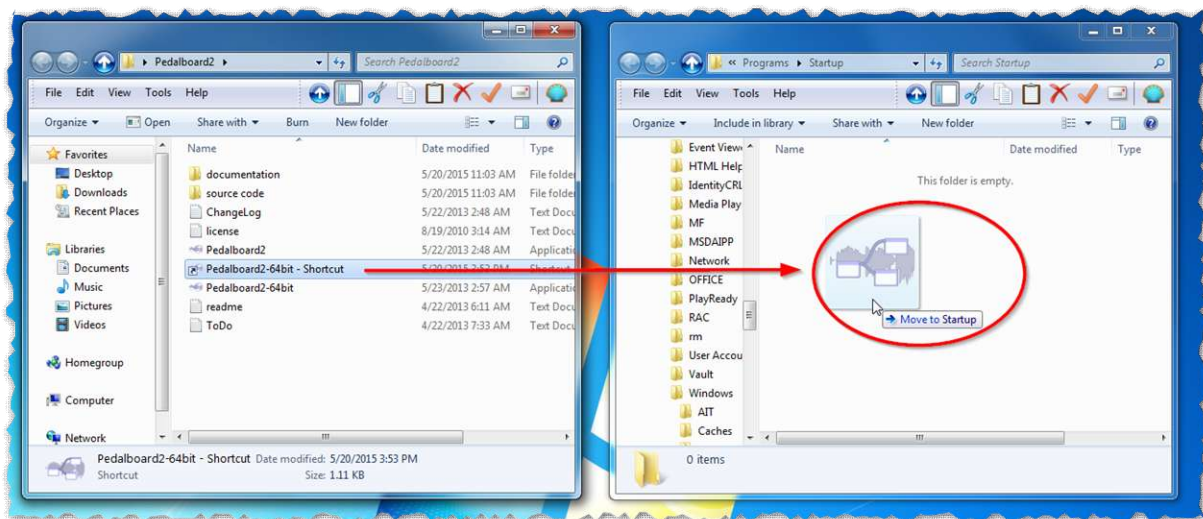

Dragging and dropping the Pedalboard2 shortcut from the Pedalboard2 folder (left) to the Windows startup folder (right).

When auto-starting, you may also find it useful to set *Pedalboard2* to start minimized in the notification area (near the clock).

From *Pedalboard2*, go to **Options > Misc Settings >** and tick the options **Display Tray Icon** and **Start In Tray.**

Although *Pedalboard2* will start minimized and not show in the taskbar, all plugin windows (such as your analyzer) will still be visible.
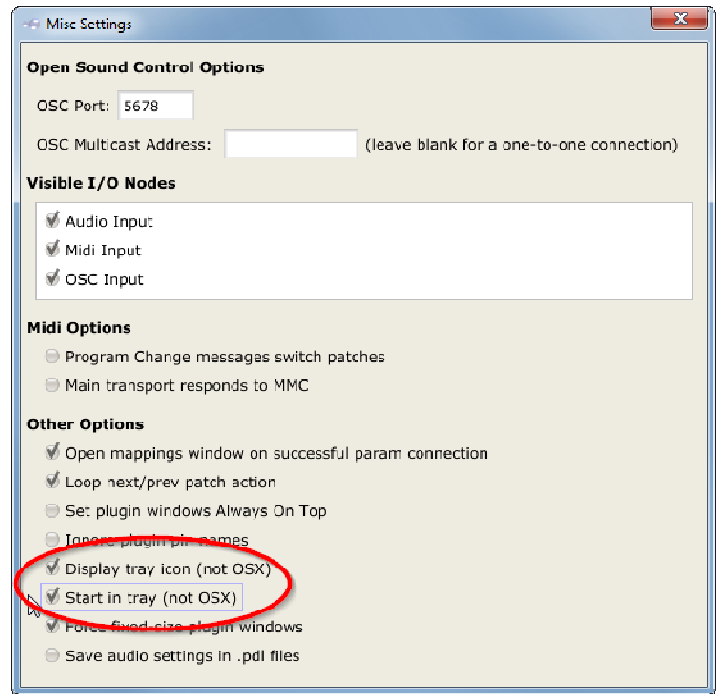
Taking Things To Another Level

Running Multiple Plugins Simultaneously

To get a deeper look at what's possible, the screenshot below shows *Pedalboard2* and a number of free analyzer and metering plugins running simultaneously while a popular streaming service provides the audio in the background. All plugins were inserted using the instructions in this guide.

Clockwise from top left: **Voxengo's SPAN** *(with customized colors and metering);* **Voxengo's AnSpec** *(analog bar-style analyzer);* **Blue Cat's FreqAnalyst** *(with customized colors and metering);* **IK Multimedia's T-RackS CS Metering** *(with independent level, RMS, phase, and spectrum displays);* **beyerdynamic's virtual studio** *(speaker and environment simulator for headphone listening)*

A setup like this can be useful for learning about analyzers and deciding which plugin is right for you. You could also use multiple analyzers to monitor different aspects of the sound simultaneously. For example, you could configure different analyzers (or even multiple copies of the same analyzer) so that some are fast, and some are slow; some have frequency smoothing (1/3 octave,1/4 octave, etc.), and some have no smoothing (or different smoothing); some are working full-range, while others are focused on specific frequency bands or threshold levels.

See the software list in the **Downloads section** for more info on the free plugins used above.

Lastly, you can also experiment by adding EQ and compression plugins, to watch how their different parameters affect the sound.

Adding A Second Display

For the modest cost of a video cable and a small flatscreen monitor (new or secondhand), or if your computer is near a flatscreen TV, you can have all plugins permanently in the foreground on a dedicated external screen, while you continue working on your computer's main display. Before purchasing a cable or display, check the external display connections supported by your system (HDMI, DVI, VGA, etc.).
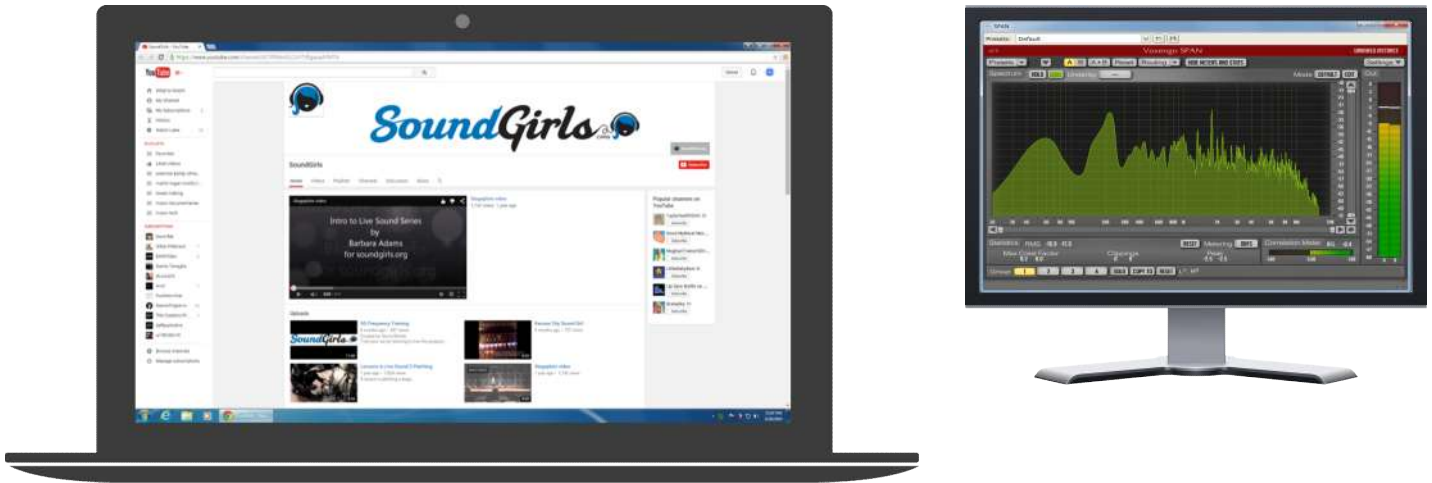
Watching [SoundGirls videos](#) on a laptop (left) while checking audio on an external display (right).

Basic Troubleshooting

While advanced system troubleshooting is beyond the scope of this guide, below you'll find some basic tips if you run into trouble. Unfortunately, with Windows especially, there can be a number of software/hardware combinations which can impact audio performance.

No Audio

Incorrect connections are the most likely cause. Go back and double-check the audio settings in Windows and _Pedalboard2_, as well as the virtual cables you drew to connect devices.

To make sure the virtual audio device is enabled on your system, go here.

To make sure the input and output devices in the plugin host are correct, go here.

To make sure all devices in your plugin chain are connected correctly inside the plugin host, go here.

Latency Or Audio Artifacts (Dropouts, Crackling, Etc.)

In some cases (depending on your hardware and system settings), you may need to do some additional investigating to track down issues.

First, you can try adjusting settings in your soundcard's control panel. Refer to the manufacturer's documentation for assistance.

You can also try adjusting the **sample rate** and **audio buffer size** from _Pedalboard2_.

Go to **Options > audio settings**, adjust the settings, and re-test.
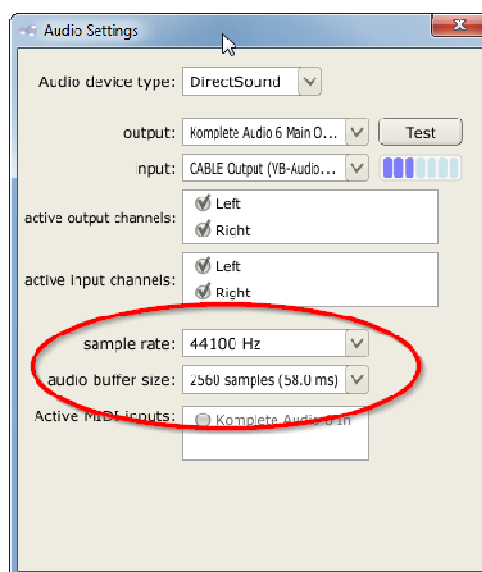
VB-Cable also includes a tool for verifying and adjusting sample rates and latency, the **VB-Cable Control Panel**.

1. Go to the folder where you extracted the zip file you downloaded for *VB-Cable*.

2. Open the file called **VBCABLE_ControlPanel**.
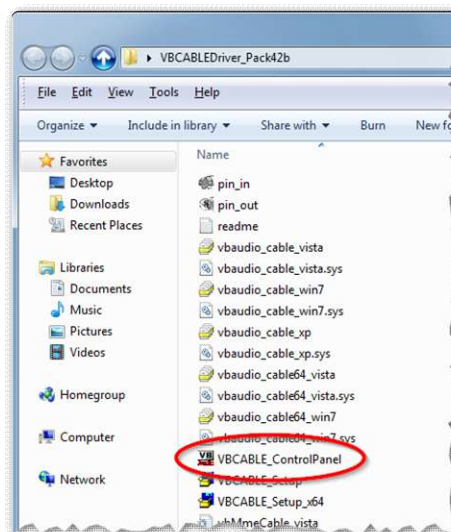
In addition to real-time stats about the audio passing through your system, the **VB-Cable Control Panel** displays the sample rates and bit depths in use. It also allows you to adjust the internal sampling rate and latency.

For more help on setting up and troubleshooting *VB-Cable* and using the **Control Panel**, refer to the developer's help guide: http://vb-audio.pagesperso-orange.fr/Cable/VBCABLE_SystemSettings.pdf

Try The Alternatives From The Downloads Section

If things still don't improve, refer to the **Downloads section** above for a list of alternative tools. It's possible that another virtual audio device or plugin host will get along better with your particular system.

Technical Support For SoundGirls Members

Exclusively for SoundGirls members, for additional help send a message to the author through the SoundGirls.org members section and post your question in the forum so others can join the discussion.