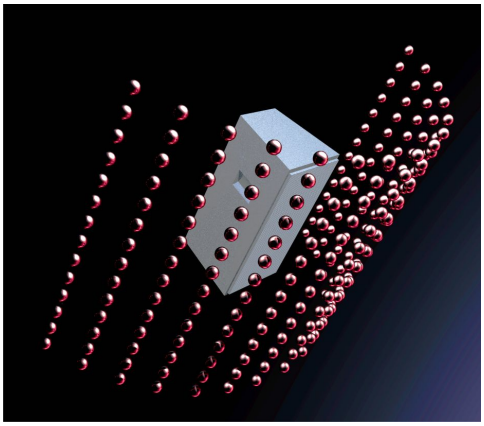

CONEQ™ Plug-ins

(CONEQ™ P2/P8/P2pro/P8pro)

USER MANUAL

for software version 1.1.0

Contents

OVERVIEW

ABOUT CONEQ™ PLUG-INS

Real Sound Lab's CONEQ™ is a technology to measure and correct loudspeakers. With CONEQ™ every loudspeaker sounds better – clear, natural, and without attenuations – within the limits of its physical capabilities. The CONEQ™ technology is applied in two steps. First, a precise measurement of how loud the loudspeaker reproduces tones of each frequency is done and a correction filter is automatically produced. This is done by CONEQ™ Workshop application - the acoustic power frequency response measurement application. Second, the filter is applied by any of the software or hardware tools supporting CONEQ™, for instance, CONEQ™ plug-ins.

Real Sound Lab's CONEQ™ plug-ins are software components for applying the CONEQ™ correction filters from within a host application. Host applications for RTAS and VST plug-in formats are currently supported. Typical examples of applications in which a CONEQ™ plug-in is used are DAW (Digital Audio Workstation) applications such as Digidesign Pro Tools, Steinberg Cubase, and Cakewalk Sonar, audio editing applications like Steinberg Wavelab and Sony SoundForge, and various media players. CONEQ™ plug-ins are a software alternative to the Real Sound Lab's flagship product, the APEQ™ hardware equalizer.

This manual explains how to install and use CONEQ™ P2, CONEQ™ P8, CONEQ™ P2pro, and CONEQ™ P8pro plug-ins. The term "CONEQ™ plug-in" refers to any edition of the plug-in. Differences between editions are described on page 8

REQUIREMENTS

Operating System and Hardware

The following operating systems are supported - Windows XP SP2, Windows Vista, Windows 7, Mac OS 10.4 "Tiger", 10.5 "Leopard", and 10.6 "Snow Leopard". 32-bit and 64-bit editions of the above mentioned operating systems are supported. Both Intel- and PowerPC-based Mac computers are supported.

A fast CPU is recommended for maximum performance when using CONEQ™ plug-in. CPU load can be reduced by increasing the plug-in latency (see page 8).

Host Applications

All editions of CONEQ™ plug-in work in Digidesign ProTools application as RTAS and AS plug-ins and in VST host applications (such as Steinberg Cubase, Cakewalk Sonar, and many others) as VST plug-ins.

CONEQ™ correction filters

The CONEQ™ plug-in uses CONEQ™ correction filters made by the CONEQ™ Workshop application (a limited license is included with every CONEQ™ plug-in).

SETUP

INSTALLING THE SOFTWARE

The installation CD contains installation programs for both Mac and Windows operating systems. Included are installers for all editions of CONEQ™ plug-ins as well as for CONEQ™ Workshop. The CONEQ™ Workshop application currently runs only on Windows operating systems.

To install software, insert the installation CD. On Mac find the installer in the `Mac` folder at the root of the CD. On Windows, find the installer in the `Win` folder. On Windows the installer will start automatically if the auto-start feature is enabled.

You must accept the CONEQ™ User License Agreement (see page 11) to install and use the software.

COPY-PROTECTION

CONEQ™ plug-in is protected against illegal copying using eLicenser USB device. The device is delivered together with the software. The eLicenser Control Center application that manages the licenses on eLicensers will be installed as part of the installation process. It is recommended to connect the eLicenser USB device only after the installation has finished. The licenses of Real Sound Lab products can be moved to eLicensers of other applications (e.g. Cubase) to have them all on the same device and free USB ports. The licenses cannot be moved to other types of copy-protection devices, e.g. iLok.

All CONEQ™ plug-ins are bundled with a limited license for the CONEQ™ Workshop application. Please refer to the CONEQ™ Workshop Quickstart Guide for information about activating the limited license.

USING CONEQ™ PLUG-IN

OVERVIEW

The CONEQ™ plug-in is a multi-channel equaliser used to correct the acoustic power frequency response characteristic of loudspeakers. The correction filters for the loudspeakers are obtained using the CONEQ™ Workshop application and then loaded into the CONEQ™ plug-in.

The CONEQ™ plug-in should be inserted as the last plug-in on the master track/bus and used at all times when monitoring a recording session and editing or mixing the material. However, the CONEQ™ plug-in only improves the sound quality of the equipment and not that of the mix. Therefore, the plug-in must be disabled (bypassed) when exporting the final production. Otherwise, the final result will be corrected for reproduction on a particular speaker system but everywhere else it will contain some unwanted equalisation which even might lead to unexpected sound distortion.

TYPICAL WORKFLOW

A typical workflow when using a CONEQ™ plug-in is like this:

- Create/open a project in a DAW application
- Insert the CONEQ™ plug-in as the last plug-in on the master track/bus
- Load a CONEQ™ correction filter for each channel
- Compare the corrected and original sound
- Adjust the input level so that no clipping occurs for filtered sound
- Do the recording, editing and/or mixing
- Deactivate the plug-in in the host application to export/bounce the final production

> **IMPORTANT!** *Deactivate the CONEQ™ plug-in during final export/bounce of the ready production! Otherwise, the sound will contain equalisation which is unwanted on any system but yours.*

INSERTING PLUG-IN IN THE MASTER TRACK/BUS

The CONEQ™ plug-in must be inserted as the very last processor in the sound path. This is typically the last insert of the master track/bus but different DAW and other applications offer different ways to achieve that. Below are guidelines for some DAW applications. This should give an idea about where to look for the correct place for inserting the CONEQ™ plug-in in all other applications.

One common rule is that the plug-ins should not be inserted for individual tracks. The CONEQ™ plug-in does not support opening multiple instances of the same plug-in in the same host application. This is by design to encourage inserting the plug-in only in one place - the master track/bus.

Inserting CONEQ™ plug-in in Pro Tools®.

Open the mixer by choosing *"Window->Mix"* . If the session does not have a master fader then choose *"Track->New"* and create a *"Master Fader"* with the number of channels that corresponds to the session type. Now click on the last master fader insert and select the CONEQ™ plug-in from *"Multi-channel plug-in->EQ"* .

Inserting CONEQ™ plug-in in Cubase®/Nuendo®.

Open the mixer by choosing *"Devices->Mixer"* (or *"Mixer 2/3/4"*). In the output section (on the right side of the mixer) click the "e" icon and then select the CONEQ™ plug-in from the insert menu of the last insert.

Inserting CONEQ™ plug-in in SONAR™.

On the Master track, right-click the FX area and select the CONEQ™ plug-in from *"Audio FX->vstplugins"* . Make sure that the CONEQ™ plug-in is the last in the list. If it isn't then drag-and-drop it to the bottom of the list.

PLUG-IN INTERFACE

After the CONEQ™ plug-in is inserted, its GUI (Graphical User Interface) will open (see figure 1.

Figure 1: Elements of the CONEQ™ plug-in user interface.

Information panel

The information panel has three areas. The TRACK (left) area shows the track type (mono, stereo, Quadro, 5.1, etc.) and sample rate of the track in which the plug-in is inserted. The FILTER area (middle) shows the resolution and sample rate of the loaded filters. The PLUG-IN area (right) allows adjusting the latency (lower latency means higher CPU load) and shows the number of simultaneously active filters supported by this plug-in edition.

Channel strips

There is one channel strip for each channel of the host track. For stereo tracks two strips will be shown, for 5.1 tracks - six, etc.

Figure 2 shows the elements of a channel strip. Clicking on filter name field will open a file selection dialogue which allows selecting a CONEQ™ correction filter file

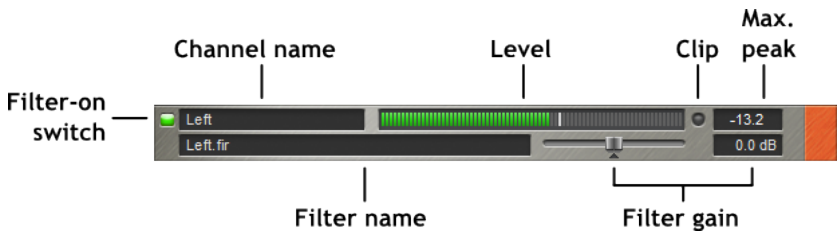

Figure 2: Elements of a channel strip.

for this channel. Filter-on switch allows to switch channel filtering on and off. The level meter shows the level after the CONEQ™ correction has been applied. The clip indicator can be clicked to reset the clip status and the maximum peak value. The filter gain controls allow adjusting gain for this channel to make the filtered sound and original sound equally loud.

BYPASS switch

The BYPASS switch bypasses filtering of all channels. It is as if the plug-in was disabled or removed from the track except that the INPUT LEVEL adjustment is still applied.

Output meter

The output meter shows the maximum current level and the largest maximum peak value of all the channels. The clip indicator of the output meter turns on as soon as the first channels clip indicator turns on. Clicking the output meter's clip indicator resets all channel clip indicators and maximum peak values.

INPUT LEVEL knob

The INPUT LEVEL knob is used to prevent clipping of the corrected sound by reducing the signal level in all channels before processing by the CONEQ™ correction filters.

LOADING CONEQ™ CORRECTION FILTERS

Once the CONEQ™ plug-in is inserted in the sound path, the CONEQ™ correction filters should be loaded. Figure 3 shows a channel strip of a plug-in that has been just inserted and where no filter has yet been loaded.

Figure 3: Channel strip with no loaded filter.

Click on the filter name field (the area that displays the "Click here to load a filter for this channel..." text). A file selection dialogue will open. A file containing the CONEQ™ correction filter for this channel should be selected.

The filter must be already created by the CONEQ™ Workshop application. CONEQ™ correction filters have extension `.FIR`. To find where the filters are saved by the CONEQ™ Workshop application, refer to the chapter FILE STRUCTURE OF THE CONEQ™ WORKSHOP PROJECT on page 9.

The sample rate of the filter must match that of the material to be filtered. For example, if the project sample rate is set to 44.1 kHz then the correction filter also must have a sample rate of 44.1 kHz. Please refer to the CONEQ™ Workshop documentation to learn how to save a filter with the required sample rate.

The sample rate and resolution of the CONEQ™correction filters for all channels must match. If a filter of different sample rate or resolution is loaded then all the currently loaded filters will be unloaded.

If the sample rate of the loaded filters is different from that of the track sample rate then the plug-in will switch to BYPASS mode.

Note that CONEQ™ plug-in editions differ in the supported maximum filter resolution. See page 8 for details.

COMPARING FILTERED AND ORIGINAL SOUND

Once the filters are loaded, the corrected sound can be compared with the original. Play some material that you know very well with the correction on. Allow the hearing to adjust and get used to the new sound. Then switch off the correction using the BYPASS switch and listen to the same piece again. Try several different pieces to cover the whole frequency spectrum. Depending on the quality of the loudspeakers, the difference can be more or less noticeable. For simpler speakers the difference (and improvement) will be big and obvious while for the higher quality systems the difference will be revealed as many nuanced improvements across the whole frequency range.

ADJUSTING INPUT LEVEL

It may happen that the filtered sound is clipping (the clip indicators in the plug-in and host turn on). This is expected for saturated input signals because CONEQ™ correction filters boost the signal in those frequencies where the speaker performance is insufficient. If there is no headroom in the input signal then clipping will occur. If that happens, reduce the input signal level by using the INPUT LEVEL knob (see figure 1). Note that the adjustment to the INPUT LEVEL remains active also when the plug-in's BYPASS switch is on, allowing easier comparison between the filtered and original sound.

IMPORTANT! *Please note that the INPUT LEVEL knob should NOT be used as a master fader to adjust the master level of the session/project. If the original signal level is already clipping before CONEQ™ correction filter is applied then the signal level should be adjusted by means of the host application before passing the signal to the CONEQ™ plug-in.*

EXPORTING FINAL PRODUCTION

When the production is ready to be exported, deactivate (but not remove) the CONEQ™ correction plug-in using the means of the host application. This is a very important step because omitting it will cause the final product to sound unpredictable on all systems except the one for which the correction filters were loaded at the time of exporting. Such a mistake can pass unspotted easily because when the exported material is played on the same loudspeakers on which it was produced, it will sound excellent because the correct CONEQ™ correction filters were applied to it during export.

After deactivating the CONEQ™ plug-in, please verify that the master level is optimal. It will most probably be different from the master level with the CONEQ™ plug-in activated.

> **IMPORTANT!** *Deactivate the CONEQ™ plug-in during final export/bounce of the ready production! Otherwise, the sound will contain equalisation which is unwanted on any system but yours.*

LATENCY

CONEQ™ plug-ins allows adjustment of the filter latency. The latency is specified in samples and ranges from 2 samples up to the number of samples equal to half of the number of taps in the filter. Shorter latency means higher CPU load, so choose the setting according to the available CPU resources.

PLUG-IN EDITIONS

There are four editions of the CONEQ™ plug-ins - CONEQ™ P2, CONEQ™ P8, CONEQ™ P2pro, and CONEQ™ P8pro. The current manual describes all of them unless specially marked.

Filter resolution

The CONEQ™ P2/P8 plug-ins support filter resolution of up to 1024 taps. Such filter resolution means an EQ adjustment point at every 20 Hz. This allows very precise correction for frequencies above 600 Hz. Below that the correction gets less precise with lower frequencies. The CONEQ™ P2pro/P8pro plug-ins support the filter resolution of up to 4096 taps (EQ adjustment point at every 5 Hz). This resolution enables very precise correction across the whole audio frequency range.

The figure 4 shows the difference of filter resolution between 4096 taps (yellow curve) and 1024 taps (orange curve). The green curve shows the actually measured acoustic power frequency response which is corrected by the CONEQ™ correction filters.

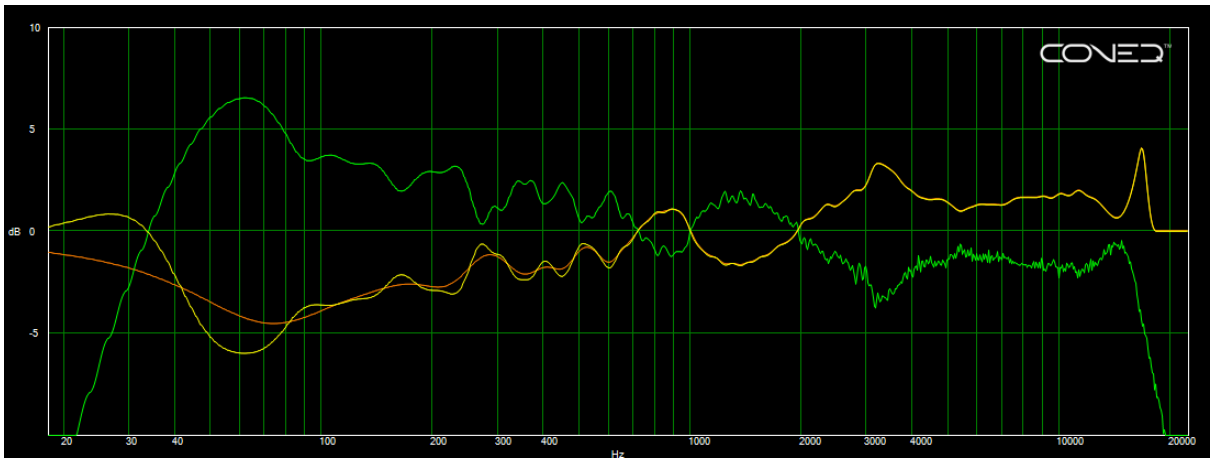

Figure 4: Difference in resolution of 4096-tap and 1024-tap filters.

Multi-channel support

All CONEQ™ plug-ins can be used in mono, stereo, as well as in various types of multi-channel projects. This includes but is not limited to projects having 5.1 and 7.1 output. The CONEQ™ P2/P2pro plug-ins support simultaneous filtering of up to two channels. The CONEQ™ P8/P8pro plug-ins can filter up to eight channels at a time.

FILE STRUCTURE OF THE CONEQ™ WORKSHOP PROJECT

To create the CONEQ™ correction filters, one of the editions of CONEQ™ Workshop is used. CONEQ™ Workshop has a concept of projects - each project is a folder on the hard disk. A project contains one or more measurements. One or more filters can be created for each measurement.

Filters are files with the extension `.FIR` in the project file hierarchy. Here is how to locate the relevant files. Let's assume your project folder is named `MySpeakers`. Let's also assume that you have made two measurements, named `Left_1` and `Right_1` for the left and right channels respectively. At last, let's assume that for the left channel you made one recalculation after changing some parameters. Then you should have the folder structure as depicted in figure 5 on your hard disk.

The file `1_MySp_001_Left_1_02_MPF-441.fir` is the filter for the left channel. As you see, there are two folders for the Left_1 measurement. The folder `01` always contains the correction filter calculated directly after measurement was taken. The folder `02` contains the result of recalculation after the change of filter settings.

The filter for the right channel is located in folder `MySpeakers/002_Right_1/01` and is named `1_MySp_002_Right_1_01_MPF-441.fir`.

These files are the CONEQ™ correction filters that must be selected for filters in CONEQ™ plug-ins.

Alternatively, click on the *"Open filter folder"* button on the main screen in CONEQ™ Workshop when the needed filter is selected. This will open a Finder/Explorer at the folder where the corresponding `.FIR` file is stored.

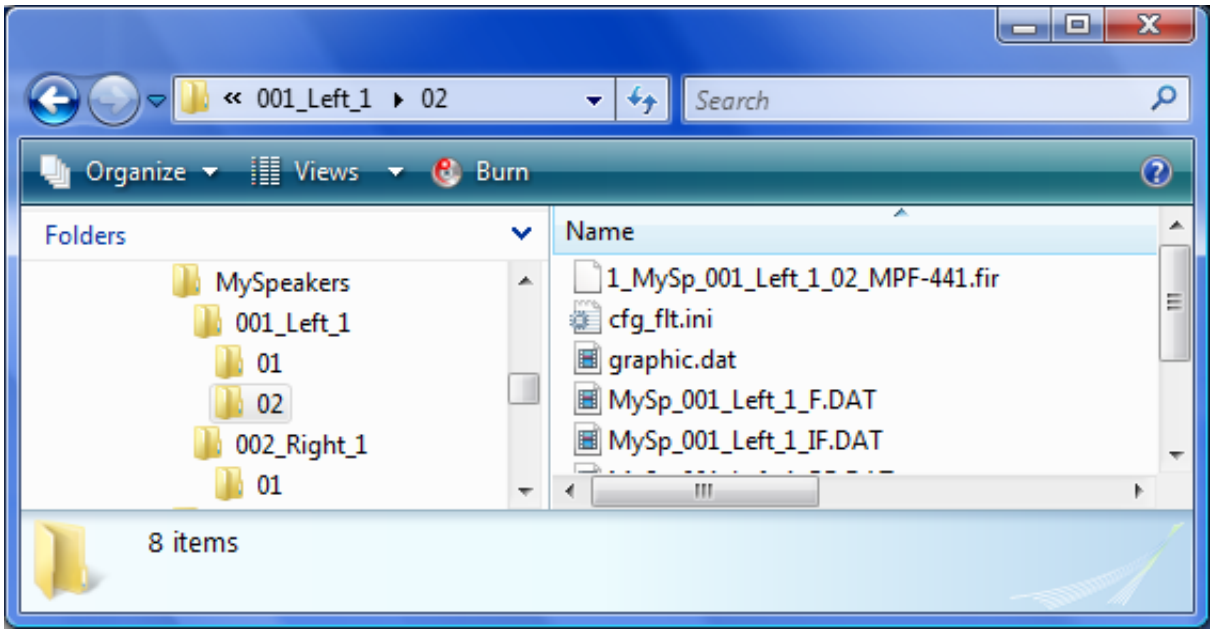

Figure 5: The structure of the CONEQ™ Workshop project folder.

IMPORTANT! *For use with the CONEQ™ plug-ins, generate and use filter files that are Minimum Phase Filters (the suffix is* `MPF` *, not* `LPF` *). The resolution of the filters must be 1024 taps (for CONEQ™ P2/P8) or 4096 (for CONEQ™ P2pro/P8pro). The filter sample rate must match the sample rate of the audio signal to be filtered.*

TECHNICAL SUPPORT

Please feel free to contact us at any time if you have any difficulties using the CONEQ™ plug-ins (our contact details are listed below). We will do our best to respond to you as quickly as possible. Our mission is to make your experience with CONEQ™ as simple and rewarding as possible. When contacting us, please inform us of the following:

1. CONEQ™ plug-in version (click on the small ”i” on the main plug-in window).
2. CONEQ™ Workshop version (go to *“Help->About CONEQ™ Workshop...”*).
3. Your operating system version.
4. Host application name and version. (e.g. Cubase 5 Studio).
5. Computer information: CPU type and speed, installed memory.
6. Description of your problem (as much information as possible for us to understand the problem).

CONTACTING REAL SOUND LAB

Should you have questions or comments, please contact us using one of the following:

- E-mail: support@realsoundlab.com
- WWW: http://www.realsoundlab.com
- Phone: +371 6788 9828 (Real Sound Lab SIA Headquarters, Riga, Latvia)

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