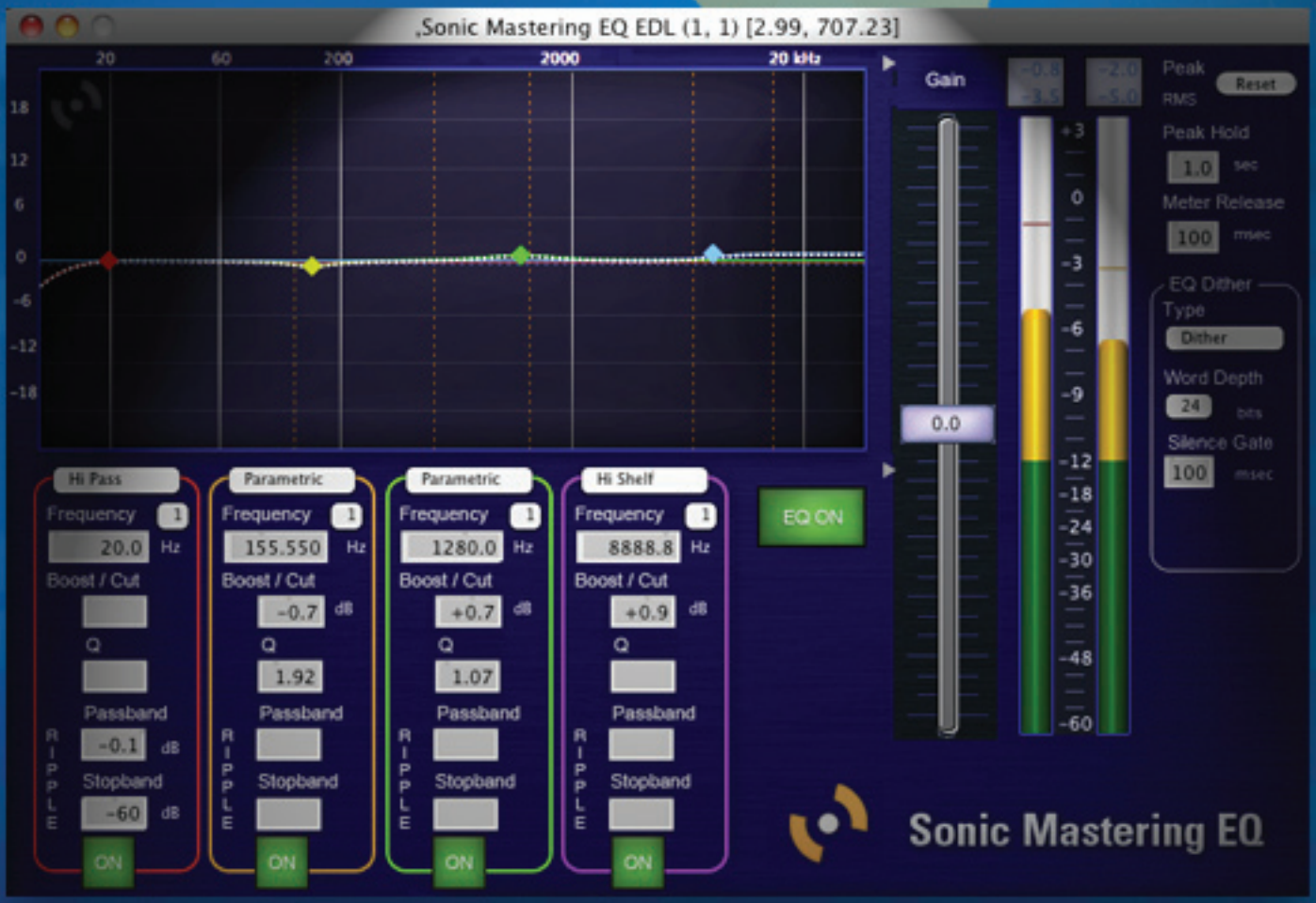
Sonic Studio Mastering EQ

User Manual



www.sonicstudio.com

Sonic Studio Mastering EQ Table of Contents

1.0 .....Sonic Studio Mastering EQ

Thank you for purchasing Sonic Studio Mastering EQ™! You've made an excellent choice owing to the fact that the filters and algorithms featured in this equalizer have been used on innumerable tracks. It's perfect for every type of music - Ambient to A Cappella, Jazz to Jive, Symphony to Spoken Word, Zydeco to ZeitGeist. You may not be aware of it, but you've heard this EQ before!

Sonic Studio Mastering EQ is a minimal-phase four band filter Audio Unit™ plug-in. Each band offers your choice of 17 filter types or topologies with some best used for restoration and damage control while other are excellent for changing color or timbre. It can be used as a mono, stereo or multichannel instantiation.

This document covers Sonic Studio Mastering EQ's use in our soundBlade product. However, since it's an Audio Unit plug-in, it will operate on any audio software that supports Audio Unit plug-ins.

The Sonic Studio Mastering EQ User Interface.

1.1 Sonic Studio Mastering EQ Audio Unit Plug-in

1.1.1 Overview

In the soundBlade environment, Sonic Studio Mastering EQ can be inserted as a plug-in in three different points within the signal flow of soundBlade:

1. As a Desk Event.
2. In the EDL Desk (mixer window).
3. In the Meters window.

LEARN: soundBlade offer the option to add "Desk Events" or plug–ins to a Project or bus. When plug–ins are instantiated in a Project, they provide time–based, "snapshot automation." Also in Projects, plug–ins are constant latency and are seamlessly cross-faded, even within an individual segment. This means settings change smoothly, free of audible discontinuities, even for plug–ins with high latency. All plug–in instantiations are fully latency compensated, unless the plug–in itself cannot or does not report latency. See the soundBlade HD or SE user manual for more on using plug-ins as Desk Events.

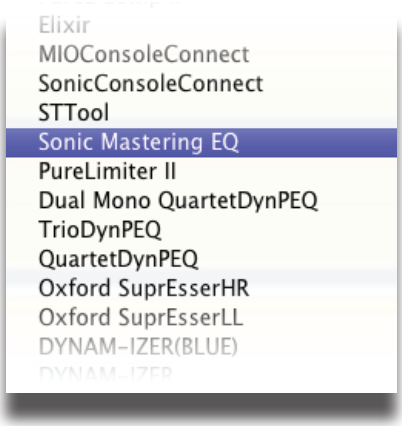
LEARN: To insert a plug–in into one of the slots in the EDL Desk, simply click on the slot button and a drop down menu appears, showing all valid plug–ins available. Then, select the desired plug–in from the list. The plug–in will be inserted in the slot and the selected plug–in will open for manipulation of its parameters. These instantiations are mono, and unlike other workstations, using plug-ins in the EDL Desk is generally not recommended. Use Desk Events instead. See the soundBlade HD or SE user manual for more on using the EDL Desk.

LEARN: The Meters window is a good place to use true stereo plug-ins. When a plug-in is inserted in the Meters section, that plug-in is applied to all audio that is routed out that bus. See the soundBlade HD or SE user manual for more on using plug-ins in the Meters section.

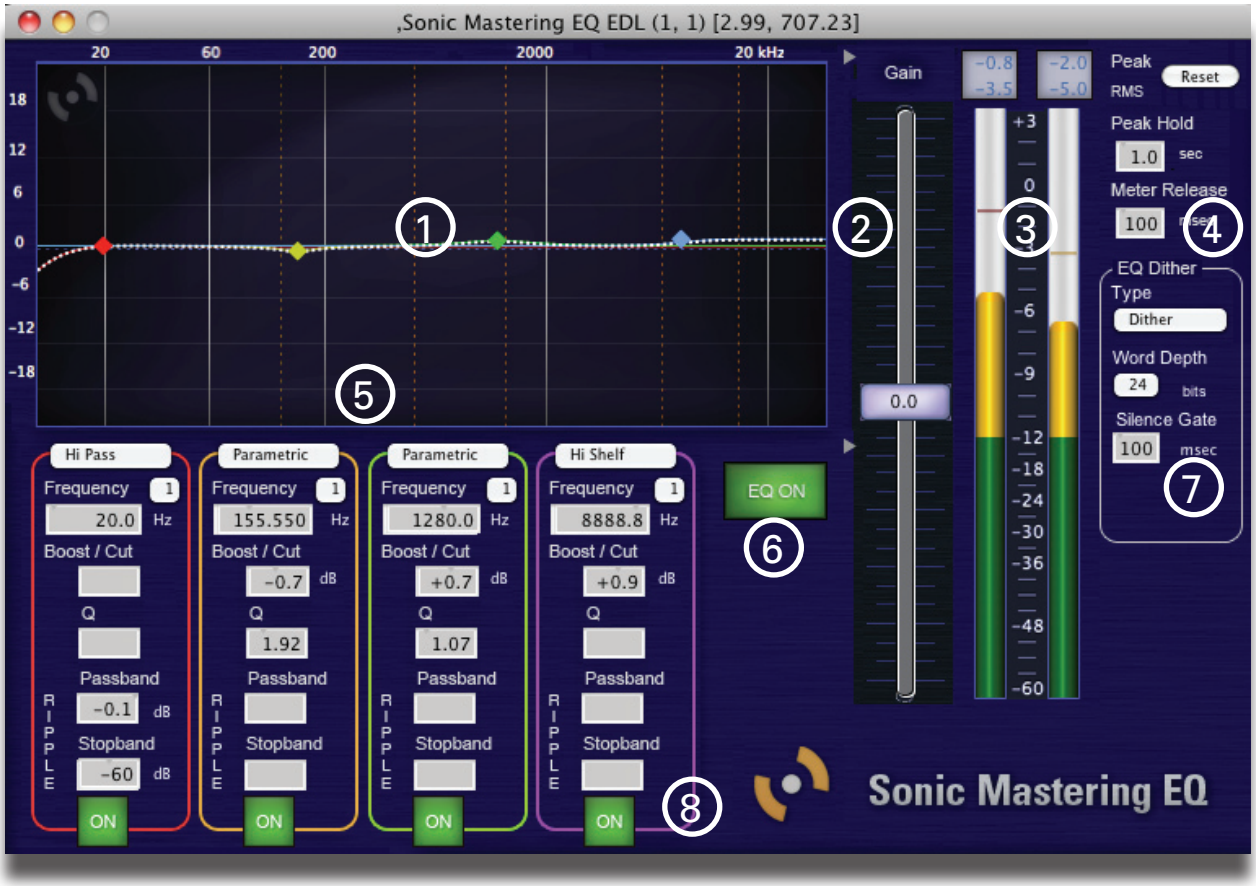
1.1.2 Installation and Operation

To install Sonic Studio Mastering EQ, double-click on the 'SonicMasteringEQ_Installer.pkg' and follow the on-screen instructions. If you are a soundBlade user, you'll also need to run 'Install Sonic Studio Options.mpkg' located in the Sonic Options folder of your soundBlade app folder, selecting 'Sonic Mastering EQ' in the options installer dialog box.

To enable a Sonic Studio Mastering EQ plug-in as a Desk Event, in the EDL Desk or Meters window, select 'Sonic Mastering EQ' from the contextual menu that appears. The Sonic Studio Mastering EQ window will appear.



Select 'Sonic Mastering EQ' from the contextual menu.
After selection, the Sonic Studio Mastering EQ window will appear:



1) Mastering EQ Visualizer	2) Gain Fader
3) High-Definition Meters	4) Peak Hold Settings
5) Equalizer Bands with 17 unique filters	6) EQ Global On/Off
7) Dither Selection Area	8) EQ Band On/Off

1.1.2.1 Mastering EQ Visualizer

This area displays the current filter settings as a visual representation. Each color-coded filter node can be dragged and adjusted from within this window.

1.1.2.2 Gain Fader

Adjusts the overall gain of the plug-in. Parameters are +12 to +12 dB. Option click to (re)set to zero.

1.1.2.3 High-Definition Meters

The Meters section graphically displays real-time indications of Peak, RMS and VU values with hyper-ballistic accuracy. At the top of the meter strips, Peak and RMS values are displayed in numeric relation to zero; - for under zero, + for over zero. Both the meter strip and the numbers in this section will turn red when an over-zero level is detected.

When Sonic Studio Mastering EQ is used as a mono instantiation, only channel one, or the left channel, will display level.

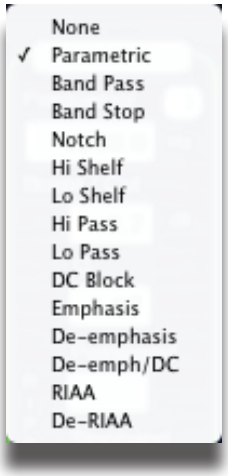
1.1.2.4 Peak Hold Settings

In this section, Peak Hold preferences can be set to reflect your needs. The default value is one second for Peak Hold and 100 milliseconds for Meter Release timing. This setting is saved with the EQ.

1.1.2.5 Equalizer Bands with 17 Unique Filters

The bottom left half of the Sonic Studio Mastering EQ window contains the master controls for each of the four available filter bands. The controls are context–sensitive and apply to the selected filter section and changes are reflected in the Mastering EQ Visualizer section.

Clicking on the top reveals a list the available filter types:



Filter Selection Menu.
Select your desired filter from the menu to instantiate.
Extra control sections will me enabled depending on filter type.

LEARN: See Appendix A below for complete filter descriptions and graphical representations of their capabilities.

LEARN: Values can be entered by keyboard or by click+hold+mouse up/down.

1.1.2.6 EQ Global On/Off

This button toggles the Sonic Mastering EQ on or off and is useful for comparing the sum of all changes made with this instance of EQ.

1.1.2.7 Dither Selection Area

This section selects whether dither is enabled on this instance of EQ. The choices are Off, Dither and Noise Shaped.

LEARN: See Appendix B below for complete dither descriptions.

1.1.2.8 EQ Band On/Off

This button toggles individual bands of Sonic Mastering EQ on or off and is useful for comparing the change induced in a single band of EQ.

Appendix A..... Sonic Studio Mastering EQ Filter Specifications and Descriptions

The parametric filters are classic, three parameter versions, with Resonant Frequency, gain, and Q. Q or Quality Factor is defined as the resonant frequency, or center frequency in the case of a symmetrical filter, divided by the bandwidth. The bandwidth is, in turn, defined as the one or two frequencies at which the filter response is 3 dB up or down from unity gain.

Expressing the width of a filter as a Quality Factor, rather than bandwidth, provides a more intuitive sense of the filter's subjective "sound," since the same value of Q will produce different bandwidths at different frequencies. The higher the frequency, the wider the bandwidth will be for a given Q value, which roughly corresponds to our auditory mechanism's ability to perceive a filter's action. As an example, a parametric filter with a Q of 1 has a bandwidth of 100 Hz when its center frequency is set to 100 Hz but, it has a bandwidth of 1000 Hz when the center frequency is set to 1000 Hz.

The order or slope of the filter is controllable, with 1st through 4th order or 6 to 24 dB per octave slope, respectively. Each of the four orders are separate menu choices. The family of curves shown below include a wide Q of 0.5, a medium Q of 2.0 and a narrow Q of 10.

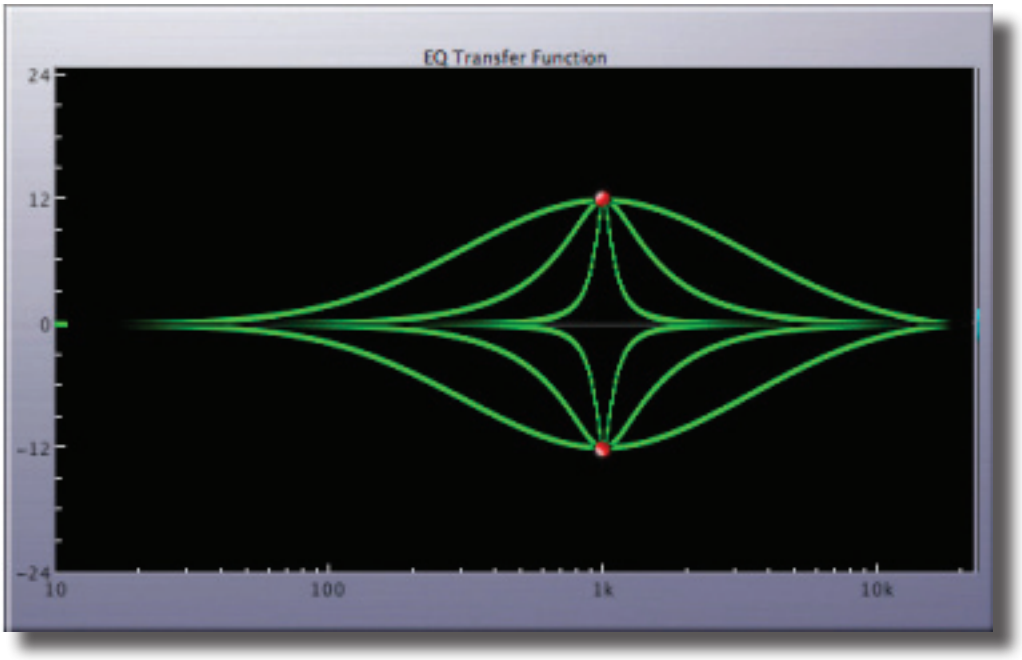


Figure 10.2: 1st order parametric with f_R of 1000 Hz

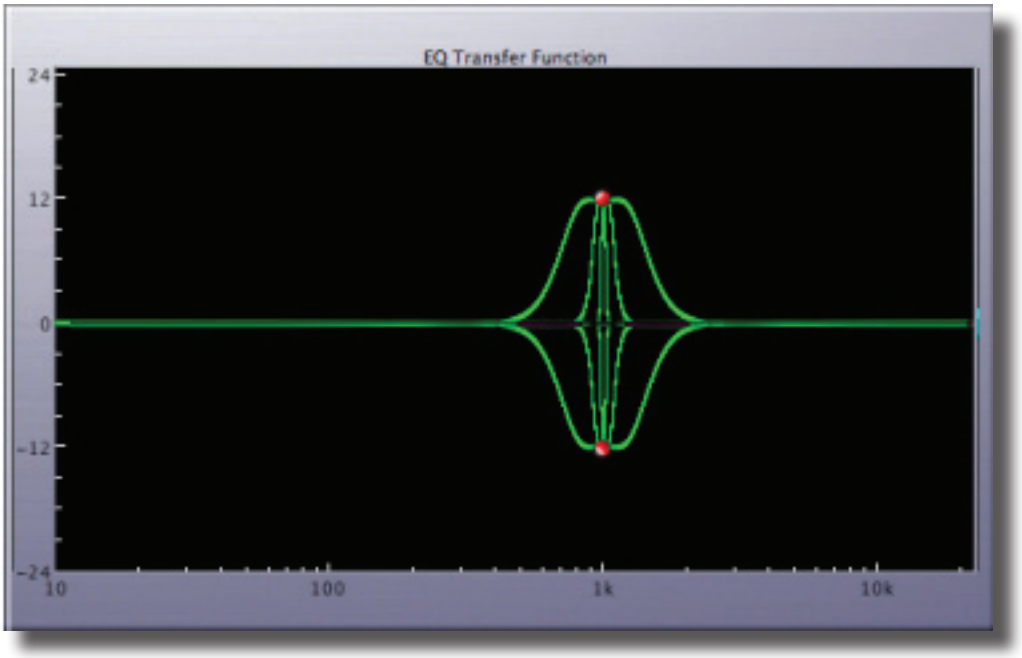


Figure 10.3: 2nd order parametric with f_R of 1000 Hz

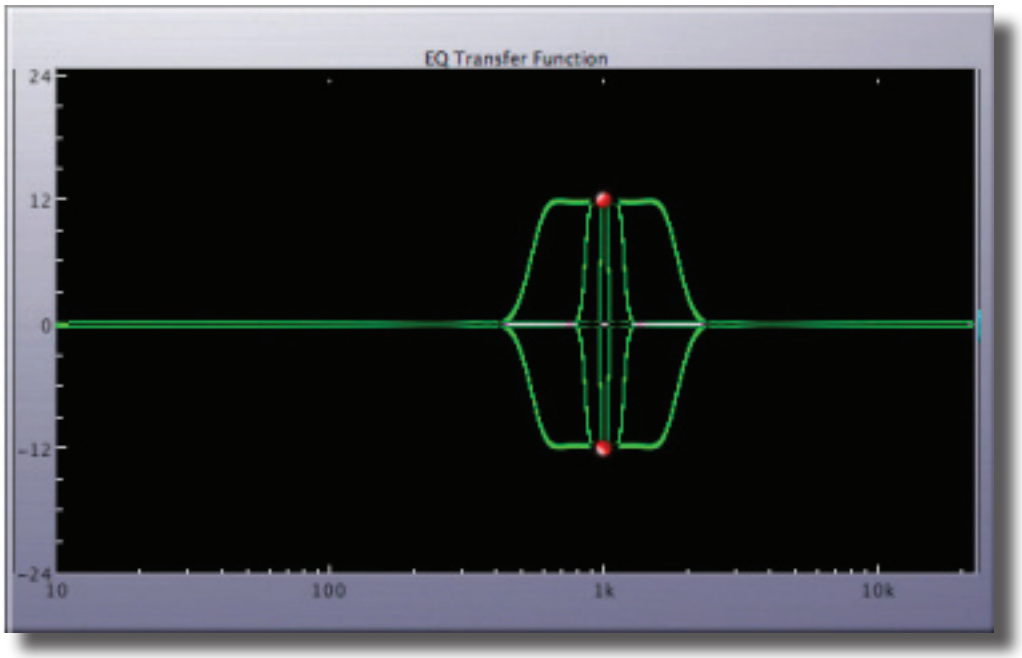


Figure 10.4: 3rd order parametric with f_R of 1000 Hz

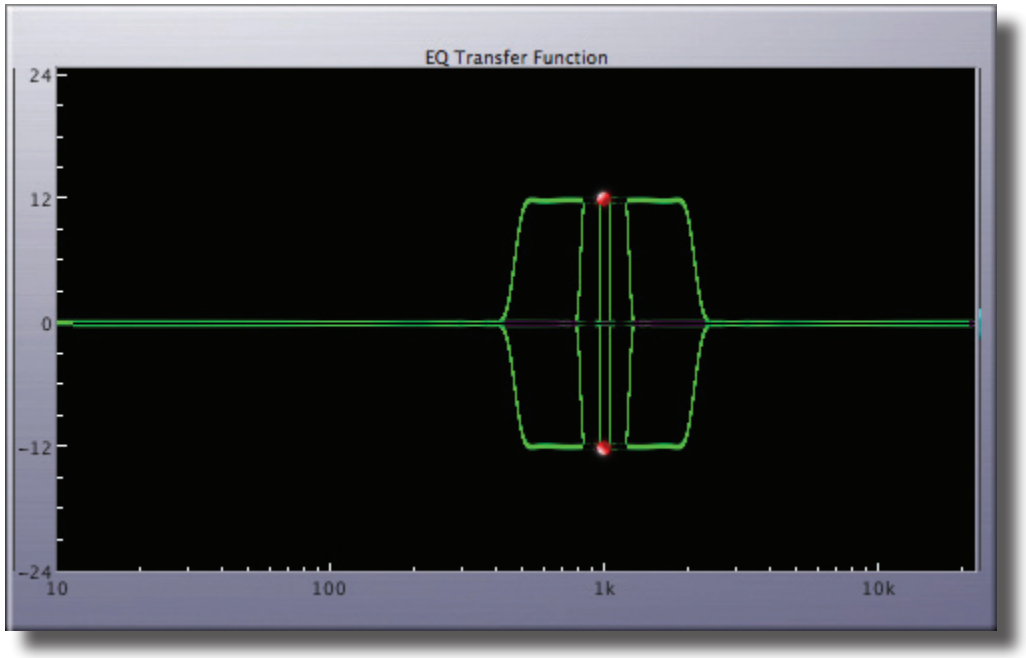


Figure 10.5: 4th order parametric with f_R of 1000 Hz

The high and low shelves are also three parameter filters, with Resonant Frequency, gain, and order. The family of curves below include 1st through 4th order. The 4th order response is practically vertical in the transition region.

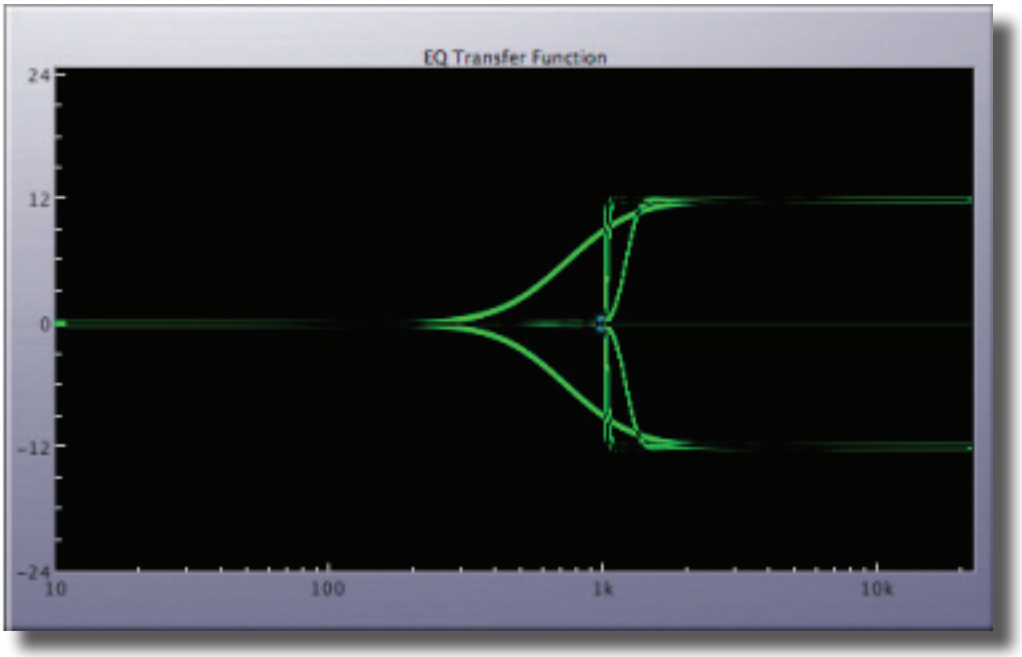


Figure 10.6: High shelf with f_R of 1000 Hz

The high and low pass filters also have three parameters. However, in this case stopband ripple, labeled Stop, has taken the place of gain. As with the shelving filter above, the family of curves below include 1st through 4th order.

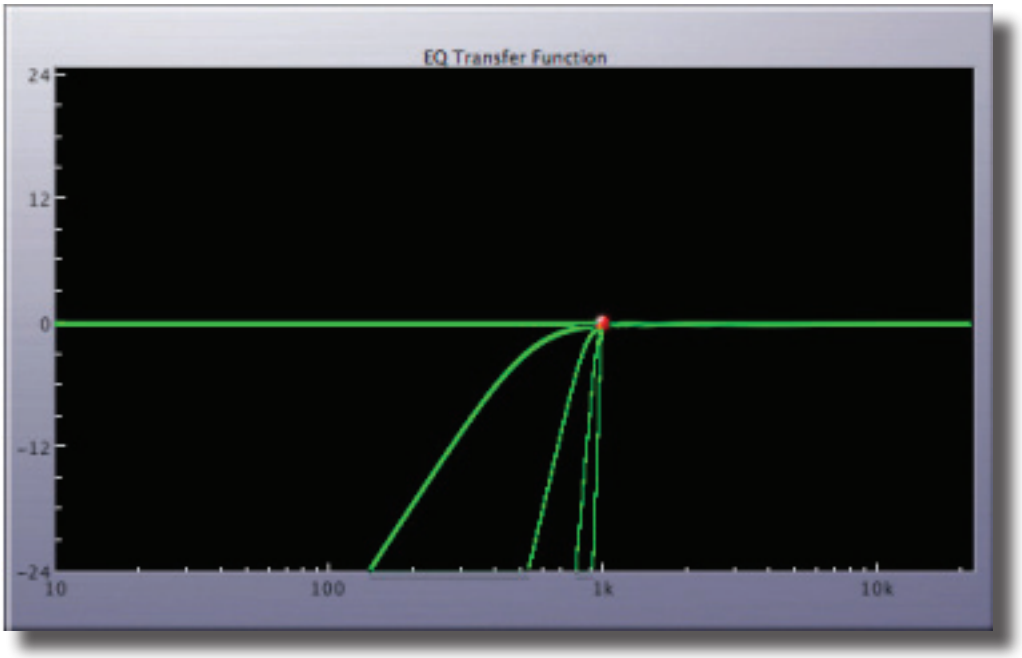


Figure 10.7: High pass with f_R of 1000 Hz

Stopband ripple describes the amount of amplitude variation or ripple in a filter's out of band response. Indirectly, it describes two more important parameters. One is out of band suppression or, how much "leakage" of unwanted signal you receive, and the other is phase shift and group delay.

The stopband ripple parameter provides a range of -12 to -108. At the -12 setting, only 12 dB of loss will occur out of band, no much for a filter of this type. However, because the stopband ripple value is so low, the phase response and resultant temporal response of the filter will be excellent. At the other extreme of its range, stopband ripple will be 108 dB down from the (unity) passband gain but, the phase response will suffer, the group delay will be severe and the resulting temporal smearing may be unacceptable. As with any filter, careful listening will determine the tradeoff between stopband suppression and side effects.

Figure 10.8 below shows an typical 3rd order high pass filter. Superimposed on that curve is another 3rd order high pass with 6 dB of passband ripple & 120 dB of stopband attenuation. Notice the rippling "bouncing ball" amplitude response in the region above the resonant frequency. This passband ripple would create some possibly undesirable amplitude effects but, because the ripple spec has been relaxed, the phase response would be improved.

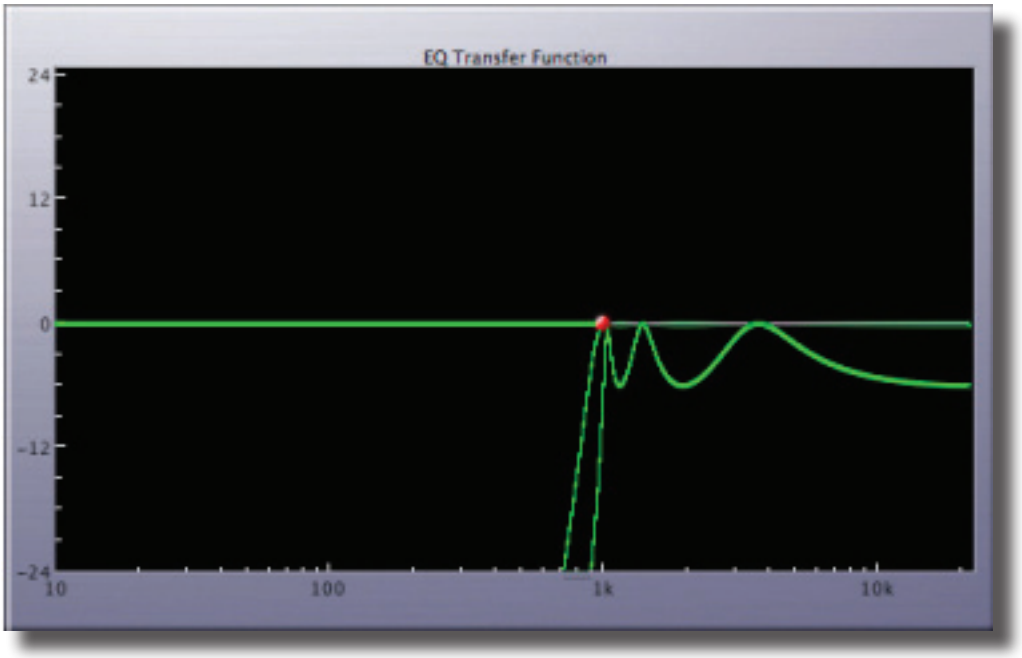


Figure 10.8: 3rd order high pass with 6 dB of passband ripple & 120 dB of attenuation

Compare the response in figure 10.8 with the next figure, which shows a 3rd order high pass with 0.10 dB of passband ripple & 10 dB of stopband attenuation. This time, the stopband ripple would allow some material below the resonant frequency to "leak" into the filter's output. Again however, because the ripple spec has been relaxed, the phase response would be improved.

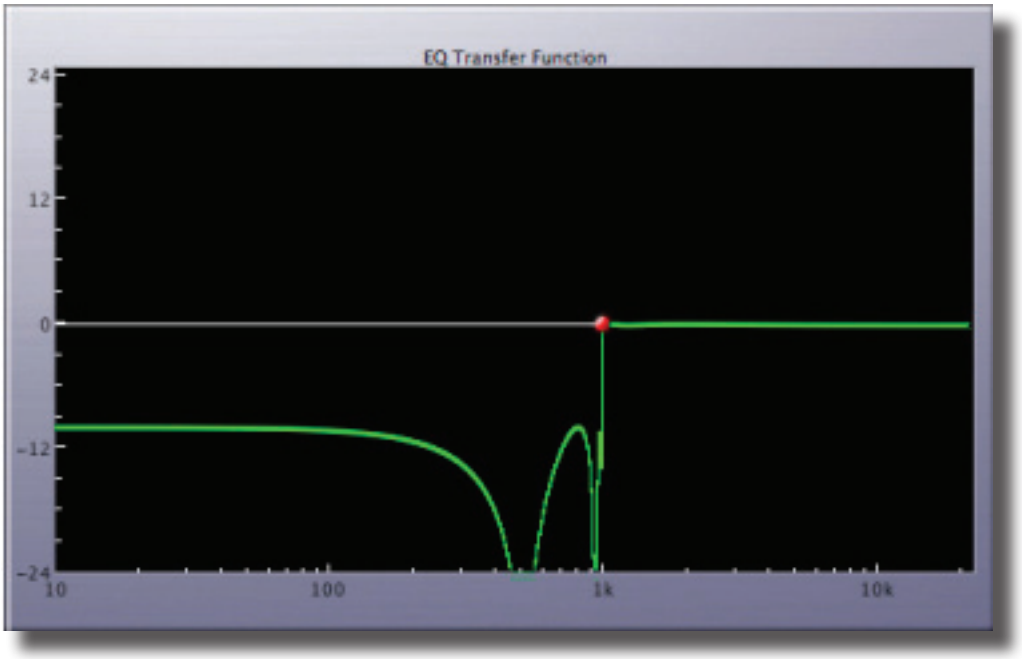


Figure 10.9: 3rd order high pass with 0.1 dB of passband ripple & 10 dB of attenuation

The bandpass and band stop filters are straightforward, three parameter forms, and the notch filter has only two parameters as the gain is implied to be -∞. The next two figures once again include quality factors (Q) of 0.5, 2 and 10.

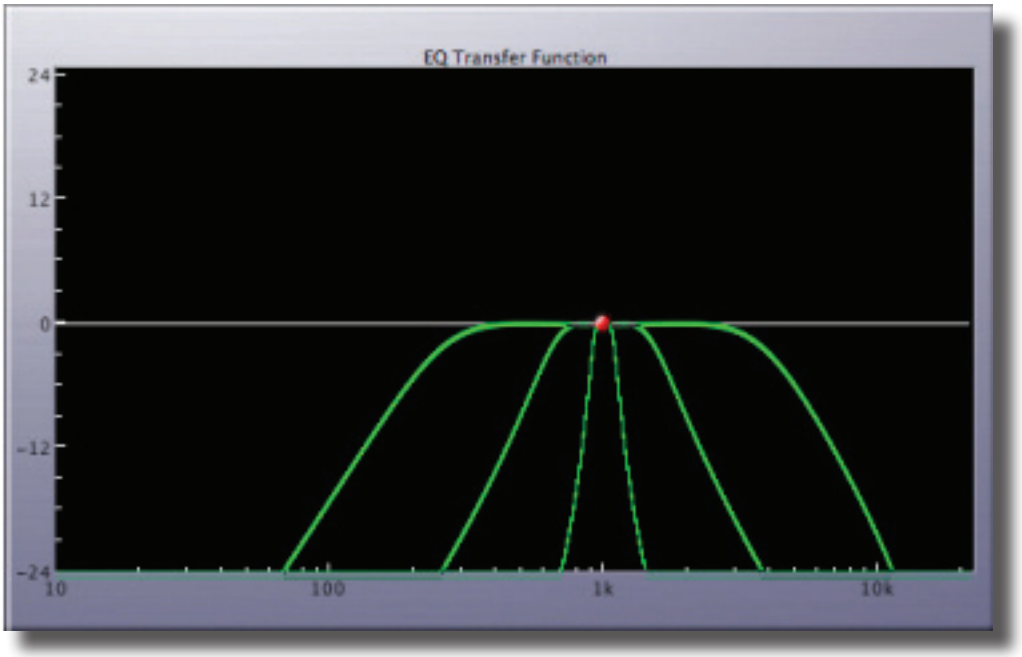


Figure 10.10: 1st order bandpass with f_R of 1000 Hz

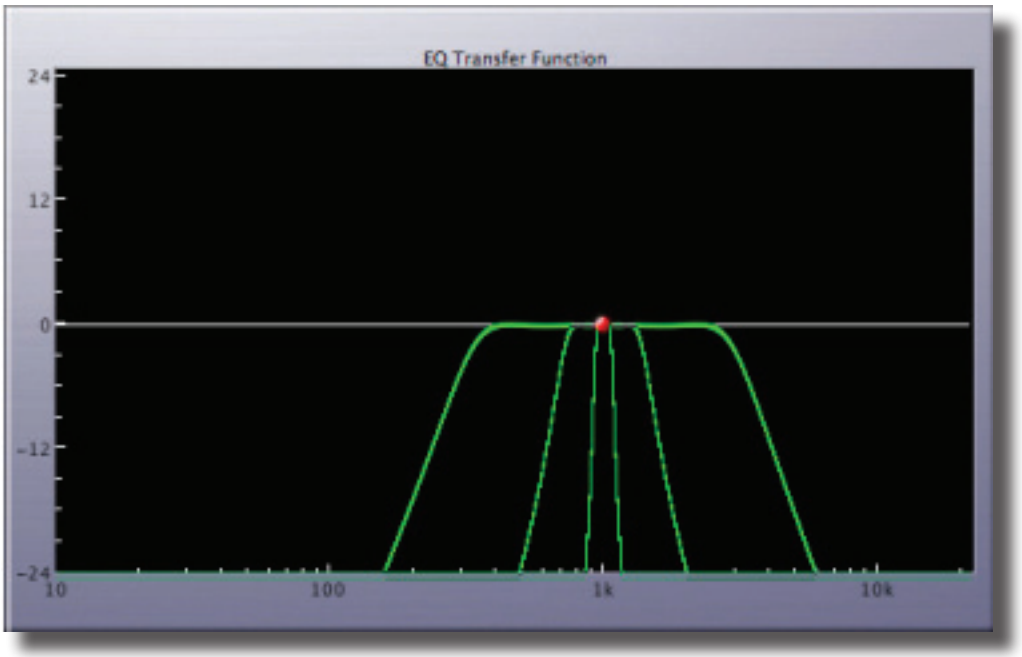


Figure 10.11: 3rd order bandpass with f_R of 1000 Hz

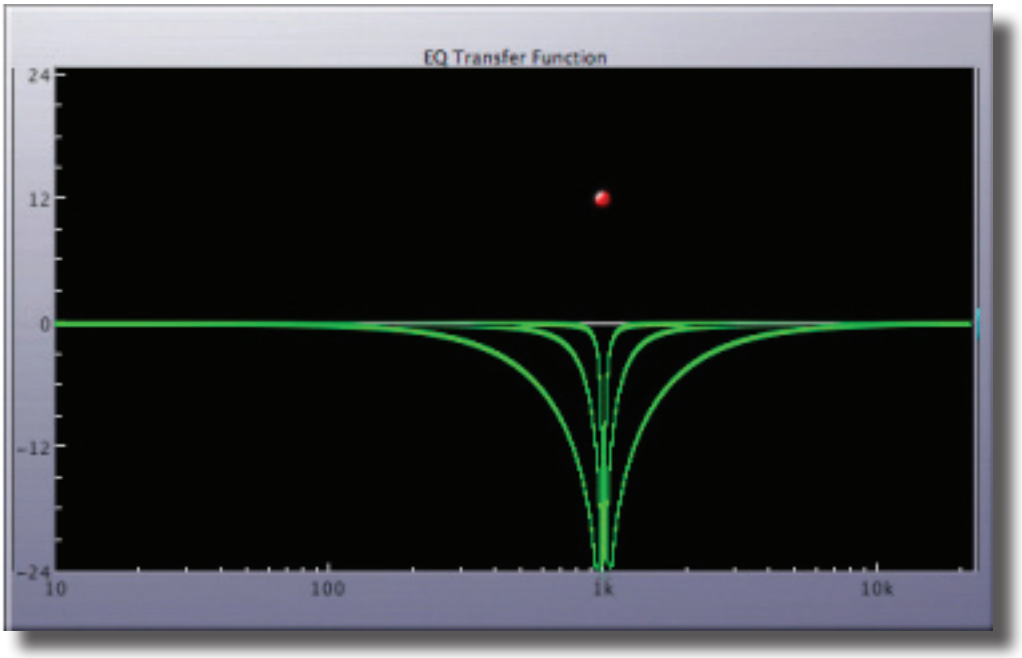


Figure 10.12: Notch filter with f_R of 1000 Hz

The RIAA filters provide emphasis, for creating cutting masters for lacquer, and de–emphasis for correcting material that is digitized flat from 33 1/3 RPM phonograph record.This approach means that the excellent, minimal phase characteristics of this digital RIAA de–emphasis implementation can be used in place of an imprecise and potentially colored analog filter network in a phono preamplifier.

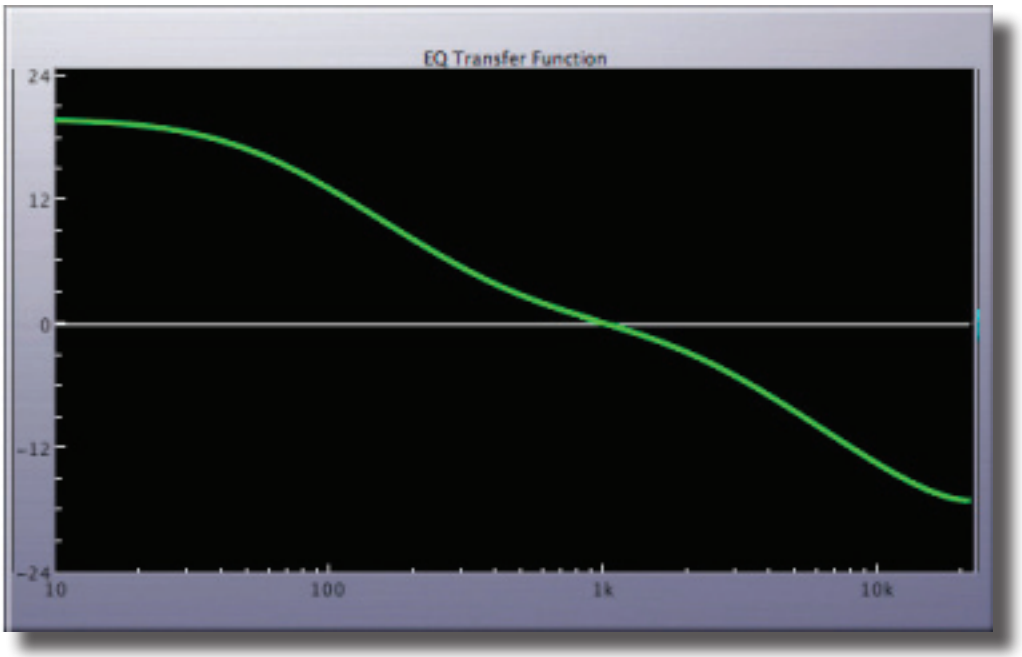


Figure 10.13: RIAA de–emphasis

The “Emph” and “DeEmph” selection are for 44.1 kHz AES/EBU audio. The de–emphasis type is quite useful when archival material was emphasized during recording but the Emphasis flag was not set.

The No DC type is a special form of high pass filter designed for archival recordings made with EIAJ adapters, so called “F1” recorders, which were short lived consumer digital audio recorders manufactured by Sony, Matsushita and others. They employed very simple, low cost converters and often injected a large amount of DC offset into the signal to overcome crossover distortion. This filter will remove that DC offset. Lastly, the “NoDC/DeEmp” type is, again, a special filter for recordings made with an EIAJ adapter that both removes DC offset and applies de–emphasis.

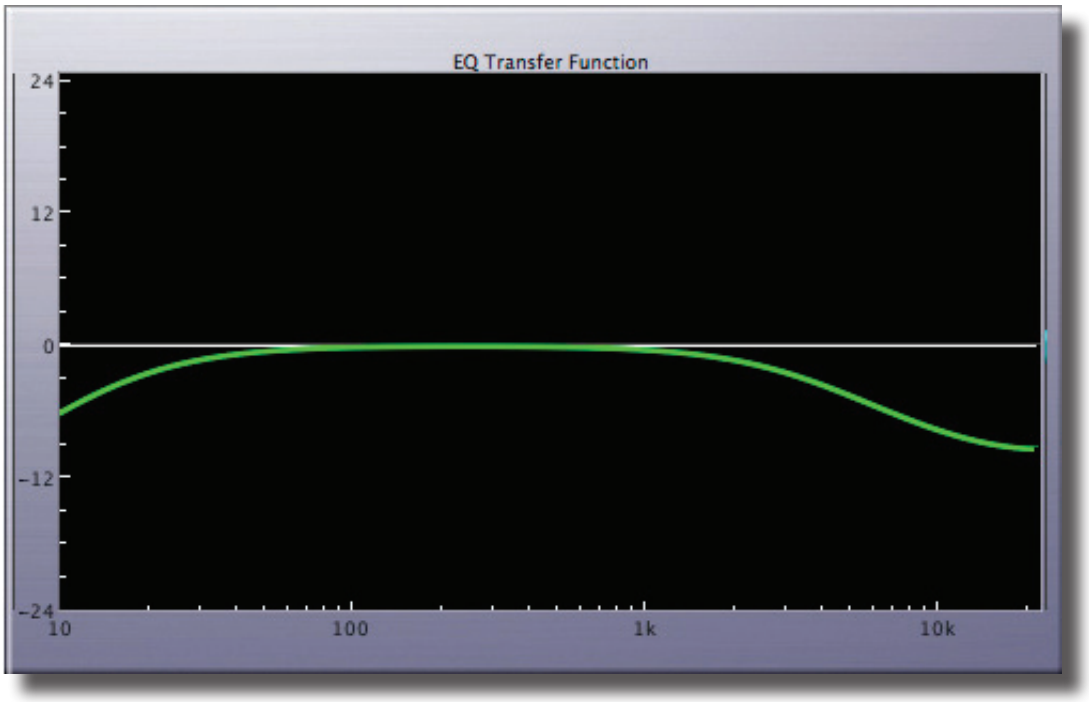


Figure 10.14: DC reject plus RIAA de–emphasis, the “NoDC/DeEmp”

Appendix B.....Sonic Studio Mastering EQ Dither Specifications and Descriptions

Selecting a Dither Type

Dither is an intentionally applied form of noise used to randomize quantization error, preventing audible artifacts from being induced when calculating sample rate or bit depth changes. No single dither is a magic bullet, so two different variations of dither are available in Sonic Studio Mastering EQ.

Sonic Studio Mastering EQ Dither Settings:

Off: Disables all dither, passing all bits as rendered.

Dither (Triangular Probability Density Function): Shaped triangular dither cuts the noise level at low frequencies while boosting it a high frequencies. This results in the dither noise being less audible. This shaping or weighting reduces the audibility of the noise to a degree. With triangular dither, the added noise level is constant and slightly higher. It is recommended for use on all types of music.

Noise Shaped: This dither type alters the spectral shape of the error that is introduced by dithering such that the noise power is at a lower level in frequency bands at which noise is perceived to be more undesirable and at a correspondingly higher level in bands where it is perceived to be less undesirable. Since this dither is 'packed' at the higher end of the hearing spectrum, this shaping or weighting reduces the audibility of the noise to a degree. This dither is recommended for general use.

Note: In general, triangular PDF dither is preferable.

Note That with either type of dither, the added noise is very small and each dither option acts differently with different types of program material. You should experiment with each dither type to achieve the results that you desire.

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Comments, corrections and suggestions regarding this manual are always welcome. Please contact us at <support@sonicstudio.com>.