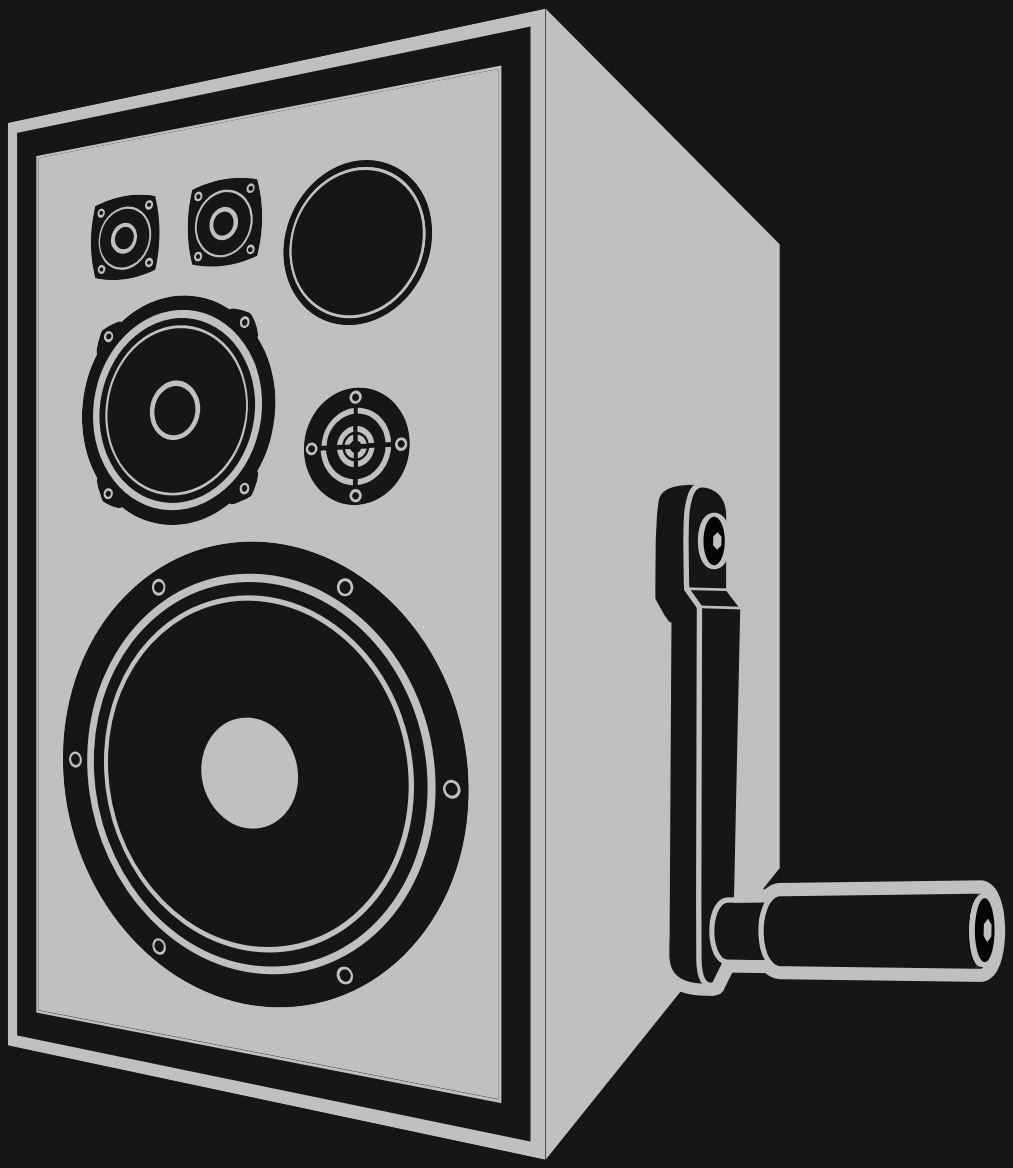

NEWFANGLED AUDIO

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EQuivocate proudly uses the PFFFT library, which is available at `https://bitbucket.org/jpommier/pffft`.

Newfangled Audio
www.newfangledaudio.com

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Chapter 1

Auditory Filter Banks

In the 1930s a physicist at Bell Labs named Harvey Fletcher was studying the human auditory system. In 1933 he published a paper called "Loudness, Its Definition, Measurement and Calculation" which introduced the concept of critical bands in human hearing. This discovery showed that a human can only detect a the presence of a frequency if it is a certain distance from another frequency playing at the same time. This frequency distance changes depending on the frequencies of the tones that are playing. But generally, this and other research has found that we can divide the human auditory range into 26 critical bands between 0 Hz and 20 kHz, and within each critical band a human can really only make out one sound at a time. Because the critical band corresponds to action of the basilar membrane in the human ear it is referred to as an auditory filter, and the set of all 26 critical bands is referred to as an auditory filter bank.

In the years since, many successful models of the human auditory system have been developed which rely on these critical bands. Many of the most successful of these rely on the Mel Scale, which defines a particular arrangement of auditory frequency bands such that each band sounds equally spaced from all others. The idea is that by breaking up a sound using a mel spaced filter bank, the division of that sound will sound equal to a human listener.

Auditory scientists and engineers now use the Mel scale in hearing research and in speech recognition research. You might not know it, but the Mel scale is probably being used behind the scenes in various gadgets and equipment you already use. It's often used any time the signal processing could benefit from working in the same way as the human ear. We thought, if this scale matches what a human hears so well, why aren't we using it in an EQ? So we created the EQuivocate Auditory Paragraphic EQ.

Chapter 2

Newfangled Audio EQuivocate

The core of EQuivocate is a relatively straightforward graphic EQ. It supports between 1 and 26 bands which, by default, are distributed along the Mel Scale between 0 Hz and 20 kHz, however it does allow you to customize the center frequency of each band, technically making this a paragraphic EQ. The filters themselves are linear phase triangular filters, of the kind often used in human auditory models to represent critical bands. Unlike the filters used in analog graphic EQs, these filters are very well behaved over the mel space. At 0dB these filters will pass your audio untouched, and when boost or cut is added, each band will stay completely independent from it's neighbor. And unlike some other linear phase filter implementations, these filters have minimal pre-echo or other time domain artifacts. The overall effect is a very pleasant and neutral tone modification, which sounds very natural.

By default, the number of bands is set to 26 and they are spread using the Mel Scale, so that filters should closely represent the critical bands of

human hearing. This means each slider is directly tickling a different section of your inner ear. For the purposes of modifying the tonal balance of a complex sound, this should be the most direct way available.

Additionally, EQuivocate adds a Match EQ feature which allows you to match or complement the tone of an audio signal streamed to it's sidechain input. Because it uses critical bands it provides a true match without trying to model imperceptible differences which can cause a match EQ to overfit and sound unnatural.

It's perfect for EQing any sound source meant to be listened to by human ears.

Chapter 3

Installation and Instantiation

Newfangled Audio plug-ins are distributed by Eventide and like other plug-ins Eventide distributes, EQuivocate uses PACE's ilok.com licensing system, with or without and iLok hardware dongle. Each license provides two activations which can reside on either your computer or on an iLok license dongle. Once you've purchased your plug-in, you'll need to register it on Eventide's website, activate your license, and install the plug-in on to your computer

3.1 Registering Your Plug-in

When you purchase EQuivocate, you'll receive a Serial Number and License Key. The Serial Number will be two letters followed by 6 numbers. If you have an individual EQuivocate license, the Serial Number will start with NQ (i.e. NQ-######). The License Key will be 3 sets of 4 characters, a letter or a number, each; like XXXX-XXXX-XXXX.

Once you've received these codes, you can register your plug-in on the Eventide website. To do so, please log in to `http://www.eventideaudio.com`, navigate to My Account in the top right corner, and select Register a New Product. Then, fill out the form by selecting Native Plug-in (VST, AU, AAX) in the Product Category field, select EQuivocate in the Product list, and enter your Serial Number, License Key, and iLok.com account name. If you don't yet have an ilok.com account, you can create one for free at `http://www.ilok.com`. Once you've done so, press Register.

Once you've entered this information and pressed the Register button, Eventide will send the applicable plug-in license to your ilok.com account, which you will need to activate to your computer or iLok dongle.

3.2 Activating Your License

To activate and manage your plug-in licenses you'll need to install PACE's iLok License Manager software which you can download from `http://www.ilok.com`. If you don't have this software installed, please download and install it now.

Once you have installed and launched iLok License Manager you should be able to log in to your account by clicking the large "Sign In" button in the upper left hand corner of the application. Once you have, you should be able to see available licenses by choosing the Available tab at the top of the iLok License Manager application. If you have successfully registered your plugin, your EQuivocate Native license will be available in this list. Please activate this license by dragging it to either your computer or iLok dongle listed on the left. When you do so, you will be asked to confirm the activation, and you will be able to see it by clicking on the location you have chosen. At this point your license is activated.

3.3 Installing Your Plug-In

You should have been given a link to the EQuivocate plug-in installer when you purchased your plug-in, but if you haven't, you can find downloads for all of our plug-ins at `http://www.newfangledaudio.com/downloads`. Please download and launch the correct installer for your system.

Once you've launched the plug-in installer, it will take you through several pages of options. We have tried to choose defaults for these options which will best serve the majority of users, but it is worth a minute to make sure you understand these options before clicking through to the next page. A common issue with Windows VST plug-ins is choosing the correct VST directory, which can be different on each system. Please pay special attention to this setting. Once you have followed through the installer, your plug-ins and presets should be in your chosen locations, and you can hit finish to end the installer application.

At this point, you should be ready to use your EQuivocate Plug-In.

3.4 Moving or Removing an Activation

If at any point, you decide to move your plug-in activation, you can do so in iLok license manager. To move an activation between an iLok dongle and your computer, simply plug in the iLok, locate the license in its current location, and drag it to its new location. To deactivate a license, find it in its location, right click on it, and choose deactivate.

Remember that each EQuivocate Plug-In License comes with two activations, which can be used on either a computer or iLok dongle, meaning you can use EQuivocate in two locations at the same time.

3.5 Removing or Uninstalling your Plug-In

We're sure you'll love your Newfangled Audio plug-ins, but if you ever want to remove them from your machine it's as easy as removing the following files.

For Mac:

- Macintosh HD/Library/Audio/Plug-Ins/Components/<Plug-In Name>.component
- Macintosh HD/Library/Audio/Plug-Ins/VST/Newfangled Audio/<Plug-In Name>.vst
- Macintosh HD/Library/Audio/Plug-Ins/VST3/Newfangled Audio/<Plug-In Name>.vst3
- Macintosh HD/Library/Application Support/Avid/Audio/Plug-Ins/Newfangled Audio/<Plug-In Name>.aaxplugin
- /Music/Newfangled Audio/<Plug-In Name>/

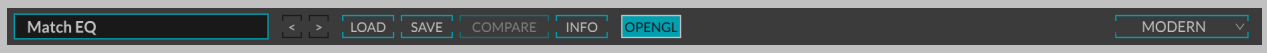
For Windows:

- c:\Program Files\Common\Steinberg\VST2\Newfangled Audio\<Plug-In Name>.dll
- c:\Program Files\Common\VST3\Newfangled Audio\<Plug-In Name>.vst3
- c:\Program Files\Common\Avid\Audio\Plug-Ins\Newfangled Audio
  <Plug-In Name>.aaxplugin
- My Documents\Newfangled Audio\<Plug-In Name>\

Chapter 4

Preset Bar

At the very top of the EQuivocate plug-in is a preset bar which allows you to load and save preset, as well as a couple other features. These are the preset bar sections.



4.1 Preset Selector

On the far left is a drop-down menu which allows you to select preset from a tree structure. You shouldn't need to access these presets on your computer, however, if you do, on the Mac these presets are stored in your <User>/Music/Newfangled Audio/EQuivocate/Presets folder. On Windows these presets are stored in your <Documents>/Newfangled Audio/EQuivocate/Presets folder.

Next to the preset drop-down menu is a left and right arrow, which allow you to quickly scroll through presets.

4.2 Preset Load and Save Buttons

To the right of the preset selection arrows is a LOAD and SAVE button. LOAD will allow you to load a .tide preset from anywhere on your computer. Save will allow you to save a new preset to anywhere on your computer, however, we suggest that you place it somewhere in the presets folder so you can access it from the file dropdown.

4.3 Compare

The COMPARE button will allow you to toggle between the current settings and the last saved or loaded preset. If you have settings that you

like, save them as a preset, and as you tweak you can always return to them using the COMPARE button.

4.4 Info

The INFO button will open this manual for you to read about the plug-in.

4.5 Update

If there is a software update available an UPDATE button will appear in the preset bar. Clicking it will bring you to a web page where you can download the new installers.

4.6 SETTINGS

The SETTINGS button pops down a settings page which contains additional options.

4.6.1 OPENGL

The OPENGL button allows you to toggle between two different rendering engines. Most people will want to use OPENGL set to on, which will select a rendering engine that uses your computer's onboard GPU to do all graphics rendering for Punctuate. However, some computers do not have a separate GPU processor, or have a GPU that doesn't use the specific OpenGL features used by Punctuate. In these cases, having OPENGL set to "on" may cause graphics errors or an extreme load on your computers CPU. To turn OpenGL rendering off, set the OPENGL button to "off", close the plug-in window, then open it again. Closing and opening the plug-in windows is necessary because the rendering engine can only be changed when the plug-in window is closed.

4.6.2 VISUALIZATIONS

The VISUALIZATIONS button allows you to turn the animated meters on or off. Generally you'll want to keep these on, but if they're bothering you, or if your computer is having trouble showing all the animations you may choose to turn these off.

4.7 Color Scheme

On the far right is a drop-down labeled COLOR SCHEME. This will allow you to choose one of several different color schemes for your viewing pleasure.

4.8 Resize

The bottom right corner of the UI will allow you to resize the plug-in. To change the default plug-in size drag the plug-in to the desired size and save over the default preset.

Chapter 5

Parameters and Metering

All of EQuivocate's controls fit on a single page, in this section we will describe each control and call out some features and tips.

5.1 Controls

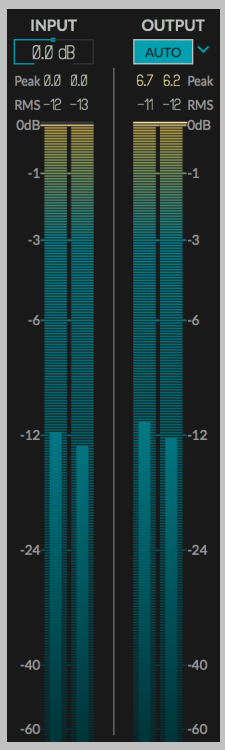
EQuivocate has several control types, including vertical and horizontal sliders, rotary knobs, drop-down menus, and toggle and radio buttons, all of which have tool-tips which will give you more information about their function if you hover your mouse above them.

In general, all sliders and knobs can be double clicked to type in a specific value, option-clicked to return them to their default value, or command-clicked or control-clicked to enter a vernier mode for fine tuning. In addition, some controls support special shift-click functionality, such as using shift-swipe to draw and EQ curve, or shift clicking the gain sliders to set output level compensation. Where available, these shift-click functions are mentioned in the tool-tips for the individual controls.

Where appropriate, many controls have a related on/off button which will deactivate this control, or even the entire section. Turning sections off when you're not using them can reduce the amount of processing power used by EQuivocate.

5.2 Global Parameters

5.2.1 INPUT AND OUTPUT LEVEL AND BAR METERS



The left and right hand sides of the plug-in have matching vertical bar meters which display the INPUT (on the left) and OUTPUT (on the right) levels in levels in Peak (horizontal ticks), RMS (solid bar and numerical display), and Peak Hold (numerical display) formats. These meters are always present in the display and clicking the Peak Hold section, or bypassing the plug-in will clear the held peak value.

Above the INPUT meter is a knob for the MASTER INPUT LEVEL, and above the OUTPUT meter is an AUTO button which will allow you to automatically compensate for the level change introduced by the EQ, or not. Alternatively, by clicking the down arrow next to this button, you can select a knob to manually set the MASTER OUTPUT LEVEL. The MASTER INPUT LEVEL is just before the INPUT meter and the MASTER OUTPUT LEVEL is just before the OUTPUT meter. The EQuivocate EQ is linear and floating point, so it will not saturate your audio at any step in it's process, but the INPUT and OUTPUT level can be used to set optimize the meters and make up for any throughput gain change.

5.2.2 ACTIVE

The ACTIVE button is located near the top left of the plug-in UI near the NEWFANGLED AUDIO label in the header. It activates or bypasses all the processing in the plug-in.

5.2.3 AUDITORY FILTER BANK

The AUDITORY FILTER BANK selector selects the number of filters and allows you to choose a MEL or CUSTOM spacing. This section is interactive, selecting a number of filters from the dropdown will automatically space the filters to a MEL spacing between the current low frequency and high frequency. If you move the filters so that they are not MEL spaced, the CUSTOM spacing will highlight reflecting the fact that the meters are no longer MEL spaced. At this point you can toggle between MEL and your CUSTOM spacing by toggling the appropriate buttons.

5.2.4 INPUT METERS

The Input Meters toggle switch allows you to toggle the input meters for each band in the slider field on and off.

5.2.5 OUTPUT METERS

The Output Meters toggle switch allows you to toggle the output meters for each band in the slider field on and off.

5.2.6 MATCH EQ BUTTON and KNOB

The MATCH EQ BUTTON toggles the match EQ mode on and off. For MATCH EQ to function correctly you must route an active audio stream to EQuivocate's sidechain input. Please consult your DAWs documentation for help learning how to do so.

Once audio is routed to the sidechain input, when you toggle the MATCH EQ button and hit play in your DAW, EQuivocate will analyze the difference between the average level coming into its main input and the average level coming into its sidechain for each band.

If the MATCH EQ KNOB is set to 100% it will modify the band gains such that the average spectrum of the EQuivocate input now matches the average spectrum of the EQuvicoate sidechain input. This will, in turn, make the main input source sound like the sidechain input source. This can be helpful to blend two tracks to make it sound like they came from the same source, or to make a final master have a similar tone to a reference track.

If the MATCH EQ KNOB is set to -100%, EQuivocate will do the opposite and seek to make the audio source coming in the main input complement the audio source coming in the sidechain input. This will serve to make two simultaneous tracks blend in such a way where each is distinct and easier to hear. They will also compete less with each other.

Sweeping the MATCH EQ KNOB between -100% and 100% and all values in between will make the function of this feature clear. We suggest you try it on several different tracks to get a good sense of it's possibilities.

Finally, when the MATCH EQ button is on, the BAND GAIN SLIDERS are being controlled by the MATCH EQ algorithm and are locked out from the UI. The sliders turn the color of the MATCH EQ button to indicate this.

When you toggle the MATCH EQ button off, the settings determined by the MATCH EQ BUTTON and KNOB are locked into place, and control is returned to the user. These control can then be adjusted further to taste.

5.2.7 RANGE KNOB

EQuivocate's RANGE KNOB allows you to set the the minimum and maximum value of EQuivocate's GAIN SLIDERS. The slider RANGE can be set to any value between -24 dB and +24 dB. When RANGE is positive pushing a slider up increases the bands gain, but when RANGE is negative pushing a slider up reduces that bands gain.

By using the range knob you can increase, decrease, and even invert the effect of an already programmed EQ shape. Additionally, by setting the range control after using MATCH EQ you can modify an already locked in MATCH EQ result, or by setting it before using MATCH EQ you can match the current track to a target track, but only modify each band up to a value determined by the EQ RANGE knob. This can be very helpful if you want to apply MATCH EQ to a master without applying the EQ effect too heavily.

5.2.8 RESET GAINS

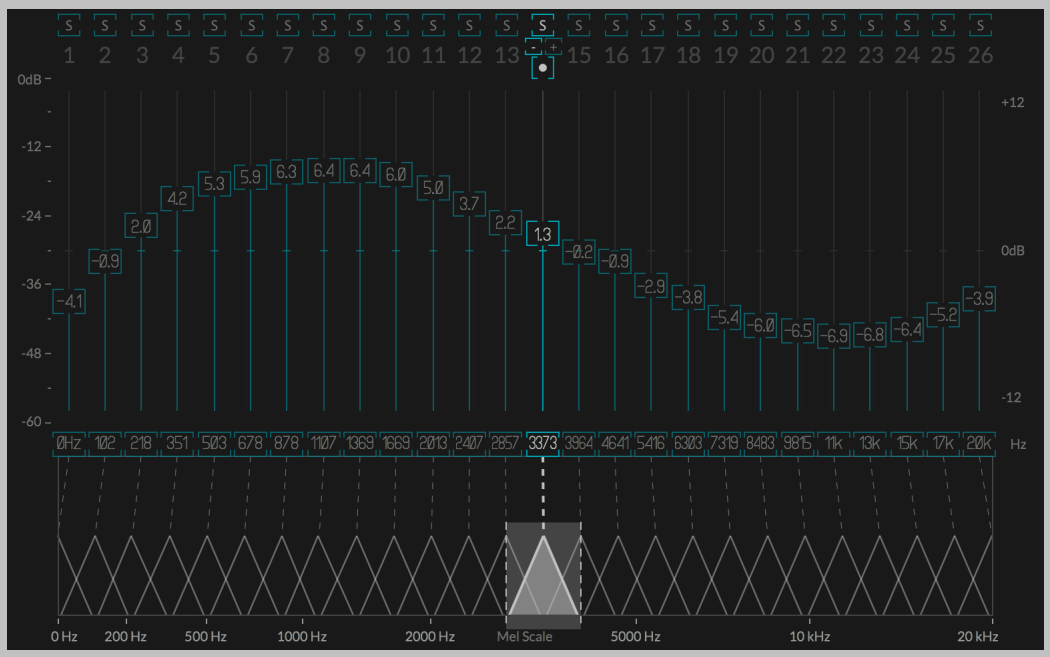
Hitting the RESET GAINS button will reset all gain sliders to 0.0 dB.

5.2.9 DRAW CURVE

The DRAW CURVE button is on by default, which allows you to click and swipe your mouse across the GAIN SLIDER FIELD to draw an EQ curve. If you toggle the DRAW CURVE button off you will be able to manipulate only one band at a time, but will be able to fine tune it using a command click.

5.3 FILTER BANK AND EQ

The center of the plug-in is taken up by the main graphic eq and filter bank controls.



Each band of the filter bank has a number of controls and meters which operate on that band. When the parameters of a particular band are being manipulated the band you are using is highlighted in both the fader field and filter bank display.

5.3.1 GAIN FADERS

The main control for each band is the GAIN FADER. This control allows you to adjust the gain of each band ± 12dB. The center of the fader displays the setting and double clicking this control allows you to type in a new setting. If the DRAW CURVE button is on, you can use your mouse to draw a shape across all the sliders. If it is off, command-dragging each slider will allow you to fine tune the control (Ctrl-drag on Windows). Similarly, option-clicking the control will reset it to it's default value (alt-clicking on Windows). Finally, in each mode, using the shift key allows you to manipulate the sliders as though you were in the other mode. So when DRAW CURVE is off, you can still press shift to draw the curve, and vice versa.

5.3.2 BAND INPUT AND OUTPUT METER

When audio is playing through the plug-in, a meter on the left side of the band's GAIN FADER will display the input level for the band while a meter

on the right of the band will display the bands output level, as modified by the gain slider. Remember, when the filter bank is MEL spaced these bands are spread perceptually equally through the frequency space, so this set of meters is like a better spectrogram display because it should show you what you are actually hearing. The number of dB for the meters is shown on the far left side of the gain slider field.

5.3.3 BAND PEAK FREQUENCY

Directly below the GAIN FADER is the PEAK FREQUENCY for that band. This is what is often called the center frequency in most EQs, however, the bands here are not necessarily symmetrical. Dragging this control up or right will increase the PEAK FREQUENCY while dragging it down or left will decrease the PEAK FREQUENCY. When the PEAK FREQUENCY of this band runs into the band to the left or right of it, it will begin pushing that band out of the way and will continue doing so as long as you push. If you do this far enough you may see some bands collapse and have no audio running through them. In this instance, these bands can be easily removed by clicking their respective REMOVE FILTER ((-)) button.

Command-dragging this control will allow you to fine tune it (Ctrl-drag on Windows). Similarly, option-clicking the control will reset it to it's default value (alt-clicking on Windows). Also, these values can be set by the AUDITORY FILTER BANK selector, MEL, and CUSTOM buttons.

5.3.4 FILTER DISPLAY

Below the BAND PEAK FREQUENCY is a display which shows all the bands on a MEL scale. As mentioned, these triangular filters approximate the filters in your ears basilar membrane and are fully complimentary, meaning that at any settings they will always sum to unity and pass dry audio if all the GAIN FADERS are at 0 dB. This display allows you visualize the filter bank in perceptual space. When manipulating a particular band its filter is highlighted in this control to show you which band you're manipulating. Similarly, when bands are soloed they will be filled in to show you that you are hearing only a particular subset of the filter outputs.

5.3.5 SOLO BUTTONS

There is a set of toggle buttons which allow you to solo the output of one band, or for a number of bands by shift-clicking or ctrl-clicking.

5.3.6 INSERT FILTER

If you are using fewer than the maximum number of bands you can use the (+) button to insert another filter to the right of the filter on which you clicked. This filter will appear between this filter and the next and the corresponding bandwidths will be adjusted. This can be helpful if you feel like the bandwidth of a particular filter is too broad for your program

material, but you don't want to shift the center frequencies of all other bands. If you are using the maximum number of filters this option will be greyed out. The INSERT FILTER button for each band is only visible when the band is highlighted.

5.3.7 REMOVE FILTER

If you are using more than one filter you can remove a filter by clicking its (-) button. When the filter is removed all other filter frequencies are left untouched and the bandwidths of the right and left filters are modified to cover the removed filters bandwidth. This option can be particularly useful when adjusting filters in CUSTOM mode. You might find yourself in a situation where multiple filters are set to the same frequency, and some of these filters may have no bandwidth at all, and therefore has no audio passing through it. In this case you can easily remove these unused filters without modifying the positions of the other filters. The REMOVE FILTER button for each band is only visible when that band is highlighted.

5.3.8 BAND ENABLE BUTTON

Finally, the circular button below the INSERT and REMOVE FILTER buttons allows you to turn the GAIN FADER for the associated band on and off. When a band is disabled the bands slider no longer changes the gain in the disabled band and the band is always greyed out. To hear the effect of the GAIN FADER again, re-enable the band by clicking the button again.

Chapter 6

Conclusion

We hope you enjoy Newfangled Audio's EQuivocate Auditory Graphic EQ plug-in. If you have any questions, comments, or concerns please write us at support@newfangledaudio.com

Chapter 7

About Newfangled Audio

The Oxford English Dictionary defines Newfangled as "objectionably new".

Music technology can sometimes be a backward looking pursuit. This is understandable, the purpose of music technology should be to help musicians make great music. There have been many great pieces of gear in the past and we should seek to keep these pieces and make them available to people who want to use them, and the time and dedication required to master a musical instrument means that changes in their design are often evolutionary rather than revolutionary.

However, the great pieces of gear from yesteryear are more often than not those that contained new ideas in their time. The reverence we have for these pieces can sometimes turn into fetishism, and mindless re-creation of classic gear can fail to inspire musicians and artists to take new risks. It's important to make sure artists and engineers have access to good tools that inspire them and don't stand in their way, but these tools should never be used as a security blanket to stand in the way of an artist or engineers ears and taste.

Newfangled Audio seeks to only make gear that incorporates new ideas. We want to make gear that is great, but only using ideas that others are not. We realize that deviation from the norm might sometimes be objectionable. The Oxford English Dictionary defines Newfangled as "objectionably new".