

Dualism

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1 Introduction

1.1 About Dualism

If you make tools, you get to watch them grow organically. You watch them in use, reconsider your design, and revise them. There's a documentary where Bob Moog compares growing peppers in his garden to designing synthesisers, and the analogy is perfect. You watch what you've grown, and you nurture it to be better. You slowly watch as a seed turns into a mature form.

Dualism started out as a mastering tool to allow for easy A/Bs between tracks. But there were obvious features missing, so it grew. Before long, it seemed obvious to add all the niceties from the channel strip of a high-end console and a monitor controller. It became a way to handle all the edge-cases of everyday audio work that would otherwise require a collection of disparate tools.

Metering started as an obvious necessity, but then it, too, grew. The PPMs grew to include new bendymeters incorporating the new ITU1770 loudness standard. The graphs expanded to include all manner of things we wanted to easily visualise - from the obvious, such as FFT analysis, through the useful, such as loudness measurement, to the more obscure, such as the bitscope for visualising usage in digital data streams. The 3D spectrograph became something of a crowning feature. A lot of time was spent just watching it, imagining how to enhance it whilst presenting just the data itself, and without ever embellishing for the sake of aesthetics.

We never compromise function for the sake of form - it's anathema to the desire to make fine tools. Rather delightfully, without having made a single compromise, we're proud to say that we've created something we find beautiful. There's a degree of risk that you can get lost in visualising your audio. It's a profound synaesthetic experience. This flower has blossomed.

- Dave Gamble, 2014

1.2 System Requirements

1.2.1 Windows

Dualism works with Windows XP, Vista, 7 and 8, 32bit and 64bit. VST, VST3 and AAX are supported in both 32bit and 64bit hosts. RTAS is supported in 32bit ProTools 7 or newer. Your graphics card must support OpenGL2; this should include most cards, though performance with integrated Intel graphics may be poor.

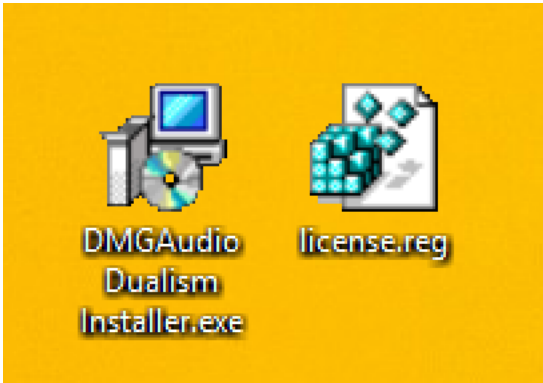
1.2.2 Mac OS

Dualism requires OSX 10.5 or newer on Intel mac. VST, VST3, AU and AAX are supported in both 32bit and 64bit hosts. RTAS is supported in 32bit ProTools 7 or newer.

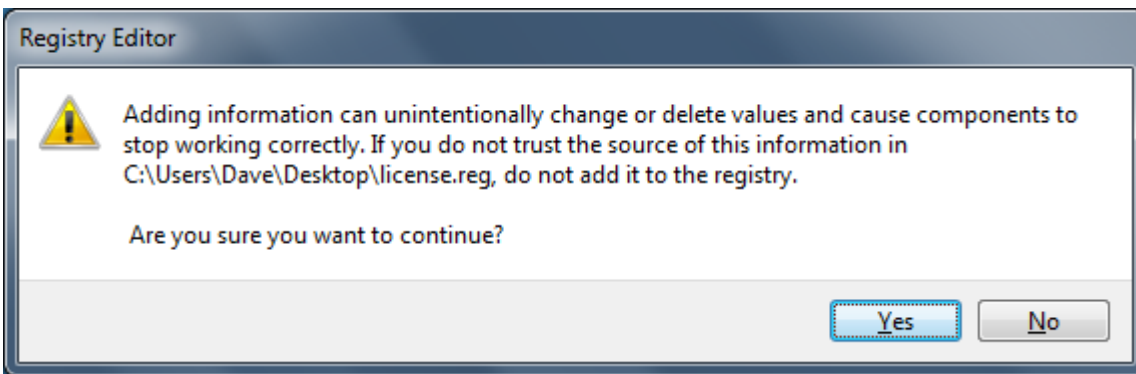
1.3 Installation and Setup

1.3.1 How to Install on Windows

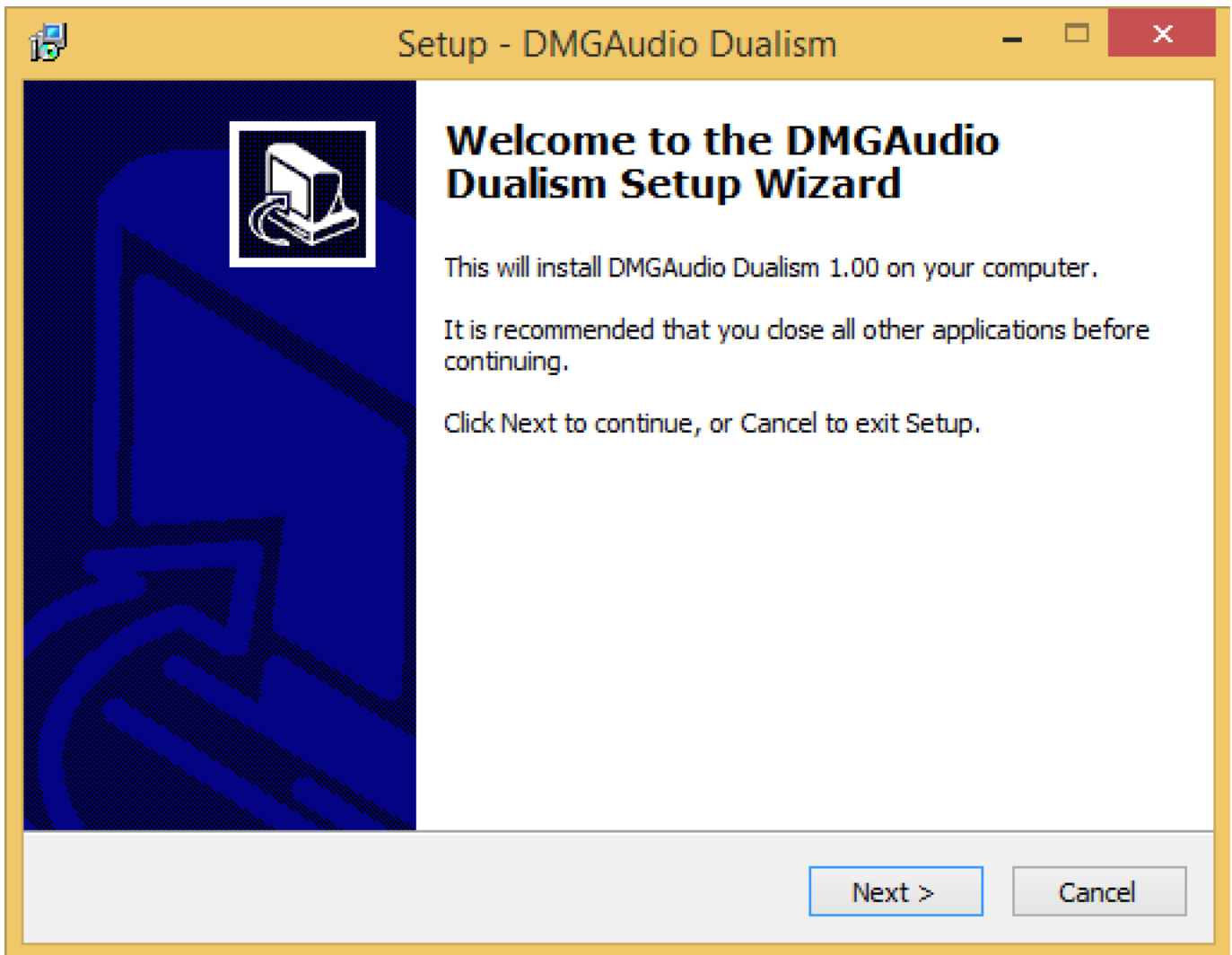
You need two files to install; the plugin installer and the license file. Both are available from the My Stuff area of the DMGAudio site whilst logged in. If you're using a demo, download the installer from the site, and use the form to have your license file emailed to you.



Double-click license.reg, and this box will open:





Click "Yes" and the license is installed. Now double-click the zip-file which contains the installer. Double-click the installer; it will look like this:







Click "next" (changing any options if you need to), and Dualism is installed! Reload your host, and enjoy!

1.3.2 How to Install on OS X

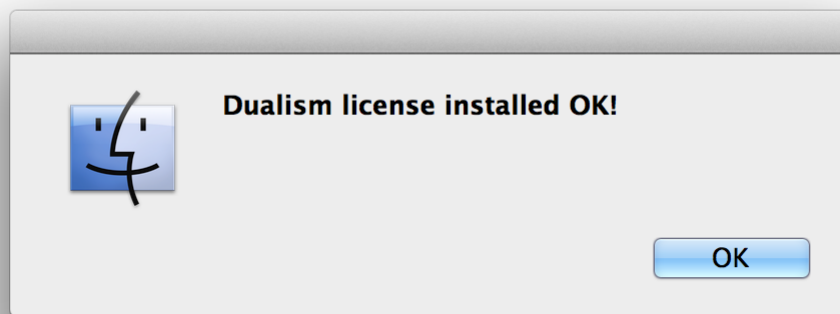
You need two files to install; the plugin installer and the license file. Both are available from the My Stuff area of the DMGAudio site whilst logged in. If you're using a demo, download the installer from the site, and use the form to have your license file emailed to you.

Name	
	DMGAudio_Dualism_license.tar
	DualismMac.zip

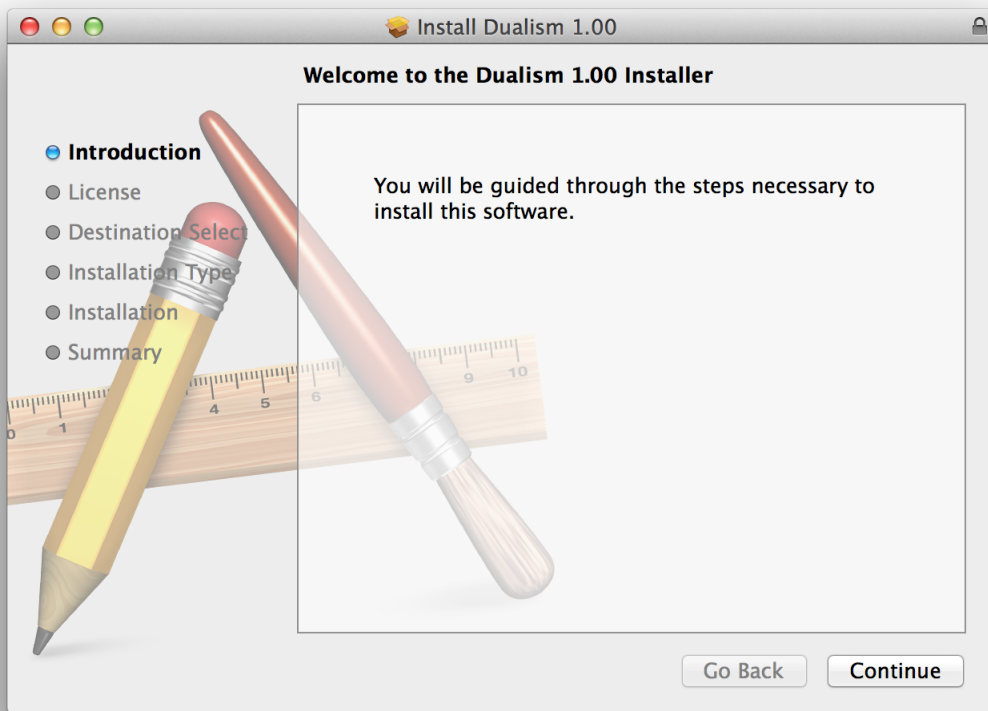
If you are using Safari, one or both of these files may be automatically unzipped for you. If not, double-click them to decompress them, so you get this:

Name	
	DMGAudio_Dualism_license.command
	DMGAudio_Dualism_license.tar
	Dualism Installer.pkg
	DualismMac.zip

Double-click "license.command" to install the license. The license will install, and you'll get the following message to confirm:



Now double-click the installer, and it will launch. It looks like this:



Click through until it installs, and everything is set! Now relaunch your host and enjoy!

2 The Dualism UI



The Dualism UI is split into three major sections - Input, Output and Graphs.

You can reconfigure the UI using the layout button in the top-right, or by double-clicking on graphs. Alt-clicking the layout button will toggle the number of inputs.

You can use two inputs to crossfade between signals, for A/B, null tests or other creative uses. The input stages include gain, metering, and a full selection of stereo-matrix translations.

The output section contains high-pass filters for mid and side, full stereo field controls (width, side->mid and mid->side), balance and pan. At the end of the output section is a full range of monitoring controls, including solo, dim and mute.

There are three sizes of graph. In the display above, two small graphs are shown. Double-clicking these will configure the screen to show the clicked graph in large size. Double-clicking a large graph will take you to full-screen mode.

Graphs offer a variety of tools including pause/resume, reset and screenshots. Screenshots are saved to your desktop. By default the tool tray is hidden, and opened using the small arrow on the right-hand-side, in the middle.

Each graph type has a rich set of features. In large or fullscreen mode, the preferences are available at the bottom of the graph. In fullscreen mode, the preferences hide until you move the mouse to the bottom of the screen. Likewise in fullscreen mode, the tools for the graph are held in a navigation bar which appears when you move the mouse to the top of the screen.

The navigation bars allow selection of graph type, with prev/next buttons and selection of graph source signals. These vary in type by graph style, and can include signals from other instances.

Further configuration can be achieved by clicking the Setup button, which opens the setup pages described below.

Presets are accessed using the Preset button, which is also described below.

A/B for parameter settings is accessed from the bar at the top of the screen and allows A-H banks of settings for quick comparison.

3 Input

The Input section allows for fixing the format of input signals and crossfading between signals, to A/B or mix them.

3.1 Processing

3.1.1 Format

M/S will decode an input M/S encoded signal to an LR signal. Use this to convert signals from an M/S mic pair to LR format.

L/R / R/L allows you to swap the input channels, to flip the stereo imaging of the input signal.

3.1.2 Phase

Left and **Right** will invert the polarity of the channel. Clicking the Link button between them will flip polarity of both channels together.

3.1.3 Mute

Clicking **Left**, **Right**, **Mid** or **Side** will mute that respective part of the signal.

Muting both Left and Right or both Mid and Side will result in silence.

3.1.4 Pad

The **Pad** button provides a one-click attenuation for a signal. By default, this will simply attenuate the signal by -18dB, though this can be configured in Setup.

3.1.5 Meters and Fader

The fader is a +/-36dB linear fader, designed for gain adjustment and riding automation. The textbox below the fader shows the current gain for the fader.

The Meters can be either one of the default PPM/VU types, or a new bendymeter style display of peak, RMS and ITU1770 K-weighted loudness. The display below shows either realtime PPM values or peaks, as configured.

3.2 Routing



Dualism offers either one or two input sections. When one input is used, as above, that stereo signal is fed directly to the Output section.

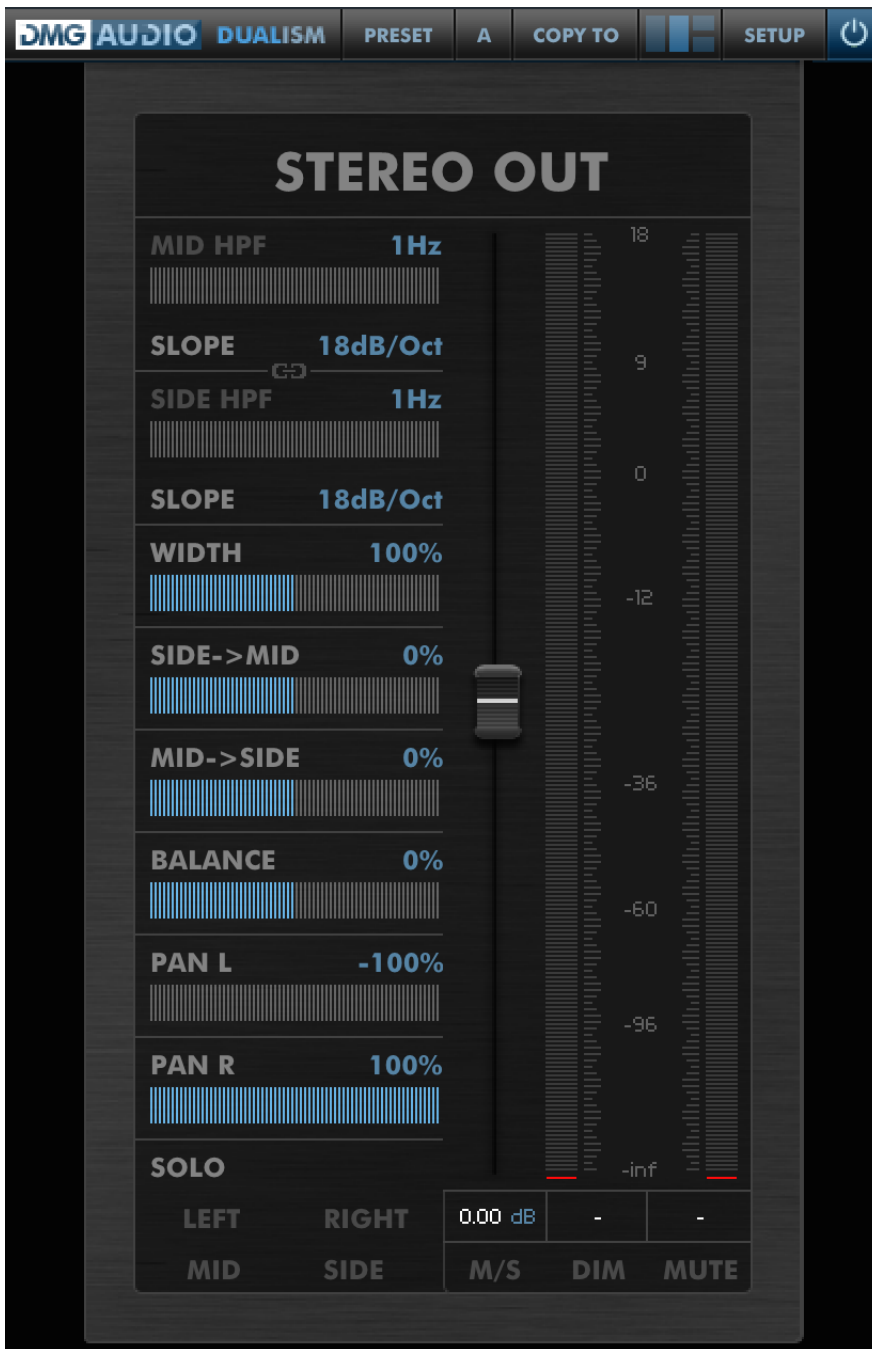
When two inputs are used, Dualism also offers some extra controls.

Flip flips the 1 and 2 inputs onscreen.

Delay introduces a delay between inputs 1 and 2. The delay is a simple sample delay, and positive values will cause input 1 to be delayed. Negative values will cause input 2 to be delayed. This can be used either as a sample delay for the channel, or to compensate for a timing offset between inputs 1 and 2.

Crossfader allows you to crossfade between the two signals, for A/B comparison of the signals, null testing (using phase inversion on one signal), or creative uses.

4 Output



4.1 Processing

At the top of the Output strip, the text label (**Stereo Out** by default) can be used as a scribble strip for the instance, and also forms the name of the instance used to locate it for overlay of graphs in other instances.

4.1.1 High-pass filters

Mid HPF and **Side HPF** allow you to high-pass filter the input signal. The striped fader and textbox both show the current cutoff frequency. At 1Hz, the filters automatically disable to save CPU. Above 1Hz will automatically enable the filters, although clicking the **Mid HPF** or **Side HPF** buttons can still be used to bypass/enable them. Side HPF is often used to narrow the stereo image below a certain frequency (to ensure mono bass).

Slope is adjustable from 6dB/oct to 48dB/oct in 6dB/oct steps. The filter type used is the standard frequency-unnormalised coincident pole style, which is ubiquitous in audio equipment, but means that the -3dB point varies depending on the **Slope** setting.

The HPF Link button will link the UI controls, so adjusting one HPF will automatically adjust the other and keep it in sync. When this button is engaged, the HPF acts like the standard HPF on a desk.

4.1.2 Stereo Matrix

Width adjusts the width of the stereo image from mono to 800% of original source width. This is done by adjusting the gain of the side channel in a stereo matrix.

Side->Mid allows you to route the Side (stereo information) in the signal into the Mid (mono information).

Mid->Side allows you to route the Mid (mono information) in the signal into the Side (stereo information).

These two controls allow a huge amount of control over the repair of imperfectly recorded stereo signals. For instance in cases where a stereo microphone pair has been slightly misaligned, these controls allow you to undo the misaligned mono position.

4.1.3 Balance and Pan

Balance is a standard attenuating balance control, which will attenuate the Left or Right signals to move the energy of a signal left or right.

Pan L and **Pan R** adjust the final stereo position of the Left and Right channels, allowing you to quickly mono a signal, or to push it left or right in the stereo field. The law of these panners can be configured.

4.1.4 Fader and Meter

The Fader is a standard desk-style fader, offering 18dB of boost, down to complete attenuation of the signal. This offers an alternative law of fader (cubic law, as opposed to the linear law on the input faders) for automation riding, or precision level mixing. The value displayed below the Fader shows the current gain or attenuation.

The Meter shows the signal after all the above controls have been applied. As for the channel meters, this can be either a regular PPM/VU style meter or a bendymeter. The values displayed below the meters show either realtime PPM/VU level or peaks, as configured.

4.2 Monitoring

4.2.1 Solo

Soloing **Left**, **Right**, **Mid** or **Side** will allow you to audition parts of the signal. As with the input mutes, these can be combined.

4.2.2 Output control

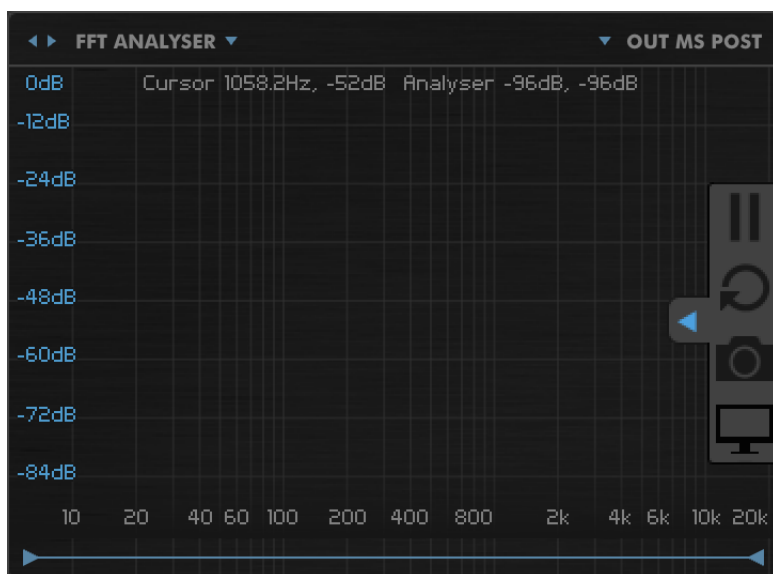
Engaging **M/S** will M/S encode the signal ready to be processed by a unit that expects an M/S signal.

DIM will attenuate the signal for monitoring usage. The DIM attenuation is 18dB by default but can be configured.

MUTE will mute the output signal for monitoring usage.

5 Graphs

5.1 All Graphs

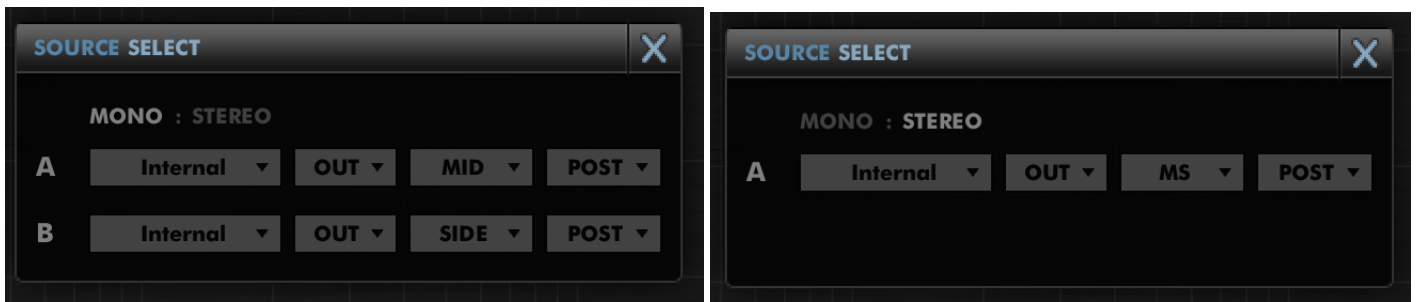


Graphs can be displayed in three different sizes. The image above shows the small (regular) graph size, which allows for display of two simultaneous graphs.

5.1.1 Header

In the header, two left/right arrows allow you to quickly jump through different types of graph. The menu to the right displays the name of the current graph type and offers a dropdown menu for graph selection.

On the right, the name of the signal or signals being displayed is shown. Clicking the dropdown will open the Source Selection window.



Dualism allows monitoring signals at a variety of points in its processing chain, in addition to the import of external signals from other instances.

Some graph types can display only mono signals, some can display only the signals from a stereo pair, and others can display either two independent mono signals or a stereo pair.

For graph types with two independent mono signals clicking **Mono** allows you to pick two separate sources for display, and clicking **Stereo** will allow you to pick two channels from the same signal in one go.

The left-hand menubox allows selection of which Dualism instance will provide the source. Internal refers to the instance you are currently editing. The next box allows selection of input signals 1 and 2, or the output signal.

For selecting mono signals, the next box allows choice of Mid, Side, Left or Right signals. Selecting stereo signals allows choice of either the MS-encoding or the LR-encoding of the signal.

Finally, the Pre/Post selector allows you to pick the pre-processing or post-processing feed for the signal.

For graphs that do not allow free choice of independent signals, only the appropriate options will be shown.

In full screen mode, the header also includes a close icon, and if you have multiple monitors connected, a selector to choose which screen the graph should be shown on.

5.1.2 Tools

Dualism offers a small tray of tools for each graph. These tools allow you to pause/resume the feed to the graph, resetting of the display, taking screenshots, and moving to a fullscreen display of the graph.

Double-clicking a graph will transfer to a larger display (small to large, large to fullscreen), while alt-double-clicking will jump to a smaller display.

Shift-clicking the graph acts as a shortcut for screenshots. Screenshots will be saved to your desktop, under the name "Dualism Screenshot <number>.png", and will match the current size of the graph.

Control/Apple-clicking the graph acts as a shortcut for pause/resume.

Many graphs respond to the mousewheel and being dragged with the mouse.

5.1.3 Big Graphs

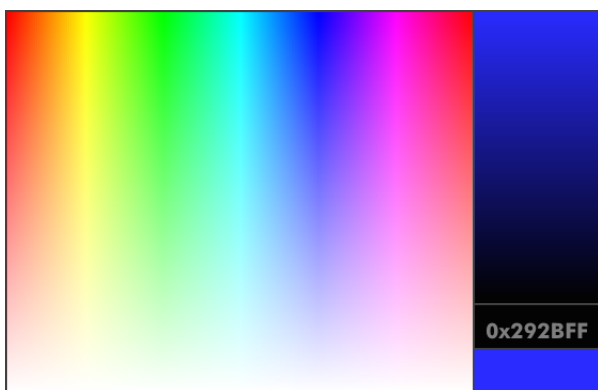


In Big or Fullscreen graph modes, options for configuring the graph are displayed in a scrollable box below the graph. The usage of these options is discussed per graph, and can allow a huge degree of configurability.

These settings can also be displayed in the Setup window, but are hidden by default (see Global Prefs).

Right-clicking this section opens a menu to allow quick propagation of settings between graph types.

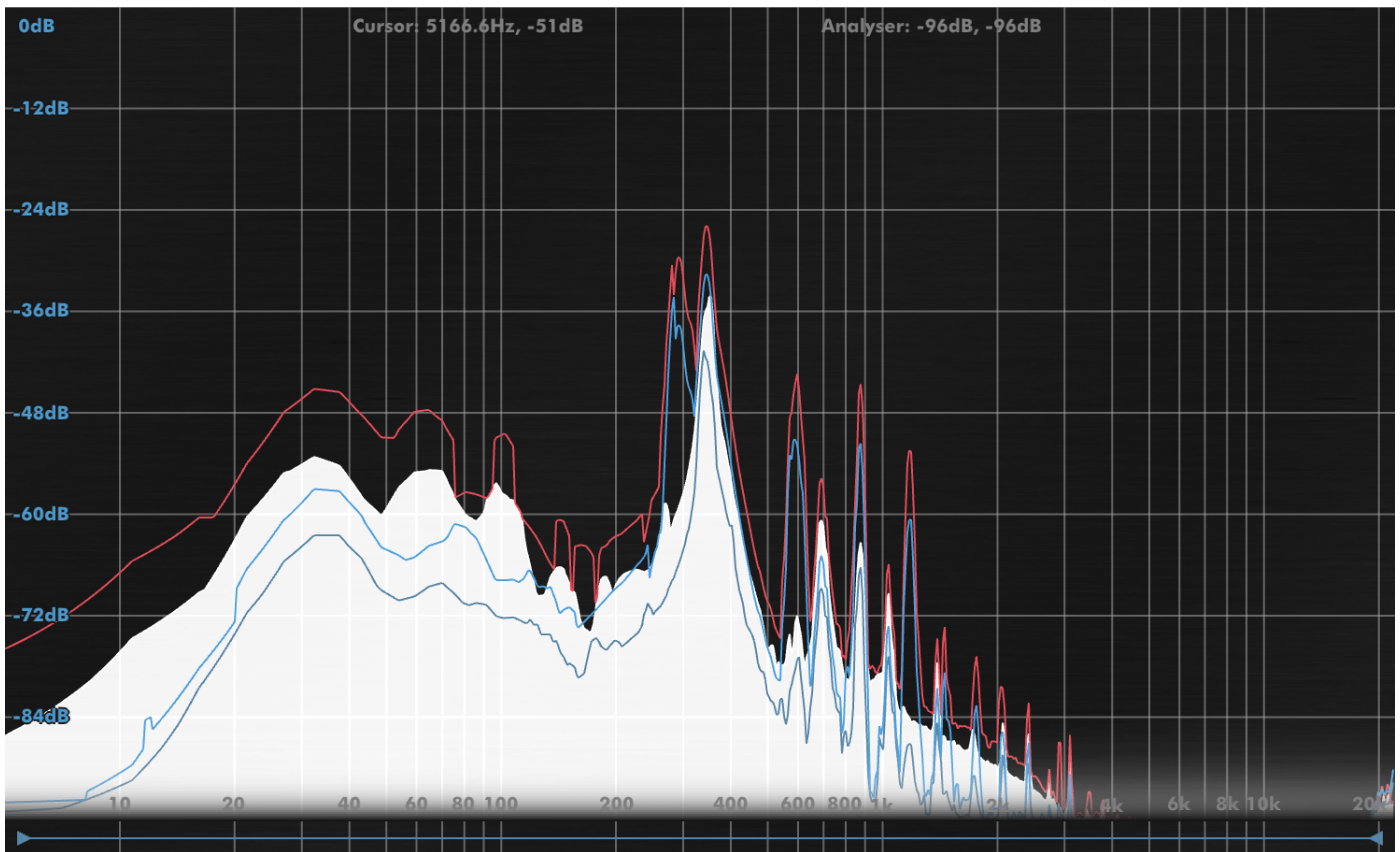
Copy All Settings and **Paste All Settings** allows you to quickly copy all semantically meaningful settings between graph types. **Propagate To All Graph Types** will push all appropriate settings to all other graph types in one click. This can be used to quickly propagate a colour scheme or decay time preference.



Finally, many graphs allow you to choose coloration using a colour picker. Clicking the left-hand box allows you to select a colour. Clicking in the strip on the right allows you to brighten/darken the colours displayed in the left-hand colour box. The hex code is displayed in an editable textbox for easy recall/setting, and a small swatch of the chosen colour is shown bottom-right. Clicking anywhere outside the picker will close it.

5.2 FFT Analyser

5.2.1 Overview



The FFT Analyser shows you the instantaneous spectral makeup of your signal. It can display two channels of information simultaneously, alongside peak information.

The analyser implemented in Dualism is an 8192-point overlapped-block design, using a hand-tuned Kaiser window.

5.2.2 Mouse/Wheel Control

The mousewheel can be used to zoom in and out on a region of interest.

When zoomed, dragging left-right can be used to move the range of frequencies shown.

Dragging up-down will adjust the maximum peak height shown on the graph.

The scrollbar at the base of the screen allows fine control over the zoom in frequency.

5.2.3 Preferences

These preferences form the default conventions for other graph types, so this section is worth a careful read to shed light on other types.

The rendering of the primary curve in the analyser is controlled by the (colour) Scheme preference. At its simplest, you can pick High, and use the “High Colour” colour picker to select a display colour. Lo->Hi will fade between Low and High colours based on the level of the band. By Freq will impose a hue-by-frequency scheme over the display. F&L->H (Frequency and Low->High) allows you to pick high and low colours. The hue-by-frequency scheme will be used, but the intensity of the colour will blend between the brightnesses of the Low and High colours.

Opacity sets the opacity of the filled area under the curve. Background configures the brightness of the axes behind the graph. Fade allows you to select whether the bottom of the graph is faded to enhance legibility of the frequency labelling. When disabled the labels will be stroked with a black outline.

Decay controls the rate of decay of instantaneous level. Increased decay eases readability of the curve at the expense of instantaneous accuracy. Peaks are always shown.

Max dB and Range determine the highest and lowest values shown on the graph.

Tilt will rotate the graph. Positive tilt values increase the displayed level of high frequencies. At 0dB, white noise is shown flat. At 3dB, pink noise is shown flat.

The Bars setting allows you to have the filled curve drawn full height, and assumes that you will use Lo->Hi to show intensity information.

Display 1 determines whether the primary signal is drawn as outline, filled, or both.

Display 2 allows you to disable the secondary signal, or draw it as outline, filled or both. It's drawn using Colour 2.

Smoothing averages readings between bands to smooth the curve for ease of reading at the expense of accuracy.

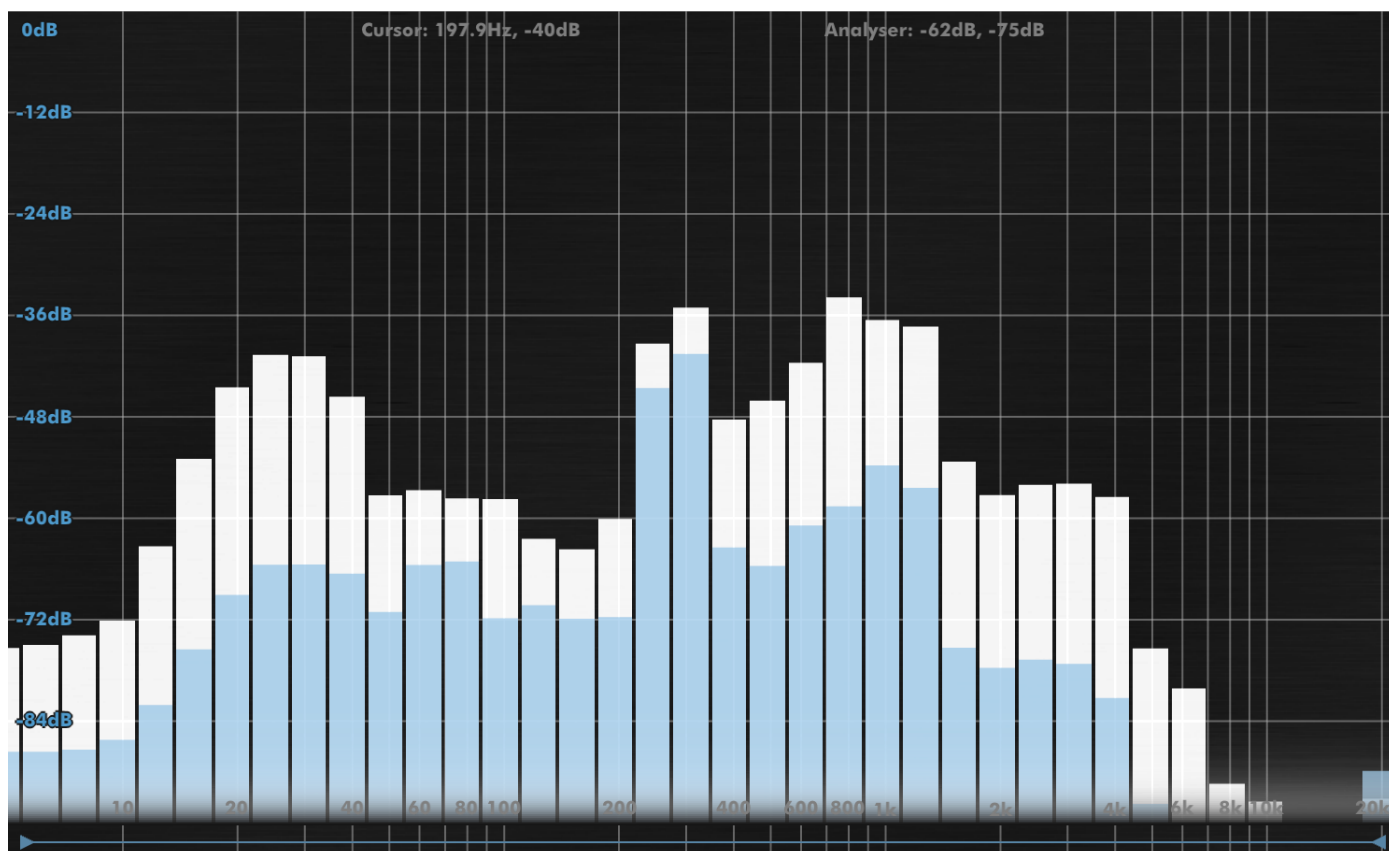
Basis determines whether the FFT is displayed in traditional Log format (where octaves have equal width onscreen) or Linearly, which can allow greater insight into high frequency behaviour.

Peaks can be hidden, shown for a number of seconds, or shown until clicked to reset.

The colours for both peak displays can be chosen with Peaks Col 1 and Peaks Col 2.

5.3 1/N Octave

5.3.1 Overview



The 1/N Octave analyser is a reformatting of the data from the FFT Analyser into octave, 1/3rd octave or 1/12th octave bands. It is not an RMS analyser (described below), but is extremely convenient for quick analysis.

5.3.2 Mouse/Wheel Control

As FFT Analyser.

5.3.3 Preferences

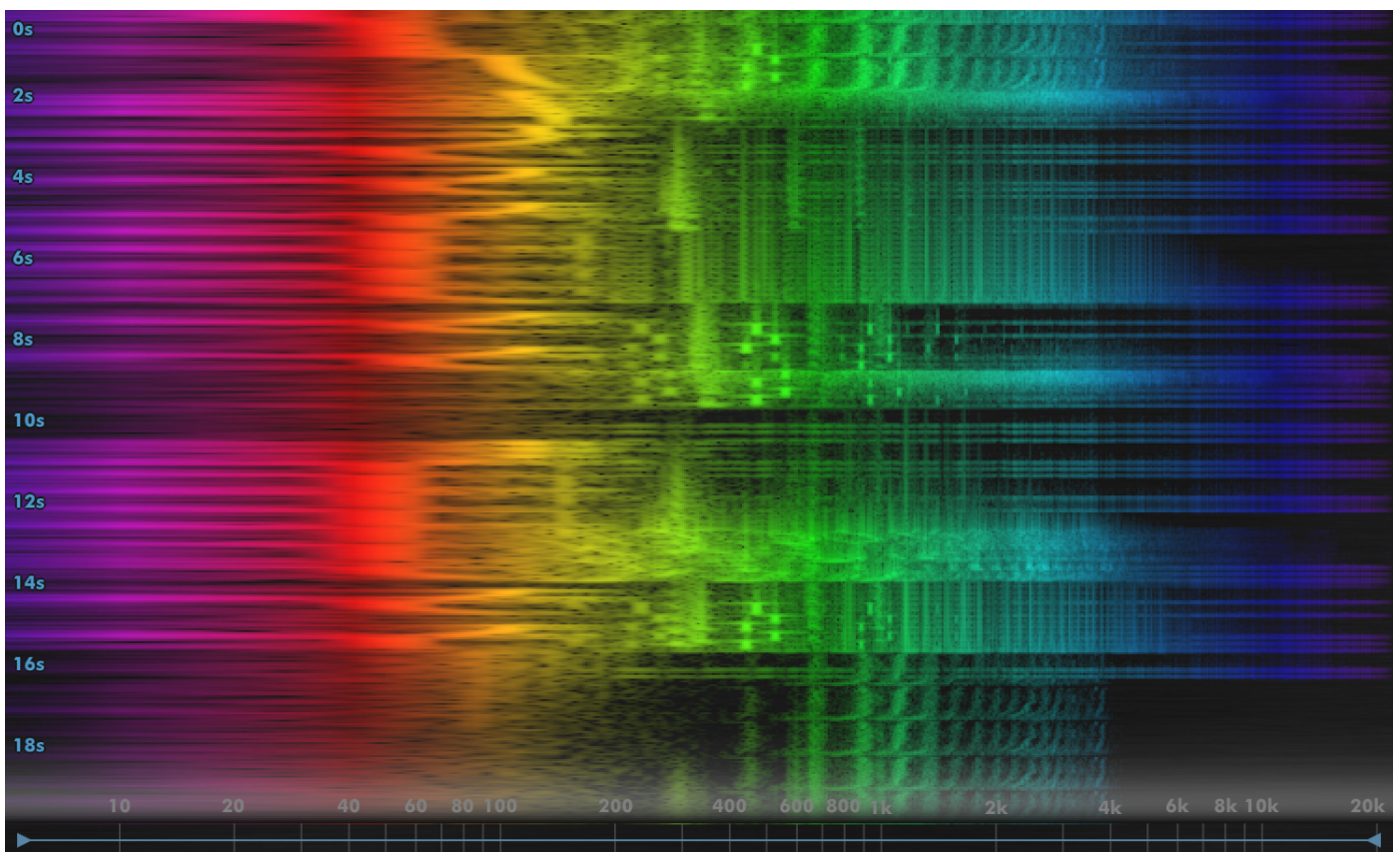
The Subdivisions preferences allows you to select the number of divisions per octave to be shown, from 1, 3 and 12.

Alignment allows you to pick how the bands are aligned in frequency. For one octave subdivisions, the alignment determines whether the octave is considered to start at A or C, or is unaligned.

Other preferences follow the FFT Analyser.

5.4 2D Spectrograph

5.4.1 Overview



The spectrograph shows a scrolling display of frequency information over time. It can be configured to visualise individual notes, or to view broader balance of audio.

The 2D Spectrograph visualises a single mono signal.

5.4.2 Mouse/Wheel Control

As FFT Analyser.

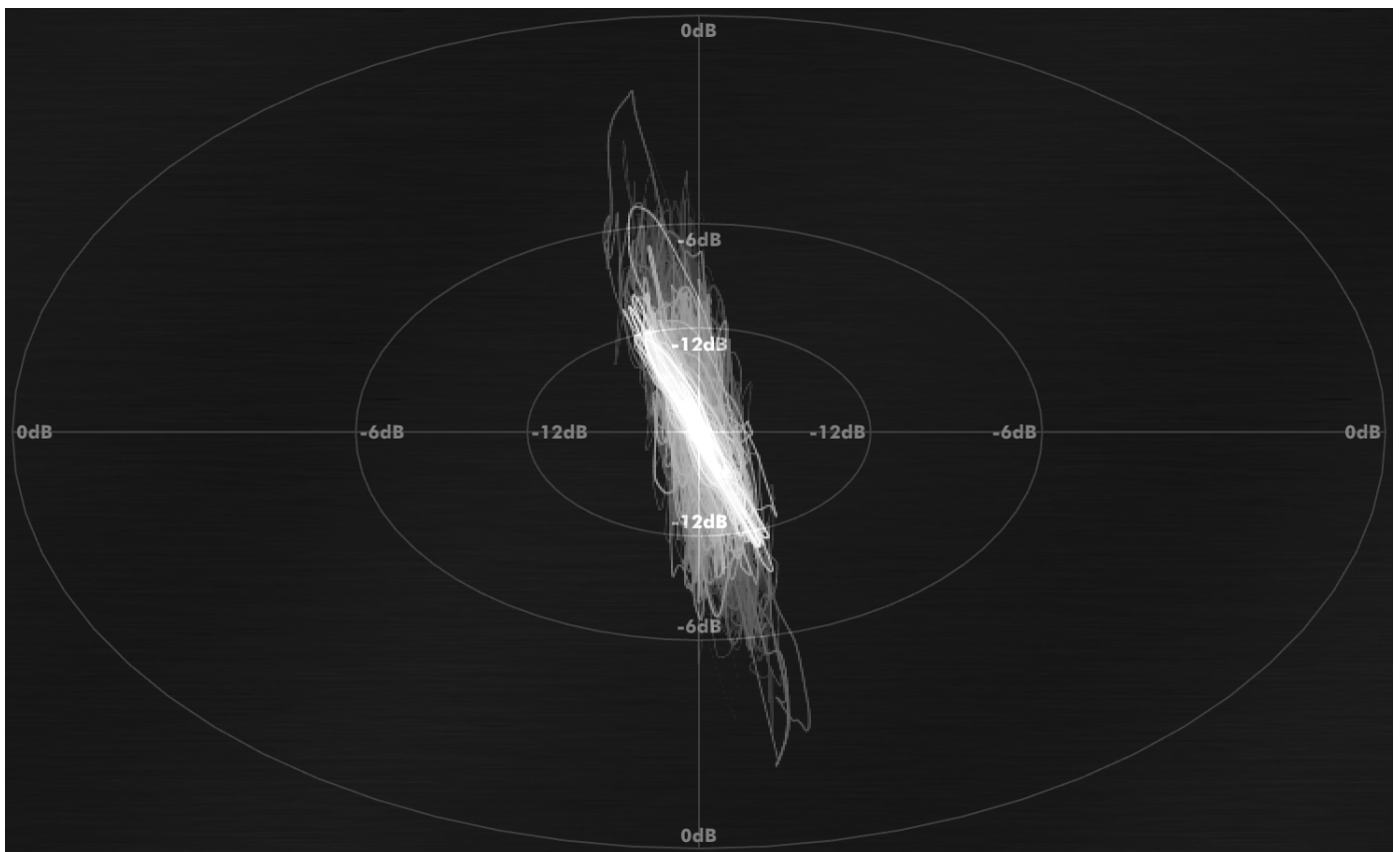
5.4.3 Preferences

The Duration setting allows you to pick the duration of the spectrograph that's shown onscreen, in seconds.

Other preferences follow the FFT Analyser.

5.5 Lissajous

5.5.1 Overview



A Lissajous is essentially an oscilloscope where a secondary signal drives the X-co-ordinate of the oscilloscope trace. It can be used to visualise stereo width of a signal, as it forms a balance between stereo image display and a more general-purpose oscilloscope.

The Lissajous requires a stereo input signal.

5.5.2 Mouse/Wheel Control

None.

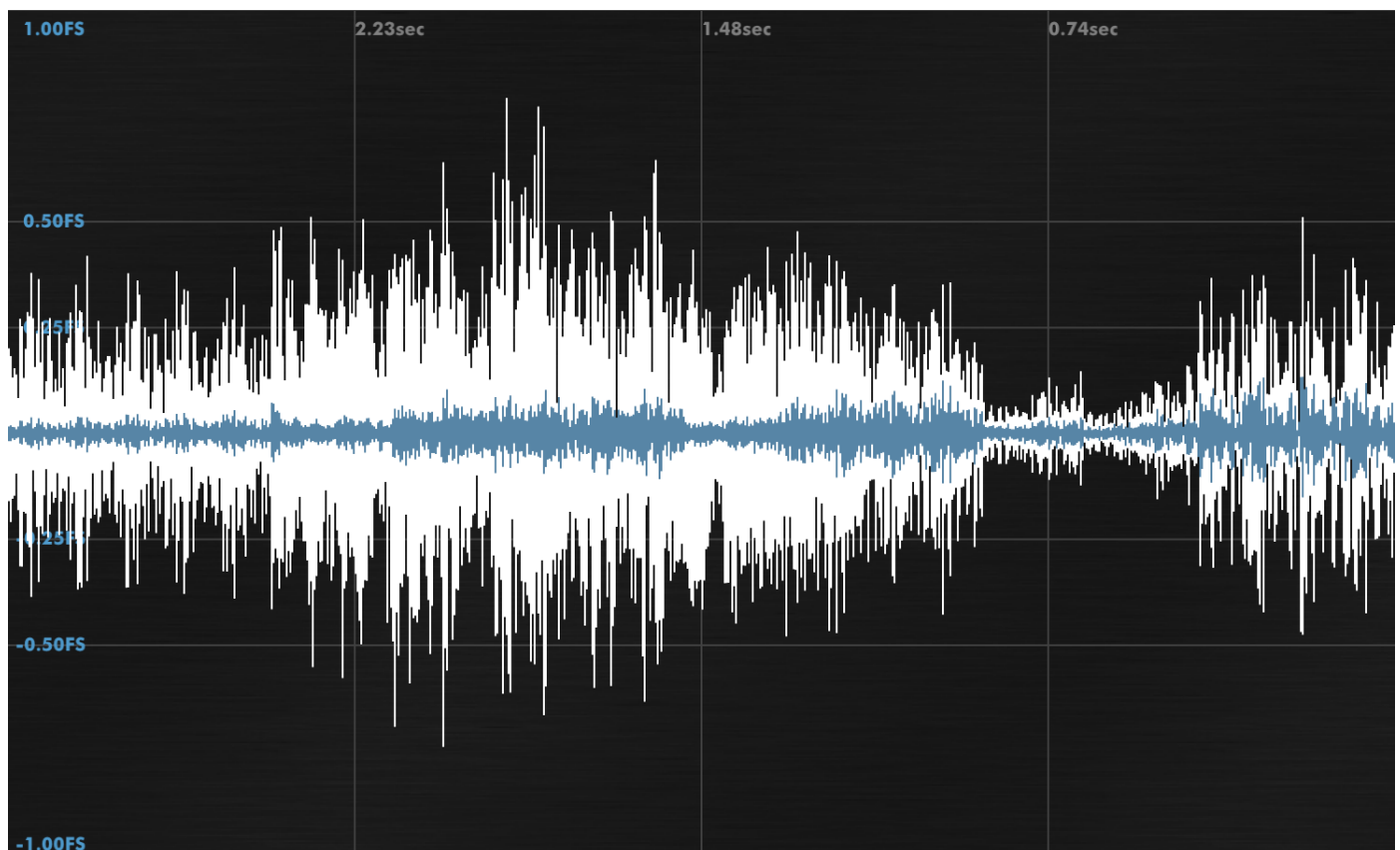
5.5.3 Preferences

The colour scheme for the Lissajous will blend between the Low and High colours as level increases. Opacity determines the draw opacity, and decay determines how fast previous values fade from the display (analogous to phosphor fade with an oscilloscope).

The Style determines whether values are joined by lines or plotted as individual points.

5.6 Scope

5.6.1 Overview



The oscilloscope provides a general-purpose oscilloscope for visualisation of signals in the time-domain.

This implementation offers a variety of common uses, from triggered display of periodic signals to display of much broader durations.

5.6.2 Mouse/Wheel Control

The wheel adjusts the period of time shown on the scope.

Dragging left-right also adjusts the time period shown. Dragging up-down adjusts the vertical range of signals to be drawn. When a trigger is in use, dragging up-down allows setting the trigger level.

5.6.3 Preferences

The colour scheme can either show the High Colour, or fade between Low and High colours by signal level. The Opacity determines the opacity of the drawn signal.

Max dB reflects the range of level that will be shown on the scope. This value is adjusted by dragging up-down.

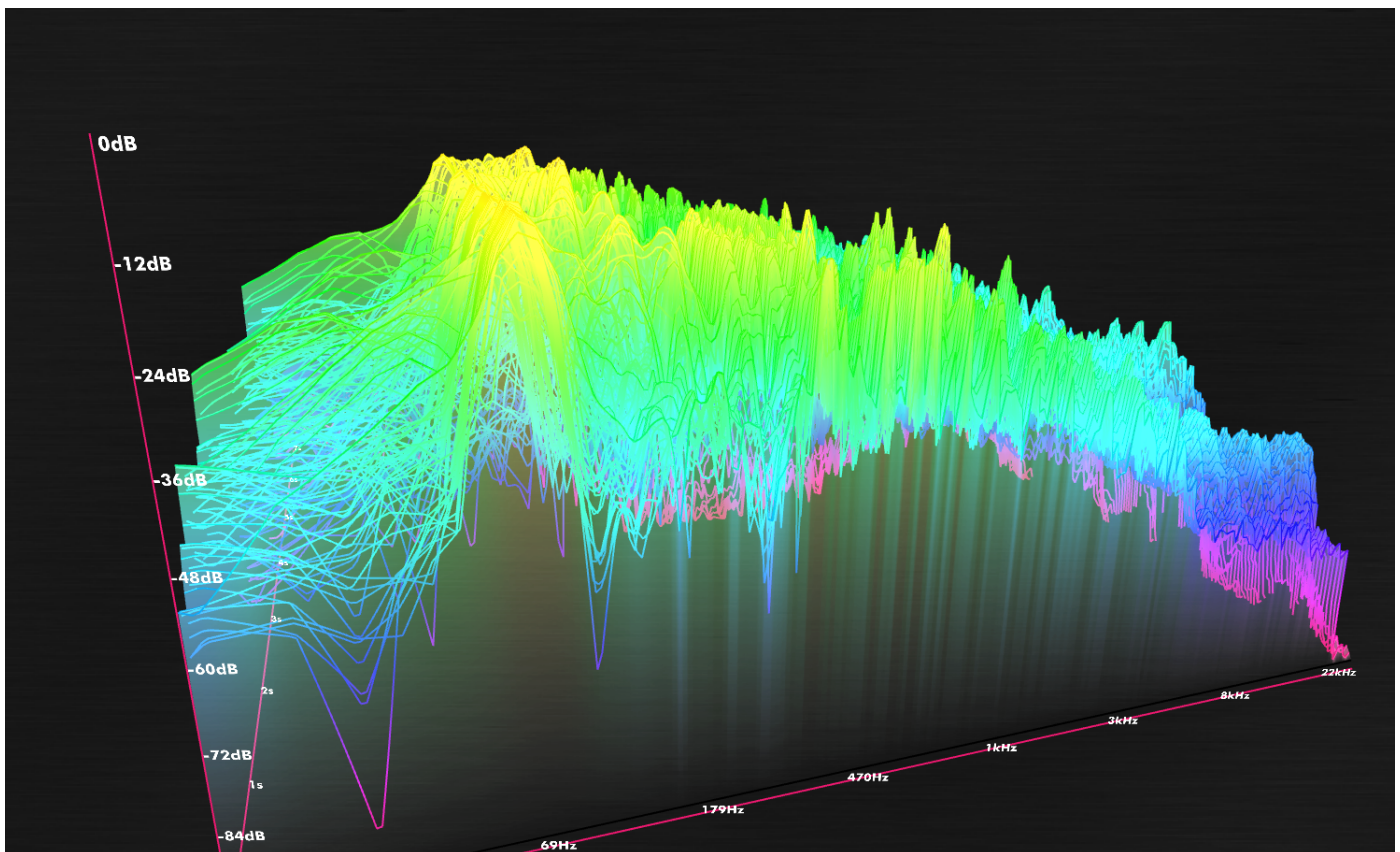
Trigger engages a traditional scope trigger. It is triggered exclusively by the first input signal, and can be either Rising or Falling. When one of these options is selected, the trigger level is drawn as a horizontal line on the scope.

Untriggered determines what the scope should draw if the trigger has been configured, but the signal does not meet it. Freeze will hold the graph in position, while Clear will empty the scope display.

Signal 2 can be enabled or disabled and is drawn in Colour 2. When engaged, the second signal can be displayed superposed or below the primary signal (both at half height).

5.7 3D Spectrograph

5.7.1 Overview



The 3D Spectrograph is a three-dimensional rendering of the 2D Spectrograph, which allows for a surprising amount of insight into the spectral and temporal makeup of a signal. It renders a single mono signal.

It is possible to lose significant amounts of time to this type of analysis, and it's likely that we would have been able to release the product many months sooner had we not been staring at this graph. Gawping.

5.7.2 Mouse/Wheel Control

Wheel zooms. Mouse up-down tilts the display up-down. Mouse left-right rotates the image.

5.7.3 Preferences

Colour scheme and analysis preferences follow the FFT Analyser conventions.

Flip Freq swaps left and right on the graph.

The shape rendered is composed of Surface and Mesh. The surface can be disabled to render only the Mesh, can use Blackout style to provide opacity for the Mesh, or can be rendered as a full Surface. The Mesh can be disabled, rendered as ridges along the frequency axis, or displayed as a wireframe net. Both Surface and Mesh have Opacity settings.

Axes determines whether the axes are shown or hidden.

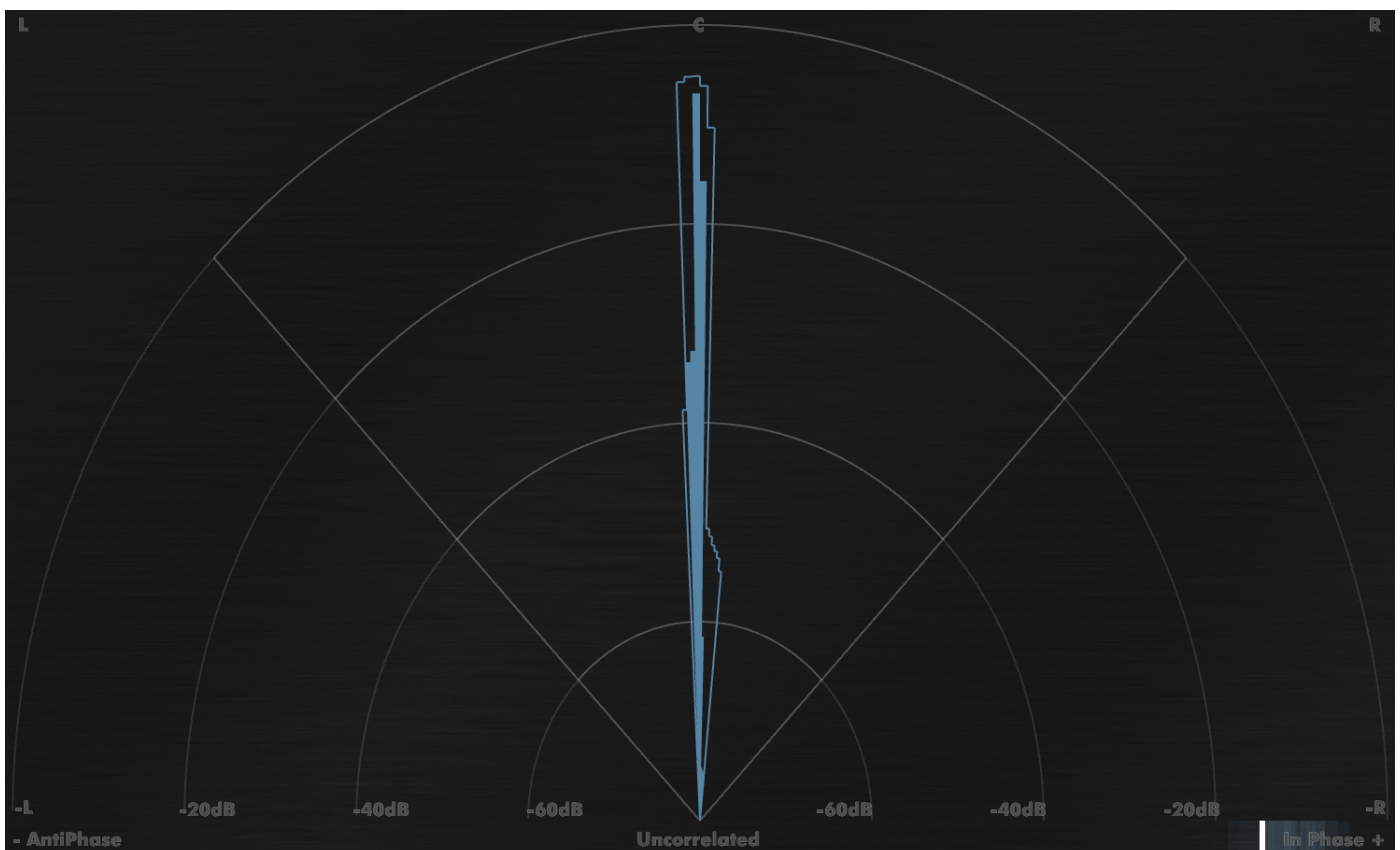
Z-Scale allows stretching of the time-axis onscreen to fit the aspect ratio of your display, or to allow you to zoom deeper in.

Time scales the duration of audio to be shown onscreen.

Freq Sub allows you to reduce the resolution of the frequency information for simpler readouts at the expense of accuracy.

5.8 Phase Meter

5.8.1 Overview



The Phase Meter provides a map of the stereo field, so you can watch stereo movement of elements in a signal. The display renders directly up as mono, hard left and hard right at 45 degree offsets,

and anti-phase data to the extremes. It requires a stereo signal source.

At the base of the Phase Meter is a small correlation meter to show the correlation of the signal.

5.8.2 Mouse/Wheel Control

Clicking resets any peak values shown.

5.8.3 Preferences

The Mode determines whether the graph collates the information to provide an overall direction at an instant (Max), or shows you an averaged set of directions (Avg). In Avg mode, the spread is controlled with the Averaging parameter.

The Decay setting determines how quickly old values decay from the meter.

Peaks can be shown, and Peaks Colour determines their colour.

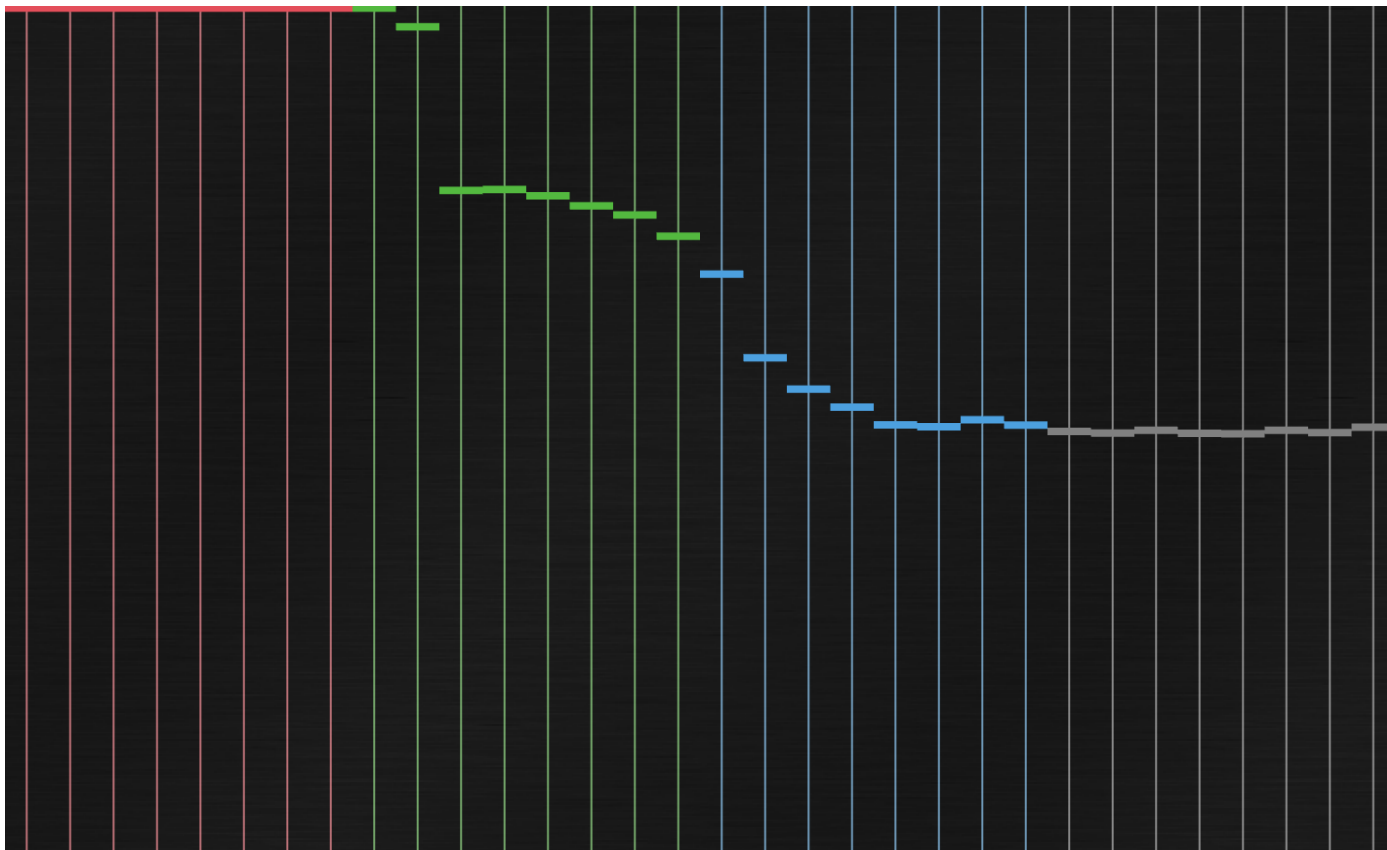
The Scheme determines whether data is drawn in the High colour, or blends from Low to High by intensity.

Opacity determines the opacity for drawn information between hard left and hard right.

Opacity Off determines the opacity for drawn information that is out of phase.

5.9 Bit Scope

5.9.1 Overview



The Bit Scope provides a display of the bits in use in a bitstream. It displays a single mono source,

and care must be taken that the source provided has not been pushed through any unintended processing. It can be used to visualise information density in a stream.

Unused bits are displayed as boxes at the top of the screen. Active bits show as levels which reflect their averaged values over time.

5.9.2 Mouse/Wheel Control

Clicking resets the meter.

5.9.3 Preferences

Mode determines how the analysis is performed. In Normal mode, the raw data is shown. In Abs, the data (Two's complement) is converted to absolute value. This prevents movement of sign bits. Mask is similar to Abs, but simply disregards movement of any bits above the topmost sign bit. Diff meters the difference between each bit and the bit above.

The colour scheme is either RGBK8 (red, green, blue, grey, for each block of 8 bits), or a chosen Colour. Opacity selects the opacity of the drawn data.

Decay sets the timebase for the averaging when displaying average bit values.

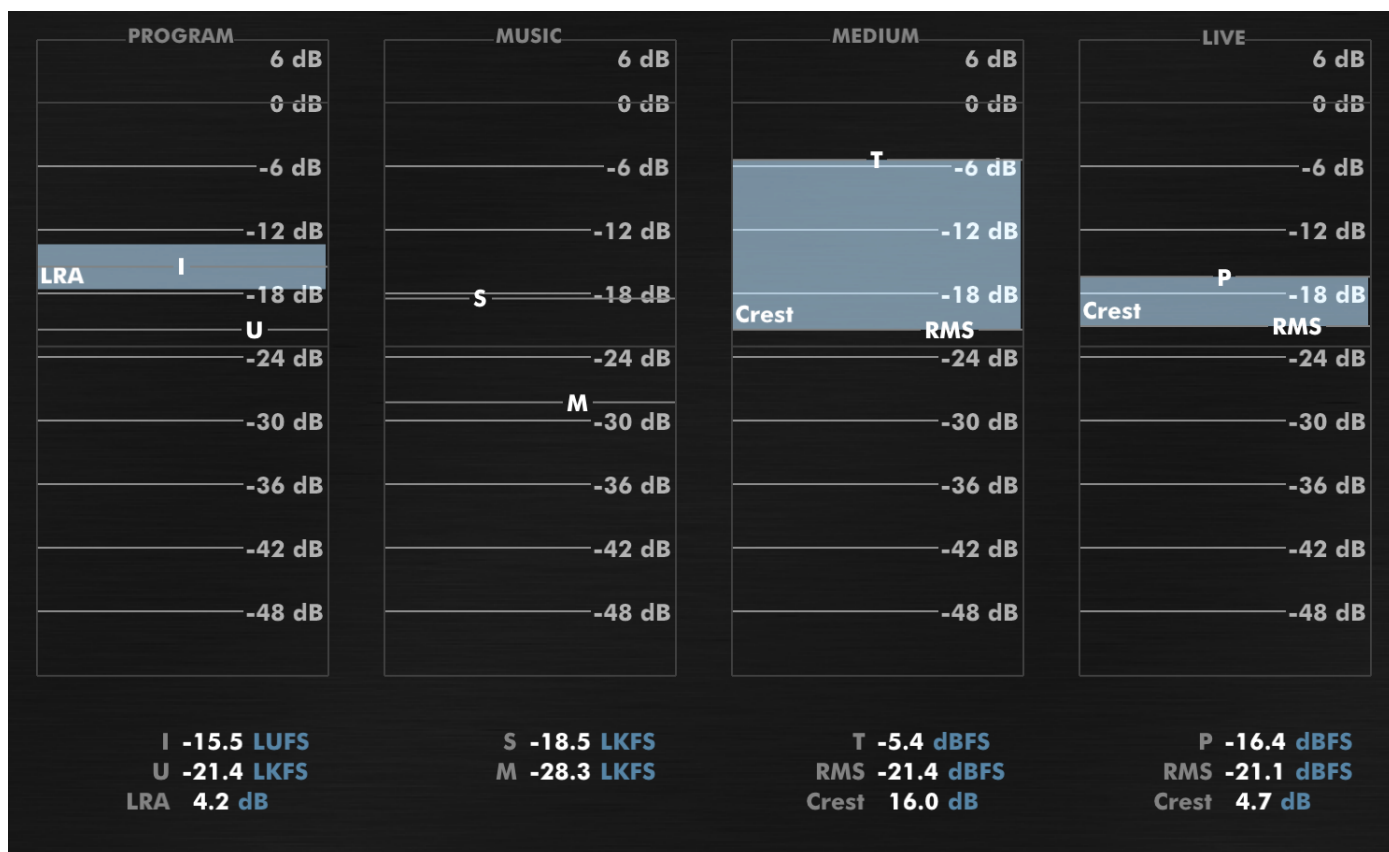
Show Range adds a display of the minimum and maximum bit values seen (to immediately identify stuck bits in a feed).

Show Markers adds labels either every bit or every 8 bits.

The Bits preference picks which bits will be shown. +8->-24 will draw 32 bits; 8 above 0dBFS, and 24 below, corresponding to the broad range of values seen in audio work. 0->-24 will hide the 8 bits above 0dBFS, 0->-16 will draw only the 16 bits below 0dBFS, and +8->-16 will draw 8 bits above 0dBFS and 16 below.

5.10 Loudness Meters

5.10.1 Overview



The Loudness Meters provide a set of statistics for your audio, from conventional Peaks to the new ITU1770 loudness standard figures. It is split into four domains.

Program provides the EBU r128 Integrated loudness statistic (I), the ATSC A/85 Ungated loudness statistic (U), and the EBU r128 LRA statistic.

Music provides the ITU1770 Short-term (S) statistic, and Momentary (M) statistic.

Medium provides the ITU1770 True Peak (T) statistic, includes the ATSC A/85 Ungated loudness statistic as RMS, and displays the Crest factor as their difference.

Live provides a traditional PPM and RMS measurement, and displays the Crest factor as their difference.

5.10.2 On Loudness

In case these specifications don't mean anything to you yet, we provide here a very quick introduction to these terms. Traditionally, audio metering has been based on PPM or RMS meters (also provided here), which respond to voltage, and do not provide a good perceptual match to human experience of loudness. The ITU set about working out a remedy to this. The first stage towards this was to define more precisely how to take an RMS measurement, and to compensate for the fact that different frequencies are experienced as having different loudness.

The latter part was resolved with what's known as the K-weighting filter, which includes a high-pass filter at roughly 60Hz, and a high shelf at about 1.5kHz with about 4dB of boost. This simple filter has proven remarkably effective in listening tests at compensating for the frequency-nonlinearity of the ear.

The RMS measurement was now to be performed on K-weighted audio. Signals were to be processed per-channel, and then squared and summed. The RMS mean is computed over some number of samples. When that number of samples equates to 0.4 seconds, we call that the Momentary (M) statistic. It has the feel of a traditional PPM meter, but maps better to perceived loudness. When that number of samples corresponds to 3 seconds, we call that the Short-Term (S) statistic. It has the feel of a traditional RMS meter. The benefits are increased correlation with human experience of loudness, and unambiguous, clear definition as to how they are computed.

You can watch and compare the Music and Live sections to compare the new ITU1770 measurements with traditional Peak/RMS readings.

The ITU (and the EBU and the ATSC and many others!) also had a requirement to be able to measure the loudness of an entire program with a single number. Historically this would literally have been a TV program or radio program. It has since expanded to film, and it is expected to transition to music very soon.

Obviously a peak or an RMS meter respond in real-time to audio information, so some further processing was required. The ITU came up with two solutions. One was to compute the RMS of the entire K-weighted (filtered) signal. This is the Ungated (U) signal, as used by ATSC A/85, and is written down as a figure in LKFS (with the understanding that LKFS means dBFS for a signal that has been measured as ITU1770 ungated).

The second solution the ITU proposed was to record all Momentary (M) readings for the duration of the program, at a minimum of ten per second. Any readings below -70dB are discarded, and the average of what remains is computed. Then subtract 10 from that figure, and discard any readings below that number, and recompute the average. This is known as the Integrated (I) (gated) loudness, as used by EBU r128. It is written down as a figure in LUFS (with the understanding that LUFS means dBFS for a signal that has been measured as ITU1770 integrated).

Whilst I and U figures are displayed in realtime, they are only ever meaningful once an entire program has been played through them.

The EBU wanted a further statistical measurement for a complete program, to measure the perceived dynamic range. This is the LRA statistic. It is measured by recording all Short-Term (S) readings for the duration of a program and discarding any readings below -70dB. They are then compiled into a histogram, where the top 5% and bottom 10% are discarded. The difference between the highest and lowest values remaining is the LRA figure, and is a figure in dB (no units, since it's a ratio).

Finally, True Peak is an estimation of the maximum instantaneous level of a digital signal after it has been played through a DAC. It is possible for a digital audio signal which does not clip to represent a signal that does clip in the analogue domain. This is measured by simply upsampling the audio and measuring peak levels.

The Dualism loudness meters pass all ITU1770 and EBU r128 calibration tests.

5.10.3 Mouse/Wheel Control

None.

5.10.4 Preferences

Fill Colour sets the colour for statistics drawn as boxes (LRA/Crest).

Label Colour sets the colour for the readout text.

Target allows you to set the Loudness Target calliper for the graphs.

Clip Level allows you to set the Clip Level calliper for the graphs.

Marker Opacity sets the opacity for the markers behind the meters.

5.11 Loudness History

5.11.1 Overview



The Loudness History allows you to visualise the ITU1770 K-weighted Short Term loudness over the duration of a block of audio, combined with an EBU r128 histogram of the LRA data. These terms are discussed in the Loudness Meters section. All values shown are LUFS ITU1770 K-Weighted Short-Term measurements.

Loudness History measurements never translate to accurate ATSC A/85 or EBU r128 integrated statistics. They provide a way to measure perceptually-weighted loudness over the course of a recording, for the purpose of providing feedback that can be used to dynamically process data towards meeting your targets.

The Loudness History requires a stereo input signal.

5.11.2 Mouse/Wheel Control

Dragging left-right adjusts the time-scale shown. Dragging up-down allows you to move the target loudness calliper.

5.11.3 Preferences

Colour 1 sets the colour for the Short-term loudness curve. Colour 2 sets the colour for the Variance window. Opacity configures overall drawing opacity.

Target sets the loudness target calliper level, which is displayed over the graph for easy checking of when the signal is above and below target.

When enabled, Variance computes an EBU r128 LRA statistic from the individual (very-short-term) values that have contributed to the last Short-term loudness measurement. This is displayed as a range behind the Short-term loudness curve.

Histogram shows or hides a histogram of the Short-Term loudness measurements that have contributed to the overall LRA measurement.

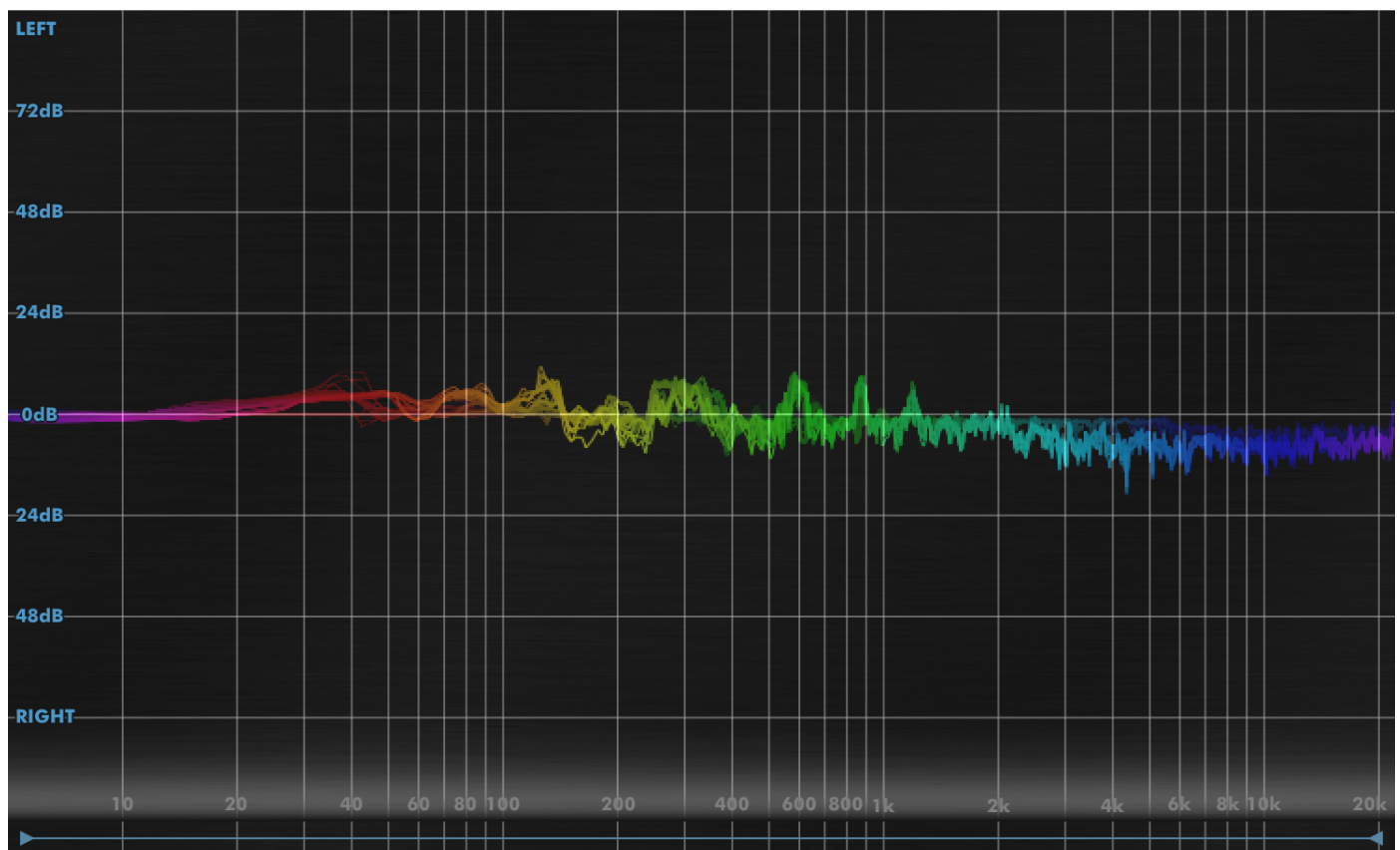
Labels set to Abs labels the graph relative to 0dB. Set to Target, the labels are relative to the target loudness calliper.

Hist Style switches the histogram from a regular distribution function to a cumulative distribution.

Max dB and Range set the range of loudness shown.

5.12 Phase Spectrum

5.12.1 Overview



The Phase Spectrum renders the instantaneous difference in stereo position by frequency.

It can be used to see signals jump left or right, and to see their spectral shape as they do. It also provides a very clear display of stereo width by frequency.

The top of the graph represents 'leftness' and the bottom 'rightness'.

5.12.2 Mouse/Wheel Control

As FFT Analyser, without up-down drag.

5.12.3 Preferences

The Mode picks whether you want to see the offset in dB, or as a correlation percentage.

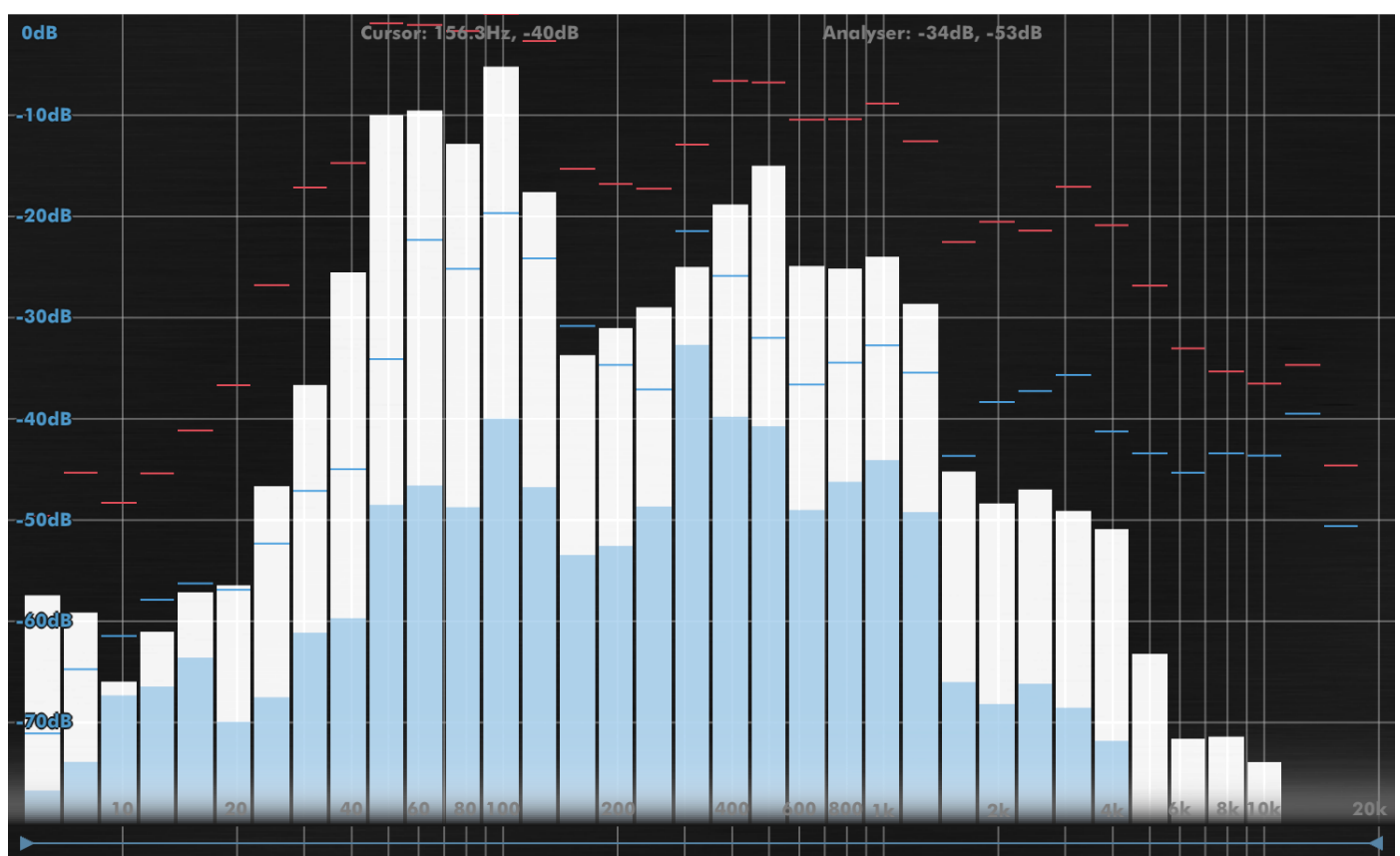
Like the Lissajous, the drawing can be joined lines or dots. The Fade Out parameter also determines the fade time for old drawn values.

In dB mode, the Distance displays the dB distance scale between Left and Right, allowing you to go from broad scale to zoomed right in.

Other preferences follow the FFT Analyser conventions.

5.13 RMS Analyser

5.13.1 Overview



The RMS Analyser is a classic 1/3rd octave analyser design based on overlapping 36dB/oct Butterworth Band-pass filters, with per-band peak detection. This has the advantage of even resolution across the spectrum, and also allows for measurement of per-band crest factor.

The analyser has been normalised to display white noise as flat. This can be reconfigured using the Tilt preference.

5.13.2 Mouse/Wheel Control

As FFT Analyser.

5.13.3 Preferences

Align allows you to choose the alignment of the filterbank. Filters can be centered to align with 1kHz, A (440Hz) or C (261Hz).

Timebase determines the timebase used for the RMS computation. Low values provide very responsive measurements but are harder to read.

Display and Analysis preferences follow FFT Analyser conventions.

The Mode preference determines whether the graph displays conventional analyser curves, or a Density display, which shows the distance from peak to RMS reading (akin to crest factor) per-band. This offers a measurement of the density of a frequency band over the duration of the RMS timebase, which provides valuable information for mastering work.

6 Other UI

6.1 The Menu Bar



The menu bar is a largely-fixed set of controls for administering tasks around your work.

6.1.1 Preset

Pressing this button will pop out the Preset tray. See “Presets”.

6.1.2 A/B and Copy To

Dualism maintains 8 banks of controls at all times, so you can easily A/B (or A/H) through different variants of your settings.

For example, you might create a curve, then use Copy To to copy it to B, then modify that a little, and keep going to get as many different settings as you want to evaluate. Then you can use the A/B menu to audition each setting.

If you'd like the auditioning process to happen with one click, simply right-click on the A/B button. You can configure whether this toggles between the last two settings you visited, or between all visited.

6.1.3 Layout Button

The Layout button allows you to show and hide sections of the UI. In its default mode, three columns are shown, corresponding to the Input stage, the Output stage and the Graphs section.

Clicking the left-hand-side of the icon will toggle display of the input section. Clicking the right-hand-side of the icon will toggle display of the graph section. Alt-clicking the icon will toggle between single and dual input modes.

When a graph has been zoomed, clicking the layout button will return to the standard three-column layout, respecting your preference for which sections should be shown.

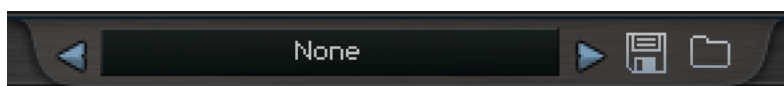
6.1.4 Setup Panel

This opens the Setup Panel, that allows further configuration of Dualism. See "Preferences and Options".

6.1.5 Bypass

The Bypass button bypasses all processing within Dualism, and routes the input (1) directly to the output.

6.2 Presets



Dualism includes a set of presets, which you can add to, to build up your library of settings.

By default, on mac they reside at /Library/Application Support/DMGAudio/Dualism/Presets and on windows, at C:\Program Files\DMGAudio\Dualism\Presets

Saving presets into these folders will allow you to select them from the Preset menu. Don't forget to include these files in your backups.

6.2.1 Previous/Next

These buttons allow you to quickly jump back and forward within the list of presets. They grey out to show you when there's no further to go.

6.2.2 Preset Menu / Name

This shows the Preset name, and you can right-click to modify the name. Clicking here will open the Preset Menu, which is a multi-level menu of all of the presets you currently have saved. You can arrange this folder to suit your needs, but be aware that installing updates will reinstall the factory set.

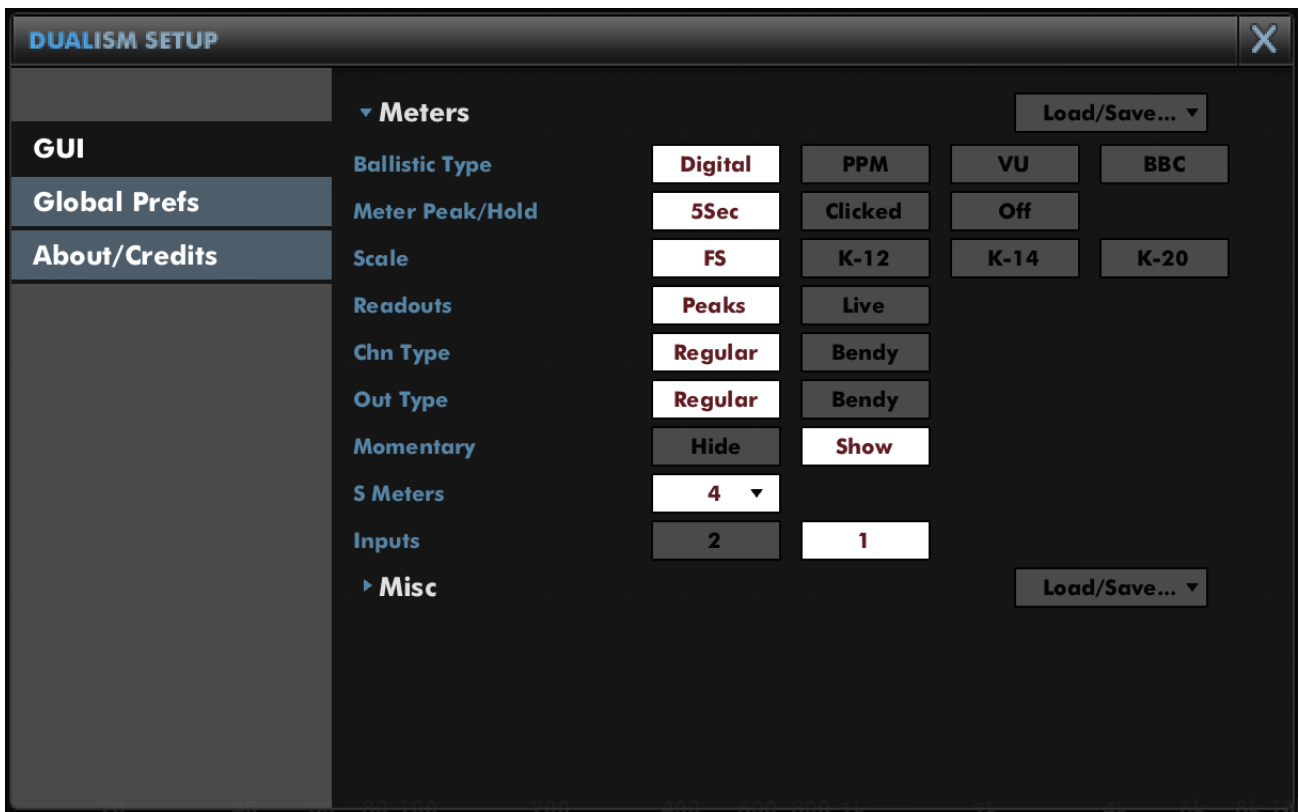
6.2.3 Load/Save

Use these buttons to open a window to save or load presets and/or banks.

7 Preferences and Options

7.1 GUI

7.1.1 Meters



Ballistic Type allows you to pick the ballistics used by the meters when in PPM mode.

Meter Peak/Hold sets the behaviour of peaks for PPM mode.

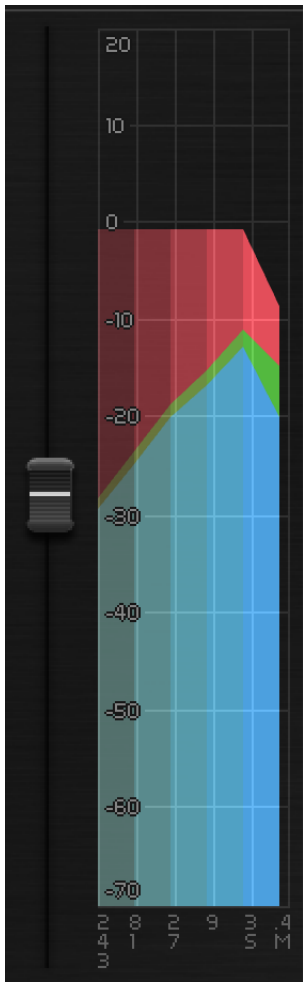
Scale allows configuration of a K-Meter scale for PPM meters, between the K-12, K-14 and K-20 standards.

Readouts determines whether the boxes below the meters will display live readouts, or just show peak levels.

Chn Type and **Out Type** pick whether the Input and Output meters display PPM style meters, or bendymeters.

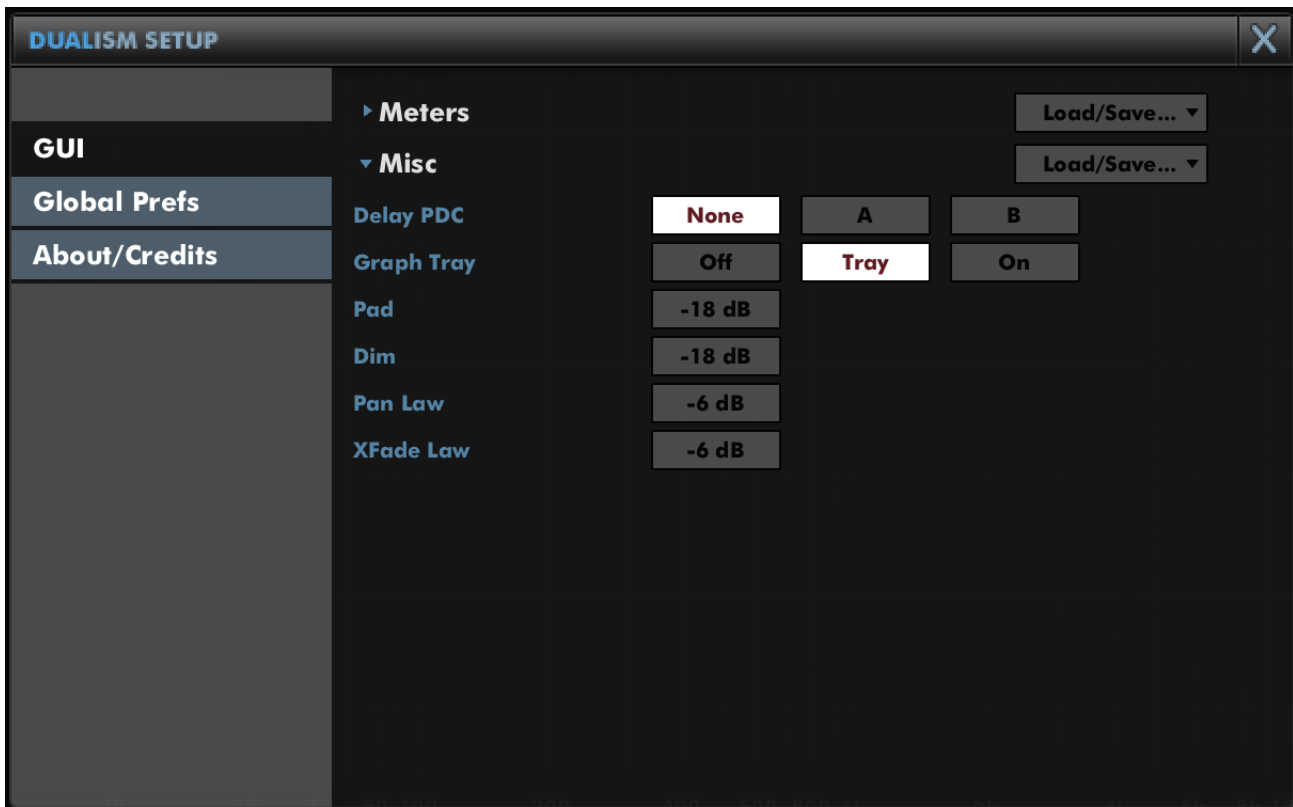
Momentary allows you to show or hide momentary-timebase (0.4sec) metering for bendymeters.

S Meters allows you to configure the number of channels of short-term metering for bendymeters. The default timebase is 3sec, and subsequent meters multiply the timebase by a factor of 3. The timebase is labelled below the readout.



The image above shows a bendymeter including Momentary and five Short-term timebase readouts. The red level shows the peak value (digital peak, not true-peak) over that timebase. The green level shows ITU1770 K-weighted perceptual level over the timebase and blue shows unweighted RMS over the timebase.

7.1.2 Misc



Delay PDC determines how the delay time between the two input channels is reported to the host. Set to None, no delay will be reported. Set to 1, input 1 will be delay compensated, so only positive delay values will be reported to the host. Set to 2, input 2 will be delay compensated, so only negative delay values will be reported to the host.

Graph Tray allows you to show or hide the graph utilities tray, or keep the handle onscreen to allow toggling of its display.

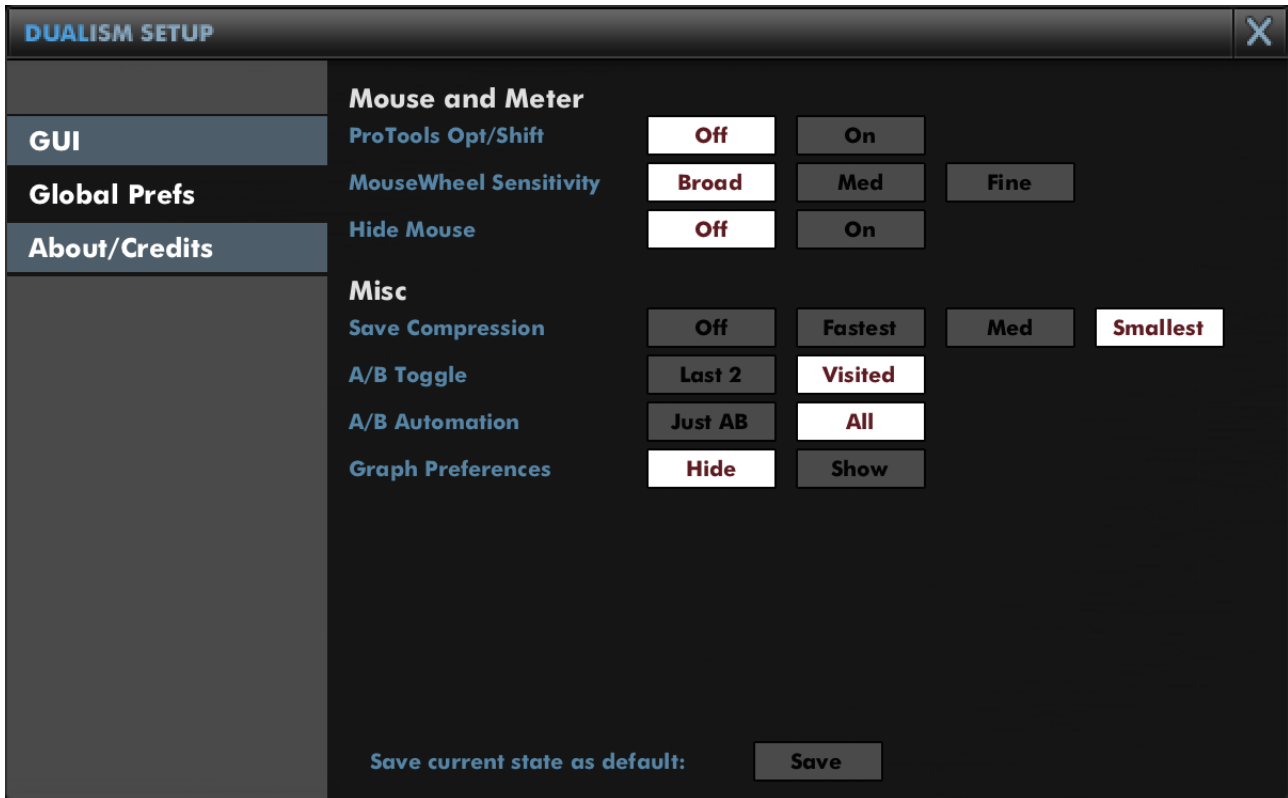
Pad configures the attenuation provided by the input section pad buttons.

Dim configures the attenuation provided by the output monitoring section dim button.

Pan Law allows you to configure the law applied by the pan faders in the output section.

XFade Law adjusts the law used by the input signal crossfader.

7.2 Global Prefs



ProTools Opt/Shift determines whether you expect ProTools style keyboard modifiers (Opt/Alt for reset to default and Apple/Ctrl for fine-adjust).

MouseWheel Sensitivity configures mousewheel response for knobs and textboxes.

Hide Mouse will cause the mouse to disappear while you're adjusting a value to reduce distraction.

Save Compression allows you to adjust the degree of compression used when saving state for a preset or within a session. If you want to text-edit presets, or want fastest-possible save times, switch this Off. By default this is set to Smallest to minimise session file sizes.

A/B Toggle allows you to determine how right-clicking the A/B menu cycles through A/B banks. Last 2 swaps between the last two A/B banks you have visited. Visited allows you to cycle through all A/B banks you've visited so far.

A/B Automation allows you to determine whether changing A/B bank writes full automation to the session, or just records the change of A/B bank.

Graph Preferences determines whether the "GUI" section includes the graph preference groups.

Save current state as default is used to save the state of this instance as the state that new instances will have when created.

8 Troubleshooting

8.1 Get in touch

If you run into trouble, get in touch! We're here to help, after all!

You can visit this page: <http://dmgaudio.com/contact.php>

Or you can just email me: dave@dmgaudio.com