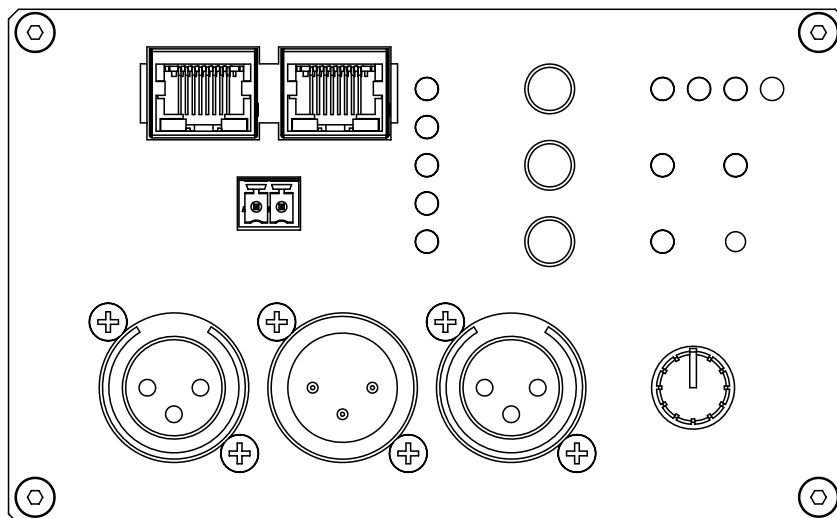


DSP-4

User Guide v1.0



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I Source Selection Options

I.1 Analog and Digital AES3 input via XLR connector

At the DSP- interface section, you can find different input source options that you can choose for your current application. The DSP-4 manages both one analog input, available with XLR connector, and digital inputs available with XLR or ETH connectors (see Connecting inputs). You can connect all type of input sources and later select the source that you want to activate using the Input routing window in Armonia ; alternatively, you can use the input selector button on the control panel (see Interface panel explained). The DSP-4 is able to process only one channel at a time. When a digital AES3 signal is connected, it can be selected as main input. Using Armonia, you can choose which of the two channels the AES3 protocol is able to handle you want to process. There are two types of backup signals available if the AES3 signal is not present:

- ▶ Analog
- ▶ Mute

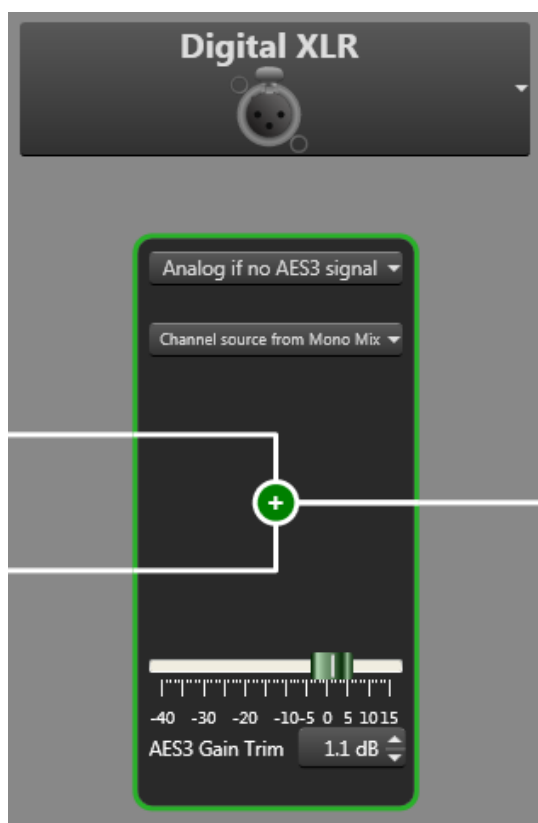


FIGURE 1: Digital input configuration

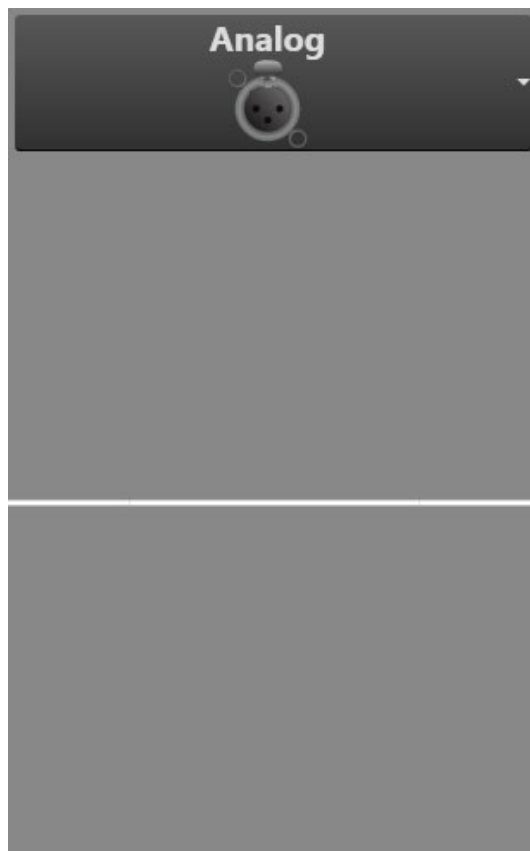


FIGURE 2: Analog input configuration

XLR Connections:

- ▶ 1 XLR female connector for Digital AES3 signal input
- ▶ 1 XLR male connector for analog Link Out, used as a comms through port
- ▶ 1 XLR female connector for analog signal input

I.2 Digital AES3 input via ETH connector (AESOP)

AESOP (AES Ethernet Simple Open Protocol) is the network dedicated to live applications where high quality audio, easy system configuration and reliability must be guaranteed. Control data travels through an auto-sense 100 Mbit Ethernet network, while audio is carried by the AES-3 protocol in the two unused pairs of the same CAT 5e Ethernet cable. RJ45 dual port design allows daisy chain and redundant ring topologies. Moreover, fault bypass technology permits to overcome any faulty device in the network, assuring solid connectivity without any audio or control signal loss. In order to connect an AESOP configuration with AES3:

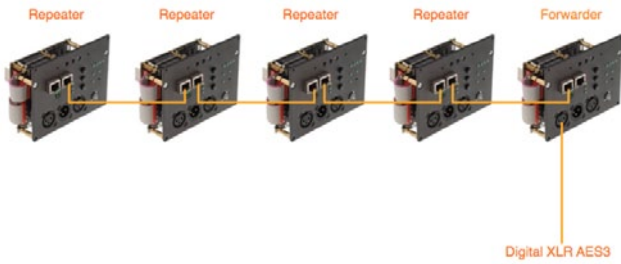


FIGURE 3: AESOP wiring configuration

Connect the AES3 signal by Digital XLR on the DSP-4 panel interface to the module that you want to have as forwarder.

4. In the forwarder module, connect one ETH (choose either port 1 or port 2) on the DSP-4 panel interface with Ethernet cable to the other DSP-4 that will behave as a repeater of AES3 signal
5. In the repeater module, connect one ETH (choose the remaining free port) on the DSP-4 panel interface with Ethernet cable to the other DSP-4 that will behave as a repeater module of AES3 signal
6. Continue the wiring until you close the chain
7. Set the AESOP preferences (what module is repeater or forwarder) via Armonia in the Input routing window; this operation is necessary for each connected module

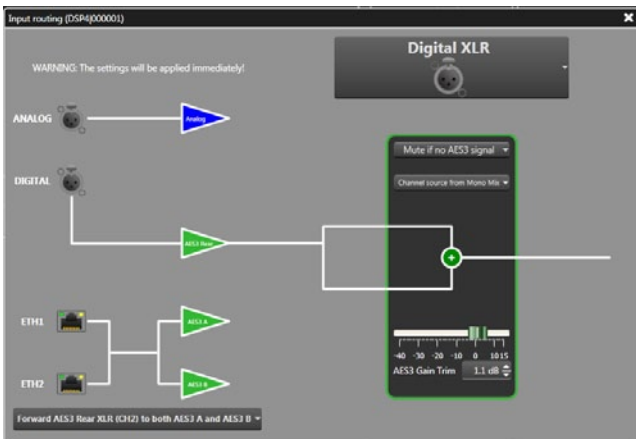


FIGURE 8: Forwarder configuration

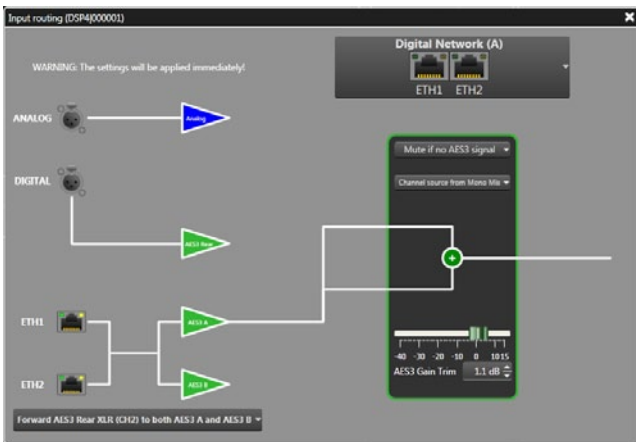


FIGURE 9: Repeater configuration

2 Network Connection

2.1 Type of connections

The DSP-4 can be connect to a PC via its standard RJ45 network port. Standard IT-industry Ethernet switches may be employed to develop any network topology suitable for your particular installation needs. The Ethernet port can be used for remote control in one of two ways:

- ▶ Either port can be used to connect the DSP-4 to an Ethernet capable PC or router for remote operation via Armonia; only one port is connected, the other isn't (hub-and-spoke topology)
- ▶ Both ports can be connected at once: one port is connected to a router or PC, while the other port is used as "comms thru", allowing another module to be daisy chained to this unit. In this mode, Armonia will be able to control all modules sharing an Ethernet cable connection (simple daisy-chain, looped Ethernet arrangement)

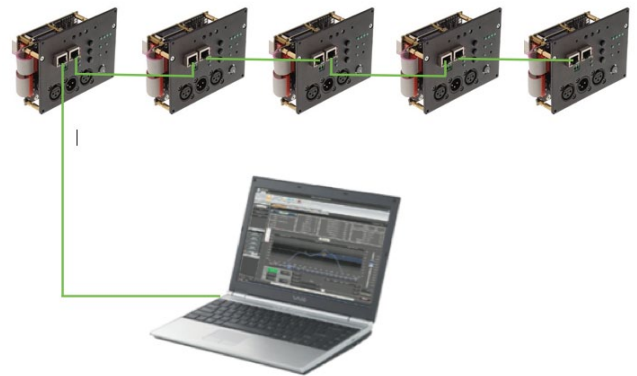


FIGURE 10: Hub-and-spoke topology

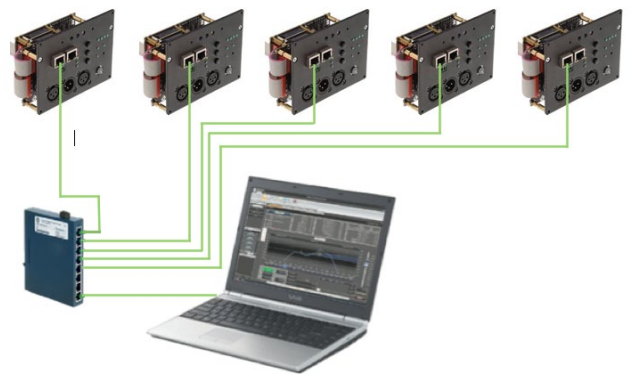


FIGURE 11: Simple daisy-chain arrangement

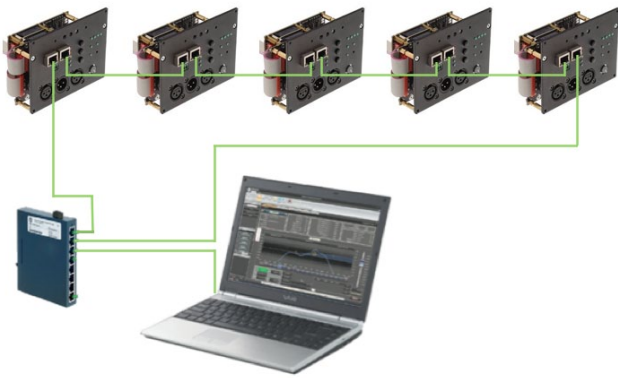


FIGURE 12: Looped Ethernet for added redundancy

2.2 Use with existing LAN

Using an existing LAN (Local Area Network) to exchange data via Ethernet between the PC and amplifiers is not good practice; the wiring used for such purpose should always be “dedicated”. Ethernet communication requires IP addresses to be set correctly on the PC and on every amplifier being used. The DSP-4 system may be set to assign IP addresses manually or automatically. Automatic assignment (via DHCP) is recommended for non-permanent installations, as it requires very little user involvement; manual assignment may be preferable in large, fixed installation sound scenarios (see Network configuration in Armonia).

2.3 Auxiliary DSP power supply

The MC 1.5 Phoenix named “Vext” on the DSP-4 label interface provides external DSP auxiliary power supply, used only if the DSP-4 needs to be functional when the amp module is turned off. The external auxiliary power supply needs to provide 9/12 Volt @ 900mA to power the DSP.

2.4 System completed

The picture below shows an example of a system set up with “AESOP” and control data both connected

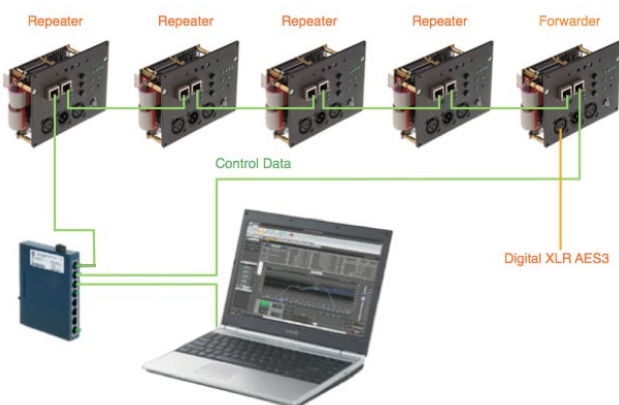


FIGURE 13: AESOP orange wires, Control Data green wires

3 Interface panel explained

3.1 MAC Address

The DSP-4 MAC address is specified on two separate labels, one on the back and one on the front of the DSP-4 interface. In the later versions, two separate MAC address labels will still be supplied: one will be on the back of DSP-4 and the another label you will be free to attach where you deem best.

3.2 Interface panel commands

- ▶ DSP preset button: this button allows selection of one of firsts four DSP presets. One green LED lights up to identify active preset number.
- ▶ Input type button: this button allows the user to toggle between digital or analog input selection. The corresponding LED lights up to signal which input is in use.
- ▶ Input equalizer button: this button toggles input equalizer on/off status. Green LED is on when input equalization is active.
- ▶ Volume knob: this rotary potentiometer determines the output volume. Clockwise rotation of the knob corresponds to a logarithmic attenuation increase.
- ▶ Reset switch: pressing this switch will reset all network communications.

3.3 LED column

FIGURE 15 summarizes the meaning of the LED column on the DSP-4 interface. These explanations refer to the behavior of the DSP-4 board, not of the module it is connected to. This means that, for example, if the DSP-4 signals a high temperature event by blinking the temp LED, whether or not output power will be reduced to speed up cooling depends on the module’s thermal protection behavior, not on the DSP-4.

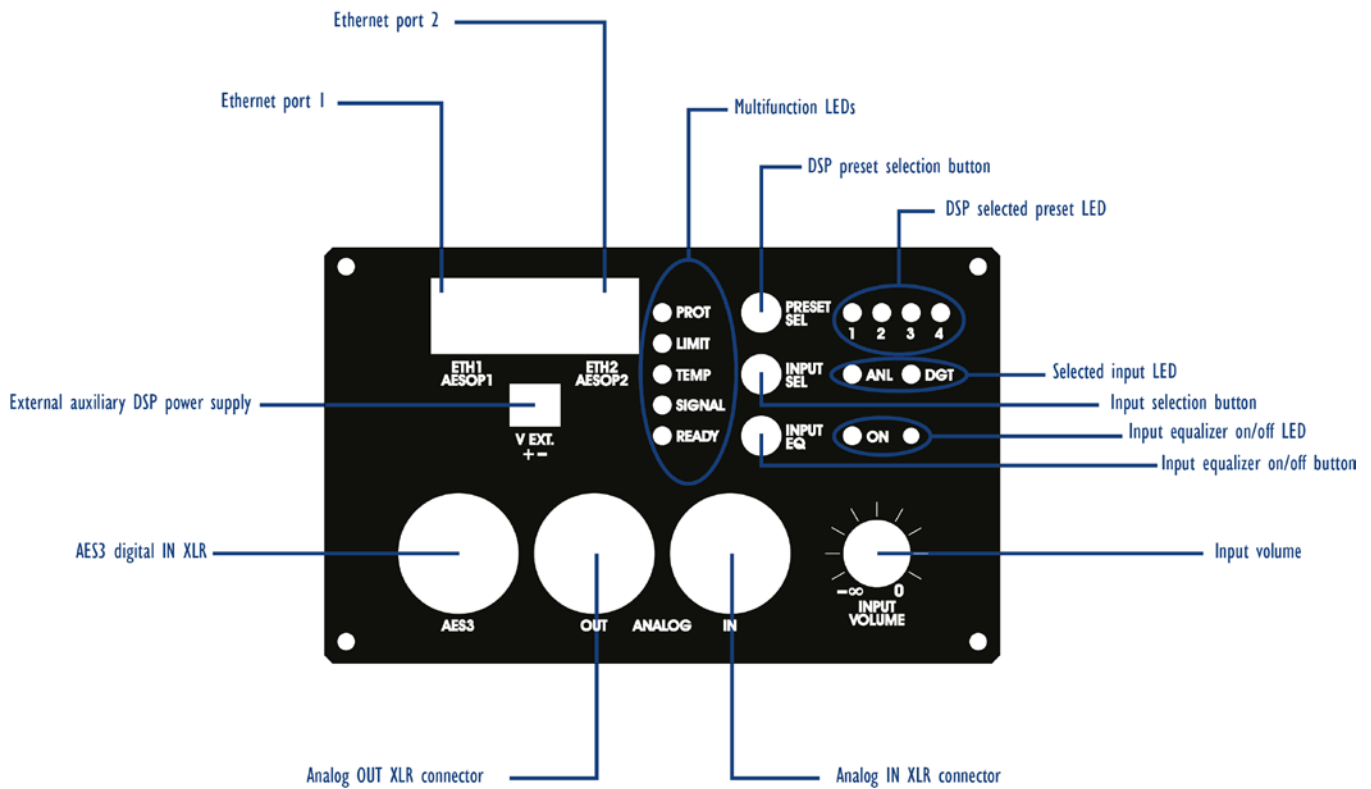


FIGURE 14: DSP-4 interface label

LED label	LED	Color	Steady on	Blinking	Off	Comments
Protect		RED	Load draws excessive current		Load current draw returns to normal values	Output power is reduced when this LED lights up. Normal functioning mode automatically resumed when LED turns off
Limit		RED	At least one limiter is active		No Limiter is active	Each limiter (one per channel) can be controlled by Armonia
Temp		YELLOW	Module is near the critical temperature (approx. 70°C) that triggers thermal protection mechanisms	Module temperature is greater than or equal to 60°C	Module temperature is below 60°C	
Signal		GREEN	Signal is present at either input		Signal is not present at either input	If signal is not present, check the input connection
Ready		GREEN	DSP-4 is ready to function		DSP-4 is not ready to function	AUX inputs are selected

FIGURE 15: LED meaning chart

4 Armonia for DSP-4 Kit

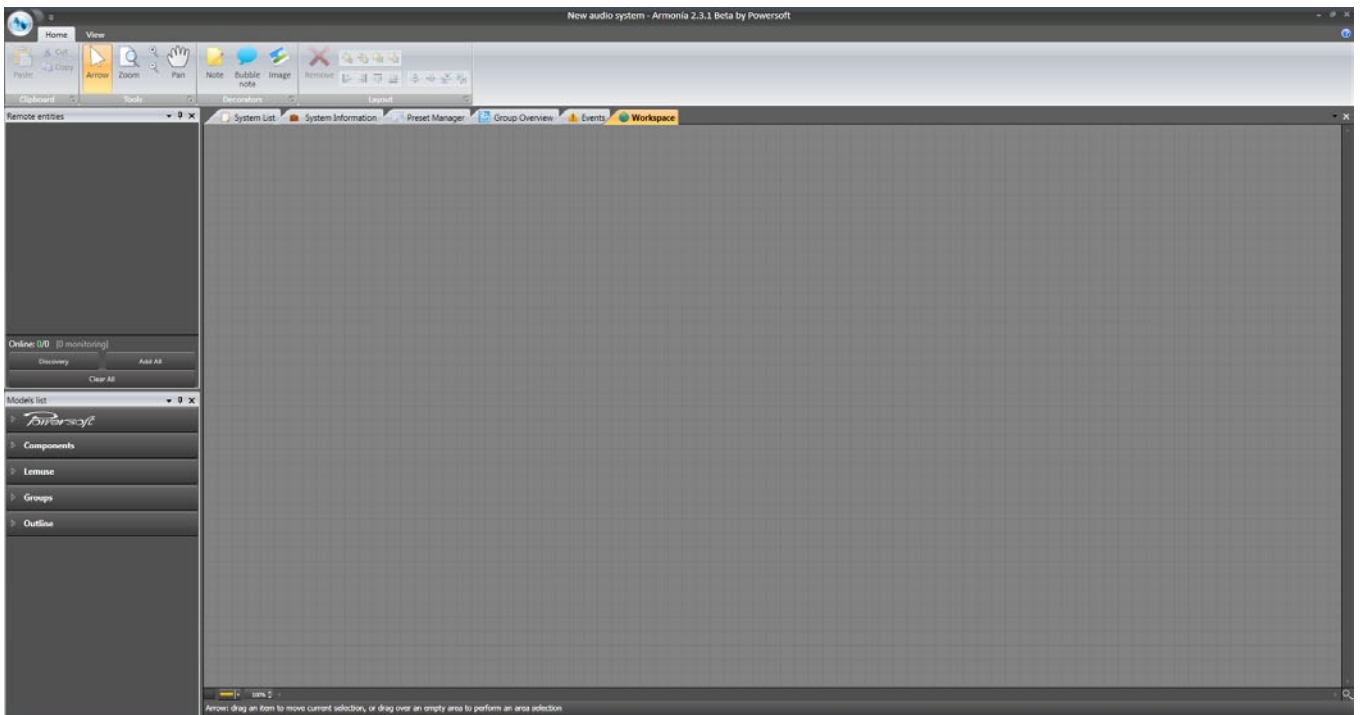
Please refer to the link below to download Armonia

<http://www.powersoft-audio.com/aforum/viewtopic.php?f=16&t=138#p458>

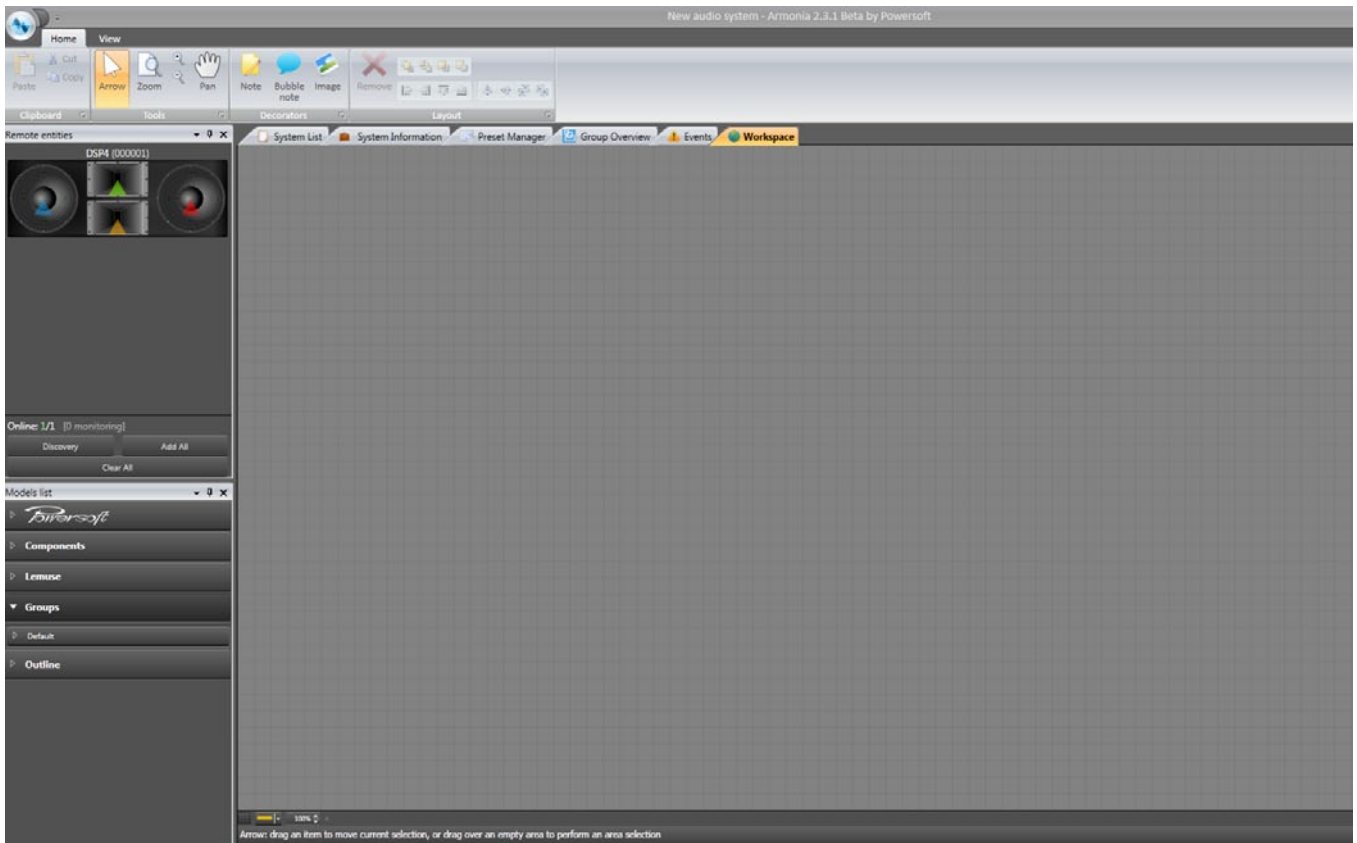
4.1 Installation and First Launch

Installation of the Armonia DSP-4 is straightforward. Double click on the installer icon and follow the onscreen instructions. Installation will create a folder named Armonia DSP-4 which will not interfere with any other Armonia folders in the system. Before launching Armonia DSP-4 for the first time, it is very important to have the amp module already connected and powered on. Connect an Ethernet cable from either RJ45 ports to a router or directly to your computer's Ethernet port. Connect all audio inputs and output according to the instructions given in this manual. In the interest of security, turn on mains power supply last.

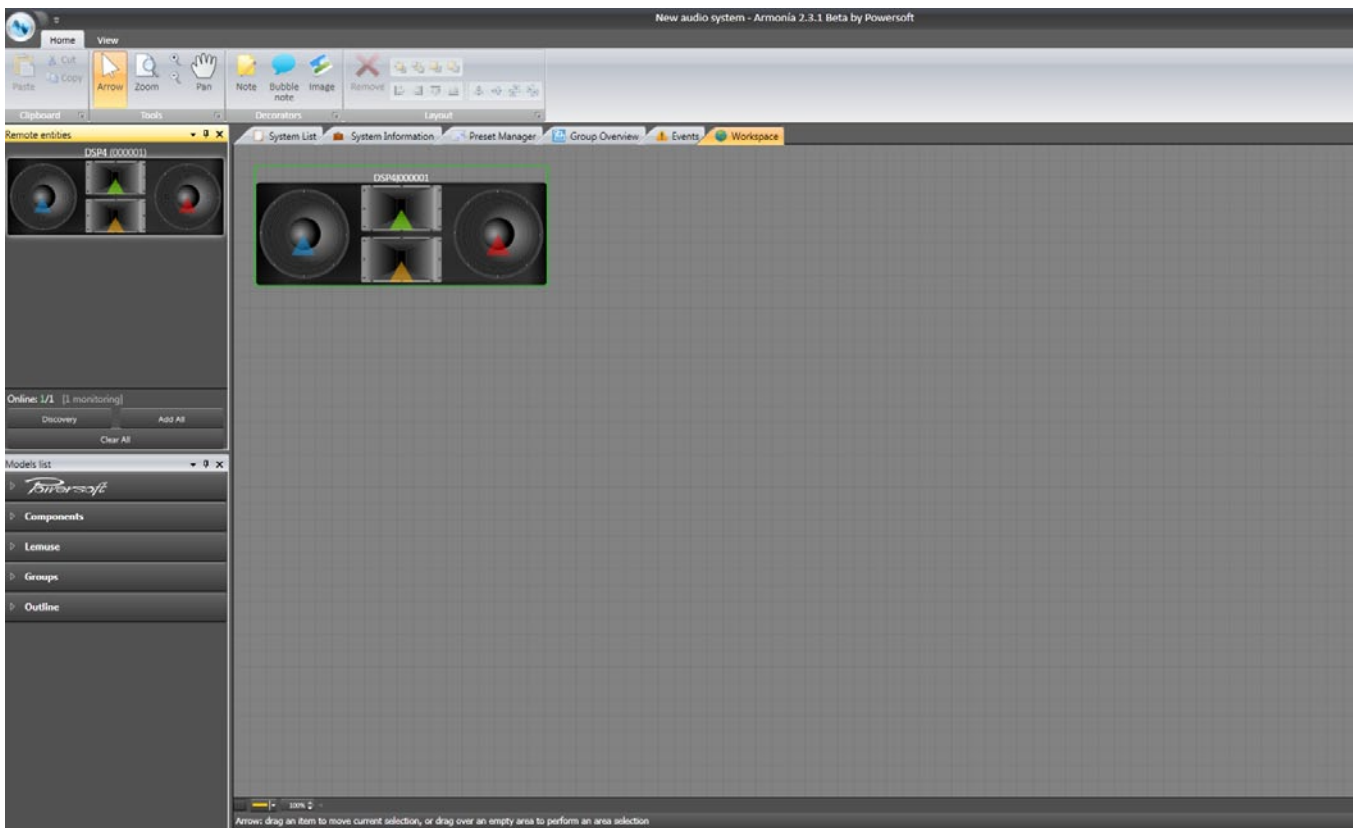
The first time Armonia launches, you will be greeted by a splash screen followed by the main screen layout you can see below:



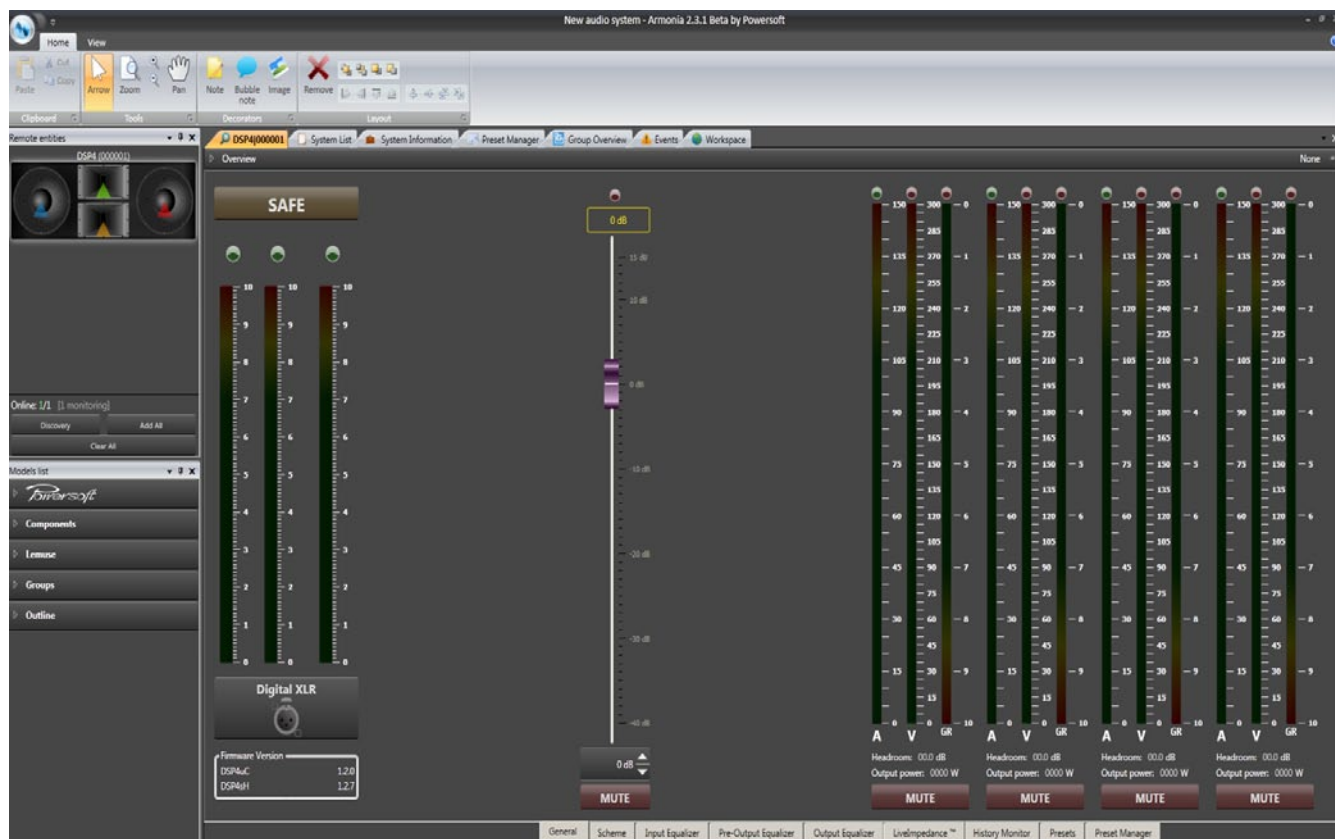
To find the connected amplifier, click on the “Discovery” button on the Remote entities panel on the left hand side floating window. The DSP-4 amplifier module setup icon will appear on the Remote entities floating window.



This version of Armonia does not allow editing of this icon, but our standard version does. This allows users to easily customize the way their final product appears in Armonia. Double click on the DSP-4 icon in the Remote entities floating window. This will place it on the workspace, allowing interaction with it. As soon as the DSP-4 is placed on the workspace, a new tab, named “DSP4” is created. By selecting this tab, a series of bar indicators are displayed. This is the General View.



The right hand side of the screen displays three bargraph meters for each channel. These indicate the channel's instantaneous current level (left), instantaneous voltage level (center) and gain reduction level (right). Clicking anywhere on the Overview bar opens an additional pane displaying further amplifier information.



The main view area is reduced in size accordingly. The Overview pane auto-closes after approximately 5 seconds, but can be kept open by clicking on the pin symbol at the right-hand end of the bar – a vertical pin keeps the pane open. The Overview pane is not specific to the General View and can be opened in any of the other tabbed views. Note that output channel numbering is consistent with that shown in figure 11 (see chapter "Connecting Outputs").

4.2 Input Routing Procedure

In order to access the input routing scheme, click on the input routing icon on the bottom left hand side of the General View window. Please refer to the Armonia user manual for details on how to specify input signal routing. The bottom portion of the screen shows a series of tabs, each leading to separate configuration windows. A complete description of each tab can be found in the Armonia user guide. The following is but a quick overview intended to help you set up and get to work as quickly and easily as possible.

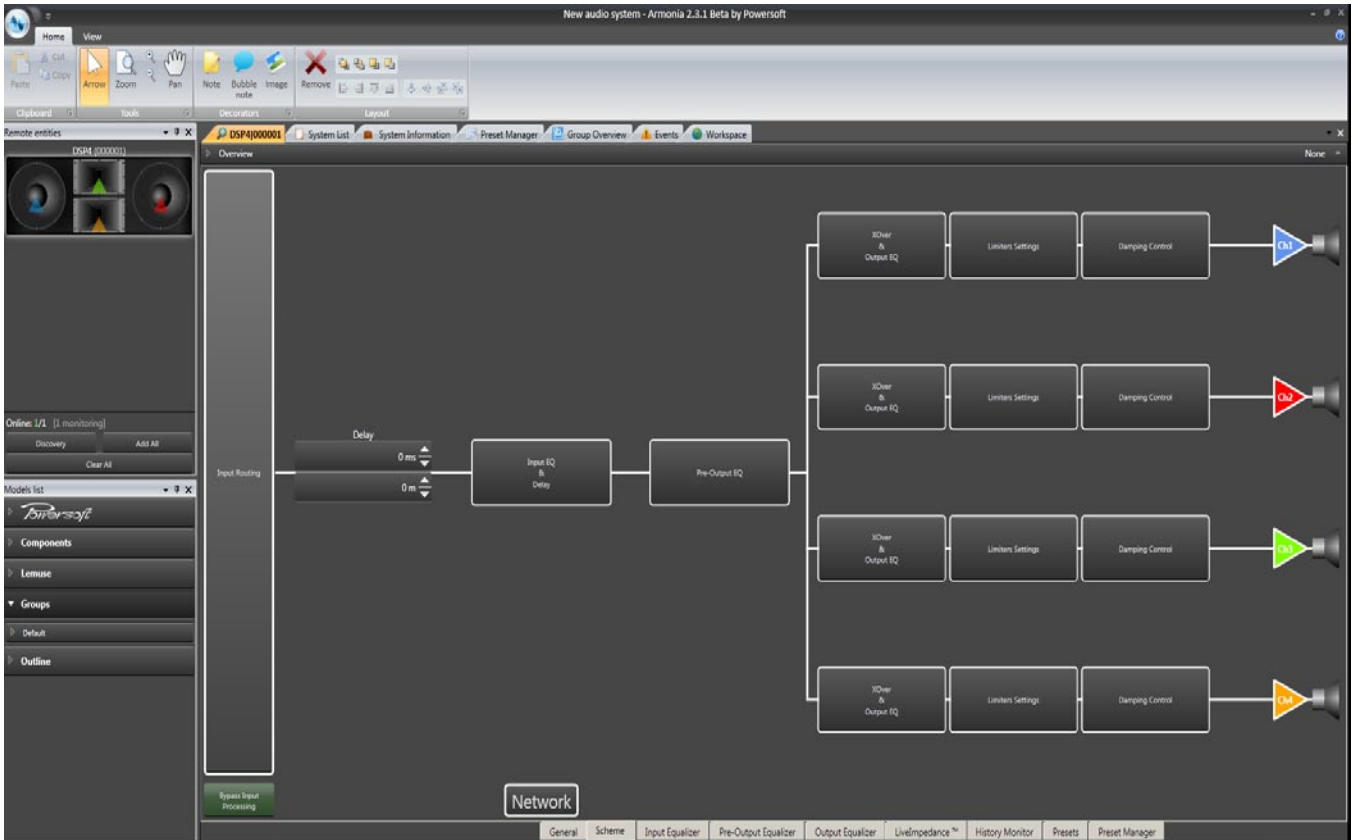
Scheme tab:

Using the Scheme tab is the simplest way of visualizing the signal routing and processing available within the amplifier. It gives you a basic signal flow diagram from input routing to outputs. Each processing block can be accessed simply by clicking it.

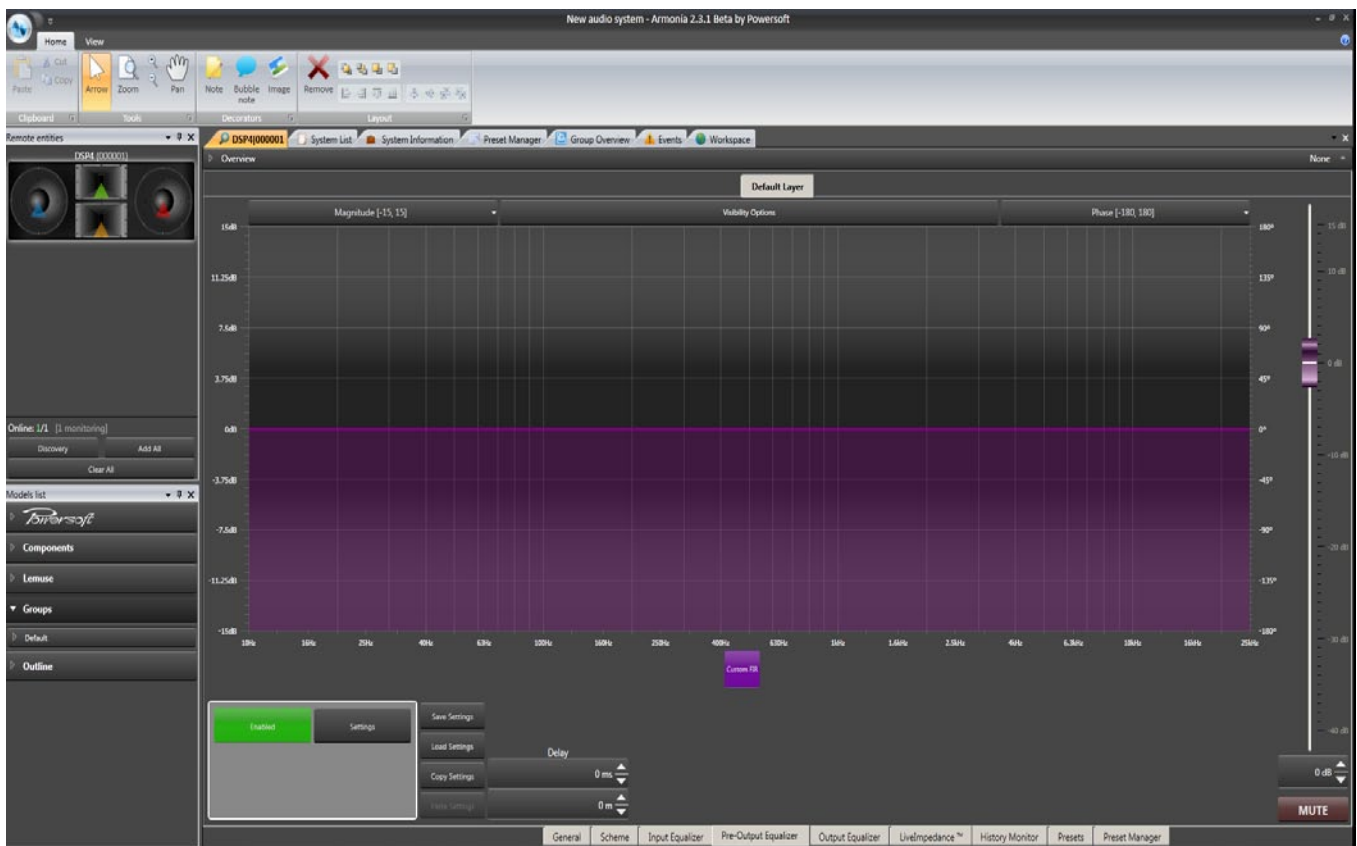
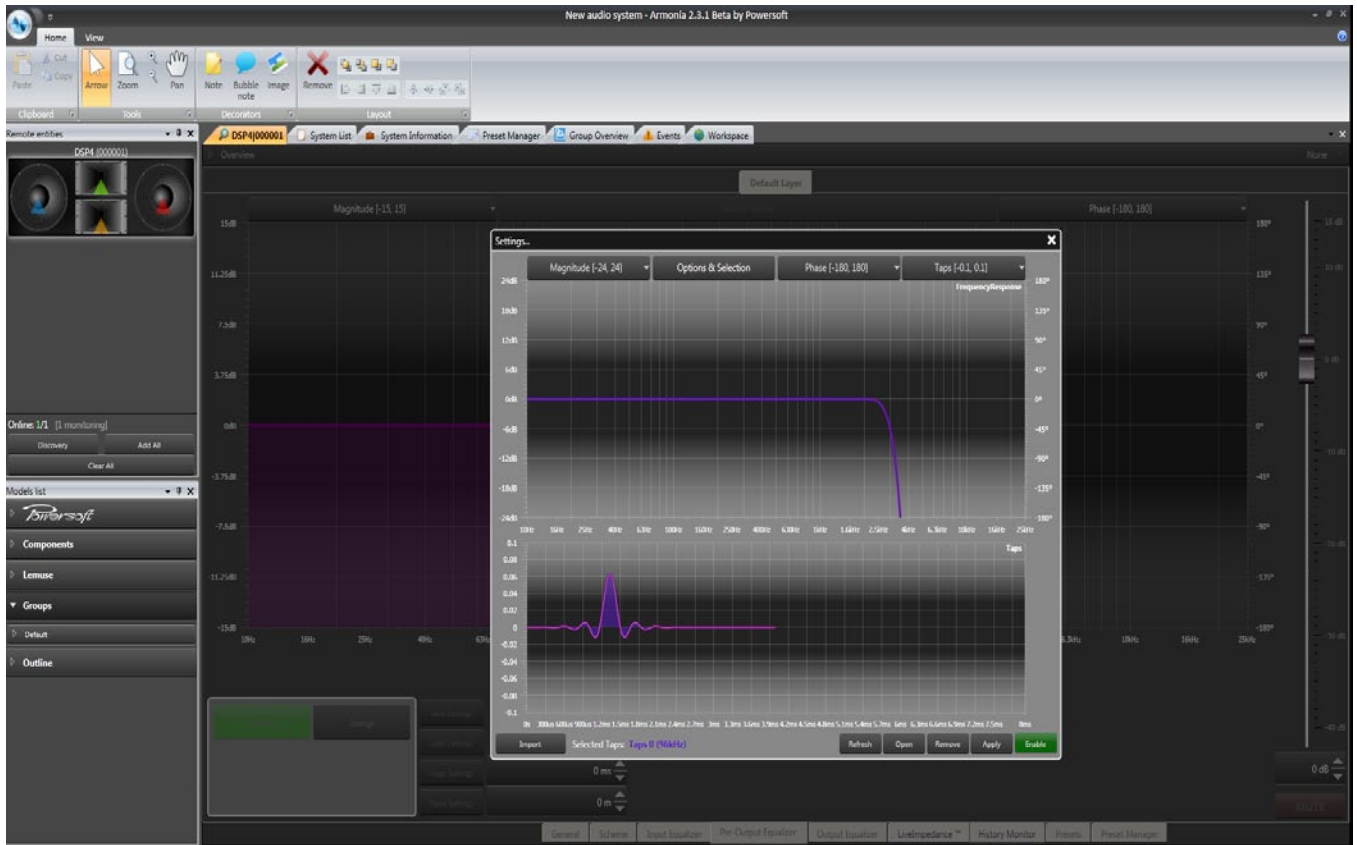


Input Equalizer Tab:

From this page, discrete time delays and the frequency response of each channel may be adjusted in several ways. The input equalizer has both fully parametric and 30-band graphic modes. Note that the Input EQ & Delay blocks can be taken out of circuit entirely by clicking the Bypass input processing button at the bottom left of the Scheme tab.



Pre-Output Tab:



Custom FIR filter button – it is possible to import coefficients for a Custom FIR filter design generated from a third-party source (such as FilterShop™ or MatLab®). Clicking the Custom FIR button opens two buttons in the Filter Editing window, Enabled and Settings. Clicking Settings opens the Settings... window, allowing the importation of the fixed FIR filter design. Configuring Amplifiers fitted with DSP.

Output Equalizer Tab:



This page is similar in general appearance to the Input Equalizer page, but has several important differences. The Output EQ curve the amplifier employs is intended to be created from the speaker manufacturers' data for the particular loudspeaker cabinets or arrays the amplifier will be driving. It provides a range of hi-pass and lo-pass cross-over filters as well as 16 individual peaking filters. It is also possible to import and export cross-over/filter response curves. The displayed frequency response (and/or phase response) curve is always the composite response of all filters currently active.

Channel select – filter and crossover settings will often need to differ between amplifier channels. The two side tabs Channel 1 and Channel 2 toggle the View between the channels. The frequency response curves, together with some other View items, are colour coded – blue for Ch1, red for Ch2.

Fader – adjusts the output level of the DSP section. The gain can be adjusted over the range -40 to +15dB either by dragging the fader, using the spin controls at the bottom of the fader, or entering a numeric value in the spin control box.

Mute button – these mute the signal at the DSP output; the mute button turns red, and the amplifier front panel display will confirm a mute state.

Polarity – the output signal may be phase reversed by clicking the Reverse polarity button.

Crossover filter buttons – these two buttons are larger than all the others and dark mauve in colour. They select the hi-pass (at the left-hand end of the graph's frequency axis) and lo-pass (at the right-hand end) crossover filters for configuration or adjustment.

The filter parameters are loaded into the Filter Editing Window. Butterworth, Bessel, Linkwitz-Riley, FIR and Hybrid FIR filters are available and the turnover frequency is fully adjustable for all types. The filter slope is selectable in 6dB/oct increments from 6 dB/oct to 48 dB/oct for Butterworth and Bessel types, and in 12dB/oct increments from 12 dB/oct to 48 dB/oct for Linkwitz-Riley types. FIR and Hybrid FIR filters have slopes which are defined by the turnover frequency, so dedicated slope adjustment parameters are unavailable.

Custom FIR filter button – it is possible to import coefficients for a Custom FIR filter design generated from a third-party source (such as FilterShop™ or MatLab®). Clicking the Custom FIR button opens two buttons in the Filter Editing window, Enabled and Settings. Clicking Settings opens the Settings... window, allowing the importation of the fixed FIR filter design. Configuring Amplifiers fitted with DSP.



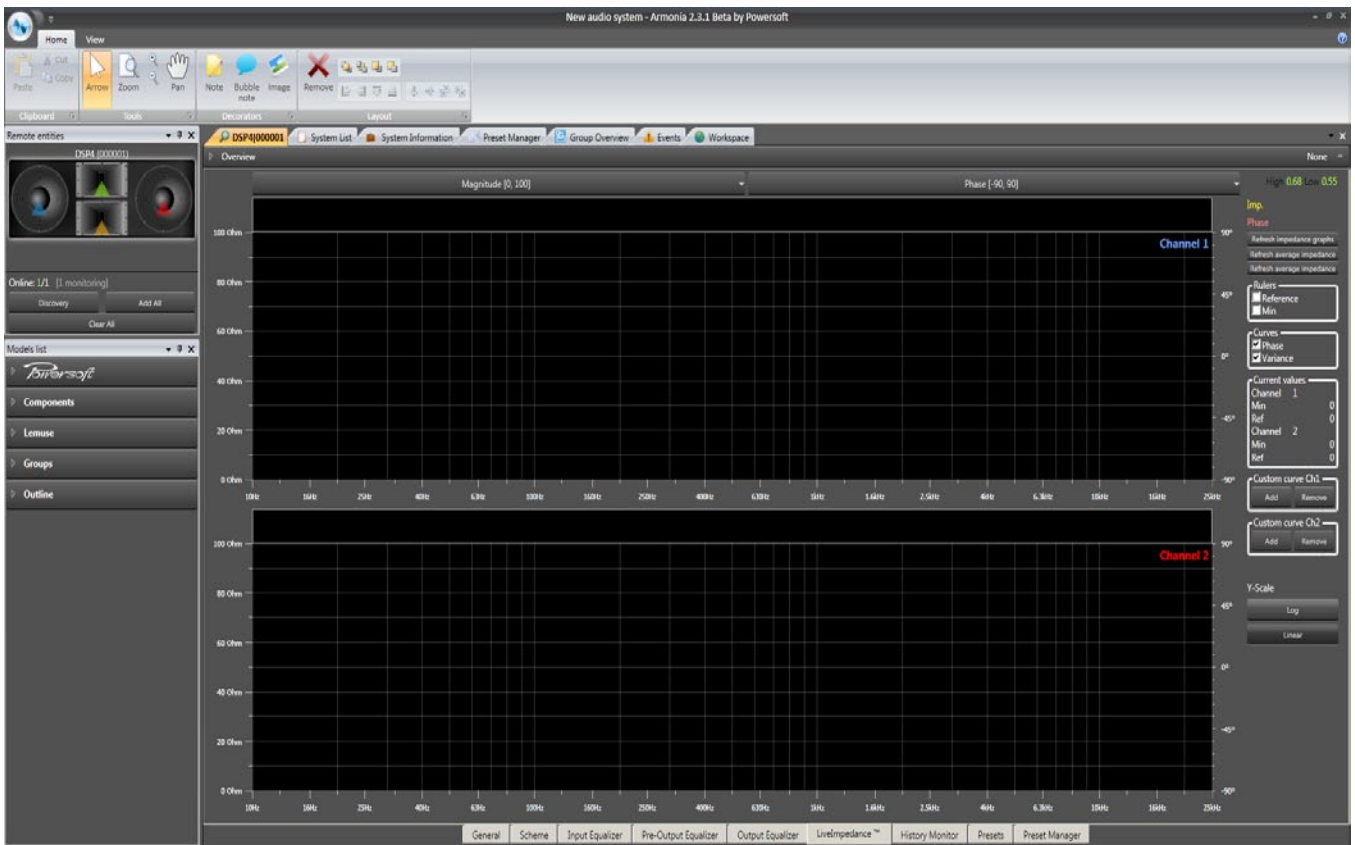
Preset Tab:

This section is dedicated to preset management:

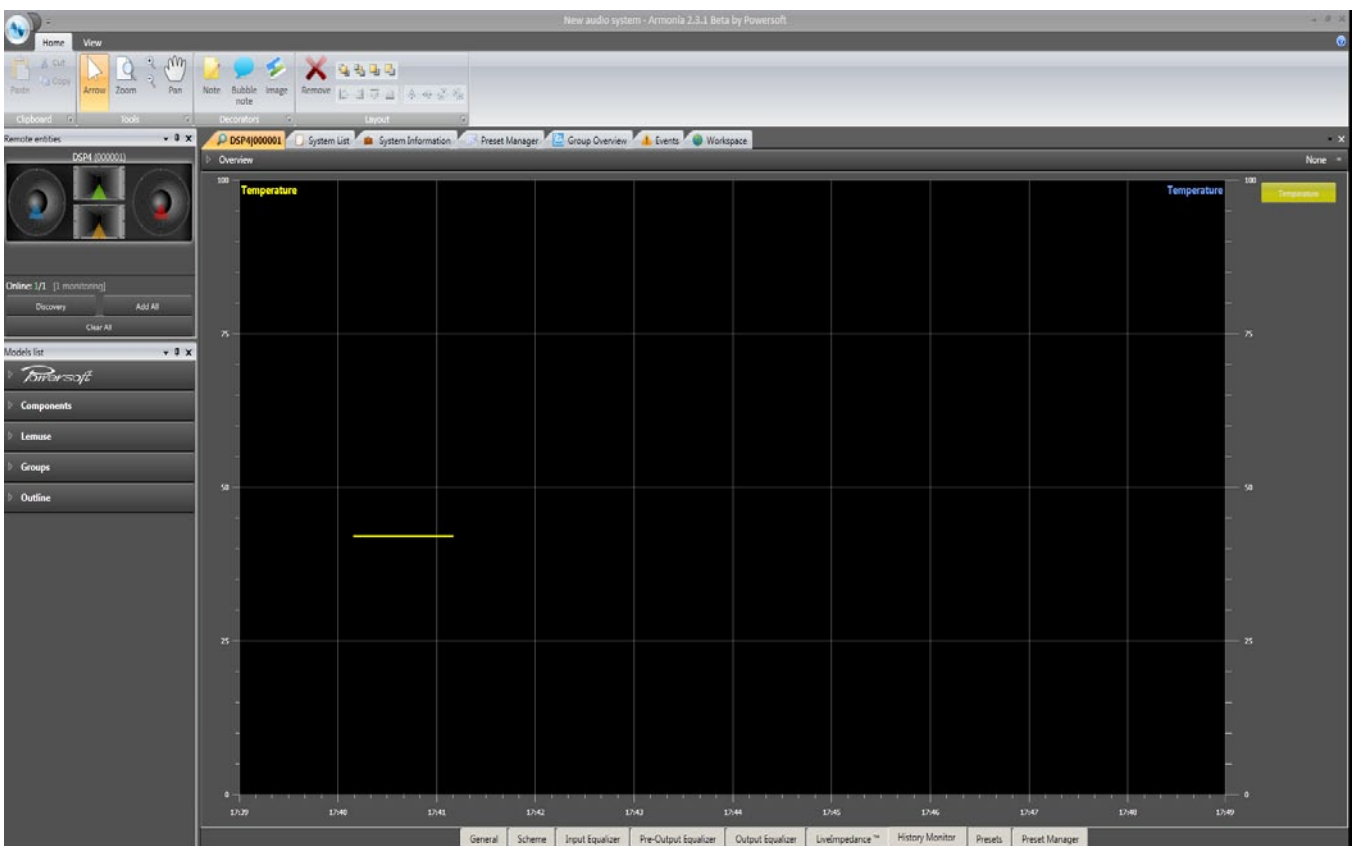
LiveImpedance™ Tab:

Powersoft’s LiveImpedance™ feature provides a graphical display of instantaneous load impedance against frequency, for each channel. The instantaneous impedance is calculated from snapshot measurements of output voltage and current. Real-world amplifier loads like loudspeakers have a complex impedance, which means that the impedance possesses both resistive and reactive components. Because the components are in quadrature with each other, the impedance has both magnitude and phase. Both quantities are calculated and displayed by LiveImpedance™. An amplifier’s output stage will be constrained by any filter assignments from handling the entire audio frequency spectrum. Furthermore, the audio programme may not contain certain frequencies at the instant of snapshot. For these reasons the display may not be a complete plot. Apart from displaying the complex impedance, the LiveImpedance™ graphs can also display reference data derived from the amplifier’s normal (non-DSP) output impedance measurements, and imported “ideal” impedance plots from speaker manufacturers. These make the engineer’s task of monitoring the high output levels of multiple amplifiers over long periods very simple.

LiveImpedance will be available soon for Armonía for DSP-4.



History Monitor Tab:



The screendump above shows the History Monitor page for a K Series amplifier. The corresponding view for other amplifier models may differ in the range of data provided. Three graphs are displayed, with control buttons to their right. Data for the last ten minutes of operation is visible, the X-axis scale being taken from the PC's internal clock. The right-hand Y-axis represents the present time, and the data "moves" from right to left. The top graph shows the amplifier's internal temperature, and may be enabled/disabled with the Temperature button.

Temperature is monitored on both the power supply and output stage heatsinks; the displayed temperature will always be the higher of the two. The scale is 0 to 100°C. The two lower graphs show data for Channel 1 and 2 separately. Four parameters are monitored, and any two may be displayed simultaneously, the first choice using the left-hand Y-axis, and the second the right-hand. Use the control buttons to make the selections. Each parameter/channel combination is uniquely colour-coded.

History monitoring will be available soon for Armonía for DSP-4.