jünger

D*AP4 SLIM LINE

# D*AP4

D*AP4 FLX / D*AP4 LM Edition

## Digital Audio Processor

**Manual**


Hardware Features

- **1RU** — compact 19" processing device with front side info display
- **Dual power supply** — second power supply for redundancy
- **Front panel info display** — for signal activity, IP address, QR code, status alert
- **Two h00idden touch buttons** — to change the content of the info display
- **Remote Panel** — optional X*AP $RM_1$ panel
- **Audio inputs** — balance/unbalanced AES – manual selection
- **Audio outputs** — balance/unbalanced AES
- **One interface slot** — I/O expansion slot for one option board at a time
  - **3G / HD / SD SDI** — SDI de-embedder / embedder - power fail relay bypass
  - **4x AES I/O module** — 4x AES3id I/Os – power fail relay bypass
  - **4Ch analog I/O module** — 4 analog line I/Os – power fail relay bypass
- **RJ45 network connector** — 100BaseT full duplex Ethernet interface
- **USB B connector** — built in USB < > serial adapter to access the device service port
- **8 GPI/Os** — 8 balanced inputs, 8 relay closure combined on a 25pin D-Sub
- **Aux power supply** — isolated 5V supply for external wiring
- **External sync IN** — 75Ohm input (Word Clock, AES, Black Burst, Tri-Level)
- **Sync OUT** — 75Ohm Word Clock output

Software Features in general

The **D*AP4** may be purchased as a fully loaded **Level Magic Edition** and will appear as **D*AP4 LM** or may be configured based on separate software licenses of the **D*AP4 FLX**.

- **LEVEL MAGIC II** — loudness management according to ITU BS.1770-1/-2/-3 EBU R128, ATSC A/85, ARIB TR-B32, Free TV OP-59, Portaria 354
- **Dynamic filter** — **optional** SPECTRAL SIGNATURE™ dynamic EQ
- **EQ** — 5 band parametric
- **Dynamics** — compressor, expander / gate
- **Fail over** — automatic switch over with signal loss detection
- **Voice over** — stereo or mono voice over extra program input, pan
- **Loudness measurement** — in reference to the selected standard
- **SNMP agent** — SNMP v1, see D*AP4-MIB
- **Remote control** — l-s-b EmBER plus protocol for VSM integration and 3rd party API

# Content

# Content

# Introduction

The **D*AP4** is a processing platform that may be bought as a 2 channel or 4 channel processor.
The **D*AP4 LM** is a fully featured loudness control device **except** Spectral Signature (which may be purchased extra) while the **D*AP4 FLX** will be featured to your order so you may later on upgrade it in the field.

The **D*AP4** focuses on automatic and adaptive loudness management compliant with all current broadcast audio loudness recommendations including ITU.1770 standards (revisions 1, 2 and 3) as well as recommended practices ATSC A/85 (2011/2013), ARIB TR-B32, Free TV OP-59, Portaria 354 and EBU R128. It features loudness normalization and dynamic range processing for up to two stereo programs of audio. Sophisticated fail over and voice over round off the **D*AP4** feature set. Dynamic range control and Level Magic™ are based on a unique multi-loop control principle.

**LEVEL MAGICII™**
The algorithm offers adaptive wideband control with exceptionally high audio quality and without any coloration, pumping, distortion or modulation effects uncompromised loudness management by combining three major gain changing elements:
· Transient Processor
· Adaptive AGC
· Distortion-free true peak limiter

**Dynamics section**
Comes with an expander and upward compressor.

**5 band parametric EQs**
With graphical UI for comfortable setup

**Spectral Signature™**
Jünger Audio's Spectral Signature™ dynamic equalizer gives you a powerful creative tool to control the spectral balance of your program. Spectral Signature™ analyzes incoming audio and compares its spectrum with a predetermined reference curve. This allows dynamic EQ corrections to be applied, if necessary, to give a consistent sound impression. Spectral Signature™ is an optional feature for the D*AP4.

**Fail Over / Voice Over**
Are manually or automatically triggered functions which help you to deal with special requirements of today broadcast applications.

**System Integration**
All system parameters are remotely accessible allowing the unit to be integrated and remotely controlled by broadcast control systems. This helps users to apply individual processing to their programs, which is a key feature for well-managed loudness control.

**Loudness measurement**
To check compliance of programs with your local loudness regulations the unit analyzes loudness and true peak levels from input signals and transfers the measurement data via Ethernet to an optional measurement and logging software anywhere in your network. These measurements can be triggered by automation systems via GPIs, via network or even manually on the **X*AP RM1** remote panel. The **D*AP4** can also generate SNMP or GPI/O alarms in case pre-determined limits are exceeded.

**Web configuration**
A web interface also allows easy and intuitive setup and configuration anywhere in your network.

**Interfaces and system security**
Audio I/Os range from onboard AES I/O to optional 3G/HD/SD-SDI I/O including video delay and analog I/O. All combined I/O interfaces support power fail bypass relays as standard. With optional redundant PSU and SNMP integration the unit ensures maximum operational safety.

**D*AP4** front panel view

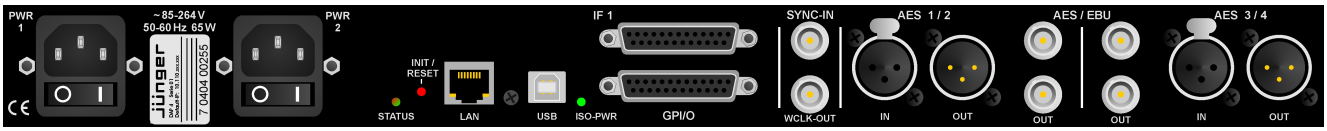

The front panel of the **D*AP4** has a 3 line status display and two hidden touch buttons 2.5cm left from the display. **Button 1** = Home will switch back to the power up display no matter which display level you are in. **Button 2** controls the multi level display :

| | |
|---|---|
| Level 0 | Welcome screen (boot display) |
| Level 1 | Home Screen<br>Device Type [D*AP4 FLX]<br>Firmware version |
| Level 2 | Admin screen (Status display)<br>[OK / ERROR]<br>Device name, device location<br>IP address |
| Level 3 | Bar graph peak level display<br>IN / OUT |
| Level 4 | Loudness display – short term<br>Program 1 - OUT |
| Level 5 | Loudness display – short term<br>Program 2 - OUT |
| Level 6 | Loudness display - integrated<br>Program 1 - OUT<br>Integration time / Loudness value |
| Level 7 | Loudness display - integrated<br>Program 2 - OUT<br>Integration time / Loudness value |

The measures of the loudness displays depend on the setup of the respective loudness mode (see AUDIO PROCESSOR > SETUP > Loudness Mode).

| | |
|---|---|
| Display background color | Green = hardware status OK<br>Red = hardware status ERROR<br>Flashing red / green during boot up |

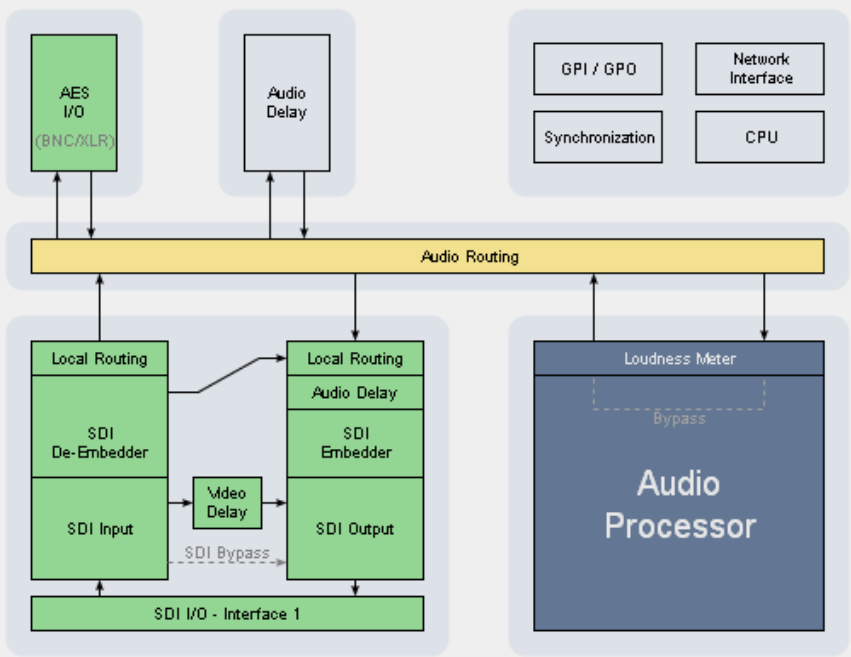
**D*AP** rear view




For fail safe operation, the **D*AP4** provides two independent power supplies. These power supplies operate in load balance. The status of both PSUs are combined with other status information and displayed as the front panel display back light color. On the **X*AP RM1** remote panel, are two independent status LEDs.

| | |
|---|---|
| **STATUS** | shows the status of the device controller |
| **INIT / RESET** | pressing the INIT button briefly will warm start the device controller.<br>Holding down the button until the **STATUS** LED flashes 3 times will initialize the **D*AP4** to factory default |
| **LAN** | RJ45 socket for Ethernet connection to a LAN |
| **USB** | USB 2.0 type B socket to connect the built in **USB >> serial** converter with an external PC |
| **ISO-PWR** | lights up if the isolated 5V power supply for GPI /O application is turned on |
| **Interface 1** | slot to mount one of the optional interface boards (SDI, AES, analog) |
| **GPI/O** | 25pin Sub-D female connector to interface with the 8 optical isolated general purpose inputs and 8 solid state relay closure outputs |
| **SYNC IN** | 75Ohm BNC connector to connect with external sync sources |
| **WCLK-OUT** | 75Ohm BNC connector to synchronize external devices to the **D*AP4** internal word clock |
| **AES 1/2 IN / OUT** | AES3 and AES3id input (selectable via GUI) / output (parallel) |
| **AES 3/4 IN / OUT** | AES3 and AES3id input (selectable via GUI) / output (parallel) |
| **Interface 2** | slot to mount the optional dual high end microphone pre amp module<br>or the optional dual AES42 module for digital microphones |

Block Diagram




The above schematic shows the principal blocks of the **D*AP4**.

The core of the unit is the audio processor with 4 inputs and 4 outputs.

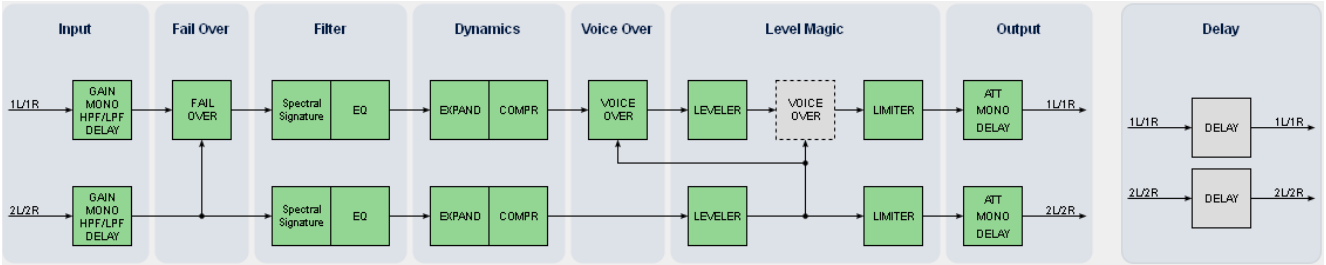
An AES I/O on the motherboard is provided for digital line operation. The respective connectors have relay bypass for power fail operation. The bypass ciruit maybe disabled by an internal jumper. For the 2 channel version only one AES I/O is fitted.

An interface slot is provided to carry optional 3G / HD / SD-SDI, AES I/O or even analog expansion modules. It allows for extremely flexible interfacing of the **D*AP4** in TV installations.

The sync. circuit can deal with all formats to integrate the **D*AP4** into digital facilities with sample rates from 44.1 to 96kHz. Other devices may be synchronized by the word clock output of the **D*AP4**.

The **D*AP4** has 8 balanced **GPIs** and 8 relay closure **GPO** contacts. This enables the user to simply recall presets or call events, change device configurations and report general status information.

Audio Processing Blocks




Above you see the various function blocks of the audio processor rendered by the **DSP** engine.
Each function block has its representation in the GUI by individual tab sheets. You may simply click on the respective graphical area as an alternative way to navigate through the GUI.

It is important to understand that the physical input interfaces of the device (SDI DE-EMBEDDER, AES IN) must be routed to the **DSP** inputs in order to process it. In the similar way the **DSP** outputs must be routed to output interfaces (SDI EMBEDDER, AES OUT). You will find those settings by clicking on the **ROUTING** tab.

## Control Concept

The communication between external applications or the **X*AP RM1** remote panel, is based on **TCP/IP over Ethernet**.

The setup GUI utilizes web technology. At the time of editing this manual the functionality of the web GUI is optimized for Firefox 20.x.

The setup GUI can be complemented by other application programs running on PCs like the Junger Application Manager **J*AM**. Operator access is possible via mobile devices like smart phones and tablets.

An **SNMP** agent may be activated to incorporate the device into a station monitoring system.

For 3rd party remote applications, Junger highly recommends using the **l-s-b Ember+** protocol which is widely distributed in the European broadcast industry. The user community is also increasing rapidly world wide. By default, the **X*AP RM1** remote panel and the **D*AP4** "talk" Ember natively.

## Operating Concept

Further below you will see that the setup GUI for the device is grouped into several parameter areas. One can reach the parameters via a 3 tier navigation by tabs which may have sub tabs, and the sub tabs may have pages embedded or extra soft buttons for groups of parameters.

Each function block (parameter area) has dedicated presets. The presets can be recalled at any time during operation, either by manual intervention via the embedded web server (browser based GUI), automatically by the internal event manager or by external applications.

For all relevant settings an **ON AIR** and a **PRESET** part exists. I.e. you may either edit the parameters **ON AIR** or **offline** for the respective part of the **D*AP4**.

The presets of the **D*AP4** are persistent by nature. You are working directly on the preset memory. I.e. you need not to worry about storing such presets. The **D*AP4** does it for you.

## Event Concept

The **D*AP4** incorporates a sophisticated event management system. Events may be combined to perform actions. The **D*AP4** offers these event types :

* **Preset Events** for System set up, Interfaces, Routing, Audio Processing etc.
* **I/O Events** to control GPOs
* **Bypass Events** for pre-configured bypass scenarios
* **Measurement Events** to control loudness measurements per program

These events may be combined to form **Actions** which are fired by **Triggers.**

Triggers are defined by a logical combination (AND, OR, XOR) of two random trigger sources. Trigger source may be GPIs, hotkeys of the **X*AP RM1** remote panel, network commands, parameters, other active events, other active triggers (nested trigger), or device status information (e.g. sync lost).

Getting Started – quick start guide

Before the **D*AP4** can be used, there are some basic configuration steps which must be followed in the order set out below. This example assumes you will process one stereo program that is embedded into SDI group1 Ch1/2.

* Connect the SDI signal (from a source like the station router or video server) to the SDI IN.
* Connect the SDI OUT connector to your destination device (station router or monitor box).
* Connect the BNC SYNC IN to the Black Burst reference of your TV station.
* Hook up the device to the station PC network
  - Consult your IT administrator for assistance if you are not sure about this procedure
  - Connect it to a switch or hub or directly to a PC / LapTop by an Ethernet cable (some PCs need a cross over [1:1] cable when connected with the D*AP4 directly)
  - Find an unused IP address - ask your administrator!
  - Assign it that IP address and set the network mask accordingly, a gateway is optional (see next page for details)
* Open a browser (FireFox 20.x recommended) and connect with the device
  - Type in the IP address as an URL
* Set the **sync source**
  - SYSTEM > Setup > Sync Source Priority > **Choice 1=Sync-In BB** leave all other **Choices x=OFF** (for the beginning)
  - SYSTEM > Setup > System Clock > **Sample Rate=Follow Source**
* Set the routing to the Audio Processor (DSP)
  - ROUTING > SDI DE-EMBEDDER > **DM1=DSP 1**
  - ROUTING > SDI DE-EMBEDDER > **DM2=DSP 2**
* Set the routing from the Audio Processor (DSP)
  - ROUTING > DSP > **DSP 1=SDI EMBEDDER > EMB 1**
  - ROUTING > DSP > **DSP 2=SDI EMBEDDER > EMB 2**
* Enable the SDI embdder
  - INTERFACES > SDI I/O Interface > Embedder > **SDI OUT Gr1=ON** (check box)
  - Check if the routing radio buttons will connect **"From Routing EMB 1/2"** to **"SDI Out Gr1 1/2"**

Now you should hear your source stereo program signal at the destination and you may start experimenting with the various parameters of the audio processing blocks.

Getting Started – IP setup in general

The process of installing a **D*AP4** into an **IP network** is as follows :

1. Ask the system administrator for a unique IP addresses of the network, the netmask and gateway address
2. Assign the **D*AP4** an IP address

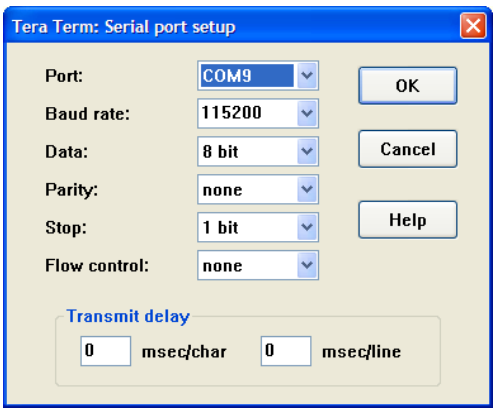
   You have 2 choices to assign the **D*AP4** an **IP address** :
   * From the serial console interface
   * Via Web browser

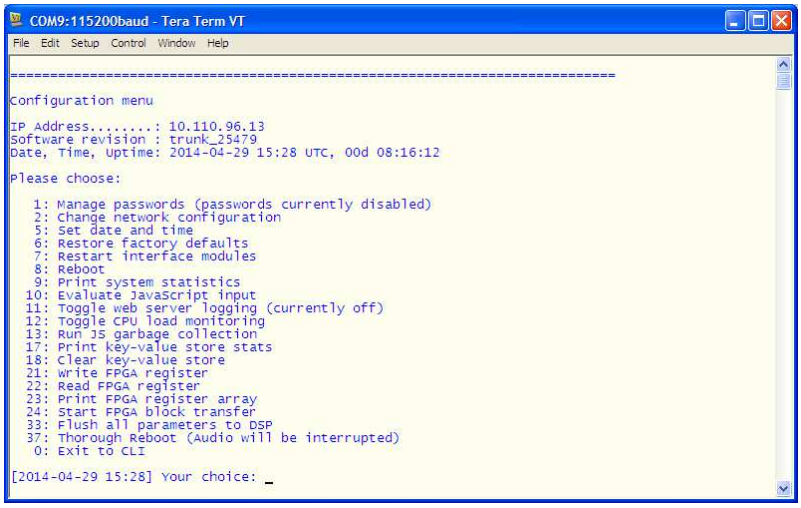
**! Important Note:** If you are not familiar with setting up devices for IP communication, we highly recommend you consult your system service or IT department to assist you.

Getting Started – IP setup of the **D*AP4** – **via console interface**

The tool to change the IP configuration of the **D*AP4** can be accessed via the console interface.
You must connect it with the PC via an **USB A to B** cable. It may take a few seconds until the driver of the built in **FTDI** USB to serial converter **chip** will be up and running. If you have difficulties you may download a compatible driver from FTDI : http://www.ftdichip.com/FTDrivers.htm.
Now you can open a terminal program. Here you must select the virtual COM port assigned by the PCs operating system. The communication parameters are :

115200kBaud, 8, N, 1 no hand shake. Pressing **<ENTER>** will open the console menu :




Go for item **2** and press **<ENTER>** :

**"Your choice: 2"**
**"Current network configuration**

**IP Address : 10.110.88.1**
**Netmask ... : 255.255.0.0**
**Gateway ... : 0.0.0.0**

You must enter the IP address and the netmask. Here is an an example :

**Enter new IP address, press ENTER to cancel : "192.168.176.78" <Enter>**
**Enter new netmask, press ENTER to cancel : "255.255.255.0" <Enter>**

**Important Note!** The gateway entry is optional but you must ensure that the gateway address matches the network mask related to the device IP address!
If you re not sure simply leave it **0.0.0.0**.

**Enter new gateway, press ENTER to configure without gateway : "0.0.0.0" <Enter>**
**Changing Network configuration**
**The network configuration has been changed. Please reboot the device to activate the new settings.**

Select item 8 and press **<ENTER>** :

**Do you want to reboot the device ?**

Press **small "y"** :

**Do you want to reboot the device ? y**

Press **<ENTER>**

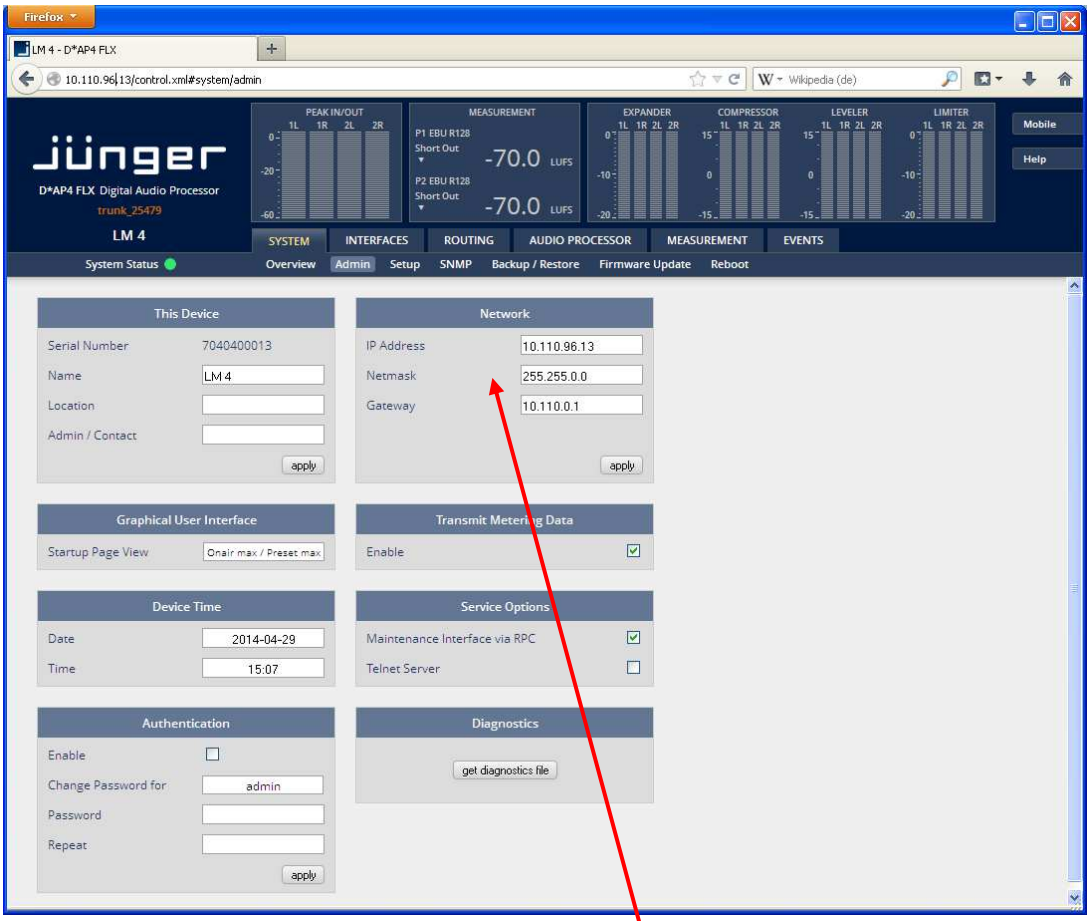
**Rebooting the device ……..**

**Now you see the boot messages of the device controller**

After reboot has finished, the new IP configuration is active and will be displayed in the top of the configuration menu.

Getting Started – IP setup of the **D*AP4** – **via web browser**

* Read the **default IP address** printed on a label at rear of the device.
* Set up network parameters of your PC to fit the default IP address of the **D*AP4** (net mask = 255.255.0.0).
* Connect the **D*AP4** with the PC either by an Ethernet cross over cable (if it does not support Auto MDI-X) or by a switch.
* Open a browser and type the default IP address of the **D*AP4** into the URL field and press **<ENTER>**. This will open the **AUDIO PROCESSOR** tab sheet of the GUI.
* Click on **<SYSTEM>** and the "**Admin"** tab will open automatically :

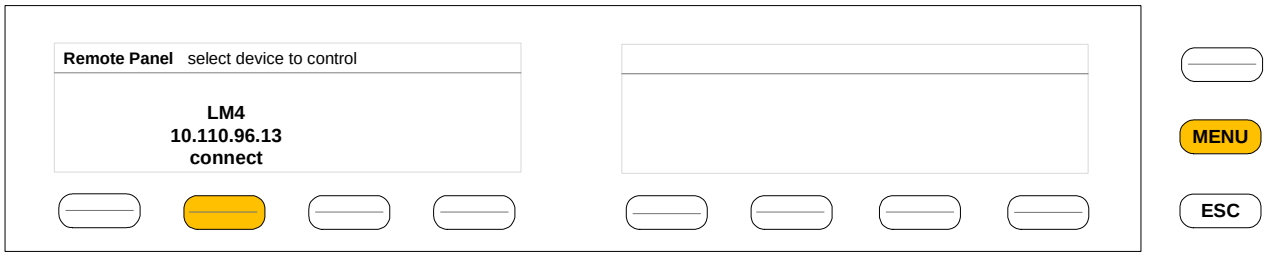



Enter the desired network configuration and press **<apply>**
Afterwards you must reboot the **D*AP4** in order to activate the new IP configuration.
Regarding Gateway address see above.

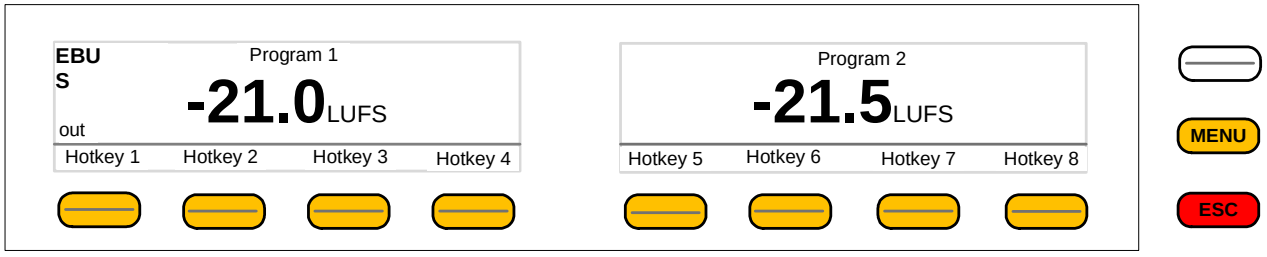
**Important Note!** After reboot neither the **web browser** nor the **X*AP RM1** remote panel may be able to communicate with the **D*AP4**. You must change back the IP configuration of the PC and fill in the **new** IP address in the URL field. You must change the **X*AP RM1** remote panel settings as well to attach this device again.

Operating - menu structure of the **X*AP RM1** remote panel

**Power up display** – may show up to 4 **D*AP4s** enabled for remote control for this **X*AP RM1** remote panel**.** The example below shows one pre defined D*AP4 [given name: LM4] to connect with :

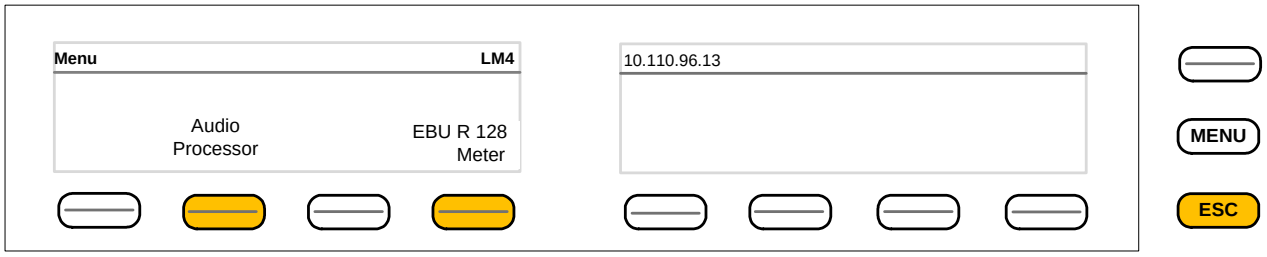



Pressing one of these buttons will connect with the respective **D*AP4**
After gathering all **D*AP4** settings the **main operating display** opens up :



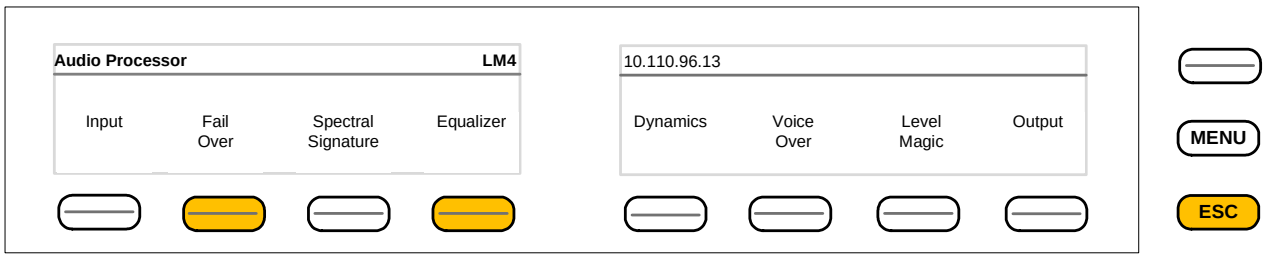

Operating – menu structure of the **X*AP RM1** remote panel – **operating displays**

When pressing the **<MENU>** button, the first page of the **operating display** opens up :



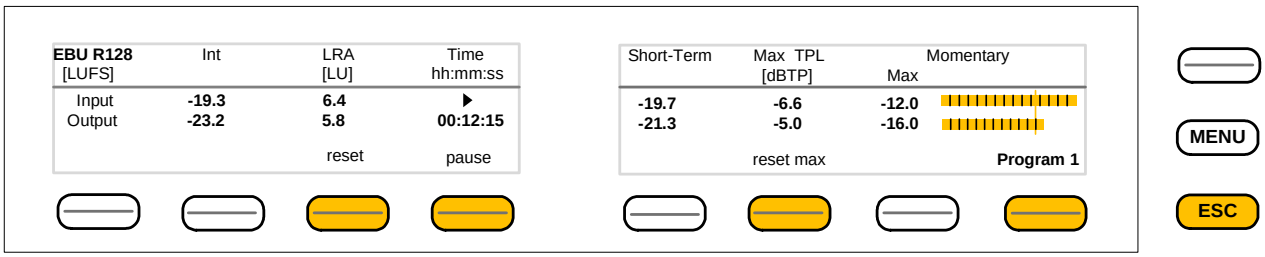

<ESC> returns to the **main operating display**

Operating display – **Audio Processor**




<ESC> returns to the main **operating display**

Operating display – **EBU R 128 Meter**




<ESC> returns to the main **operating display**

Operating – menu structure of the **X*AP RM1** remote panel – **menu tree**

**Power Up Display –** select a remote device
**<MENU>** opens **X*AP RM1** remote panel IP setup menu.
Hotkey #
1 <Address> setup
2 <Netmask> setup
3 <Gateway> setup
4 < empty >
5 Device 1 setup IP & ON / OFF
6 Device 2 setup IP & ON / OFF
7 Device 3 setup IP & ON / OFF
8 Device 4 setup IP & ON / OFF
**<ESC>** back to **power up** display

**<connect>** will connect with that particular **D*AP4** and opens the **main operating** display :
Hotkey #
1 user defined
2 user defined
3 user defined
4 user defined
5 user defined
6 user defined
7 user defined
8 user defined
**<ESC>** will jump back to **power up** display

**<MENU>** opens **operating** display:
Hotkey #
**1** <Empty>
**2 <Audio Processor>** opens up the function block selection
Hotkey #
1 <Input>
2 <Fail Over>
3 <Spectral Signature>
4 <Equalizer>
5 <Dynamics>
6 <Voice Over>
7 <Level Magic>
8 <Output>
<ESC> back to operating display
**3** <Empty>

**4 <EBU R 128>** opens the loudness meter display
Hotkey #
1 <Input>
2 <Fail Over>
3 <Spectral Signature>
4 <Equalizer>
5 <Dynamics>
6 <Voice Over>
7 <Level Magic>
8 <Output>
**<ESC>** returns to the **operating display**
**5** <Empty>
**6** < Empty>
**7** < Empty>
**8** < Empty>
**<ESC>** returns to the **main operating display**

Setup GUI – connecting with the **D*AP4**

You must open a browser and enter the **IP address** of the **D*AP4** into the **URL** field and press **<Enter>**. The browser will retrieve the necessary information and open up the entrance page :

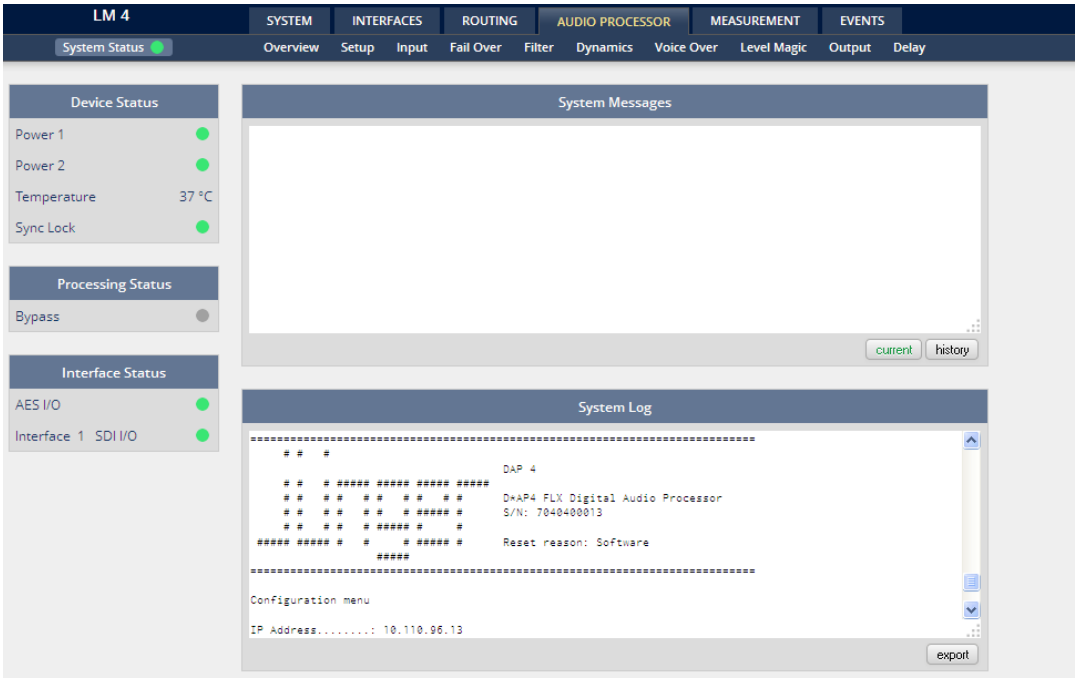

The entrance page is the **AUDIO PROCESSOR** pane with its sub pane **Overview.**

On the following pages we will go through the various panes to perform the basic setup of the device.

Those settings you will find under the **SYSTEM** link.

Setup GUI – SYSTEM – **System Status**

The system status is a special link you can reach independently from where you are :




The **System Status** page provides a top level view of the various status information available for the device.

**Device Status** — Provides the hardware status of the **D*AP4.**

- **Power 1** — Status of the first power supply (left hand side from rear).
- **Power 2** — Status of second power supply (right from the first power supply)
- **Temperature** — measured on the surface of the main PCB.
- **Sync Lock** — Turns red if the external sync source is lost or unstable.

**Processing Status**

- **Bypass** — Turns red if Bypass is activated.

**Interface Status**

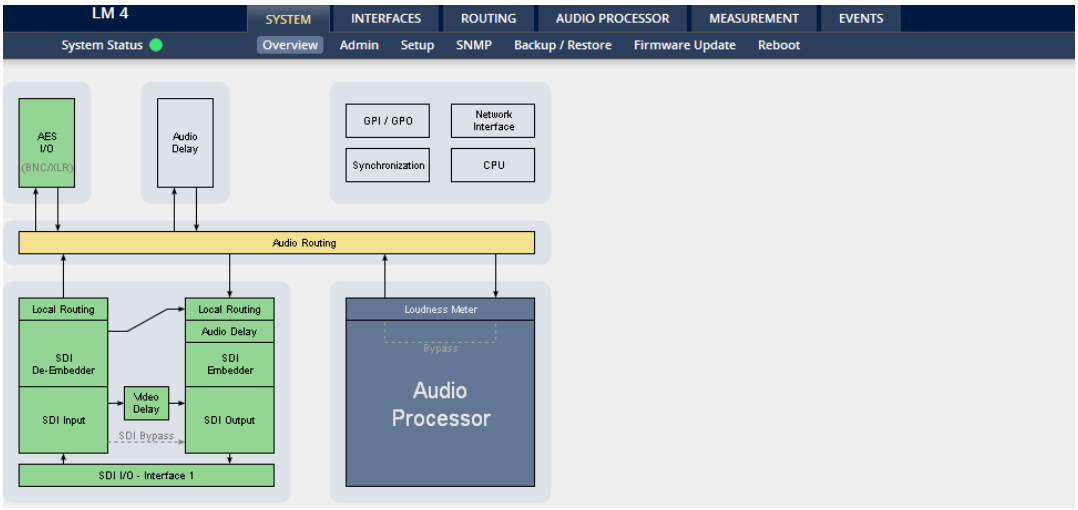
- **AES I/O** — Turns red if an AES input that is internally in use (i.e you have routed it to an input of a function block) has detected an error.
- **Interface 1 SDI I/O** — Turns red if a problem with the optional SDiinterface board has been detected.

**System Messages** — [current / history]
Displays a list of messages produced by the system controller.

**System Log** — The system controller activities will be logged. This log information may be downloaded from the device and sent it to Junger Audio in case of a problem :

**SYSTEM > Admin > Diagnostics > get diagnostics file**

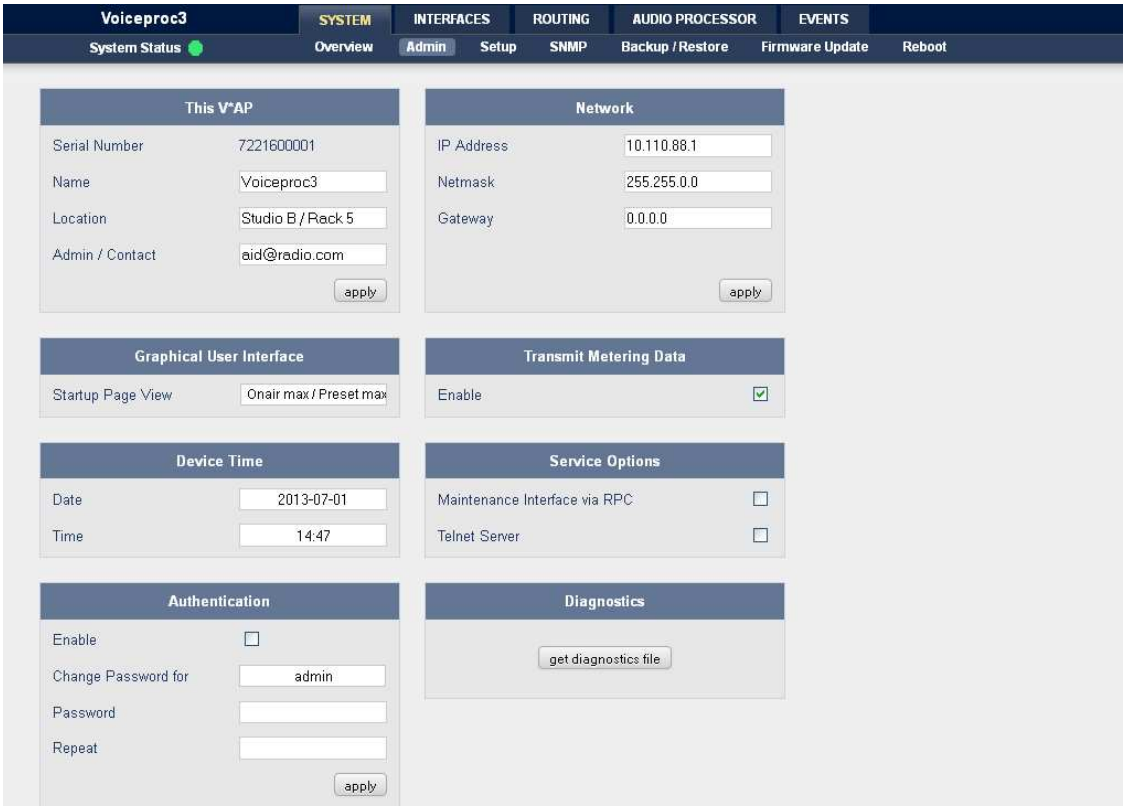
Setup GUI – SYSTEM – **Overview**




The graphical overview shows the main building blocks of the device including the options installed, in this example SDI interface placed into the interface 1 location (see rear view).

You may click on the boxes and the respective setup page will open. The navigation is based on URLs so you may use the **<Back>** navigation button of the browser to return to this page.

Setup GUI – SYSTEM – **Admin**



| | |
|---|---|
| **This Device** | Input fields for information utilized by higher level services. |
| **Serial Number** | Electronic serial number of the device |
| **Name** | Give the device a meaningful name that may be used by name services and SNMP management. |
| **Location** | The place where the **D*AP4** is located. |
| **Admin / Contact** | e-mail address of a person in charge. |
| **Graphical User Interface** | [Onair max / Preset max, Onair max / Preset min, Onair min / Preset max, Last Used]<br>Defines the appearance of the parameter panes in the ON AIR vs. the PRESETS area (which one will be visible). |
| **Device Time** | Allows you to set the device clock.<br>At the factory it is set to UTC (Coordinated Universal Time). |
| **Date** | If you click into the **Date** input field, a convenient calendar tool will pop up : |
| **Time** | If you click into the **Time** input field, you will be able to set the device time. |


| | |
|---|---|
| **Authentication** | To prevent non authorized people from changing **D*AP4** settings the administrator may assign passwords for either the admin and/or an operator. While the admin is allowed to set everything, an operator is just allowed to load presets. Parameters will be reset if there was an attempt from the operator to change it. |
| **Enable** | [enable / disable]<br>The administrator may turn authentication OFF. |
| **Change Password for** | [admin / operator]<br>Select which password you will set / change |
| **Password** | key in a password<br>Default passwords are: admin (for admin) and operator (for operator). |
| **Repeat** | repeat that password |

**Important Note!** The authentication may be enabled / disabled form the **console** interface as well (see page 8 "1: Manage Password") via USB connection but also via Telnet! If you have higher security demands you should turn the Telnet server off. Authentication will turned off and passwords will be reset if one initializes the device to factory default (see Reboot - page 19, INIT/RESET rear button - page 4).

If there was an authentication failure, the **admin** will be notified on next proper login about such conditions : The pop up appears for each login that has failed. It shows the IP address of the device that caused the authentication failure.


| | |
|---|---|
| **Network** | IP address setup, see above:<br>getting started – IP setup of the **D*AP4** – **via web browser** |
| **IP Address** | A proper address for your network |
| **Netmask** | The net mask of your network |
| **Gateway** | The optional gateway address – default [0.0.0.0] |
| **Transmit Metering Data** | [OFF / ON]<br>metering data will be streamed via UDP protocol. In order not to receive such data by external applications you may disable it. |

### Service Options

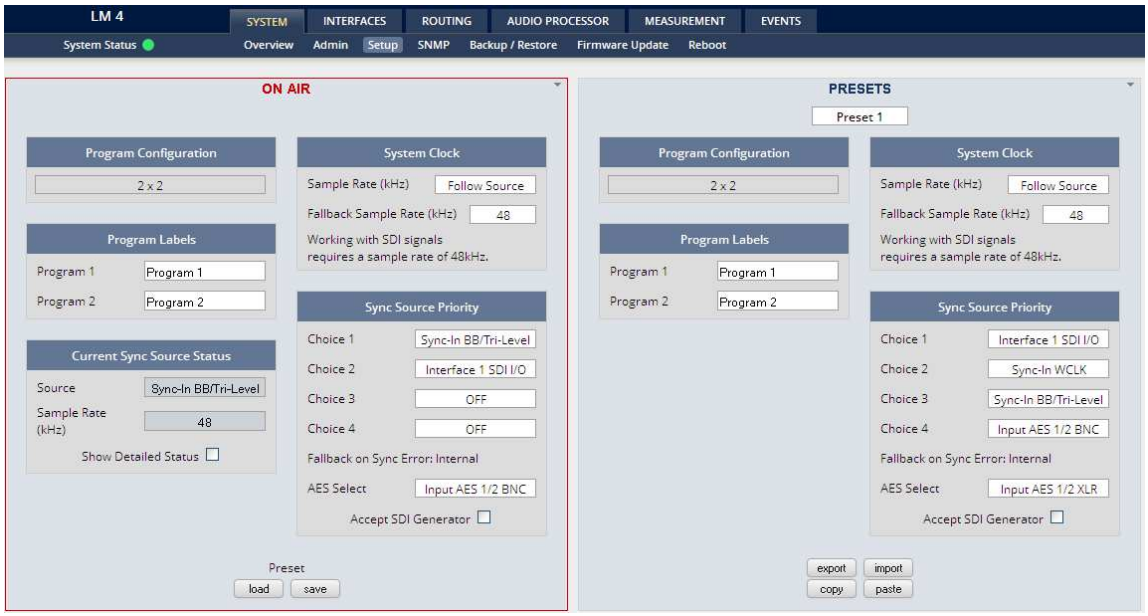
**Maintenance Interface via RPC** [OFF / ON]
For administrative use to enable communication with factory tools**.**

**Telnet Server** [ON / OFF]
Enables a telnet server to connect to the consol interface via Telnet (IP port 21).

### Diagnostics

**<get diagnostics file>** Pressing this soft button will start the assembly of a diagnostics file. The file will be presented in XML format for download.
If you experience unexpected behavior of the device you may be asked by the Junger service team to send such file by e-mail for analysis.

Setup GUI – SYSTEM – **Setup**

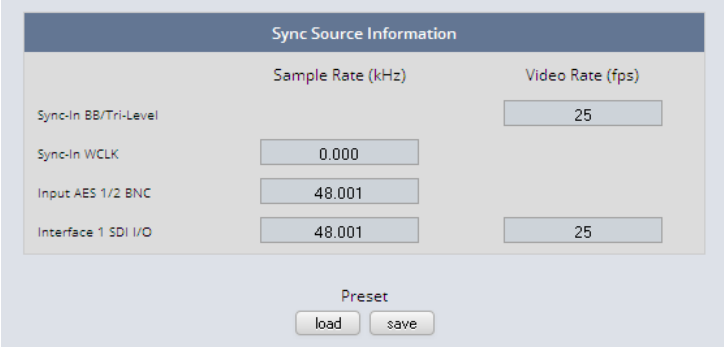



**Program Configuration** [2 x 2]
Shows the program configuration (2 times 2 channel). This is also the default configuration of the audio processing blocks.

**Program Labels** Each of the two possible programs has a name that will be used
**Program 1** as a reference for the display of parameters and its setup.
**Program 2** You may edit the default names.

**Current Sync Source Status** shows the status of the 5 tier sync priority circuit
**Source** active sync source
**Sample Rate** measured sample rate
**Show detailed status** [ON / OFF]
If you enable the checkbox you will get this information :

### Sync Source Information




You will get detailed information about the measured rates of possible sync sources

### System Clock

**Sample Rate** [Follow Input / 44.1 / 48 / 88.2 / 96]

**Fallback Sample Rate** [44.1 / 48 / 88.2 / 96]

**Fallback Video rate** [25 / 29,97 / 30]

### Sync Source Priority

**Choice 1 – 4** [OFF / Internal / Sync-In WCLK / Sync-In AES / Interface 1 [SDI I/O if fitted] / Sync-In Black Burst/Tri-Level]

**Fallback on Sync Error:** [Internal]

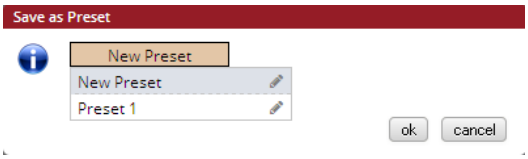
**AES Select** [Sync-In AES / Input AES 1/2 XLR / Input AES 1/2 BNC]
Select from which physical input the AES sync must be taken.

**Accept SDI Generator** [ON / OFF]
In some rare cases or on an SDI input disruption it might be desirable to use the build in SDI interface as an SDI generator.
In this case the audio clocks should be derived from that generator as well.

**Important note!** It is not possible to gen lock the SDI generator. The generator will run on its own internal 27MHz crystal clock.

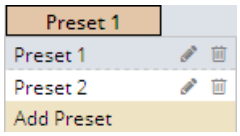
Setup GUI – SYSTEM - the **preset concept** in detail

The example above shows the **preset concept** of the **D*AP4.** It is the central theme of the device.
For all relevant setting one set of **ON AIR** parameters and a practically unlimited number of **PRESETS** are available. The number depends on the memory space left.
If you want to **load** parameters from a preset to the **ON AIR** area or **save** parameters from the **ON AIR** area to a preset, you must press **<load>** or **<save>** to open a dialog to select the desired preset :




In case of **<save>** you may add a **"New Preset"** or select an existing one and overwrite it.
To edit a name you simply press on the pencil symbol. To indicate the edit mode it the name becomes italic:


and it is highlighted blueish. Press **<ok>** to execute the action or **<cancel>** it.
To generate a new preset offline, you must click into the preset name field below the **PRESETS** headline :




The pull down offers **"Add Preset"**. If you click on that phrase a new entry to the list will be generated. Clicking on the small waste basket will delete the highlighted preset.

You may change names as described above.

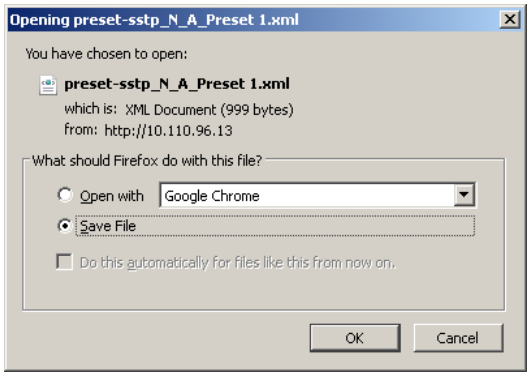
If you have selected the new preset or one of the existing presets, you may edit the parameter values.

**Important note!** The presets of the **D*AP4** are persistent by nature. You are working directly on the preset memory. I.e. you need not to worry about storing such presets. The **D*AP4** does it for you in the background.

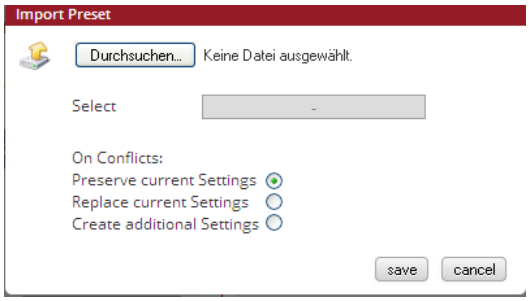
In the bottom of the **PRESETS** part you find the soft buttons to **<copy>** the content of that preset to a clip board or to **<paste>** the content of the clip board into an other preset which you have selected before pasting.

You may also **<export>** the preset content to a file or display the content of that file via an XML editor.

Since this is a standard browser based file operation you will get the respective pop ups from your PC's operating system.

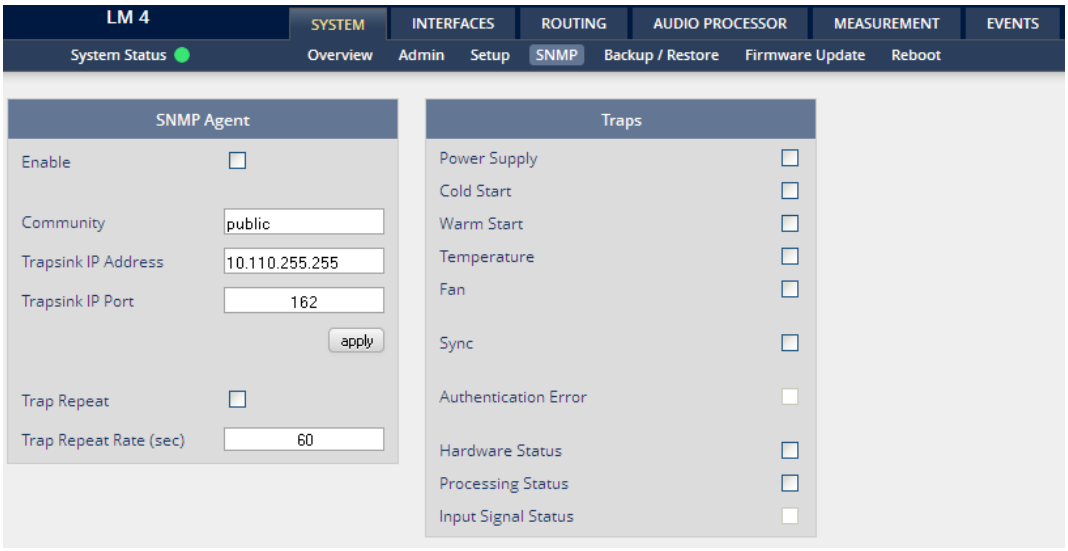



If you want to **<import>** a preset from a file you will get this pre-selection :



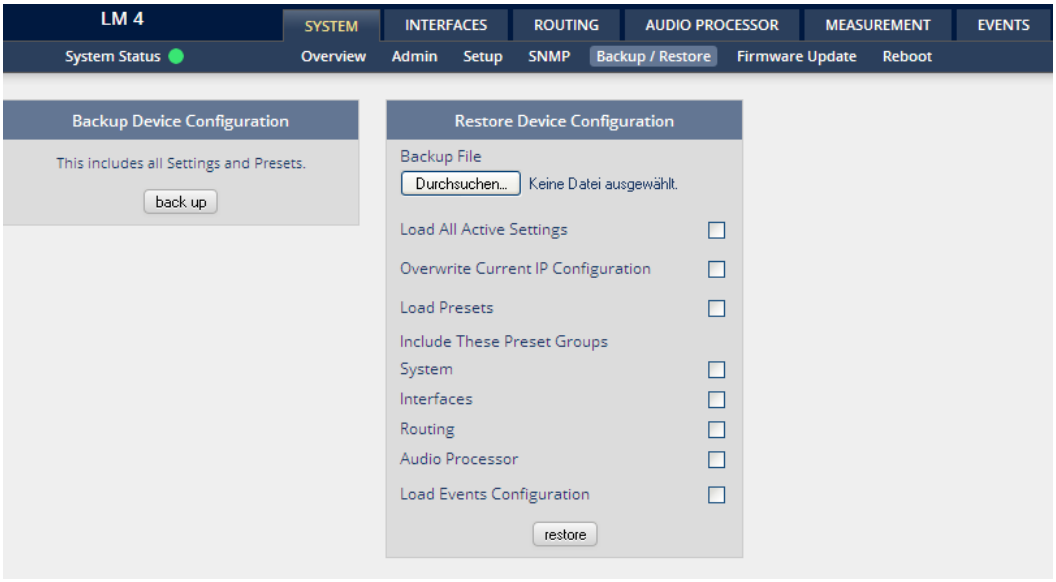

If you try to import presets from an older firmware versions there might be conflicts with some parameters which did not exist before. So you can select what to do in such a case.

Setup GUI – SYSTEM – **SNMP**

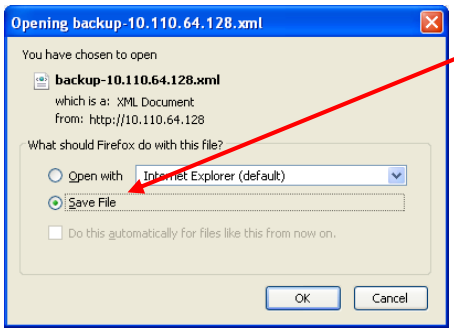



This pane is meant for basic settings of the **SNMP Agent** of the device. If you are not familiar with the use of SNMP protocol for system monitoring you should not enable the SNMP agent.

Setup GUI – SYSTEM – **Backup / Restore**

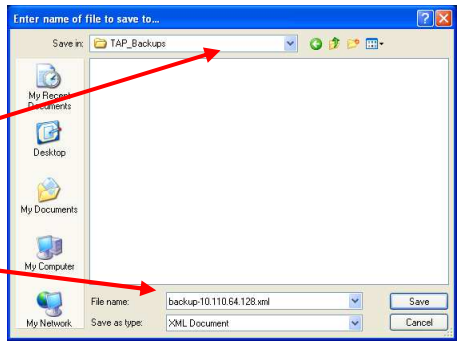



Here you can **backup** the complete **device** and **restore** parts or all of it .If you press **<backup>** the device controller will collect all necessary data and assemble it to an XML file. Finally you will get a pop up message:




You must select :
**<Save File>**.
After pressing **<OK>**, the system file dialog opens :

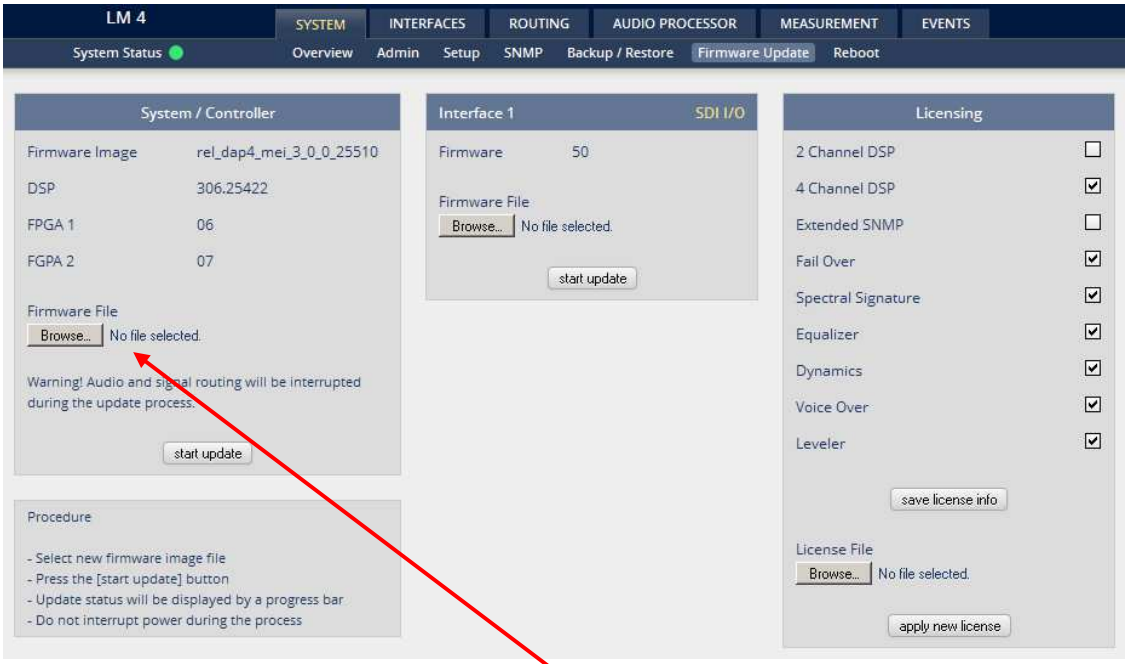
Select a folder and alter that default file name if needed.



Setup GUI – SYSTEM – **Firmware Update**

The files to update the **D*AP4** will be available in **ZIP** format. You must unpack them to your PC in order to access them for the update procedure.

You will find an image file for the **D*AP4** core system in the format : "rel_dap4-mei_x_y_z.img" as well as update files for components, like the optional interface boards in the format : "rsdi150_v50.sdi" or for **Dolby** CAT (OEM) modules or for the **X*AP RM1** remote panel.

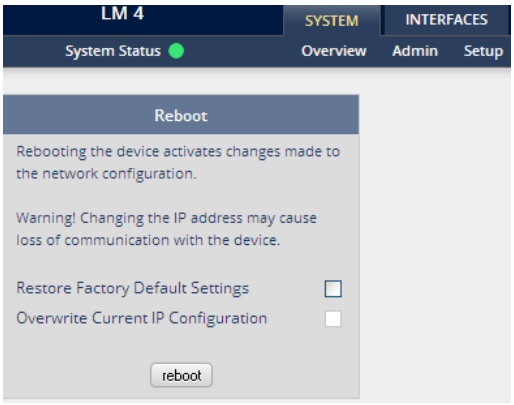



To update the **D*AP4**, you must **<Browse …>** for the respective Firmware File (which you have unzipped before) and press **<start update>**. After finishing the procedure the device will automatically reboot.

You may also update the firmware of an SDI board installed into **interface 1.**

**Important note!** The D*AP4 offers a licensing model where you may buy software features later on. When you upgrade your D*AP4 you must send a license info file to your local dealer. This file represents the activated functions as displayed above. After purchasing more functions you will get a license file in return. From the PC you must install it by pressing **<apply new license>**.

Setup GUI – SYSTEM – **Reboot**



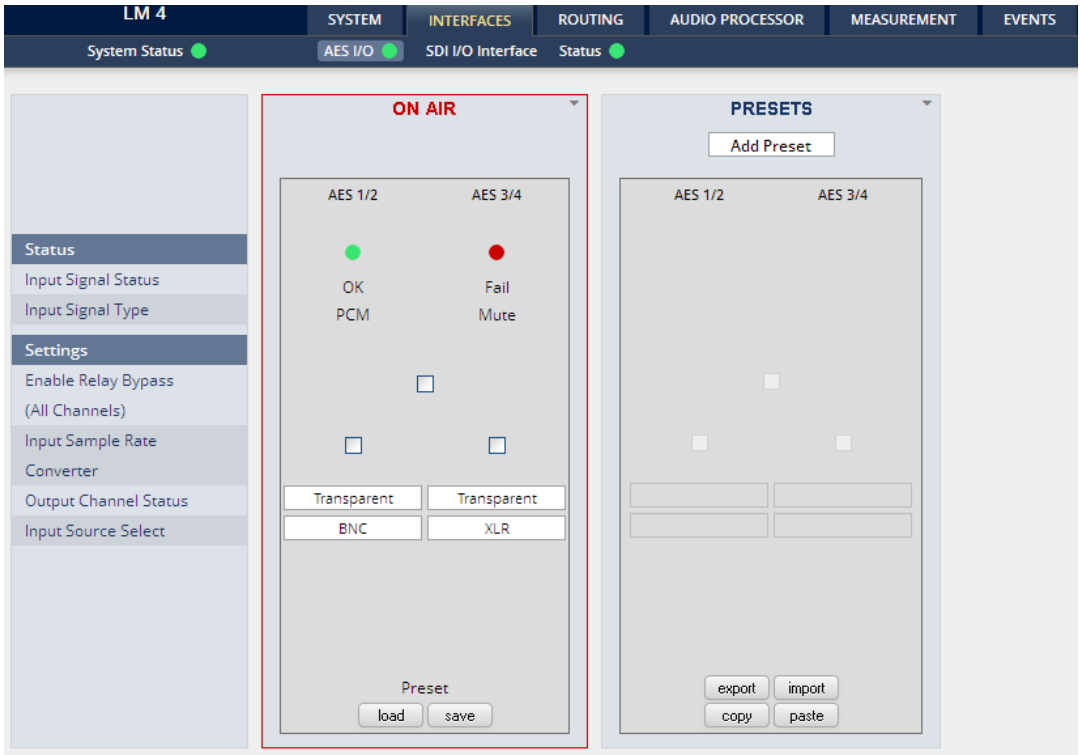

**Restore Factory defaults**

Will clean up the parameter and preset memory, will initialize all parameters to their factory default values, will reset passwords and turn authentication OFF.

**Overwrite Current IP**

You may exclude the current IP settings from this process to keep the device within you IP network.

SetupGUI – INTERFACES – **AES I/O**




**Status** [green / red / yellow] The soft LED represents the status.

Input Signal Status [OK / Fail]
Fail reasons could be: no carrier, unlock, cranky [too much jitter].

Input Signal Type [PCM / Non PCM / Mute]
The **Non PCM** (e.g. Dolby encoded signal) status will be retrieved from a logical combination of the Validity flag and the channel status.

If one of the inputs is not assigned by the ROUTING section, its status will not be incorporated into the System Status (see upper left hand side above).

**Settings**

**Enable Relay Bypass** [ON / OFF]
For fail save operation bypass relays are provided to connect AES IN / OUT in case of a power fail. One may enable such relay manually here.

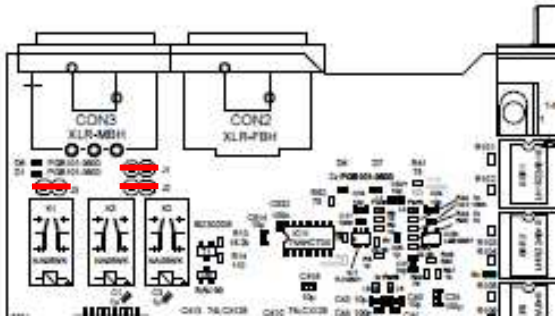
**Input Sample Rate Converter** [ON / OFF]
For asynchronous sources it is possible to turn the **SRC** on.
If an **SRC** is turned on and the input status becomes **Non-PCM**, the **SCR** will be turned OFF automatically in order to maintain the original data structure of an encoded bit stream (e.g. Dolby E).

**Output Channel Status** [Transperant / Prof PCM / Prof Non-PCM / Cons PCM / Cons Non-PCM]

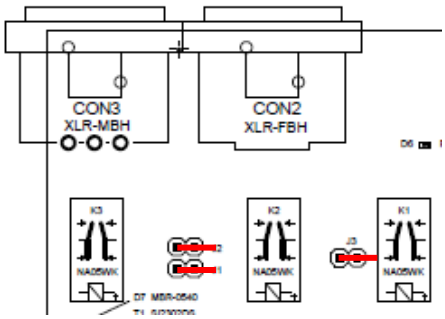
**Input Source Select** [BNC / XLR]
You must select here which input is in use (AES3id = BNC or AES3 = XLR).

**Important note!** The AES relay bypass circuit of the AES I/Os may be deactivated inside the **D*AP4.** You must open the cover plate from the **D*AP4** unit and locate the red jumpers shown in the schematic below :

**AES 1/2** on the main PCB on interface slot 0



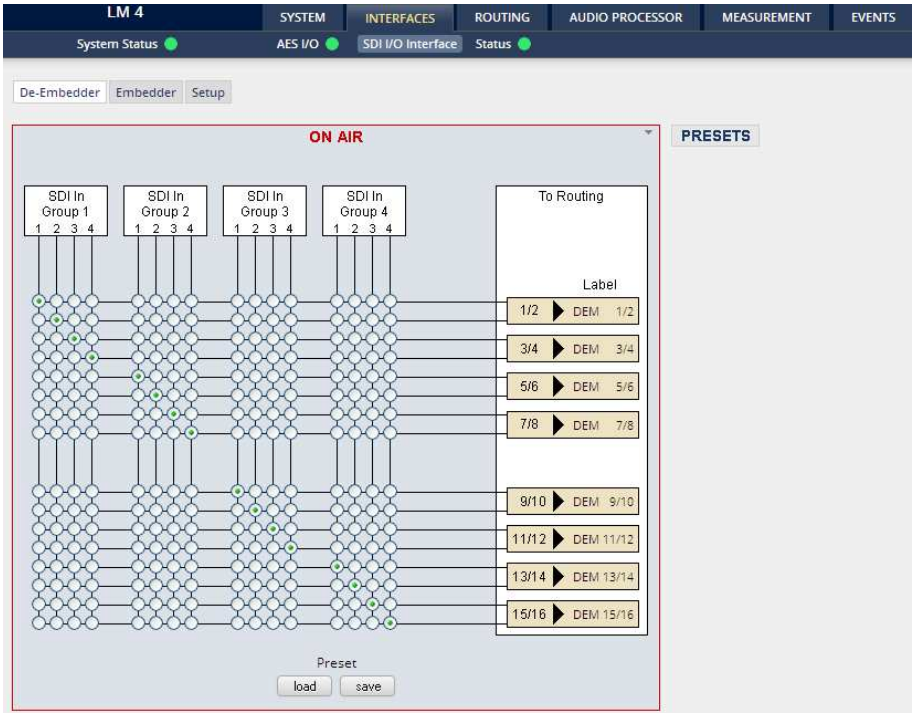

**AES 3/4** on interface slot 0




You must remove the jumpers to de-activate the AES I/O power fail relay operation.

Setup GUI – INTERFACES – SDI I/O interface – **De-Embedder**

If the **D*AP4** is equipped with an optional **SDI** interface the following settings will be available. This pane has three more sub panes implemented :

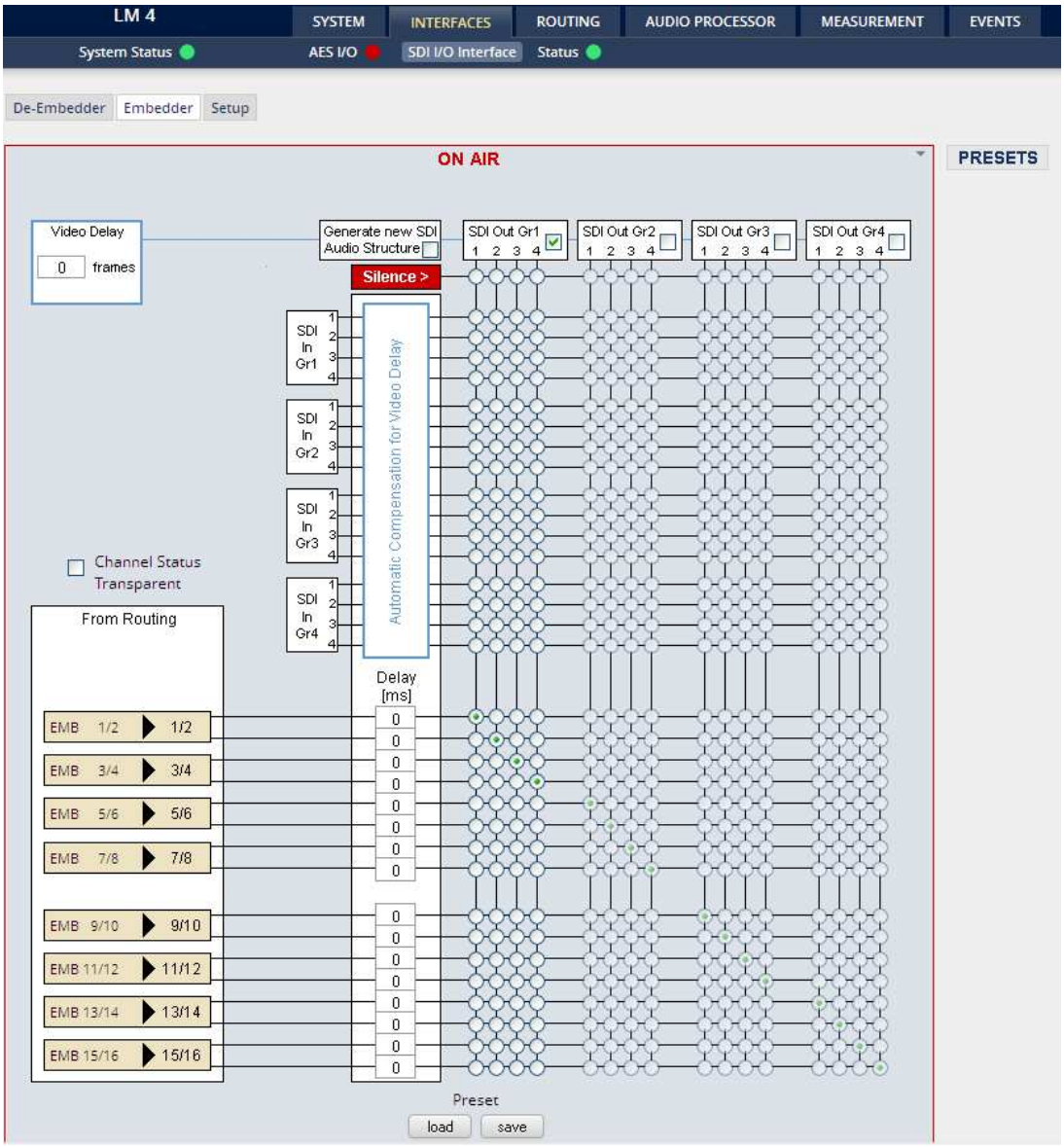



The **De-Embedder** has a 16 x 16 matrix to allow for any combination of de-embedded audio signals of the four groups to be processed by the **D*AP4.**

The labels "DEM a/b" represent two audio channels selected by the matrix.

Same labels will appear on the ROUTING page.

Setup GUI – INTERFACES – SDI I/O interface – **Embedder**




| | |
|---|---|
| **EMB a/b** | Signal labels from the **D*AP4** router that shows the origin of the signal pair presented to the embedder. |
| **Video Delay** | For compensation of any kind of audio processing delay within the chain of devices you may use a **Video Delay**.<br>Position “0” turns off the delay function. |
| **Generate new SDI Audio Structure** | If there is the need to replace the structure of the **Ancillary Audio Data Blocks** you can clean the whole area and generate a new structure. If the option is checked, there will be no signal available at the group output as long as no **SDI Out Grx** is checked. |
| **SDI Out Grx** | This check box enables each of the 4 SDI audio groups to be used individually by the embedder. If it is not checked and **“Generate new SDI Audio Structure”** is not enabled, the audio data from the input will travel untouched from the SDI input to the output. |
| **Silence** | Mutes the respective audio channel on the embedder side. |

**Delay**

The inputs of the embedder routing matrix can be taken either from the de-embedder or from the **D*AP4** in any combination. If they are taken from the de-embedder and a **Video Delay** is introduced, the time of that Video Delay will be **automatically compensated** for those audio signals.
For signals coming from the **D*AP4** routing an **independent delay** per single channel may be used.

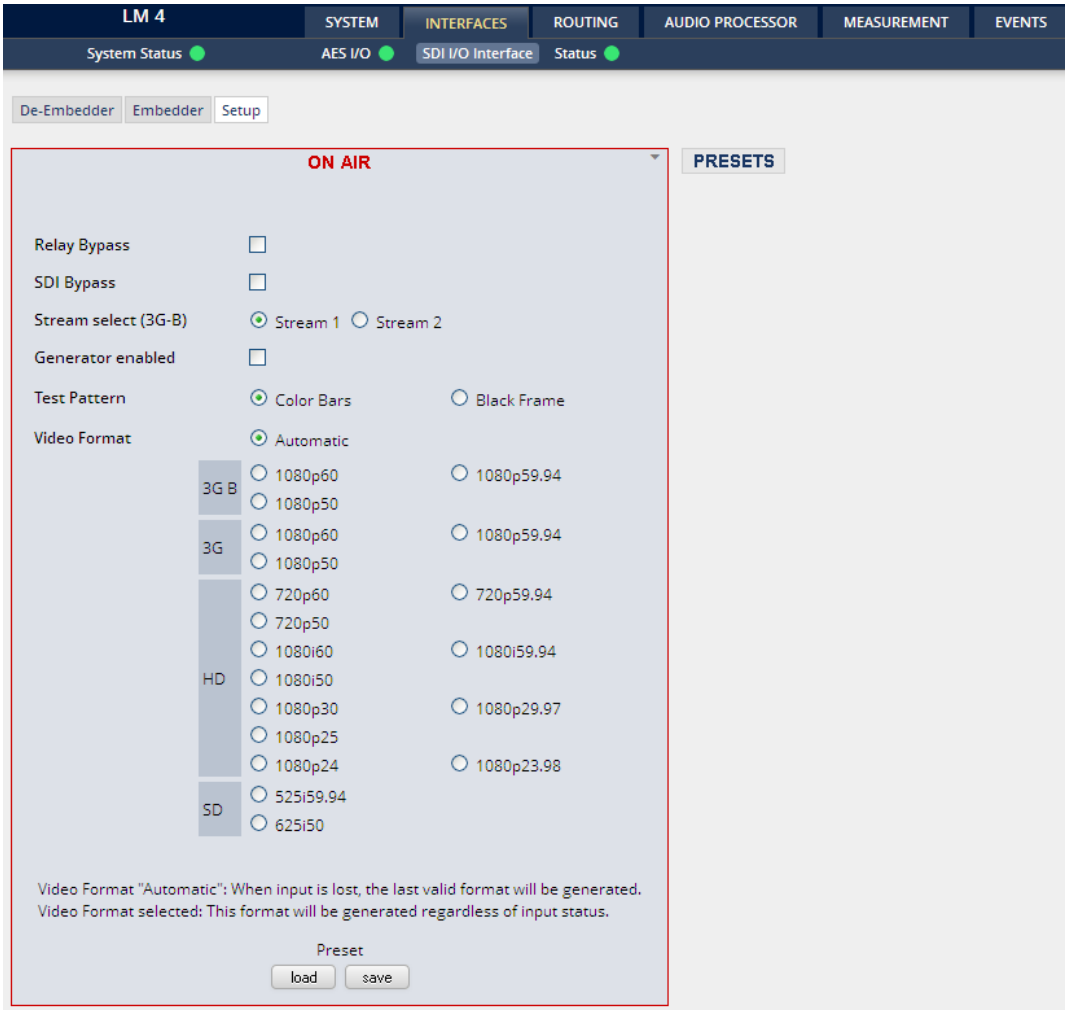
**Channel Status Bits Transparent**

For the signals coming from the **D*AP4**, you can decide whether the **AES Channel Status Bits** are taken from their source or if you want to generate new ones.
In this case the **Channel Status** will be set to:

| | |
|---|---|
| Format : | Professional |
| Audio Mode : | [Audio / Non Audio] |
| Emphasis : | None |
| Freq. Mode : | Locked |
| Sample Freq. : | 48kHz |
| Channel Mode : | Not Indicated |
| User Bits : | None |
| Auxiliary Bits : | 24Bit |
| Audio Word Length : | Not indicated |

**Important note!** If you generate a new AES channel status the **Audio Mode** will be automatically set to **Non Audio** (AKA "other") for both channels, if an adjacent pair (1/2, 3/4 …..) carries a Dolby E stream for example.

Setup GUI – INTERFACES – SDI I/O interface – **Setup**




**Relay Bypass** — Will deactivate the **Bypass Relay**. It provides a shortcut from **SDI-IN** to **SDI-OUT1** and disconnects the de-embedder from the SDI input. This relay also serves as a **fail bypass** if the power is off. This feature maintains the SDI signal for downstream equipment.

**SDI Bypass** — Will pass the embedded audio data from the de-embedder to the embedder 1:1. This function preserves the original Ancillary Data structure.

**Stream Select (3G-B)** — A 3G-SDI signal may have two HD sub streams (e.g. for 3-D TV), AKN as 3G-B standard. The radio buttons select between stream 1 or 2 for embedded audio. See SMPTE 425M for details.

**Generator enabled** — The video generator may be enabled here. The **video format** it generates depends on the selection below.

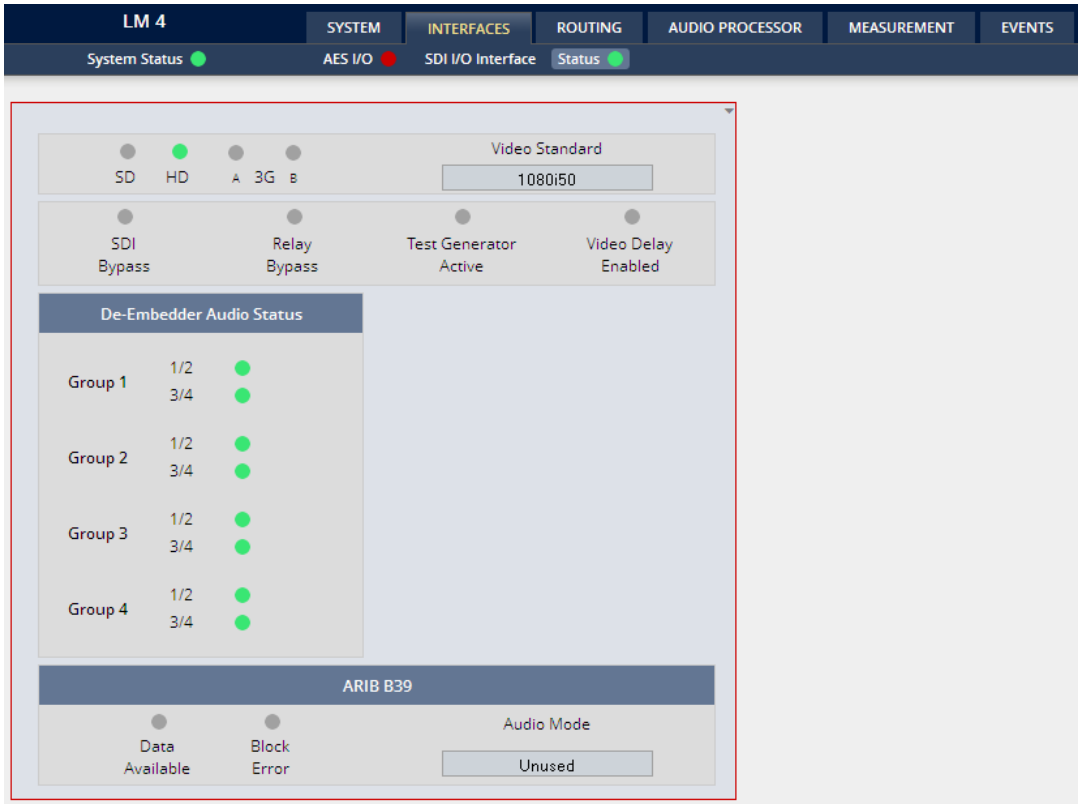
**Test Pattern** — If the Generator is on, it will generate one of the two video test patterns, either black or 100% color bar.

**Video Format** — If the **Automatic** mode is selected and the Generator is enabled, it turns on if the SDI input signal fails. In this case it will generate the same video format as the previous input signal.
If **"Generator enabled"** is checked and if you have selected one of the **Video Formats** the Generator will be turned on using this format.

**Important note!** If the **generator is on**, either in manual or in automatic mode, it operates on an internal crystal clock. It is **not possible** to **genlock** it to an external reference or to the SDI input.

Setup GUI – INTERFACES – SDI I/O Interface – **Status**

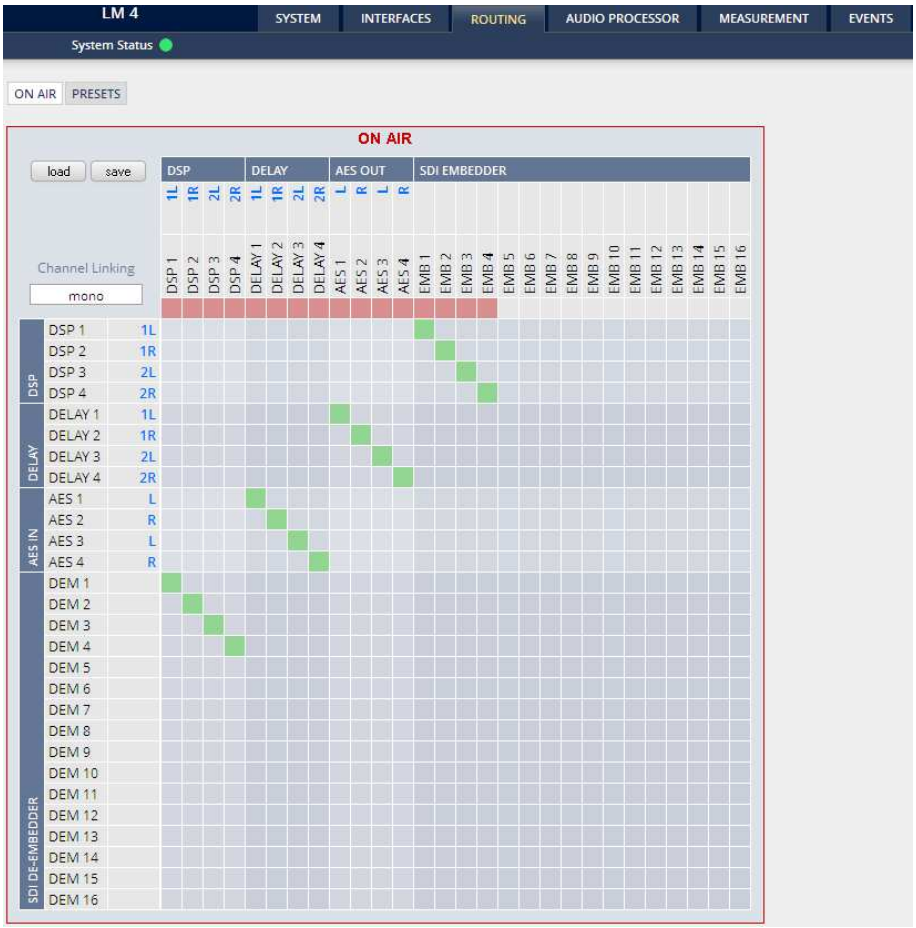
This pane shows the status of the SDI interface (if one is installed) :




| | |
|---|---|
| **Video Standard** | Display of the video standard detected by the SDI input. |
| **SDI Bypass** | Turns yellow if the SDI bypass function is activated. |
| **Relay Bypass** | Turns yellow if the power fail relay is deactivated manually. |
| **Test Generator Active** | Turns yellow if the Generator is turned on. |
| **Video Delay Enabled** | Turns green if the video delay is activated. |
| **De-Embedder Audio Status** | is grey if no audio is present.<br>Turns green if PCM audio is embedded.<br>Turns yellow if a non audio signal is present, an additional label shows the kind of signal if it is possible to gather the information. |
| **ARIB B39** | Meta information standard |
| **Data Available** | Turns green if ARIB B-39 meta information are detected. |
| **Block Error** | Turns red if an error has been detected. |
| **Audio Mode** | See **ARIB** Japanese standard "Structure of Inter-Stationary Control Data Conveyed by Ancillary Data Packets"<br>http://www.arib.or.jp/english/html/overview/doc/2-STD-B39v1_2.pdf |

Setup GUI – **ROUTING**

This is the control center of the **D*AP4** as it defines the audio signal flow inside the device :




Each functional block of the device has a two tier input- and an output-label. Additional **blue** labels give an indication of the type of signal that is detected or expected by the respective function block or I/O (e.g. **L/R** for AES or DSP / DSP 1 **1L**, DSP / DSP 2 **1R** and so forth.

The routing example shows 4 de-embedder channels connected to the 4 inputs of the DSP. The AES inputs are connected to delay inputs while the DSP outputs are connected to 4 embedders and the delay outputs are connected to the AES outputs.

| | |
|---|---|
| Channel Linking | [mono / stereo]<br>You can decide if the routing must be performed in mono or stereo mode (where adjacent odd/even channels are routed at once). |

You select cross points by hovering with the mouse over the little squares. The color of the respective squares will change :

| Mouse over | Color codes of cross points : |
|---|---|
| **dark blue** | Possible new cross point. |
| **orange** | You are about to reconnect a cross point. |
| **grey** | Cross point is not allowed<br>(i.e. routing will cause a loop and will not be performed therefore). |
| **red** | You are about to disable a cross point |

Clicking into the small squares will execute the routing.

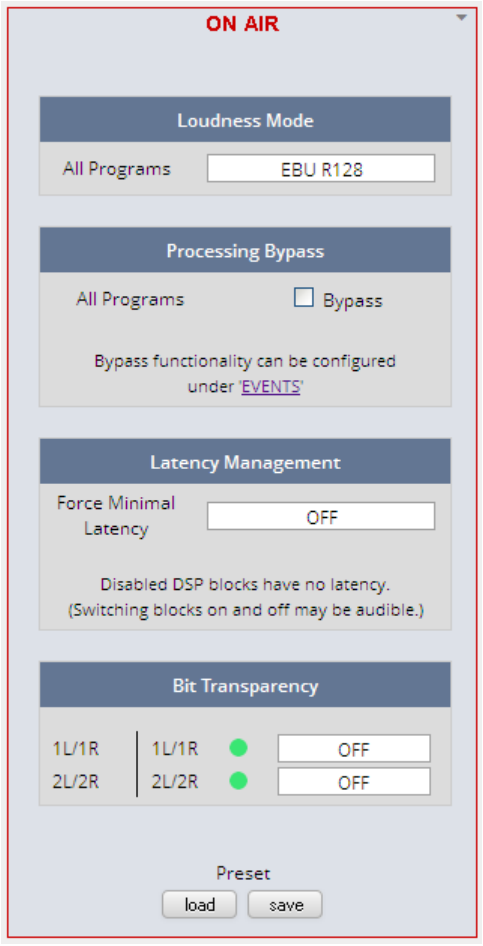
Setup GUI – AUDIO PROCESSOR - **Overview**

The overview shows the actual signal flow and the audio processor blocks, rendered by the DSPs.

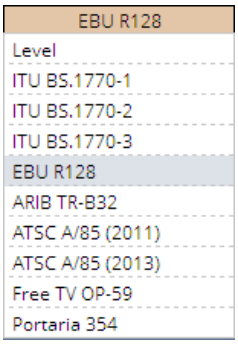

The processing blocks in use, which may be activated from their individual setup panes, will be indicated in green. I.e. blocks shown in grey are not activated by the user.

To navigate through the various processing blocks you may either click on the graphical block above or use the tabs provided in the navigation bars below the bar graph displays.

Setup GUI – AUDIO PROCESSOR - **Setup**




**Loudness Mode**




In order to meet the regulations of regions or countries you must select the loudness control mode here.
Beside of the weighing curves several measurement duration and loudness ranges have bee defined. Some regulations are based on the same measurement (e.g. ITU BS.1770-2) but defined in a different regional norm.
You must check with your local authority for correct settings if you must comply with regulations.

**Processing Bypass**

[ON / OFF]
You may turn the bypass ON/OFF from here by activating the check box.
The bypass functionality may be configured at the **EVENTS** >**Actions** pane where the link will direct you to.

**Latency Management**

In a latency critical environment it might be desirable to have the lowest possible latency. So it is useful to actually bypass a process that is not in use. In normal operation, switching audio processing modules on and off does not result in a change of latency and thus does not cause audible glitches or clicks.

**Force Minimal Latency**

[ON, OFF]
Disabled audio processing blocks are taken out of the processing chain and are no longer causing a delay.
However switching blocks on or off can cause clicks and glitches, even in unaffected channels, as the latency compensation is recalculated.

**Bit Transparency**

For non audio signals which may be appear at the input of a program chain permanently or time by time you can select the behavior here.

**1L/1R | 1L/1R**
[ON / AUTO / OFF]
**2L72R | 2L/2R**
[ON / AUTO / OFF]
You may force the DSP to pass through the audio stream untouched in case there is encoded audio present. The AUTO mode is triggered by the AES channel status.

System Latency [ms] :

| | 44.100 kHz | 48.000 kHz | 88.200 kHz | 96.000 kHz |
|---|---|---|---|---|
| Base Latency | | | | |
| AES IN to AES OUT | 4.26 | 4.08 | 3.13 | 3.05 |
| Additional Latencies | | | | |
| Spectral Signature | 2,9 | 2,66 | 2,9 | 2,66 |
| Sample Rate Converter | 0,21 | 0,21 | 0,21 | 0,21 |

Base latency consists of 1 ms Limiter Look Ahead Time and all system inherent processing and input/output delays.

Setup GUI – AUDIO PROCESSOR – **Input**

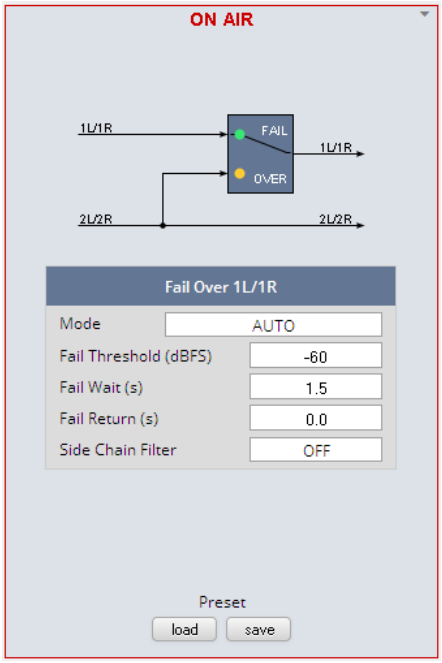

You may set the input conditions for both program channels (1L/1R) and (2L/2R) here :

**Link** [Unlinked, Linked]
For stereo operation you may link the setup parameters

**Input** [Enable / Disable]
Enables or disables the input section

- **Mute** [ON / OFF]
- **Input Gain (dB)** [-80.0 … 0.0 … 20.0]
- **Mono** [L/R Stereo / L+R Mono / L/L Mono / R/R Mono]
- **Input HPF (Hz)** [OFF / 20 / 40 / 80 / 120]
- **Input LPF (kHz)** [OFF / 15 / 20 / 22]
- **Input Delay Coarse(ms)** [0.0 … 2000.0]
- **Input Delay Fine (samples)** [0 … 2000]

Setup GUI – AUDIO PROCESSOR – **Fail Over**




**Fail Over 1L/1R** The D*AP4 offers a fail over circuit for automatic operation.

**MODE** [FIX 1L/1R / FIX 2L/2R / AUTO]
In AUTO mode the switch over happens in case of an input failure.

**Fail Threshold (dBFS)** [-80 … -60 … -40]
**RMS** weighted input level for fail detection.

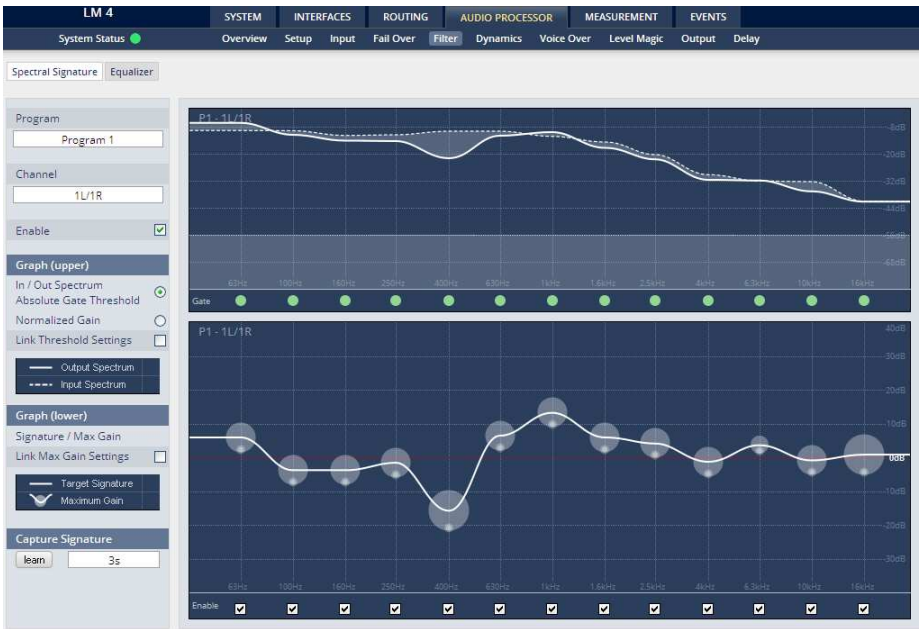
**Fail Wait (s)** [1.5 … 10.0]
elapsed time after fail detection until the switch over will happen.

**Fail Return (s)** [0.0 … 10.0]
elapsed time after detection of a proper input signal until the switch back to the program input.

**Side Chain Filter** [OFF / ON]
a high pass filter (300 Hz) and a low pass filter (3000 Hz) is applied to the detector side chain (not the audio path) to prevent hum and noise from blocking fail over switching.

Setup GUI – AUDIO PROCESSOR – Filter **– Spectral Signature**

Spectral Signature is a highly sophisticated dynamic multiband filter to boost (or reduce) spectral parts of the processed audio signal dynamically. It punches through a reference spectrum to the processed audio signal.



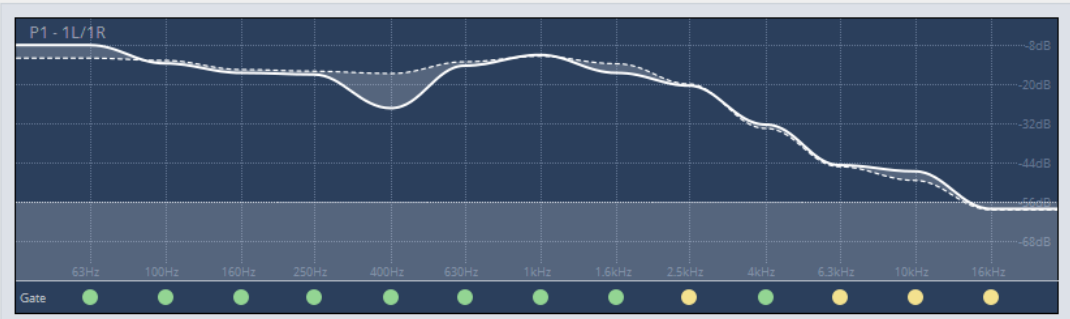
**Program** [Program1 / Program2 / Preset]
Selects the program that is actually under GUI control.
Since this view does not allow to display a preset page side by side as usual one must select "Preset" to get to the preset editor.

**Channel** [1L/1R, 2L/2R, 1L, 1R, 2L, 2R]]
Depending on the program selected and the link status (see below lower graph) the channel under control will be displayed here.

**Enable** [ON / OFF]
Enables / disables Spectral Signature for the selected program.
Please note: For convenient operation, this function is also available (in the Expert section, see below) within the web interface.

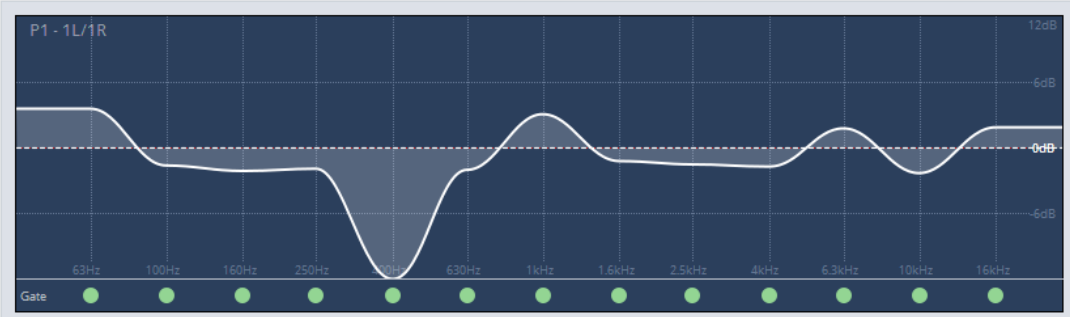
**Graph (upper)** The upper graph is a metering window, illustrating the difference between the input (dotted line) and the output (solid line) signal.
This window can be used in two different ways:

**Input / Output Spectrum**
**Absolute Gate Threshold** [alternative selection]




The spectrum is shown in absolute values (related to digital full scale). This is very helpful to get an impression of the frequency response of the signal. Also, in this mode the absolute gate threshold can be set within the graph by grabbing and dragging the lower transparent white area. The gate LED row at the bottom indicates whether the absolute or relative gate of the band is closed (yellow) or open (green). A gray LED indicates that the band is switched out.

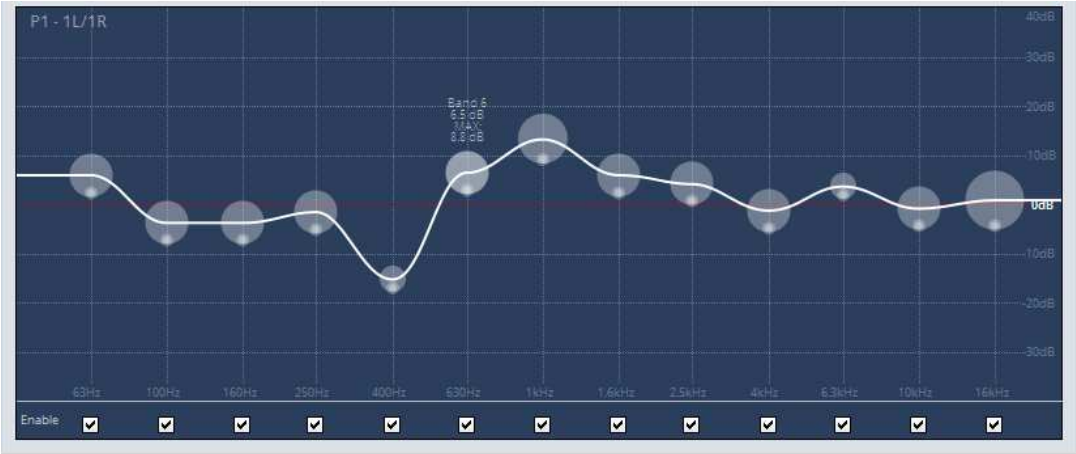
**Normalized Gain** [alternative selection]




This is very useful to see the actual amount of amplification or attenuation within each band. In this setting the Absolute Gate Threshold cannot be set.

**Link Threshold settings** [ON / OFF]
The absolute gate threshold can be set individually for every single band. However, in most cases this is not necessary. Checking this box links all gate thresholds together. This connection is absolute, differences between bands will be overwritten. Please note: For convenient operation, this function is also available
(in the Expert section, see below) within the web interface.

**Graph (lower)**




**Signature / Max Gain (dB)** [0 … 12]
Spectral Signature does not work with an absolute level reference. Its frequency response is based on level differences between bands only. Thus a signature is only represented on a relative graph showing the level positions related to the neighboring bands. In consequence, having a straight line does not mean Spectral Signature is not doing anything or in a 'neutral' status. A straight line would cause Spectral Signature to modify the input signal towards the frequency response of white noise which is, in most cases, not desirable.
On mouse over you can read the actual setting of a particular band (BAND 6 above).
To change a band, just grab and drag the corresponding sphere. It is recommended to use the 'Learn' function first (see below). Every single band can have an individual max gain value that limits the maximum amplification and attenuation. To set this value, grab and drag the smaller sphere on the bottom of the main sphere. The max gain setting is indicated by the size of the main sphere. The lowest and highest values are indicated by a flashing edge.

**Link Max Gain Settings** [ON / OFF]
Instead of dialing in all max gain settings individually per band, this link function is a handy tool to for basic setup. This connection is absolute, differences between bands will be overwritten.

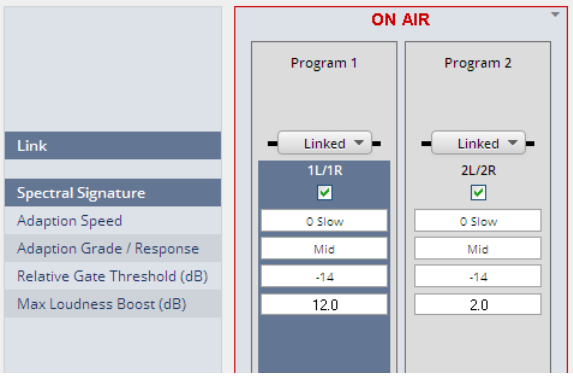
**Enable** [ON / OFF]
Checkboxes on the bottom of the lower graph can be used to bypass single bands from processing.

**Capture Signature**

**<Learn>** Spectral Signature is a dynamic filter tool to even out differences between signals of different source or condition. It does not have an absolute reference. Only if the incoming signals frequency response equals the reference response (signature), will Spectral Signature operates in a neutral manner. To create a reference spectrum, which is called 'Signature', start your reference signal and hit the 'Learn' button. After a couple of seconds (see below), the Signature is updated. If the input signal does not change, the upper graph shows that the input and output curves are alike. If the incoming signal spectrum changes, Spectral Signature starts to even out the tonal differences, without destroying the original structure.

**Learn time**

[manual / 1s … 30s / 1min]
Determines the time over which the input frequency response is integrated to create the signature. A shorter time is sufficient for single channel signals, where the content remains stable over time (for example a presenter microphone). Longer time settings are appropriate for mixed content or buses (for example a studio output).




**Link**

[Unlinked, Linked]
For stereo operation you may link the setup parameters

**Spectral Signature**

[ON / OFF]

**Adaption Speed**

[0 / 2 Mid / 3 / 4 Fast]
This parameter affects the time taken for the bands to reach their target values. Fast settings even out differences between sources, but can lead to audible transitions. They are well suited for single channel signals, for example to even out sound differences due to movement in front of a microphone. Slower settings remain unobtrusive, but cannot bring down differences very quickly. They are suitable for mixed content or buses with varying content. The overall spectrum remains well balanced without drastic sonic changes.

**Adaption Grade / Response**

[Soft / Mid / Hard]
In order to achieve a stable and natural behavior, the intensity of the gain change needs to process according to a response curve. This curve is defined by a ratio. A high ratio means that a difference of 5 dB results in a gain change of almost the same amount. A low ratio means that the actual gain applied is lower. A ratio of 2:1 would bring the amplification up to 2.5 dB in this example. The max gain value is applied after the ratio calculation. As these ratios are not static, they have been combined into three preset responses. The average ratio increases from 'soft' to 'hard'.

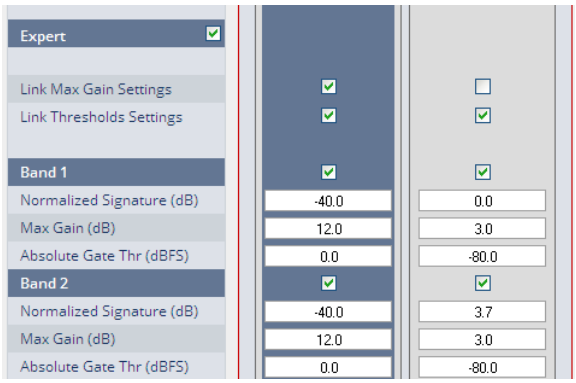
**Relative Gate Threshold (dB)**

[-10 …. -14 … -20 / OFF]
To prevent a band from amplifying noise (especially hum), a relative gate can be set. If the energy within one band is lower than this gate, no amplification will take place. This is especially useful, when mixed content with highly varying frequency response is processed (for example a radio station output with alternating presenter voice and music).

**Max Loudness Boost (dB)**

[0.0 … 1.5 … 12.0]
The human hearing is not a linear system. When levels get low, humans perceive less bass within the signal and the sound becomes subjectively thin and tiny. This phenomenon is well known and documented as the 'equal loudness contours'. By setting up Max Loudness Boost the system compensates for this difficulty of the human perception and raises the bass bands as levels decrease. Our intelligent system compensates the frequency response independently from the absolute playback level. Max Loudness Boost is the amount of gain that the system is allowed to build up, not a static gain value. We suggest to experiment with a start setting of 4.

**Expert** [ON / OFF]
All parameters within the Expert section are duplicated in the Signature and Spectrum graphs. They can be used to enter numerical values directly. Changes are reflected in the graphs and likewise in reverse.




**Link Max Gain Settings** [ON / OFF]

**Link Threshold Settings** [ON / OFF]

**Band 1** [ON / OFF]

**Normalized Signature level** [-40.0 … 0 … 40.0]

**Max Gain** [0.0 … 3.0 … 12.0

**Absolute Gate Threshold** [-84.0 … -80.0 … 0.0]

**Band 2 … 16** similar parameters as Band 1

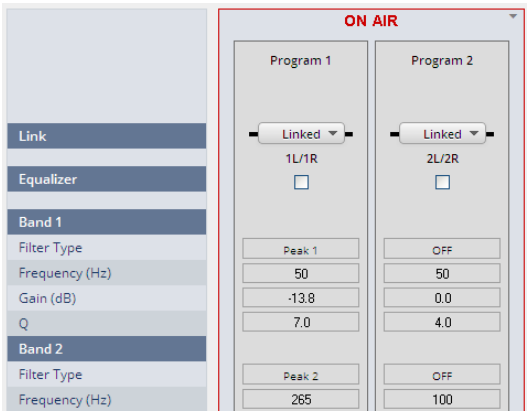
Setup GUI – AUDIO PROCESSOR – Filter **– Equalizer**


**Program** [Program1 / Program2 / Preset]
Selects the program that is actually under GUI control.
Since this view does not allow to display a preset page side by side as usual one must select Preset to get to the preset editor.

**Channel** [1L/1R, 2L/2R, 1L, 1R, 2L, 2R]]
Depending on the program selected and the link status (see below graph) the channel under control will be displayed here.

**Enable** [On / OFF]

**Band 1 … 5** [OFF / Peak 1 / Peak 2 / Lo Shelf / Hi Shelf / Lo Cut / Hi Cut]

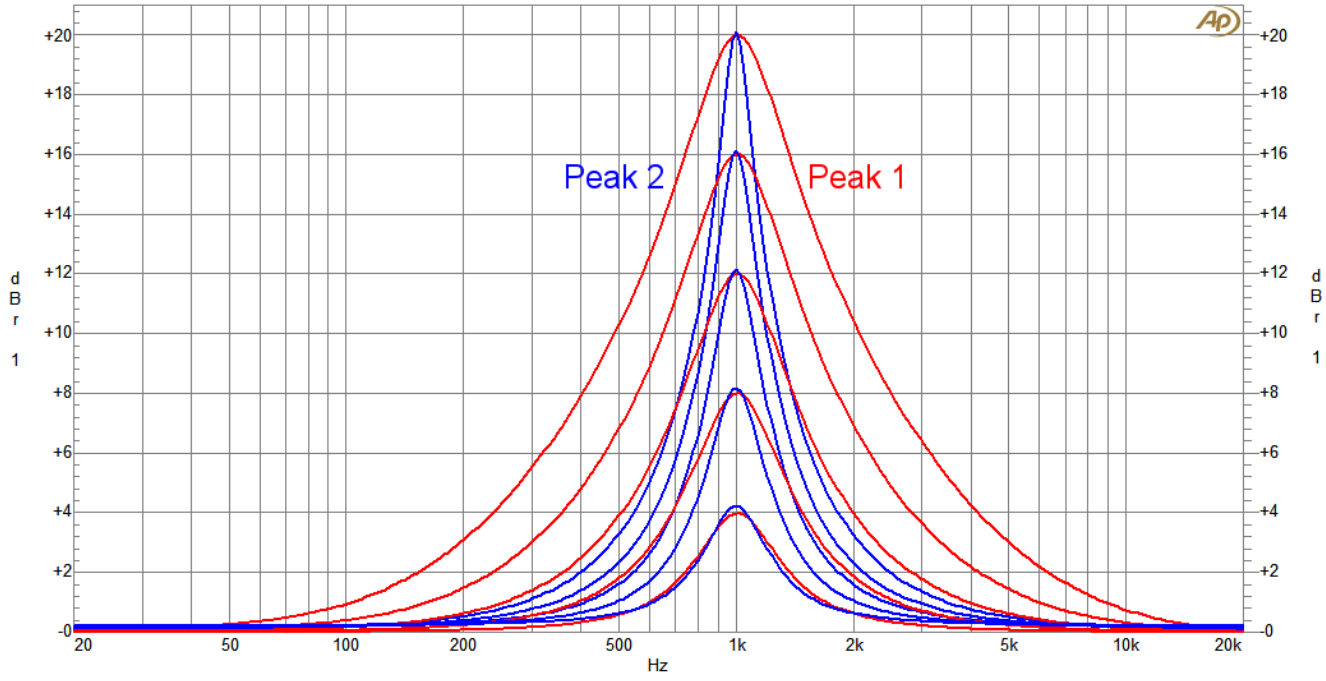



| | |
|---|---|
| **Link** | [Unlinked, Linked]<br>For stereo operation you may link the setup parameters |
| **Equalizer** | [ON / OFF] |
| **Band 1** | |
| **Filter Type** | [OFF / Peak 1 / Peak 2 / Lo Shelf / Hi Shelf / Lo Cut / Hi Cut] |
| **Frequency (Hz)** | [20 … 20000] |
| **Gain (dB)** | [-20.0 … 20.0] |
| **Q** | [0.4 … 4.0] |
| **Band 2 … 5** | similar parameters as Band 1 |

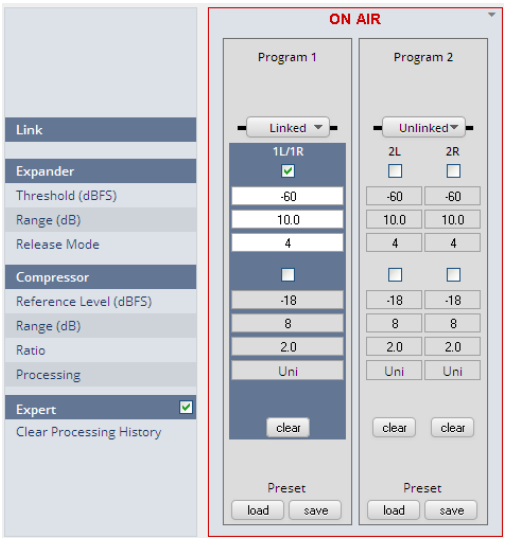
The **EQs** offer two different peak modes :

**Peak 1** : The bell curves of the **Peak 1** filter features constant quality (Q) over gain. Q is defined at -3 dB below peak. It does not change when altering gain.

**Peak2** : The bell curves of the **Peak 2** filter also features constant quality (Q) over gain. But Q is defined at 50 % of gain. Subjectively the bell curve becomes sharper when increasing gain, but this is only true for the lower 6-8 dB of gain.

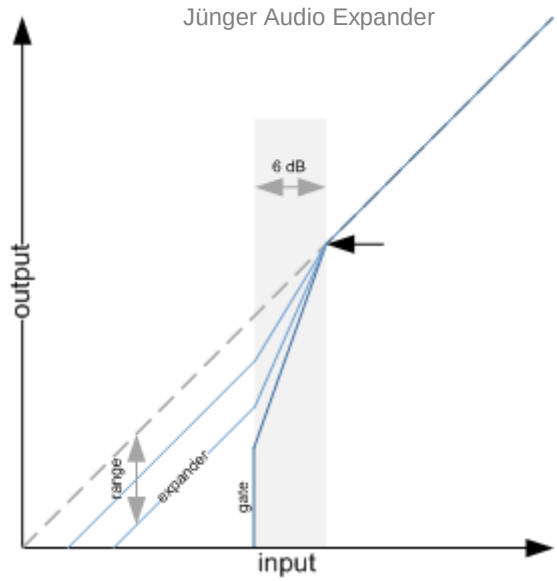


Setup GUI – AUDIO PROCESSOR – **Dynamics**




| | |
|---|---|
| **Link** | [Unlinked, Linked]<br>For mono operation you may unlink the setup parameters (see Program 2 for example). |
| **Expander** | [ON / OFF] |
| **Threshold (dB)** | [-60.0 … -20.0] |
| **Range (dB)** | [0.0 … 10.0 … 20.0 / Gate] |
| **Release Mode** | [0 … 4 … 9] |
| **Compressor** | [ON / OFF] |
| **Reference Level (dBFS)** | [-40 … -18 … 0] |
| **Range (dB)** | [0 … 8 … 20] |
| **Ratio** | [1.1 … 2.0 … 4.0]] |
| **Processing** | [Live / Speech / Pop / Uni / Classic] |
| **Expert** | [ON / OFF] |
| Clear Processing History | **<clear>**<br>pressing the soft button will clear the processing history of the dynamics control loops. |

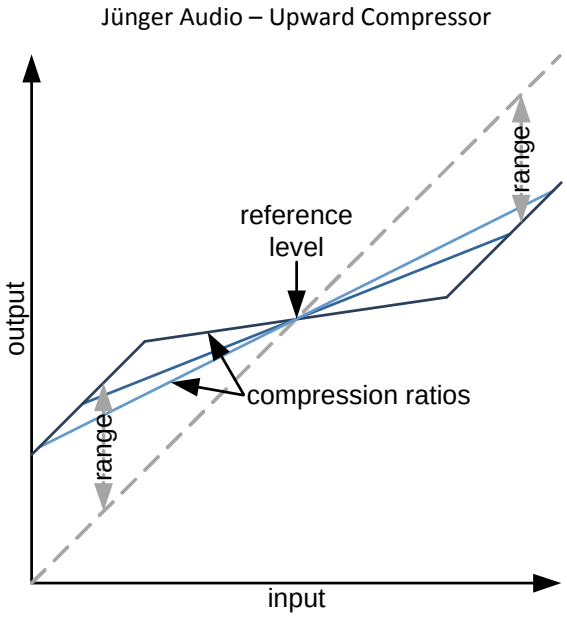
The parameters of the dynamic section are explained below in reference to the curves :




**Threshold** Signals below threshold are processed, signals above pass unaffected. Please be aware that this is only true in Gate mode, as the Expander mode features soft knee characteristics.

**Range** Maximum reduction range. Its value determines the maximum reduction of the input signal. This parameter is sometimes called 'floor', but differs in terminology. A floor level is defined as an absolute value in dBFS, no matter where the threshold is set. Range defines the relative range of reduction in dB below threshold and is thus independent from absolute values. When it is set to 'Gate' the input signal is muted.

**Release Mode** The release mode controls the timing of the closing of the Gate/Expander. Release mode 0 is very fast and even short gaps or signal intermissions lead to gain reduction. On the other end of the scale, 9 is a very slow mode with a relaxed handling of gaps and low level periods. All modes feature the same super fast opening when the signal returns above threshold.




**Reference Level (dBFS)** Not to be confused with threshold, this parameter defines the turning point of the response curve from upward to downward compression (see picture). When set to 0 dBFS, all the signal is amplified according to the ratio and range settings.

**Range (dB)** This defines the range over which dynamic compression is applied as defined by the ratio setting.. Signals outside of this range are still reduced or amplified but not altered in their dynamic structure.

**Ratio** Determines the amount of gain reduction by a selectable ratio. Although the same in mathematical terms, understanding is easier when differentiating between upward and downward compression:

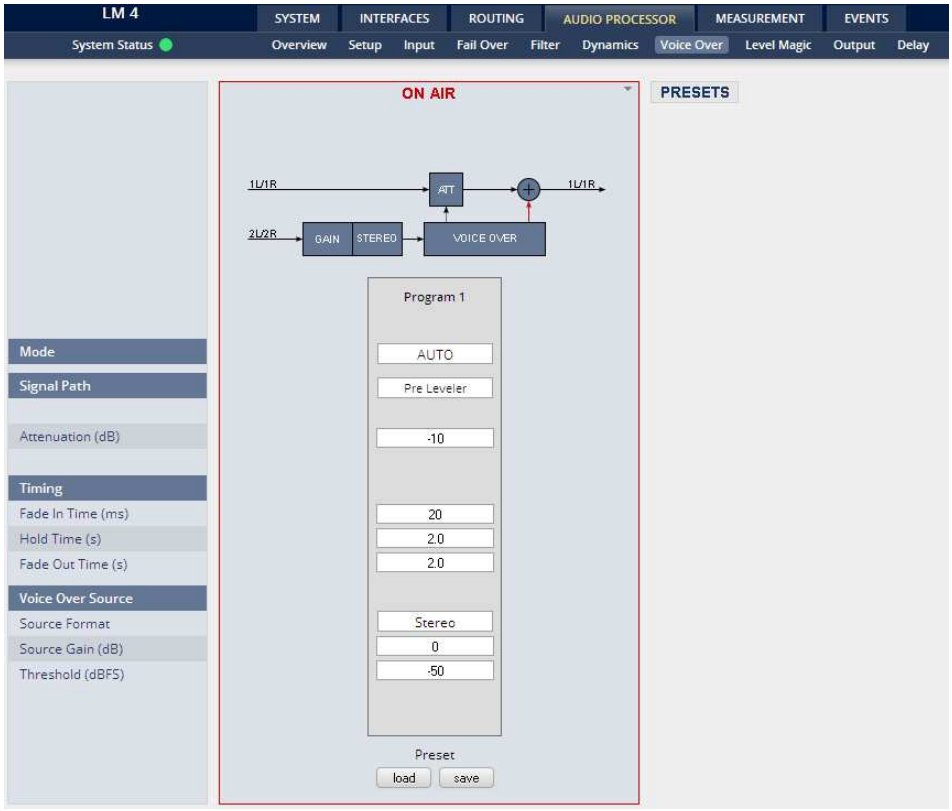
**Processing** The timing characteristics of the compressor are generated adaptively according to the incoming signal structure. The overall timing can be set up from fast and responsive settings (lower numbers) to relaxed settings (higher numbers) without detailed access to the actual micro timings. The names behind some of the numbers may help to easily find adequate values to your content.

**Expert** [ON / OFF]

**Clear Processing History** This is a triggered action that resets the dynamic processing without any release time. Imagine it as a short circuit to the timing circuits of an analog dynamic processor which discharges the whole system and immediately returns the dynamic gain to its neutral state. This function is useful to reset the process when switching programs (e.g. from movie to commercial breaks).

Setup GUI – AUDIO PROCESSOR – **Voice Over**

The voice over section allows for manual / automatic (ducking) mixing of a voice channel over the program feed. The dynamic schematic in the top of the pane shows the signal flow :




**Mode** [OFF / Always ON / AUTO]
Defines the operating mode of the voice over block. AUTO will detect the signal in the voice channel and automatically perform the voice over (ducking).

**Signal Path** [Pre Leveler / Post Leveler]
See AUDIO PROCESSOR > Overview for actual location of the circuit in the signal path.

**Timing**

- **Fade In Time (ms)** [10 / 20 … 1000]
- **Hold Time (ms)** [0.0 … 2.0 … 10.0]
- **Fade Out Time (ms)** [0.0 … 2.0 … 10.0]

**Voice Over Source**

- **Source Format** [Stereo / Mono LL / Mono RR / Mono L+R]
- **Source Gin (dB)** [-20 … 0 … 20]
- **Threshold (dBFS)** [-60 … -50 … -40]
  Sets the threshold for detection in AUTO mode.

Setup GUI – AUDIO PROCESSOR – **Level Magic**

For detailed description of the Level magic parameters pls. refer to the document :

**"Junger_Processing-Parameters_xxyyzz.pdf"**

that you may download from the **Jungeraudio.com** web site.


**Loudness Control Mode** [display of the setting from AUDIO PROCESSOR > Setup > Loudness Mode]

**Link** [unlinked / linked] defines the coupling of the control circuits

**Leveler** [disable / enable]]

- **Processing Profile** [Live / Speech / Pop / Uni / Classic]
- **Loudness Target for different modes** Level [0 … -50dBFS] ITU [0 … -50LKFS] EBU [0 … -50LUFS]
- **Time (s/min/h)** [10, 20, 40 / 1, 2, 5, 10, 20, 40 / 1, 2]
- **Max Gain (dB)** [0 … 10 … 40]
- **Freeze Level (dBFS)** [-60 … -50 … -20]

**Transient Processor**

- **Max Gain (dB)** [0 … 10 … 15]
- **Response** [Soft, Mid, Hard]

**Limiter** [OFF / ON]

- **Processing Profile** [Live / Speech / Pop / Uni / Classic]
- **Max True Peak (dBTP)** [-20 … -9.0 … 0.0]

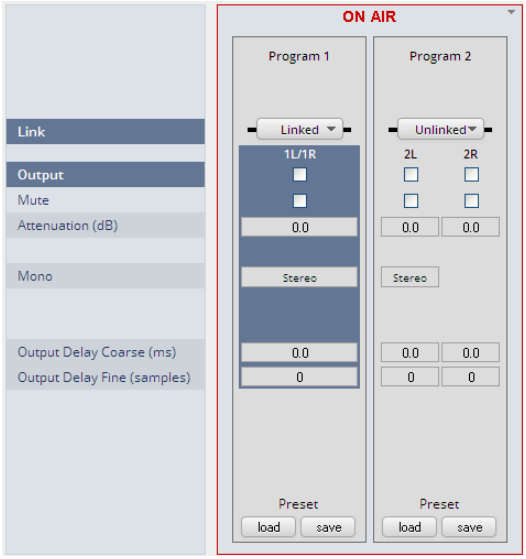
**Expert** [ON / OFF]

- **Clear Processing History** <clear>
- **Initial Dynamic Gain (dB)** [-40 … 0 … 15]
- **AGC Recovery** [Fast / Normal]

**Low Level Behavior**

- **Processing Threshold (dBFS)** [-80 … -70 … -20]
- **Below Threshold Mode** [Hold / Release]

Setup GUI – AUDIO PROCESSOR – **Output**



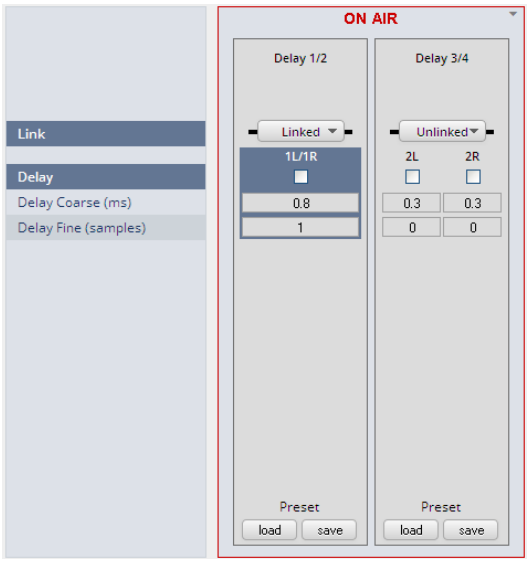

**Link** [unlinked / linked]
defines the coupling of the control circuits

**Output** [ON / OFF]]

- **Mute** [ON / OFF]
- **Attenuation (dB)** [-80.0 … 0.0]
- **Mono** [L+R Mono / LL Mono / RR Mono / Stereo]
- **Output Delay Coarse (ms)** [0.0 … 2000.0]
- **Output Delay Fine (samples)** [0 … 2000]

Setup GUI – AUDIO PROCESSOR – **Delay**

The **D*AP4** has an independent audio delay that may be routed to any signal path inside the device.




**Link** [unlinked / linked]
defines the coupling of the control circuits

**Delay** [ON / OFF]]

- **Output Delay Coarse (ms)** [0.0 … 2000.0]
- **Output Delay Fine (samples)** [0 … 2000]

Setup GUI – AUDIO PROCESSOR – **MEASUREMENT**

The D*AP4 offers an independent measurement block that allows for local loudness measurement. The pane shows the two measurement blocks for both programs :


**Control Mode** [EBU R 128]
setting from AUDIO PROCESSOR > Setup > Loudness Mode

**Current Measurement** [hh:mm:ss]
Time elapsed since start of the measurement (excluding pauses)

**Integrated Loudness (LUFS)**

**Loudness Range (LU)**

**Short-Term Loudness (LUFS)** numeric and convenient bar graph display

**Momentary Loudness (LUFS)** numeric and convenient bar graph display

**Short Term Max (LUFS)**

**Momentary Max (LUFS)**

**True Peak Max (dBTP)**

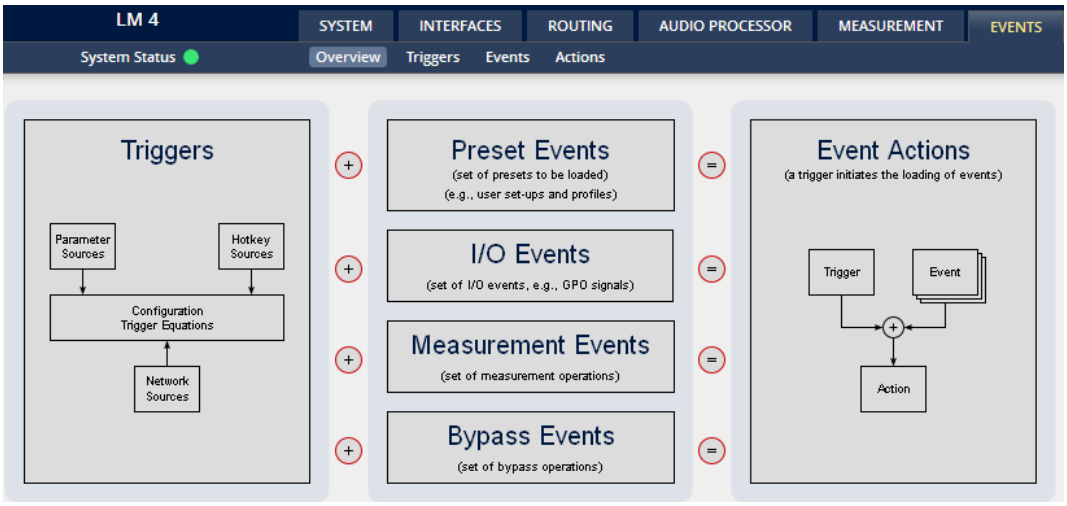
**Recent Measurement** [hh:mm:ss]
Total time of the recent measurement

**Important Note!** The measures of the parameters above depend on loudness mode selected at the AUDIO PROCESSOR > Setup pane.

The measurement data may also be streamed to the **J*AP** (Junger Application Manager) to feed the external loudness measurement and loudness logging tool. The **J*AP** is a PC software package that one can download from the Jungeraudio.com web site. To perform loudness measurement and loudness logging one must buy a hardware (USB) dongle.

Setup GUI – **EVENTS** – **Overview**

As mentioned previously, **D*AP4** includes a sophisticated **event management** system.
The event system performs **Actions.** These **actions** are build from (combined) **Events**.
**Actions** may be triggered manually (via the **X*AP RM1** remote panel **Hotkeys)**, semi-automatically (triggered by network commands or GPIs) and automatically (triggered by changes of parameters or the internal status) or as a combination of all three.




The overview shows the building blocks of the action management of the **D*AP4** :

A **trigger** is something that can ignite an action. It is subdivided into a **trigger type** and a **trigger source**.
E.g. a GPI is the trigger type while its number (the physical input number) represents the trigger source.
Other trigger types have sources which may be configured, like **X*AP RM1** Hotkeys (the names), Network- (the names) while for Parameter-Triggers the selected parameter is the source.

**Triggers**

| | |
|---|---|
| **Remote Hotkeys** | You may assign hotkeys of the **X*AP RM1** remote to become a trigger source. |
| **Network** | Received via the **EmBER+** protocol (see further below). |
| **Parameters** | Status information (e.g. sync or audio fail over status). |

**Events**

| | |
|---|---|
| **Preset Events** | System / Interfaces / Routing / Audio Processor / Delay |
| **I/O Events** | GPOs |
| **Bypass Events** | Bypass of function blocks. |
| **Measurement Events** | To remote control the loudness measurement. |

**Actions:**

| | |
|---|---|
| **Event Actions** | combination of the 4 event types, fired by a pre-defined trigger. |
| **Bypass Actions** | controls the function blocks which will be bypassed if one presses the **<BYPASS>** button on the **X*AP RM1**. |

An action runs like a flip-book inside the **D*AP4**. This powerful technology spans from simply recalling a certain parameter over specific parameter combinations (household name: "Preset") to the complete reconfiguration of the **D*AP4** including all signal routing, processing parameters and so forth.
It allows you to create your own **snap shots** where you decide what is part of it and what is not!
But it also enables **fail over** scenarios where the **D*AP4** will automatically react to the system and/or parameter status.

The steps to set up the **EVENTS** system are as follows :

1. Define - trigger sources
2. Configure - triggers by logical combination of pre-defined trigger sources
3. Set up events - by selecting presets or GPOs or bypass blocks or measurement controls
4. Create actions - what shall happen? Which trigger will launch which event?

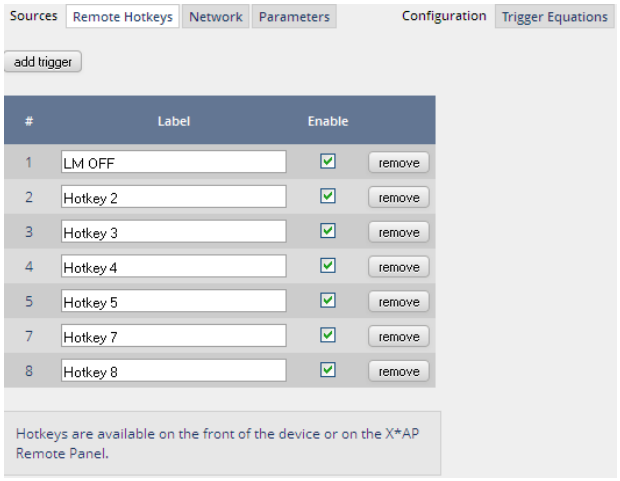
To illustrate the flexibility we will discuss two example scenarios - see underscores below :

1. GPO 1 shall turn on an alarm bell if the SDI input is lost **or** if the sync is lost.
2. A broadcast automation system shall turn off the leveler for the first program via network connection. If this fails for any reason, the operator must be enabled to do this manually via the **X*AP RM1**.

Setup GUI – EVENTS – Triggers – Sources – **Remote Hotkeys**

Hotkeys are the 8 buttons of an **X*AP RM1** remote panel. You may give them names and enable them to show up as active on the **X*AP RM1** remote panel.

Here we gave the first button the name "LM OFF" (for Level Magic off) :




| | |
|---|---|
| # | The number of the Hotkey on the **X*AP RM1** remote panel, counting from left to right. |
| **Label** | Each Hotkey may have a label that appears in the display of the **X*AP RM1** remote panel above the respective button. |
| **Enable** | [ON / OFF]<br>If you turn it off the respective Hotkey on the **X*AP RM1** remote panel becomes inactive - no label is displayed and the button background light turns off. |
| **<remove>** | will remove a line from the list. This will automatically disable the respective front panel button. |

Setup GUI – EVENTS – Triggers – Sources – **Network**

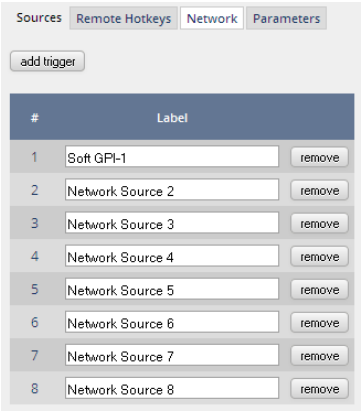
Network triggers are based on the **EmBER+** protocol designed by Co. l-s-b. www.l-s-b.de
(see also regarding **VSM** (Virtual Studio Manager).
You must implement an **EmbER+** client for your application (e.g. for a broadcast automation system) that talks to the **D*AP4** (<IP address> : TCP port 9000). Via the EmBER+ protocol you will reach each and every parameter and status of the device. I.e. you can send strings and / or values.

**EmbER+** protocol details and implementation guide lines as well as example code you will find here :
code.google.com/p/**ember**-plus/

At this point we are talking "only" about triggers received over the network. The triggers are set / reset by a control instance (e.g. VSM or a broadcast automation system). For the **VSM** system you may assign these triggers to virtual panels as well as buttons of physical (e.g. LBP) hardware panels.
A broadcast automation system on the other hand will bind these triggers to their events of a play list.

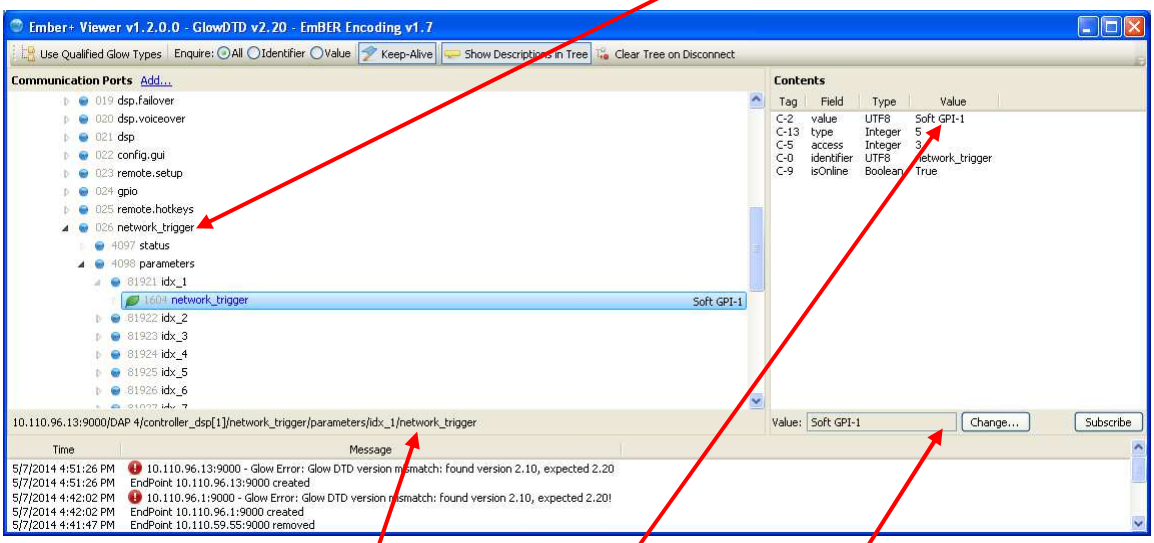
We have given the first Network trigger the name **"Soft GPI-1"**.

It will be activated from the automation system if the pr-defined event has reached in the automation play list.



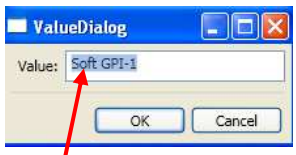

| | |
|---|---|
| # | Order number of the network trigger. |
| **Label** | Label of that network trigger. It appears on the **Configuration** pane as well as in the **EmBER+** tree. |

Lets have a look at the "Soft GPI-1" trigger.
If you open the **EmBER+** viewer tool you must drill down to **network_trigger** :




The path is also shown in the bottom of the main window :

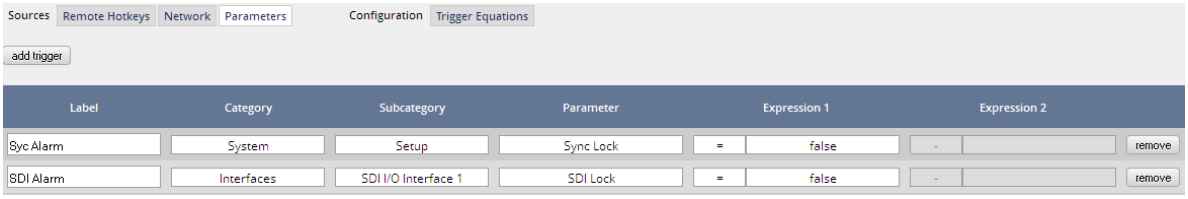
As a value you will receive the trigger name that you have given the first network trigger **"Soft GPI-1"**.




The automation may now fire that trigger by simply returning the string.
For demonstration how it works press **<Change … >** In the popup press **<OK>**.
This works like sending a pulse (behaves like a push button).

But the automation may also give it a value of **"1"** to set the trigger and later on a **"0"** to reset it.
What to do depends on the functionality which you need for a specific application.

Setup GUI – EVENTS – Triggers – Sources – **Parameters**

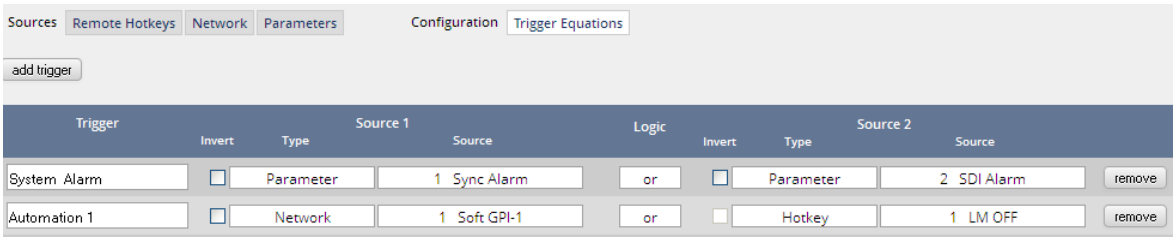



Above is an example of how to setup parameter trigger sources.

The first one (Sync Alarm) becomes active if the selected Parameter "Sync Lock" becomes false.
The second one (SDI Alarm) becomes active if "SDI Lock" becomes false.

Setup GUI – EVENTS – Triggers – Configuration – **Trigger Equation**

To form a **Trigger** you may logically combine two trigger sources below.




| | |
|---|---|
| **Trigger** | Here you define a label for the trigger (System Alarm). |
| **Source 1** | The first source of a logical combination of two trigger sources. |
| **Invert** | [ON / OFF]<br>If the type of trigger allows an inverted operation it can be defined here. |
| **Type** | [GPI / Hot Key, Network / Parameter / Event active / Trigger effective/ Bypass / Sync Lock] |
| **Source** | [1 … 8]<br>It acts like an index for the respective trigger type. In case of GPIs it is the physical GPI number or in case of X*AP Hotkeys the key number …. |
| **Logic** | Kind of logical operation [and, or, xor]. |
| **Source 2** | Second source for the logical combination of two trigger sources.<br>If only one source exists, you may leave it unassigned [-]. |

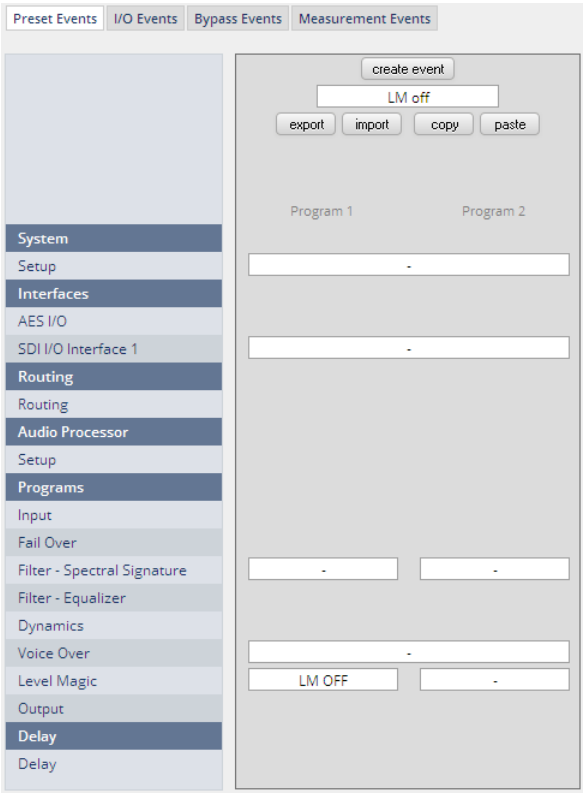
Above we have defined two triggers :
**"System Alarm"** that becomes active if parameter trigger 1 = "Sync Alarm" or parameter trigger 2 = "SDI Alarm" become active.

**"Automation 1"** becomes active if the automation activates the first network trigger "Soft GPI-1" or if one is pressing the first hotkey of the **X*AP RM1**.

Now since we have prepared the ignition we must fill the bombs …
I.e. we define what shall happen if … so we must define the events.

Setup GUI – EVENTS – Events – **Preset Events**

A preset event is a group of presets you may load at one occasion to the On Air parameters of function blocks. On executing such an event you may change all processing blocks or just only one :



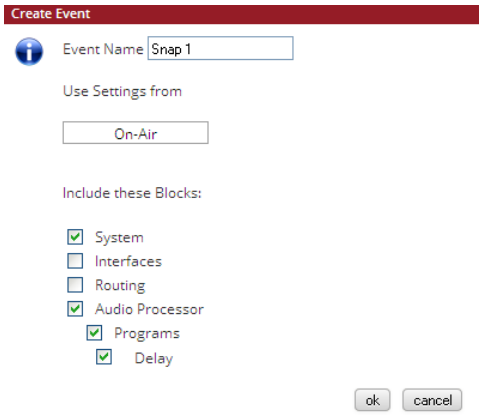

The example shows a preset event with the given name "LM off".

It was created from an empty event.

Only one preset is involved in this example.
The preset named "LM OFF" is selected for the function block Level Magic.
It was programmed before at the AUDIO PROCESSOR > Level Magic tab, by simply disabling the Leveler check box.

Some blocks have empty selection drop downs because nothing is selected while others don't have such drop down at all because no presets are existing there.

This is an extremely powerful page because you may create a **snapshot** of your device that can be loaded at any time.



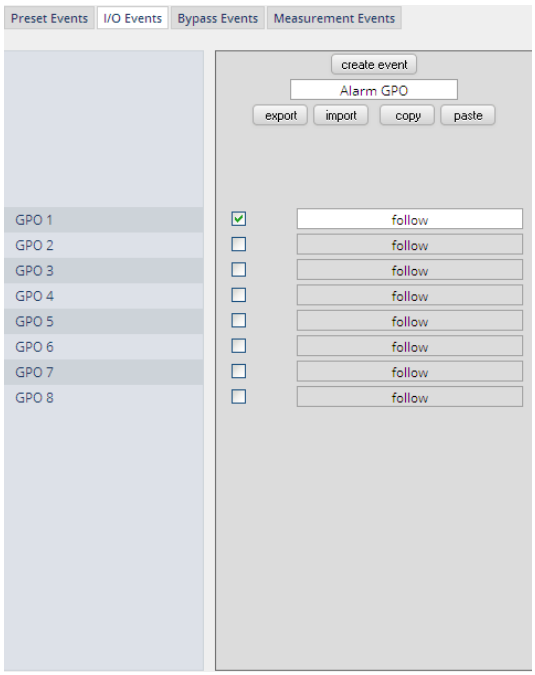

If you press **<create event>** you will get the possibility to move all On Air parameters to presets! These presets will get the same name as the preset event itself. I.e. each function block will get one new preset called "Snap 1" for this example.

You may restrict it by excluding groups of function blocks form being part of that **snapshot** like Interfaces & Routing in the example at the left hand side.

**Use Settings from** [On Air / Existing Event / Empty]
On Air will use the parameter values from the "On Air" panes while "Existing Event" gives you a selection of existing events to make a copy and modify it afterwards or you may start from scratch and select "Empty".

Setup GUI – EVENTS – Events – **I/O Events**

I/O events at the moment are restricted to control the **GPOs** of the **D*AP4** :



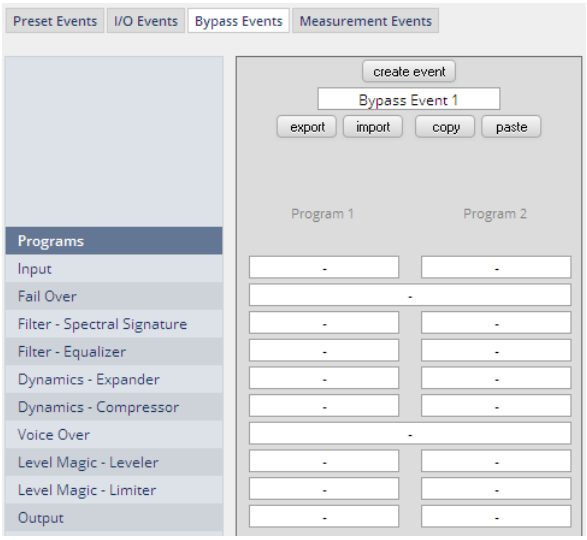

Each **GPO** (when incorporated into that I/O event) can be set to the behavior as follows :

| | |
|---|---|
| Clear | Turns a GPO off that was previously turned on. |
| Set | Turns a GPO on. |
| Follow | The GPO follows the state of the trigger. |
| Toggle | The trigger will toggle that GPO. Be careful because it needs a definite known starting condition to work properly. |

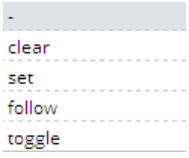
To illustrate the function we have setup **GPO 1** for that **"Alarm GPO"** event (this is the one where the alarm bell is connected to).

Setup GUI – EVENTS – Events – **Bypass Events**

The **D*AP4** allows you to bypass some or all of function blocks to use them for A/B comparison or not :

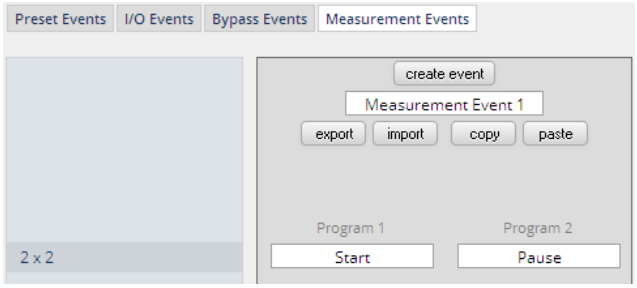



You may give it a name.
The possible selection for the individual bypass settings are :

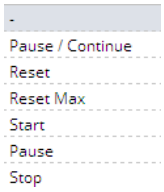


Setup GUI – EVENTS – Events – **Measurement Events**

Finally we have this sort of Events that allows you to control the loudness measurement :



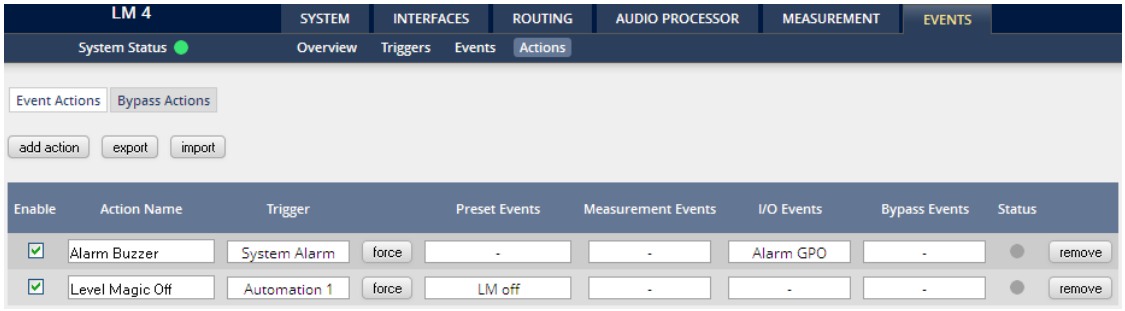

Possible settings to control the loudness measurement are :




Now we have filled the bombs, let's ignite them …

Setup GUI – EVENTS – Actions – **Event Actions**

This is the point where all previously set sub functions will be combined :




**Here you create the action!**
You must give the action a name, select a trigger (defined by the Trigger Equation) and select the respective Preset - Measurement - I/O and/or Bypass event.

**Done …**

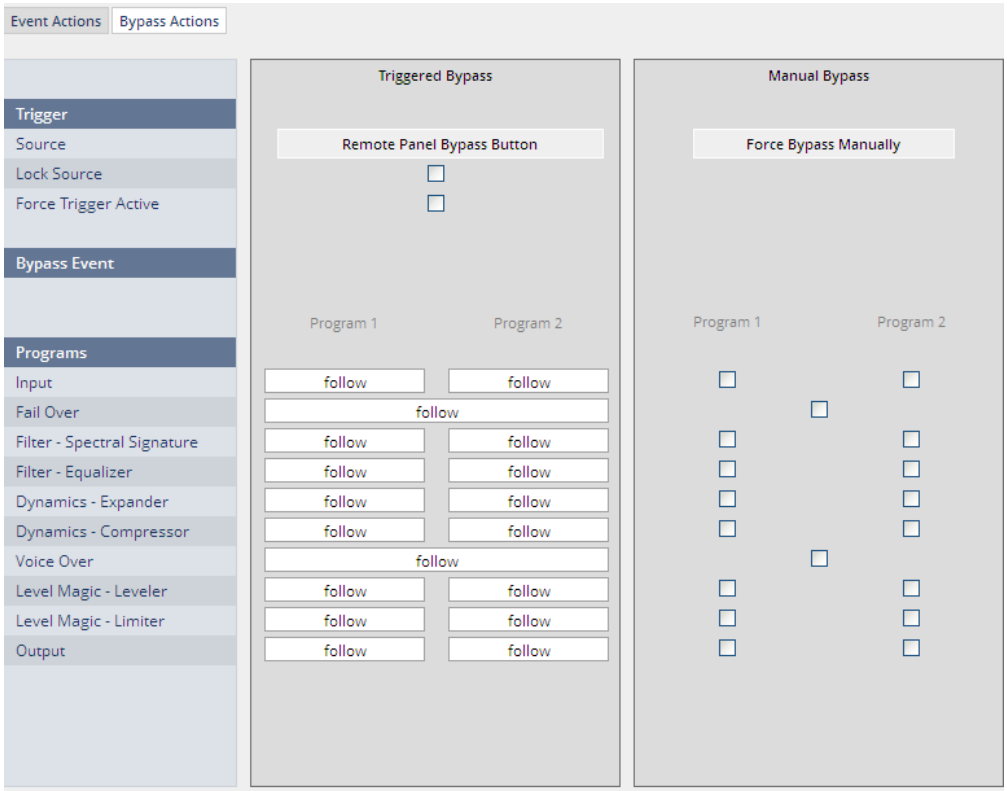
For our examples :
Event action "Alarm Buzzer" will be ignited if the trigger "System Alarm" becomes active.
This will activate the "Alarm GPO" I/O event.

Event action "Level Magic Off" will be ignited if the trigger "Automation 1" becomes active.
It will activate the "LM off"" preset event.

Setup GUI – EVENTS – Actions – **Bypass Actions**

The bypass action is bound to the **<BYPASS>** button of the **X*AP RM1** remote panel.
You must simply select "follow" or "-" for the setup field.

But it also allows you to directly turn the bypass of one, some or all function blocks on by simply clicking on the check boxes in the right hand panel :



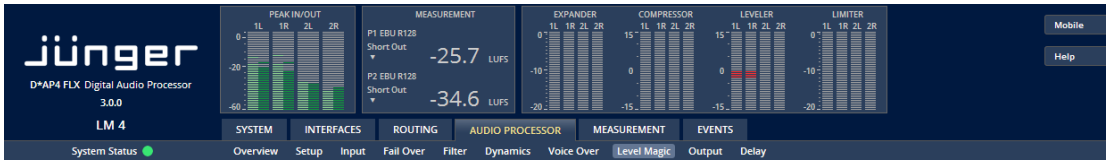

**Trigger**

**Lock Source** [ON / OFF]
The **X*AP RM1** remote panel **<BYPASS>** button may be disabled here.

**Force Trigger Active** [ON / OFF]
Force the bypass function from the GUI instead of the **X*AP RM1** remote panel **<BYPASS>** button.

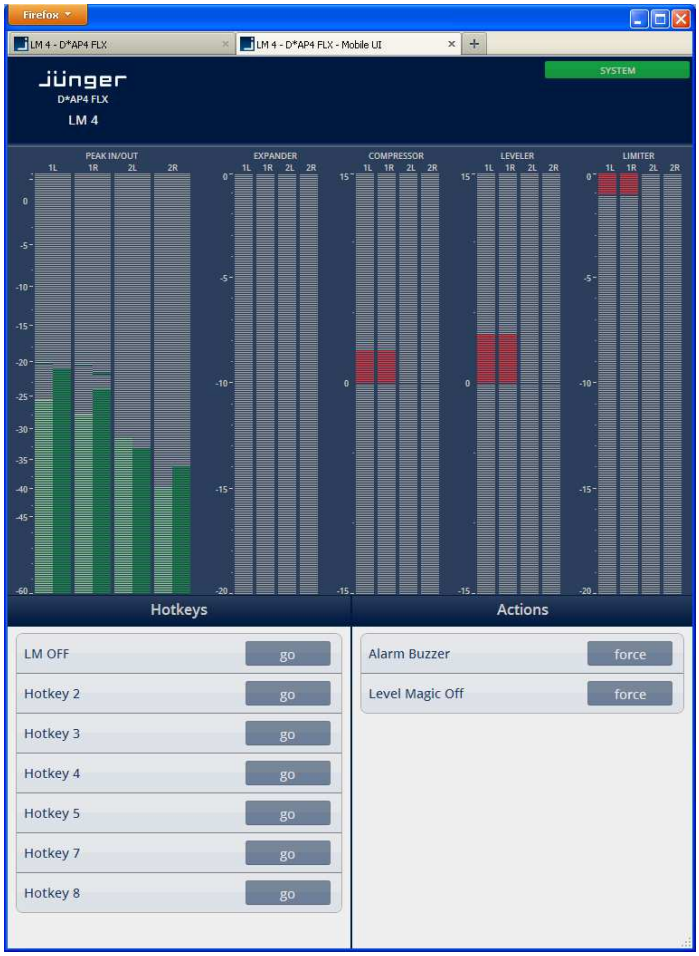
## Mobile GUI

If you open up the standard GUI you will have the link **<Mobile>** in the upper right corner :

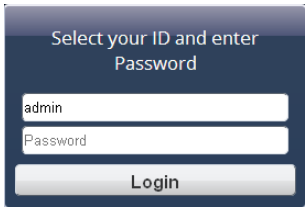



that link calls the URL : **<IP address>/mobile**. In case you can't reach the link from your mobile device's browser you my type it into the URL field.

This link will load the operator interface designed for tablet style (mobile) devices to serve an operator :




If the authentication (SYSTEM > Admin > Authentication) of the **D*AP4** is activated, you will get an pop up :




to log in.

Beside comprehensive level and gain change bar graphs the operator has excess to the functions setup for the **X*AP RM1** remote panel hotkeys and pre-defined actions.

You see both actions we have used to explain the event managing system of the device.

Technical data – **D*AP4**

- **Power supply** — dual power supply, auto fail over
  AC 85 V – 264 V, 50 Hz … 60 Hz
  58 W max
- **AES input** — AES3 - 110 Ohm balanced / 0.3 V … 5.0 Vpp
  AES3id - 75Ohm unbalanced / 0,32 … 1,2 Vpp
  sample rate converter:
  24 Bit, 32 kHz … 192 kHz, THD+N: < -130 dB @ 0 dBFS
- **AES output** — AES3 - 110 Ohm balanced / 4.0 Vpp @ 110 Ohm
  AES3id - 75 Ohm unbalanced 1Vpp @ 75 Ohm
  power fail relay bypass
- **Sync internal** — 44.1 / 48 / 88.2 / 96 kHz, +/- 25 ppm, 150ppm capture
- **Sync input** — AES3id : 44.1 / 48 / 88.2 / 96 kHz, 0,32 … 1,2 Vpp @ 75 Ohm
  Wordclock : 44.1 / 48 / 88.2 / 96 kHz, 1 … 3 V @ 75 Ohm
  Video : Black Burst or Tri Level, 0.5 … 1.0V @ 75 Ohm
- **Sync output** — Wordclock : > 2 V @ 75 Ohm
- **Network** — RJ45 rear connector
  10/100MBit Ethernet auto sense, full duplex, auto MDI/X
- **USB** — USB 2.0 connector to internal console interface
- **GPI** — 3 V – 30 V balanced, auto polarity
- **GPO** — relay change over contacts, 200 mA/24V (DC/AC)
- **Environmental** — operating temperature 0 ºC to 50 ºC
  **D*AP4** - fan cooled
  non operating -20 ºC to 70 ºC
  humidity 90%, non condensing
- **Dimensions and Weight** — 19", 1RU, depth 27 cm
  net weight approx. 5 kg shipping weight 7,5 kg

Technical data – optional interface boards – **SDI De-Embedder / Embedder [O_D*AP4_SDI_a]**

- **SDI input**
  standards (auto sensing)
    3G - SMPTE 424/425M (Level A/B)
    HD - SMPTE 292M
    SD - SMPTE 259M
  formats
    1080p23.98, 24, 25, 29.97, 30, 50, 59.95, 60
    1080i50, 59.94, 60
    720p23.98, 24, 25, 29.97, 30, 50, 59.94, 60
    625i50
    525i59.94, …
  connector
    BNC IEC 169-8)
    75 Ohm
  return Loss
    > 15 dB (typ. > 18dB) from 5MHz to 1485 MHz
    > 10 dB (typ. > 11 dB) from 1485 MHz to 2970 MHz
  adaptive equalization, typical of Belden 1694A coaxial cable
    250 m at 270 Mbps
    250 m at 1.485 Gbps
    150 m at 2.97 Gbps
  jitter tolerance
    Timing: > 2UI, Alignment: > 0.7 UI

- **SDI output**

standards
- 3G - SMPTE 424/425M (Level A/B)
- HD - SMPTE 292M
- SD - SMPTE 259M

formats
- 1080p23.98, 24, 25, 29.97, 30, 50, 59.95, 60
- 1080i50, 59.94, 60
- 720p23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- 625i50
- 525i59.94, …

quantization
- 10Bit

connector
- BNC IEC 169-8)
- 75 Ohm

return loss
- > 15 dB (typ. > 18dB) from 5MHz to 1485 MHz
- > 10 dB (typ. > 11 dB) from 1485 MHz to 2970 MHz

signal level
- 800 mV +/- 10%

D.C. offset
- 0.0 V +/- 0.5 V

rise and fall time
- < 135 ps at HD/3G, < 800 ps at SD

overshoot
- < 10% of amplitude

output jitter
- Timing: < 0.5 UI, Alignment: < 0.2 UI

- **Special features**

relay bypass (manual or automatic on power fail)
320 ms video delay (number of frames depends on the video format)
16 chanel audio de-embedder / embedder
VANC (SMPTE 2020-2) de-embedder / embedder
16 x 16 de-embedder matrix (mono routing)
32 x 16 embedder matrix (mono routing)
320 ms audio delay per audio channel
automatic compensation of non processed audio signals for video delay

Technical data – interface boards – **4x AES I/O [O_D*AP4_AES_a]**

connector
- 25pin Sub-D female

inputs
- 110 Ohm balanced or 75 Ohm unbalanced jumper selection
- 0.3 V … 5.0 Vpp

sample rate converter
- 24 Bit, input sample rate 32 kHz … 192 kHz, THD+N < -130 dB @ 0 dBFS

outputs
- 110 Ohm balanced or 75 Ohm unbalanced jumper selection
- 4.0 Vpp balanced, 1.0 Vpp @ 75 Ohm

power fail relay bypass

Technical data – interface boards – **4x analog I/O [O_D*AP4_ADDA_a]**

connector
- 25pin Sub-D female

input
- impedance: > 10 kOhm, electronically balanced
- max input level: 0.0 dBu … +24 dBu adjustable in 0.5 dB steps
- dynamic range: 115 dB
- THD+N: @ -1 dBFS, 15 dBu: -90 dB
- frequency response: 20 Hz … 22 kHz (+/- 0.25 dB)
- crosstalk @ 20 kHz: > 100 dB
- calibration gain mismatch: < 0.3 dB

output
- impedance: 5 Ohm, electronically balanced
- max. output level @ 0 dBFS: 0.0 dBu … +24 dBu adjustable in 0.5 dB steps
- dynamic range: 110dB
- THD+N @ -1 dBFS: -92 dB
- frequency response: 20 Hz … 22 kHz (+/- 0.25 dB)
- crosstalk @ 20 kHz: > 100 dB
- gain mismatch balanced / unbalanced: < 0.3 dB

power fail relay bypass

Technical data - **D*AP4** connectors - **pin assignment**

**Rear GPO connector**

| **connector** | **GPI/O** |
|---|---|
| female | 25-pin Sub-D |
| | |
| 1 | GPI_1, 2, 3, 4 common |
| 2 | GPI_1 |
| 3 | GPI_2 |
| 4 | GPI_3 |
| 5 | GPI_4 |
| 6 | GPI_5, 6, 7, 8 common |
| 7 | GPI_5 |
| 8 | GPI_6 |
| 9 | GPI_7 |
| 10 | GPI_8 |
| 11 | |
| 12 | |
| 13 | Isolated 5V **+** |
| 14 | GPO_1, 2, 3, 4 common |
| 15 | GPO_1 |
| 16 | GPO_2 |
| 17 | GPO_3 |
| 18 | GPO_4 |
| 19 | GPO_5, 6, 7, 8 common |
| 20 | GPO_5 |
| 21 | GPO_6 |
| 22 | GPO_7 |
| 23 | GPO_8 |
| 24 | Isolated 5V **-** |
| 25 | Isolated 5V **-** |

**O_D*AP4_ADDA_a**

| **connector :** | **4 x analog I/O** |
|---|---|
| female | 25-pin Sub-D |
| | |
| 1 | OUT-4 + |
| 2 | GND |
| 3 | OUT-3 - |
| 4 | OUT-2 + |
| 5 | GND |
| 6 | OUT-1 - |
| 7 | IN-4 + |
| 8 | GND |
| 9 | IN-3 - |
| 10 | IN-2 + |
| 11 | GND |
| 12 | IN-1 - |
| 13 | |
| 14 | OUT-4 - |
| 15 | OUT-3 + |
| 16 | GND |
| 17 | OUT-2 - |
| 18 | Out-1 + |
| 19 | GND |
| 20 | IN-4 - |
| 21 | IN-3 + |
| 22 | GND |
| 23 | IN-2 - |
| 24 | IN-1 + |
| 25 | GND |

**O_D*AP4_AES_a**

| **connector :** | **4x AES I/O** |
|---|---|
| female | 25-pin Sub-D |
| | |
| 1 | OUT-4 + |
| 2 | GND |
| 3 | OUT-3 - |
| 4 | OUT-2 + |
| 5 | GND |
| 6 | OUT-1 - |
| 7 | IN-4 + |
| 8 | GND |
| 9 | IN-3 - |
| 10 | IN-2 + |
| 11 | GND |
| 12 | IN-1 - |
| 13 | |
| 14 | OUT-4 - |
| 15 | OUT-3 + |
| 16 | GND |
| 17 | OUT-2 - |
| 18 | OUT-1 + |
| 19 | GND |
| 20 | IN-4 - |
| 21 | IN-3 + |
| 22 | GND |
| 23 | IN-2 - |
| 24 | IN-1 + |
| 25 | GND |

## Safety Information

### Electrical

| | |
|---|---|
| Safety classification : | Class 1 – grounded product / Schutzklasse 1<br>Corresponding to EN 60065:2002 |
| Power connection : | The device must be connected to a power socket that provides a protective earthing conductor. |
| Power switch : | The power switch is a toggle switch placed at the rear of the device.<br>The ON / OFF position is indicated by engravings [I] / [o] on the lever. It must be reached without difficulty.<br>The devices may be equipped with dual power supply, in this case it will have two power cords and switches. You must inform yourself about the location and assignment of the switches. |
| Water protection : | The device must not be exposed to splash or dripping water.<br>It is permitted to place a container filled with liquids (e.g. vases) on top of the device. |

### Service safety

Only qualified personnel should perform service procedures.

| | |
|---|---|
| Do not service alone : | Do not perform internal service or adjustments of the device unless another person capable of rendering first aid and resuscitation is present. |
| Disconnect power : | To avoid electrical shock, switch off the device power, then disconnect the power cord from the mains power. Do not block the power cord; it must remain accessible to the user at all times |

### To avoid fire or personal injury

| | |
|---|---|
| Mounting : | It must be placed on a flat surface or must be mounted into an 19" rack.<br>It is recommended to use metal brackets (sheet steel angle) to support the device. |
| Provide proper Ventilation | this case and if the device has a built in fan, a gap of at least 1cm must be left between the device edge and the steel angle. It is highly recommended to leave a gap of at least 1RU above and below the device. |
| Use proper power cord | Use only the power cord specified for this product and certified for the country of use. |
| Do not operate without covers | Do not operate this product with covers or panels removed. |
| Do not operate with suspected failures | If you suspect that there is damage to this product, have it inspected by by qualified service personnel. |
| Risk of explosion : | The device contains a lithium battery. If replaced incorrectly or by a different or inadequate type an explosion may occur. |

## Warranty

standard Junger Audio two-year warranty on parts and labor.

Specifications are subject to change without notice

**Jünger Audio GmbH**
**Justus-von-Liebig-Straße 7**
**12489 Berlin**
**Germany**

phone: +49 30 6777 21 0
fax: +49 30 6777 21 46
info@jungeraudio.com
www.jungeraudio.com