

jünger

the reference in loudness management

D*AP

D*AP LM4

Digital Audio Processor

Manual





Hardware

- **1RU** compact 19" processing device with front panel
- **Front Panel displays** 4ch LED bar graph, operating display, LED status display
- **Front Panel buttons** BYPASS, METER, 4x function control, SEL, MENU, ESC
- **Rotary encoder** predefined functions, context sensitive modes
- **4 channel audio DSP** 2 Analog Devices® Sharc floating point processors

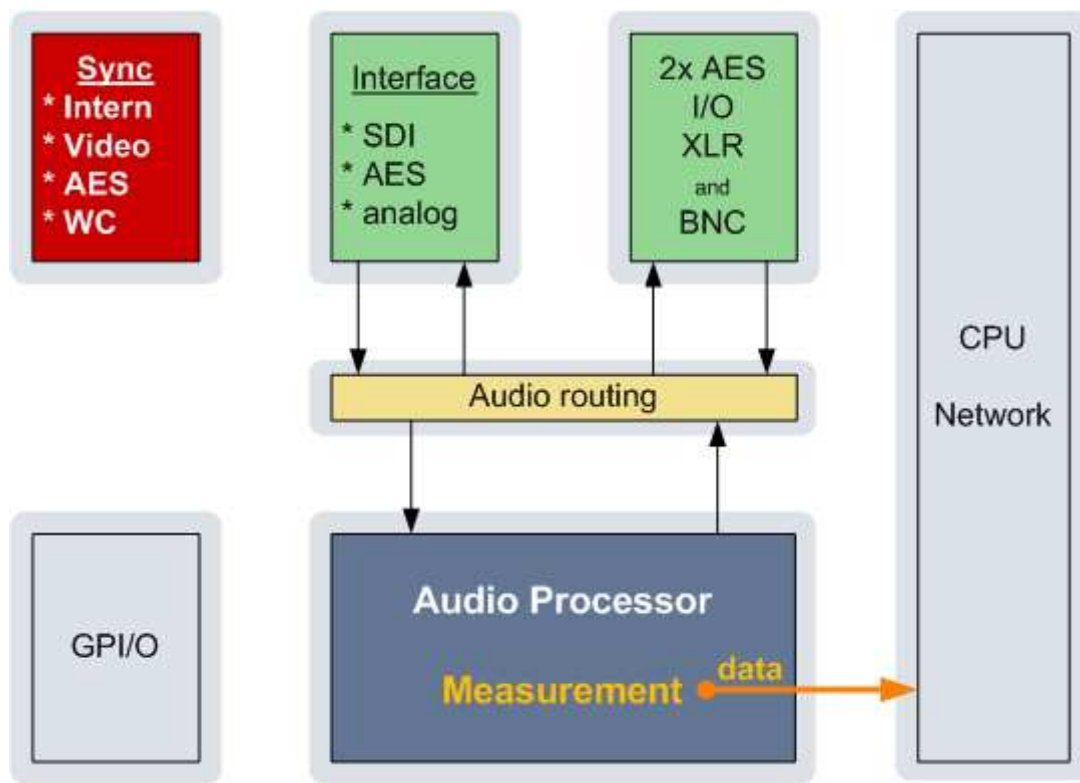


- **2 x AES3 and 2x AES3id** on board with independent relay bypass and auto input selection
- **2 x SRC** selectable per AES input
- **External sync IN** 75 Ω input (Word Clock, AES3id, Black Burst, Tri-Level)
- **Sync OUT** 75 Ω Word Clock output
- **RJ45 network connector** 100BaseT full duplex Ethernet interface
- **USB "B" connector** built in USB < > serial adapter to access the device service port
- **8 GPIs** balanced inputs on 25pin Sub-D
- **8 GPOs** relay change over contacts on 25pin Sub-D
- **Aux power supply** build in isolated 5 V supply for external GPI/O wiring
- **Optional dual power supply** load balanced, auto fail over
- **One interface slot** I/O expansion slot for option modules :
 - 3G / HD / SD SDI module** option module 3G SDI de-embedder / embedder with relay bypass
 - 8Ch AES I/O module** option module 4x AES3id I/Os with relay bypass
 - 4Ch analog I/O module** option module 4x analog line I/Os with relay bypass
 - 8Ch analog out module** option module 8x analog line out with relay protection

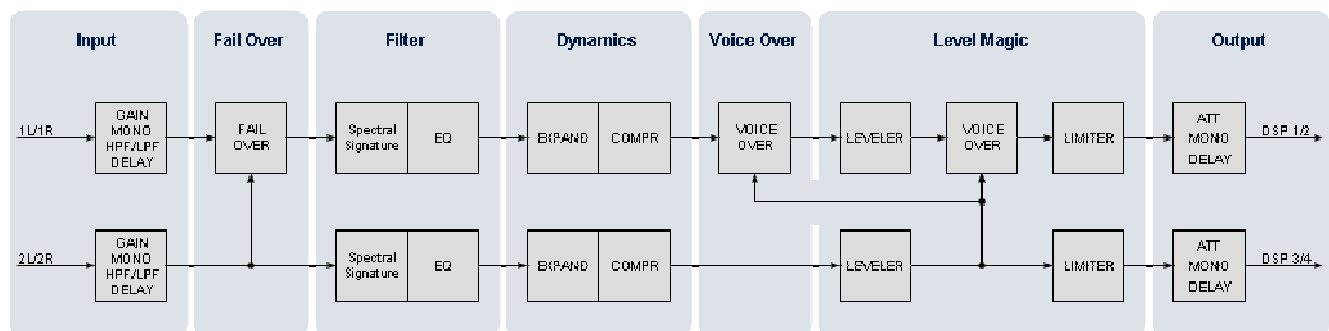
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Block diagram :



Audio processing blocks :



Getting started

Communication with the **LM 4** is via TCP/IP over Ethernet and each unit is shipped with a default IP address. Before the unit can be controlled, the following steps are required:

1. Obtain a unique IP address for the network onto which it will be installed.
2. Overwrite the default IP address with the new one by one of the methods below.
3. Ensure that the computer has an upto date version of Java installed and that any firewall is configured to allow UDP data to be returned to the unit

For specific advice, please consult your network administrator

Getting started – IP setup of the device via front panel

After power up the front panel shows the idle display:

SHORT-TERM		3s	CH 1/2
IN	-70.0	OUT	-70.0

Now you must press **<MENU>**. This will show **HOTKEYS** menu entrance. Now turn the **Rotary Encoder [RE]** one turn left and you reach the **CONFIG** menu. Press the **<RE>** and the menu item **NETWORK** will be displayed. Press **<RE>** again and you will enter the network setup :

IP			
10.	110.	3.	73.

If you turn the **RE** to the right, you may select between **IP**, **MASK** and **GATEWAY**. If you press the **<RE>** now you will enter the setup display of the respective item.

Flashing arrow markers (cursors) will appear in one of the fields, to indicate that you may change this value by turning the **RE**. Below an example for the **IP** address:

IP			
>10<	110.	3.	73.

Pressing **<SEL>** will move the flashing cursors to the next address field(s). After performing the setup you must press **<MENU>** to apply the changes:

IP CONFIG CHANGED	
OK : APPLY	ESC : DISCARD

Pressing **<RE>** will store the changes and will reboot the device in order to apply and use it.

APPLYING CHANGES	
REBOOTING . . .	

Getting started – IP setup of the device via console interface

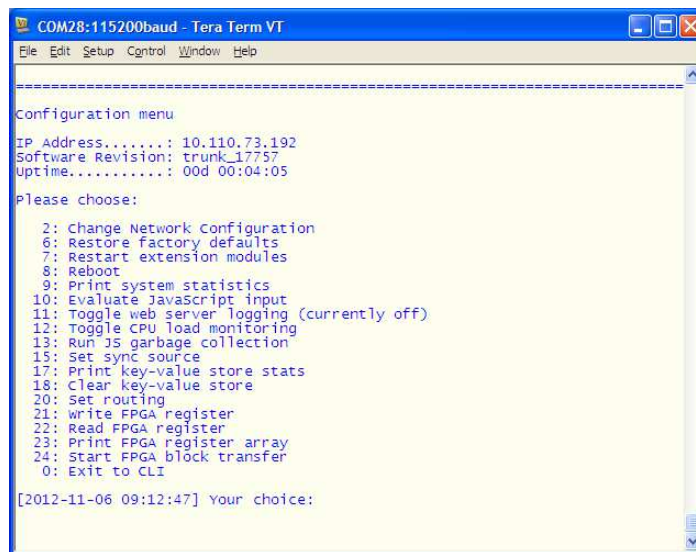
The tool to change the IP configuration of the device will be reached via the console interface. You must connect the **LM 4** with the PC via an **USB A to B** cable. Before connecting the cable you must have the **FTDI** driver installed on your PC. You will get it from the Co web site:

<http://www.ftdichip.com/FTDrivers.htm>

You must go for the VCP (Virtual Com Port) Drivers section and select the "setup executable" that matches your PC processor. E.g. "CDM20814_Setup.exe". Download the file and run it.

This will install the driver for the built in **USB to serial converter**. Now you can connect the cable and open a terminal program. Here you must select the virtual COM port assigned by the OS. The communication parameters are:

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



```

COM28:115200baud - Tera Term VT
File Edit Setup Control Window Help
=====
Configuration menu
IP Address.....: 10.110.73.192
Software Revision: trunk_17757
Uptime.....: 00d 00:04:05
Please choose:
 2: Change Network Configuration
 6: Restore factory defaults
 7: Restart extension modules
 8: Reboot
 9: Print system statistics
10: Evaluate Javascript input
11: Toggle web server logging (currently off)
12: Toggle CPU load monitoring
13: Run JS garbage collection
15: Set sync source
17: Print key-value store stats
18: Clear key-value store
20: Set routing
21: write FPGA register
22: Read FPGA register
23: Print FPGA register array
24: Start FPGA block transfer
 0: Exit to CLI
[2012-11-06 09:12:47] Your choice:
    
```

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

```

Your choice: 2
Current network configuration
IP Address :   10.110.24.128
Netmask ... : 255.255.0.0
Gateway ... : 10.110.0.1
    
```

You must enter the IP address and the netmask.

```

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 take care that the gateway address is matching the network mask related to the device IP address!
If you're not sure simply enter **0.0.0.0**.

```

Enter new gateway, press ENTER to configure without gateway: "0.0.0.0" <Enter>
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

After reboot has finished the new IP configuration is active.

Getting started – IP setup of the device via web browser

- * Read the **default IP address** printed on a label between mains sockets.
- * Set up network parameters of the PC which meet the default IP address of the **LM 4** (net mask = 255.255.0.0).
- * Connect the device with the PC either by an Ethernet cross over cable or by a switch.
- * Open a browser and type the device IP address into the URL field and press **<ENTER>**. This will open the **AUDIO PROCESSOR >> Overview** pane of the GUI.
- * Click on **SYSTEM** and the "Admin" pane will open automatically:

The screenshot displays the web interface of the jünger D*AP LM 4. At the top, there are three bar graphs labeled 'PEAK IN/OUT', 'GAIN', and 'LIMITER'. Below these are tabs for 'SYSTEM', 'INTERFACE', 'ROUTING', 'AUDIO PROCESSOR', and 'EVENTS'. The 'SYSTEM' tab is active, showing a 'System Status' indicator and a navigation bar with 'Overview', 'Admin', 'Setup', 'SNMP', 'Backup / Restore', 'Software Update', and 'Reboot'. The 'Admin' section contains several configuration panels: 'This D*AP' (Name: LM 4, Location, Admin / Contact), 'Network' (IP Address: 127.0.0.1, Netmask: 255.255.0.0, Gateway: 0.0.0.0), 'Graphical User Interface' (Startup Page View: Onair max / Preset max), 'Transmit Metering Data' (Enable: checked, UDP Port Range Start: 49152, UDP Port Range End: 65535), 'Device Time' (Date: 2012-11-05, Time: 16:15), 'Service Options' (Maintenance Interface via RPC, Telnet Server), and 'Diagnostics' (get diagnostics file button). The 'Network' section is circled in red.

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

Important Note! After reboot the **web browser** may not be able to communicate with the **LM4**. You must key in new IP address in the URL field.

Operating

Operating – menu structure of the Front Panel :

The display after power up – the **idle display** – shows the input **"IN"** and output **"OUT"** short term (3secs.) loudness of the programs processed by the respective device channels. E.g.:

SHORT-TERM		3s	CH 1/2
IN	-70.0	OUT	-70.0

If you turn the **RE** the display will change to the **True Peak Hold** display of the respective channels:

TRUEPEAK-HOLD			CH 1/2
IN	-70.0	OUT	-70.0

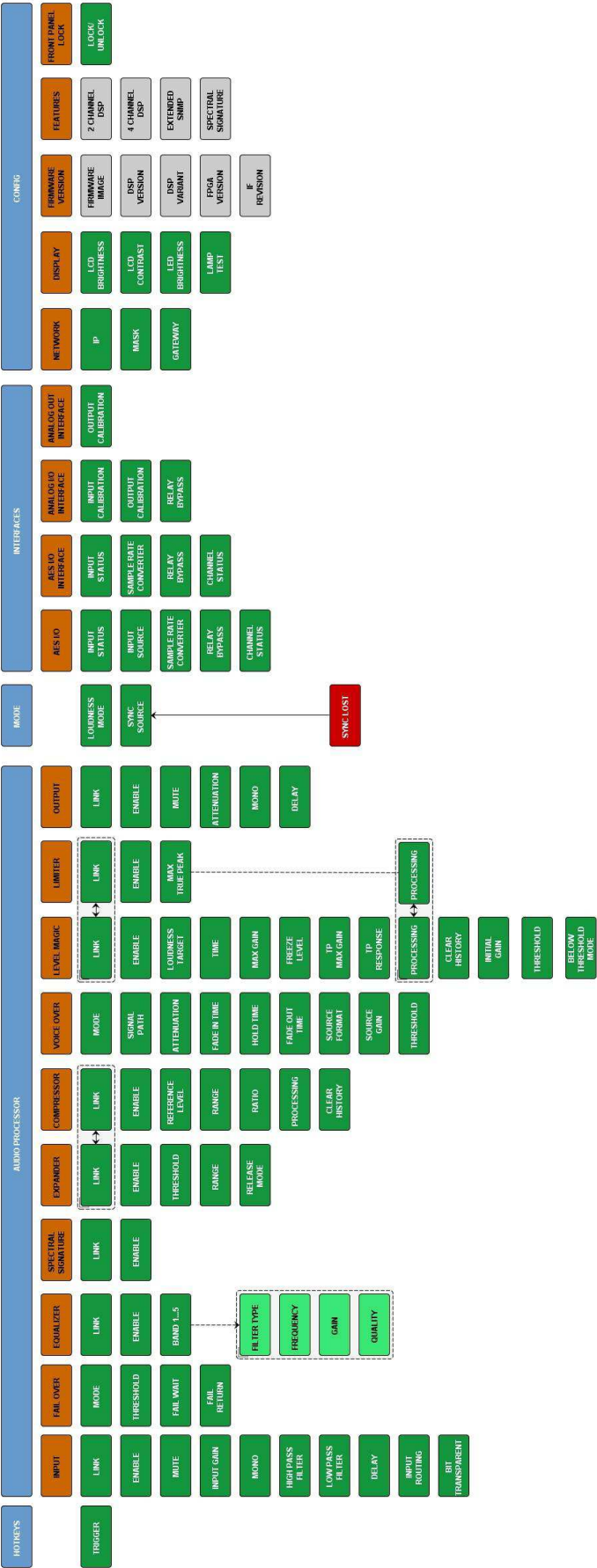
And vice versa. If you press **<SEL>** you will see the values of the other processing channels. Pressing **<ESC>** will reset the display reading (HOLD reset).

The 4 direct function buttons of the front panel will move you to the respective function blocks where the **RE** selects the respective items.

<MODE>	LOUDNESS MODE > SYNC SOURCE
<INPUT>	< MUTE < ENABLE < LINK INPUT GAIN > MONO > HP FILTER > LP FILTER > DELAY > INPUT ROUTING BIT TRANSPARENT
<LEVELER>	< LINK ENABLE > LOUDNESS TARGET > TIME > MAX GAIN > FREEZ LEVEL > TP MAX GAIN > TP RESPONSE > PROCESSING > CLEAR HISTORY > INITIAL GAIN > THRESHOLD
<LIMITER>	ENABLE > MAX TRUE PEAK > PROCESSING

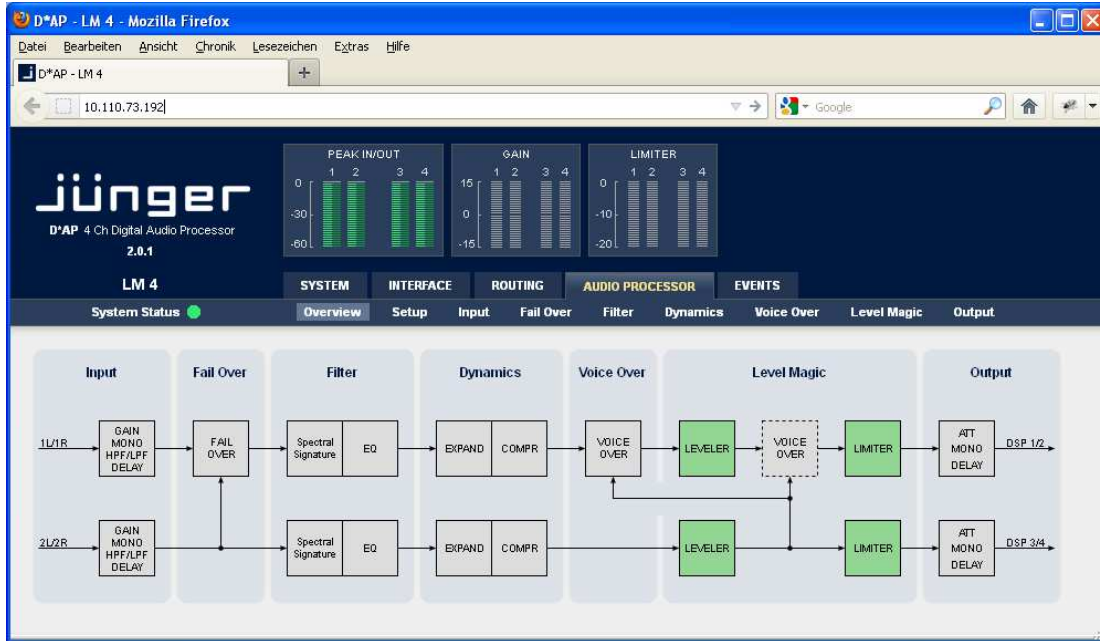
The overall parameter menu structure is shown on the next page.

Operating – front panel navigation tree :



Web GUI

Type the device IP address into the URL field of a browser to display the initial web page of the **D*AP-LM4** :



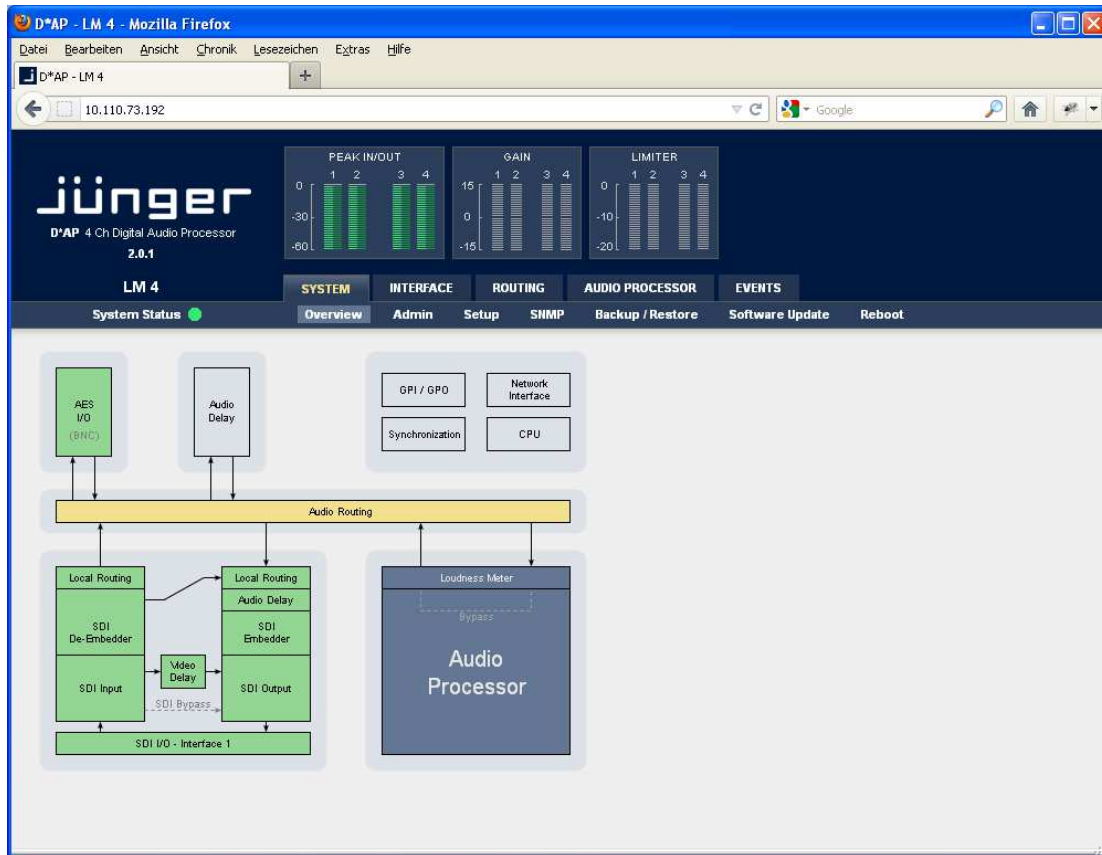
The default view is a general block diagram of the audio processing section.

Firstly you must set up basic things such as program configuration, give the programs meaningful names and set the synchronization source. You may also give the device a name, tell it its location and define an administrative contact which may be used by monitoring systems of your house (e.g. via SNMP).

Selecting any of the top 5 tabs (SYSTEM, INTERFACE, ROUTING, AUDIO PROCESSOR, EVENTS) will reveal a second row of options specific to the chosen tab.

The following paragraphs will guide you through the set up of the LM 4 step by step.

Web GUI – SYSTEM – Overview



The graphical overview shows the main building blocks of the device including the options installed such as a SDI interface module.

You may click into the boxes and the respective 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.

Web GUI – SYSTEM – Admin

Admin – allows for the setting of global options including device name and time, network and remote service, diagnostics and start up page view of the preset editor.

This D*AP

Name

input fields for information utilized by higher level services.

give the device a meaningful name that may be used by name services and SNMP management.

Location

the place where the **LM 4** is located

Admin / Contact

e-mail address of a person in charge.

Graphical User Interface

defines the appearance of the parameter panes regarding preset editor and on air parameter visibility (see below – for preset concept).

Device Time

allows you to set the device clock. At the factory it is set to UTC (Coordinated Universal Time).

Date

if you click into the **Date** input field, a comfortable calendar tool will pop up :

Time

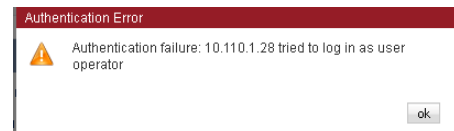
if you click into the **Time** input field, you will be able to set the device time.

Jun 2012						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1
2	3	4	5	6	7	8

Authentication	to prevent non authorized people from changing device settings the administrator may assign passwords for either the admin and/or an operator (same applies for talent/artist). 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] the administrator may turn authentication off.
Change Password for	[admin / operator] Select which password you will set / change
Password	key in a password Default passwords are: admin (for admin) and operate (for operator).
Repeat	repeat that password

Important Note! The authentication may be enabled / disabled from 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 be 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 as often as an login failed.



Network IP address setup, see above: "Getting started – IP setup of the device via web browser"

IP Address

Netmask

Gateway

Transmit Metering Data metering data will be streamed via UDP protocol. In order to receive such data by external applications you must define ports (port range) for matching fire wall definitions.

Enable streaming of metering data via UDP on demand of an external application (web browser, J*AM, 3rd party).

UDP Port Range Start lowest port number.

UDP Port Range End highest port number.

an external application, that can not be configured prior to start up like the web GUI will ask the **LM 4** for the possible port range and will start looking if the first port is available on the PC where the application resides. If yes it will tell the **LM 4** to start streaming on that port.

If not the application must look for next available port.

Other applications like the J*AM which have pre definitions will not ask the **LM 4** for possible UDP port range. They will use the one from the application set up menu.

Service Options

Maintenance Interface via RPC

for in house use to enable communication with factory tools.

Telnet Server

enables a telnet server to connect the consol interface via IP (port 21).

Diagnostics

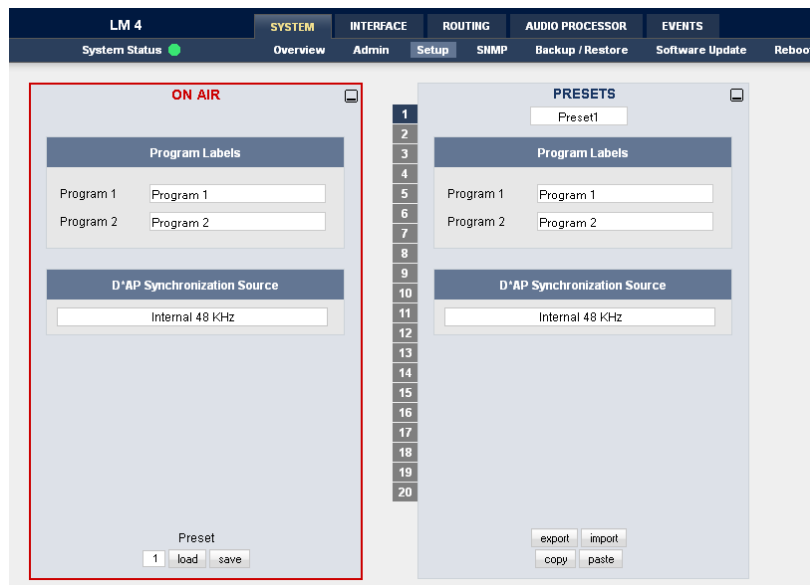
get diagnostics file

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.

Web GUI – SYSTEM – Setup

Setup – Allows the editing of program labels for the 2 stereo input sources along with the sync source selection. Displayed to the right is the PRESETS window which is common to many of the set up screens. Presets allow for up to 20 different parameter settings that can be recalled when desired.



Program Labels

each of the individual programs has a name that will be used as a reference for the display of parameters and its setup.

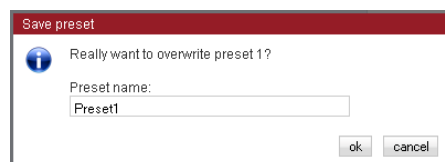
D*AP Synchronization Source

with this pull down you may select between the available sync sources :
Internal 48kHz, External AES, Input AES 1/2, External WCL, Interface (if an option board is installed), Black Burst / TriLevel).

Web GUI – SYSTEM – The Preset concept in detail

The example above shows the **preset concept** of the **LM 4**. It is the central theme of the device. For all relevant setting of the device one set of **ON AIR** parameters and **20** sets of **PRESETS** are available. If you want to load parameters from a preset or save parameters from the **ON AIR** area to a preset, you must first select a preset number at the bottom of the **ON AIR** page. You must press **1** to open the pull down list to select the desired preset.

Pressing **load** will execute it. When you press **save**, you will be asked in a pop up :



to overwrite the selected preset and to give it a (new) name.

copy **paste** acts as a clip board for the parameters of individual presets, while **export** **import** will allow you to store / recall the set of **20 presets** to / from the PC file system.

Important note! The presets of the **LM 4** are persistent by nature. You are working directly on the preset memory, i.e. you must not worry about storing such presets. The **LM 4** does it for you.

Web GUI – SYSTEM – **SNMP**

SNMP – Here you can set up the Simple Network Management Protocol options including alarms and notification path. You may also select what kind of **Trap** the **LM 4** must send in case of emergency.

The screenshot shows the Web GUI for LM 4, specifically the **SYSTEM - SNMP** configuration page. The page is divided into two main sections: **SNMP Agent** and **Traps**.

SNMP Agent Configuration:

- Enable:** ☒
- Community:** public
- Trapsink IP Address:** 10.110.255.255
- Trapsink IP Port:** 162
- Trap Repeat:** ☐
- Trap Repeat Rate (sec):** 60
- Apply:** [button]

Traps Configuration:

- Power Supply:** ☒
- Cold Start:** ☐
- Warm Start:** ☒
- Temperature:** ☒
- Fan:** ☒
- Sync:** ☒
- Authentication Error:** ☐
- Hardware Status:** ☐
- Processing Status:** ☐
- Input Signal Status:** ☐

Web GUI – SYSTEM – **Backup / Restore**

Backup / Restore – All device settings and parameters can be either backed up for future recall, or restored from a previously created backup file.

The screenshot shows the Web GUI for LM 4, specifically the **SYSTEM - Backup / Restore** configuration page. The page is divided into two main sections: **Backup Device Configuration** and **Restore Device Configuration**.

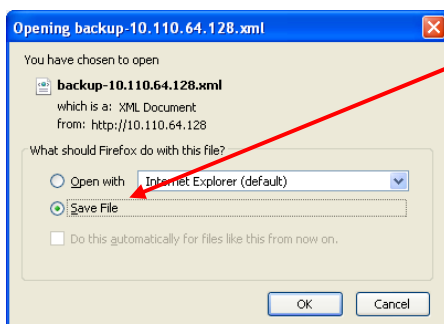
Backup Device Configuration:

- This includes all Settings and Presets.
- Backup:** [button]

Restore Device Configuration:

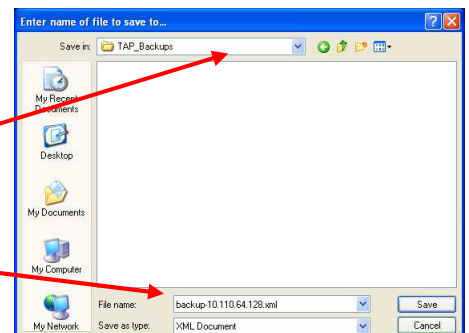
- Backup File:** [text input] [button: Durchsuchen...]
- Load All Active Settings:** ☐
- Overwrite Current IP Configuration:** ☐
- Load Presets:** ☐
- Include These Preset Groups:**
 - System:** ☐
 - Interfaces:** ☐
 - Routing:** ☐
 - Dolby Processing:** ☐
 - Audio Processor:** ☐
- Load Events Configuration:** ☐
- Restore:** [button]

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.



Web GUI – SYSTEM – Software Update

Software Update - The files to update the **LM 4** will be available in ZIP format. You must unpack it to your PC in order to access them for the update procedure.

You will find an image file for the **LM 4** core system in the format: "rel_lm4_x_y_z.img" as well as update files for components, like the optional interface boards in the format: "rsdi150_v47.sdi".

To update the **LM 4**, you must **<Browse ...>** for the respective Firmware File(which you have unzipped before) and press **start update**. After finishing the procedure the device will reboot.

You may also update the firmware of an SDI board installed in one of the two interface slots (or both). The example above shows one SDI I-O board installed into interface 1 slot. You must select the appropriate file from the firmware update bundle (ZIP file) and press **start update** afterwards.

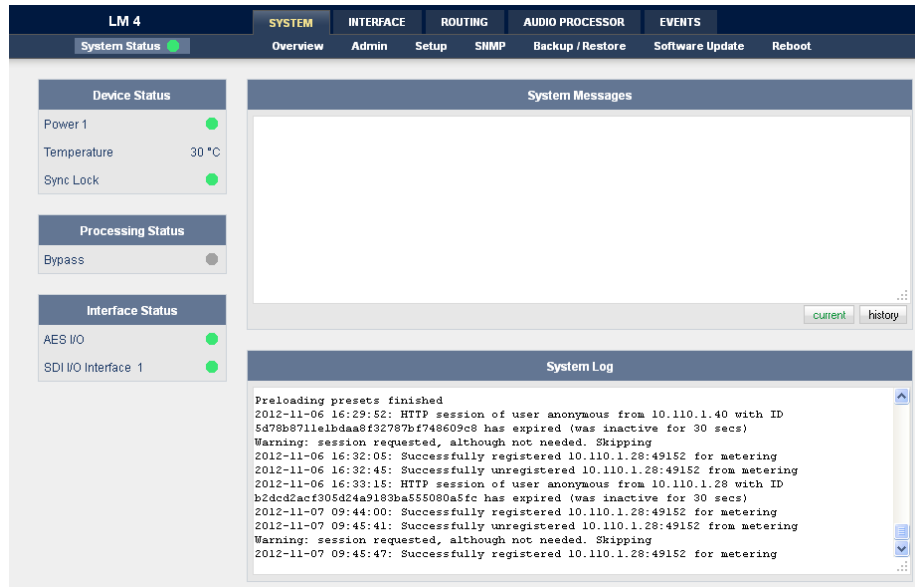
The **LM 4** has a few options you may buy extra. Which option is active on your device you can read from the licensing display in the bottom right part of this page. If you buy a license later on you must save the "license info" file and send it to your dealer. After purchasing the option you will get a "license" file in return which you must apply from there. After rebooting the device the license becomes active.

Web GUI – SYSTEM – Reboot

Reboot – Following changes to the set up or configuration, a reboot may be required. Two additional options allow for restoring the factory default settings and overwriting the current network IP settings if they have been changed.

Web GUI – SYSTEM – System Status

System Status – Provides a current overview of critical system parameters including device, processing and interface status along with a system log and any system messages.

**Device Status****Power 1**

provides the hardware status of the **LM 4**

Power 2 (optional)

status of the first power supply (left hand side from rear)

Temperature

status of second power supply (right hand side from rear)

Sync Lock

measured on the surface of the main PCB

turns red if the external sync source is removed or unstable

Processing Status**Bypass**

turns red if Bypass is activated

Interface Status**AES I/O**

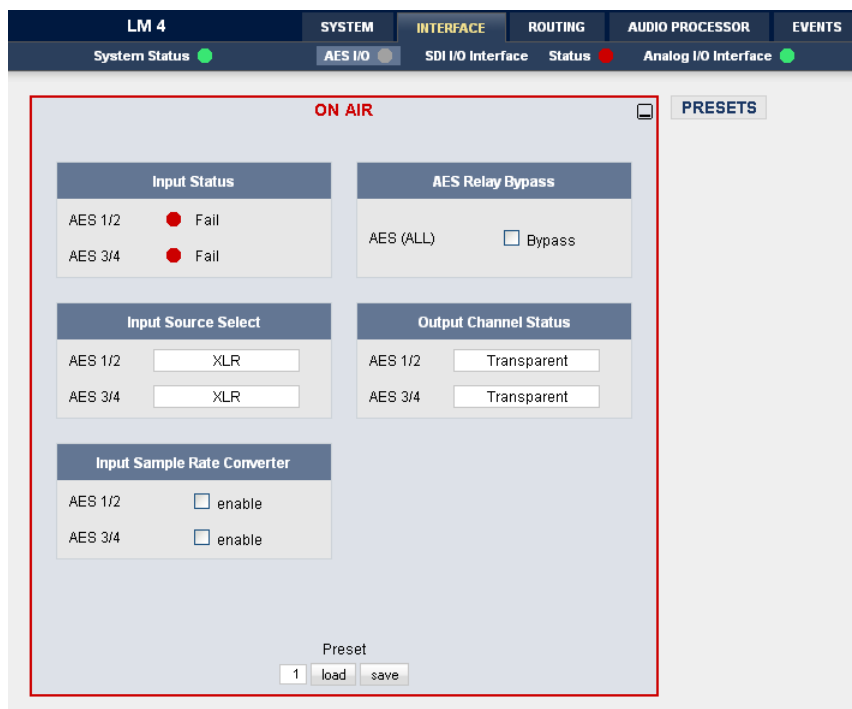
turns red if an AES input that is internally in use (i.e you have routed it to an input of a function block) has detected an error

SDI I/O Interface

turns red if the SDI input is not locked (no or bad SDI signal)

Web GUI – INTERFACE – AES I/O

AES I/O – Allows the set up of AES input source selection along with a display of signal input status.



Input Status

each AES input has a status detection that may show : **PCM** or **Fail** (no carrier, unlock, cranky [too much jitter]).

If one of the inputs is not assigned by the **ROUTING** section, its status will not be incorporated into the **System Status**.

Input Sample Rate Converter

for asynchronous sources it is possible to turn a **SRC** on per input. If a **SRC** is turned on and the input status becomes Non-PCM, the respective **SCR** will be turned off automatically in order to maintain the original data structure of an encoded bit stream like Dolby E.

AES Relay Bypass

the power fail bypass relays of all 2 I/Os may be activated manually.

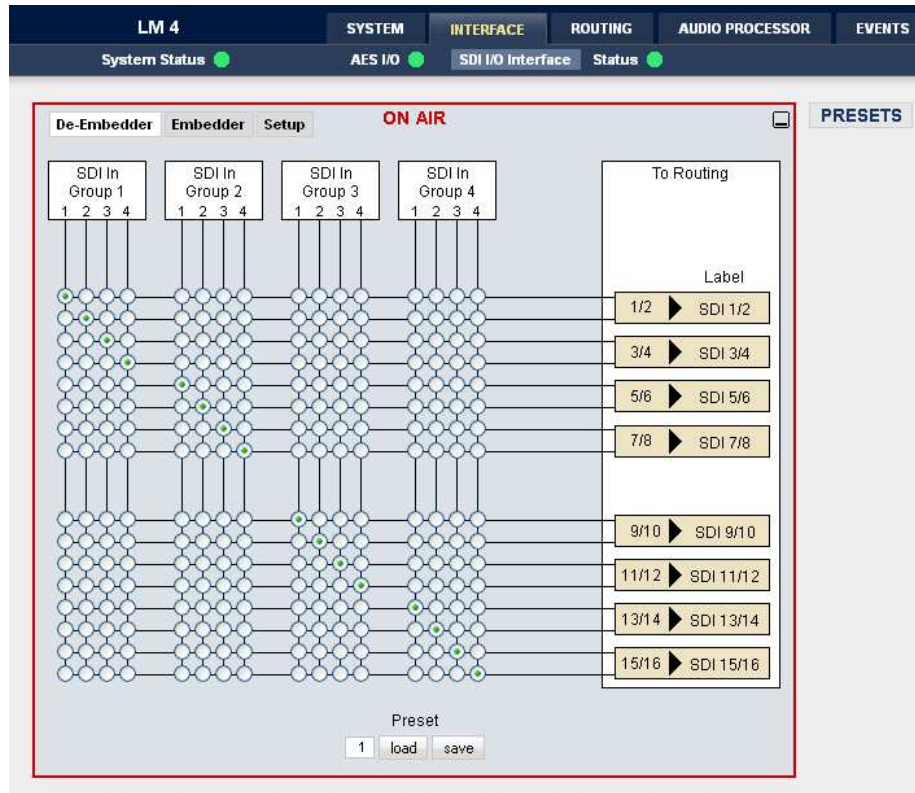
Output Channel Status

the channel status can be either transparent from the input source of the **LM 4** or may be overwritten. The pull down offers these options :

- Transparent
- Transparent
- Prof. PCM
- Prof. non-PCM
- Cons. PCM
- Cons. non-PCM

Web GUI – INTERFACE – SDI I/O Interface – **De-Embedder**

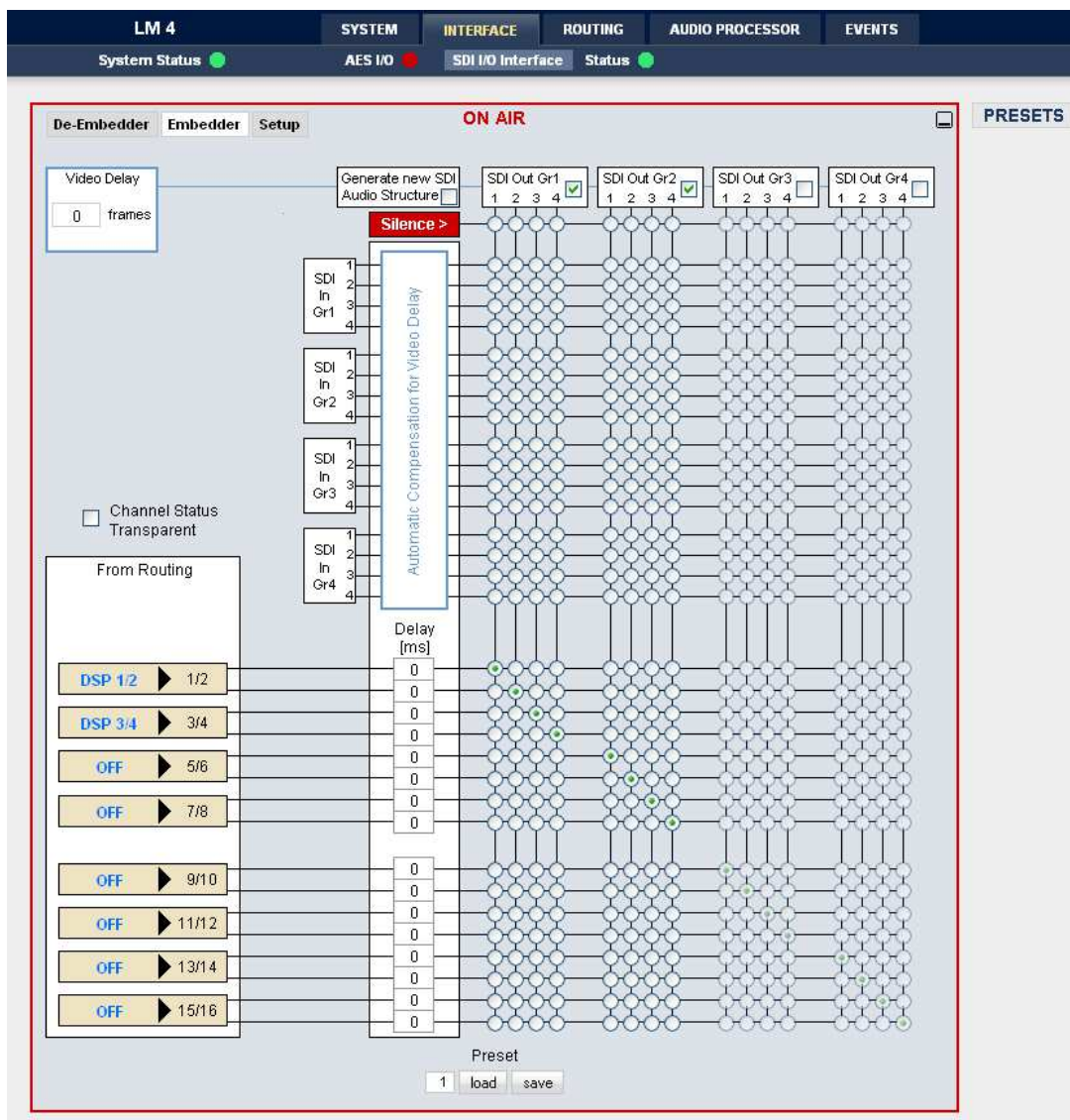
SDI I/O Interface – Here the options for de-embedding, embedding and SDI set up are performed.



The **De-Embedder** selects routing of all 16 channels to the audio processor block. There is a 16 x 16 matrix to allow for any combination of audio signals to be presented to the **LM 4** because inside the **LM 4** the signal routing is oriented in pairs. I.e. the label "**SDI 1/2**" represents two audio channels selected by the matrix :

Web GUI – INTERFACE – SDI I/O Interface – Embedder

Whilst the embedder selects routing from the audio processor block to the output.



Video Delay	For compensation of any kind of audio processing delay within the chain of devices you may use a Video Delay . 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 Delay	Mutes the respective audio channel on the embedder side. The inputs of the embedder routing matrix can be taken either from the de-embedder or from the LM 4 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 signals. For signals coming from the LM 4 routing an independent delay per single channel may be used.																		
Channel Status Bits Transparent	For the signals coming from the C8k audio busses, 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: <table> <tr> <td>Format :</td><td>Professional</td></tr> <tr> <td>Audio Mode :</td><td>Audio / Non Audio</td></tr> <tr> <td>Emphasis :</td><td>None</td></tr> <tr> <td>Freq. Mode :</td><td>Locked</td></tr> <tr> <td>Sample Freq. :</td><td>48kHz</td></tr> <tr> <td>Channel Mode :</td><td>Not Indicated</td></tr> <tr> <td>User Bits :</td><td>None</td></tr> <tr> <td>Auxiliary Bits :</td><td>24Bit</td></tr> <tr> <td>Audio Word Length :</td><td>Not indicated</td></tr> </table>	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
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** for both channels, if an adjacent pair (1/2, 3/4) carries a Dolby E stream for example.

Web GUI – INTERFACE – SDI I/O Interface – Setup

The screenshot shows the Web GUI for the D*AP LM 4, specifically the SDI I/O Interface Setup page. The top navigation bar includes tabs for SYSTEM, INTERFACE, ROUTING, AUDIO PROCESSOR, and EVENTS. The INTERFACE tab is active, and within it, the Setup sub-tab is selected. The main content area is titled 'ON AIR' in red. It contains several configuration options: Relay Bypass (checkbox), SDI Bypass (checkbox), Stream select (3G-B) (radio buttons for Stream 1 and Stream 2), Generator enabled (checkbox), Test Pattern (radio buttons for Color Bars and Black Frame), and Video Format (radio buttons for Automatic, 3G B, 3G, HD, and SD). Below these, a list of video formats is shown with radio buttons for each. A Preset section at the bottom shows '1' with load and save buttons. A note at the bottom explains the 'Automatic' video format: 'Video Format "Automatic": When input is lost, a pattern with the last format is generated. Video Format selected: Forced to generation of this format independent of input.'

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 substreams (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

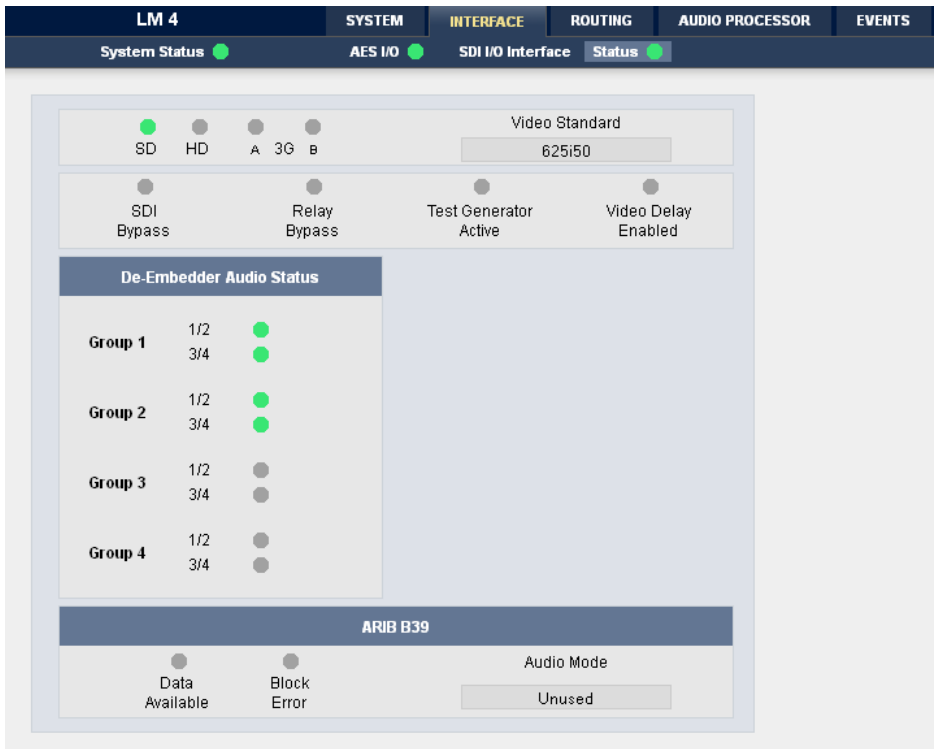
If the **Automatic** mode is selected and the Generator is enabled, it turns on if the SDI input signal fails. In this case it will generate the same video format as the previous input signal.

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 quartz reference. It is **not possible** to **genlock** it to an external reference or to the SDI input.

Web GUI – INTERFACE – SDI I/O Interface – **Status**

Status – Indicates the current status major SDI settings and parameters.



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 turns green if PCM audio is embedded 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" : http://www.arib.or.jp/english/html/overview/doc/2-STD-B39v1_2.pdf

Web GUI – ROUTING

This tab is used to setup the routing path of the audio signal(s) through the unit.

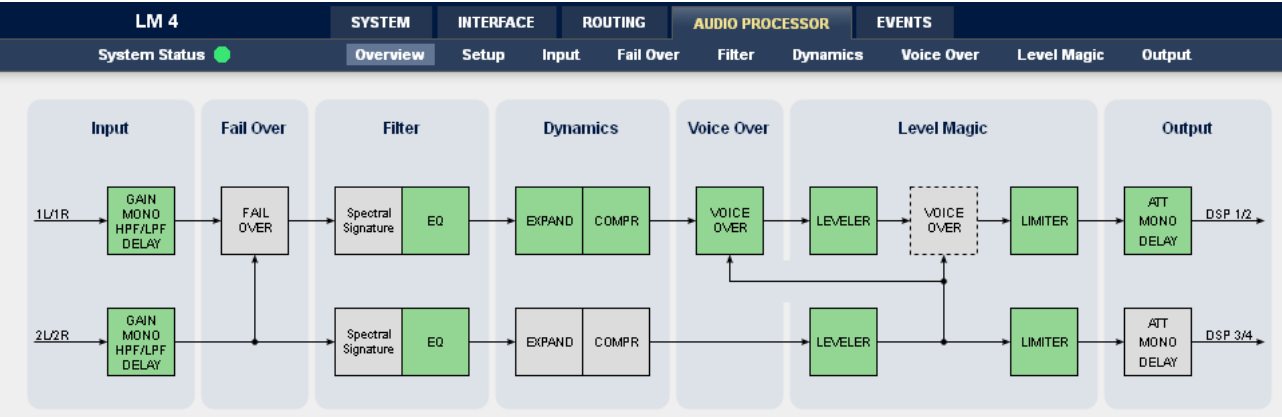
Each functional block of the device has an input- and an output-label. The output-labels are pre-defined, while the label of an input must be selected by the administrator in order to route the signals. Additional blue labels give an indication of the type of signal that is expected by the respective function block input (e.g. **1L/1R** for the DSP).

The above screen shot shows an example configuration :

- DSP** the de-embedder outputs [SDI 1/2 and 3/4] are connected to the DSP 1/2 [**1/2**] and 3/4 [**3/4**] inputs. After processing by the DSP, these signals will leave it at the outputs DSP 1/2 to 3/4.
- AES** the first outputs AES 1/2 is connected with DELAY 1/2 for a parallel delay line, while AES 3/4 is not connected.
- Delay** a signal pair from the AES 1/2 input will be delayed by 150ms and is available for routing by using the label DELAY 1/2.
- Interface 1** **SDI I/O** DSP 1/2 and DSP 3/4 are both connected with the embedder input EMB 1/2 and EMB 3/4. Where these signals will be embedded must be defined on the respective setup pane : INTERFACES > SDI I/O Interface > Embedder.

Web GUI – AUDIO PROCESSOR – Overview

The overview shows the actual signal routing of the audio processor blocks, rendered by the DSPs. This overview depends on the program configuration of the **LM 4**.



The overview shows all available function blocks. The function blocks which are activated for actual processing are highlighted by green color.

Web GUI – AUDIO PROCESSOR – Setup

The screenshot shows the 'Setup' page of the LM 4 audio processor. The page is titled 'ON AIR' and features a 'PRESETS' button. The main content area is divided into four sections:
 - **Loudness Control Mode:** A dropdown menu set to 'EBU R 128'.
 - **Processing Bypass:** A checkbox labeled 'Bypass' which is currently unchecked. Below it, a note states: 'Bypass functionality can be configured under [EVENTS](#)'.
 - **Latency Management:** A toggle switch for 'Force Minimal Latency' set to 'OFF'. Below it, a note states: 'Disabled DSP blocks have no latency. (Switching blocks on and off may be audible.)'.
 - **Bit Transparency:** Two rows for '1L/1R' and '2L/2R' channels, each with a green status indicator and a toggle switch set to 'OFF'.
 At the bottom, there is a 'Preset' section with a dropdown menu set to '1' and 'load' and 'save' buttons.

Loudness Control Mode

the pull down offers the selection of these algorithms for the **LevelMagic™** process as well as for the loudness measurement :

ITU-BS.1770-1 (A/85:2011)
Level
ITU-BS.1770-1 (A/85:2011)
ITU-BS.1770-2
EBU R 128

Level

the **Jünger Audio** proprietary level based algorithm to achieve the same program level for different programs.

ITU-BS.1770-1

defined by the ITU and found in ATSC standard A/85:2011

ITU-BS.1770-2

enhanced ITU standard

EBU R128

defined by EBU-TECH 3341. Became the de facto standard for loudness based level control and metering in TV broadcast.

Processing Bypass

will deactivate all predefined processing parameters. Which parameters are bound to the Processing Bypass function must be defined in the EVENTS section. The audio signals still travel through the **DSP** but they are not processed.

Latency Management

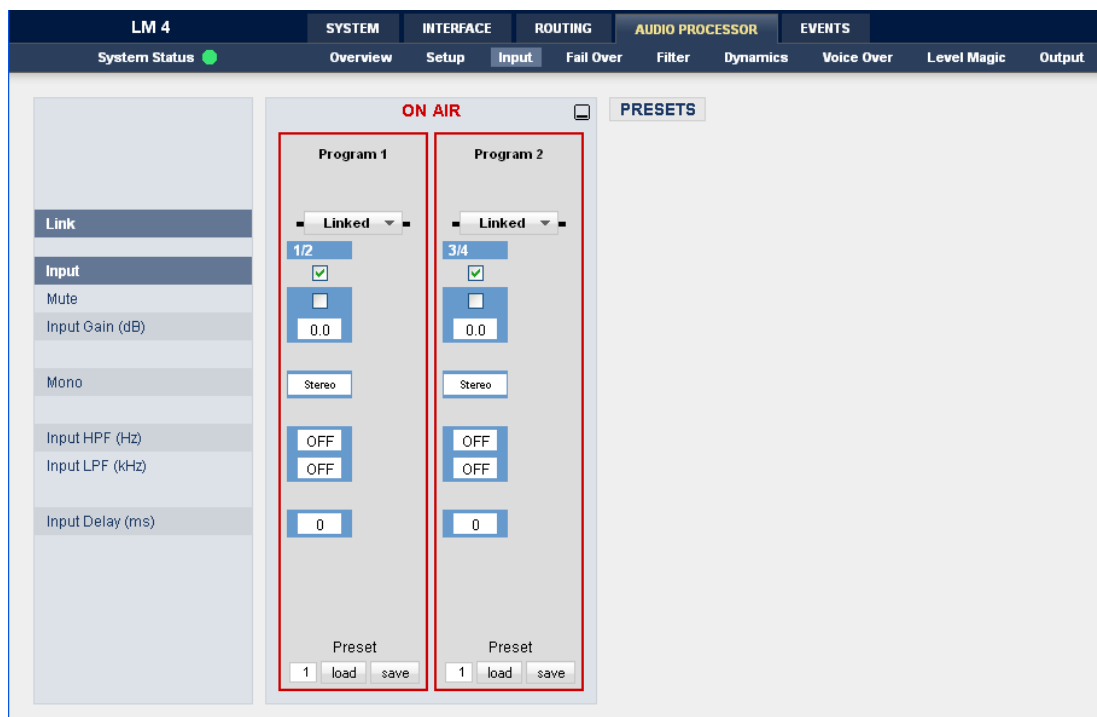
forcing minimal latency (= ON) reduces the roundtrip delay of the unit down to 4 milliseconds. This is only valid if Spectral Signature is disabled in both programs. This function will be activated for the next release.

Bit Transparency ON

will physically bypass the audio signals related to the labels on the left hand side. This function preserves the integrity of such signals if they appear in a signal path

In case of **AUTO** the channel status will be observed and if **Non Audio** is detected bit transparency will be enabled.

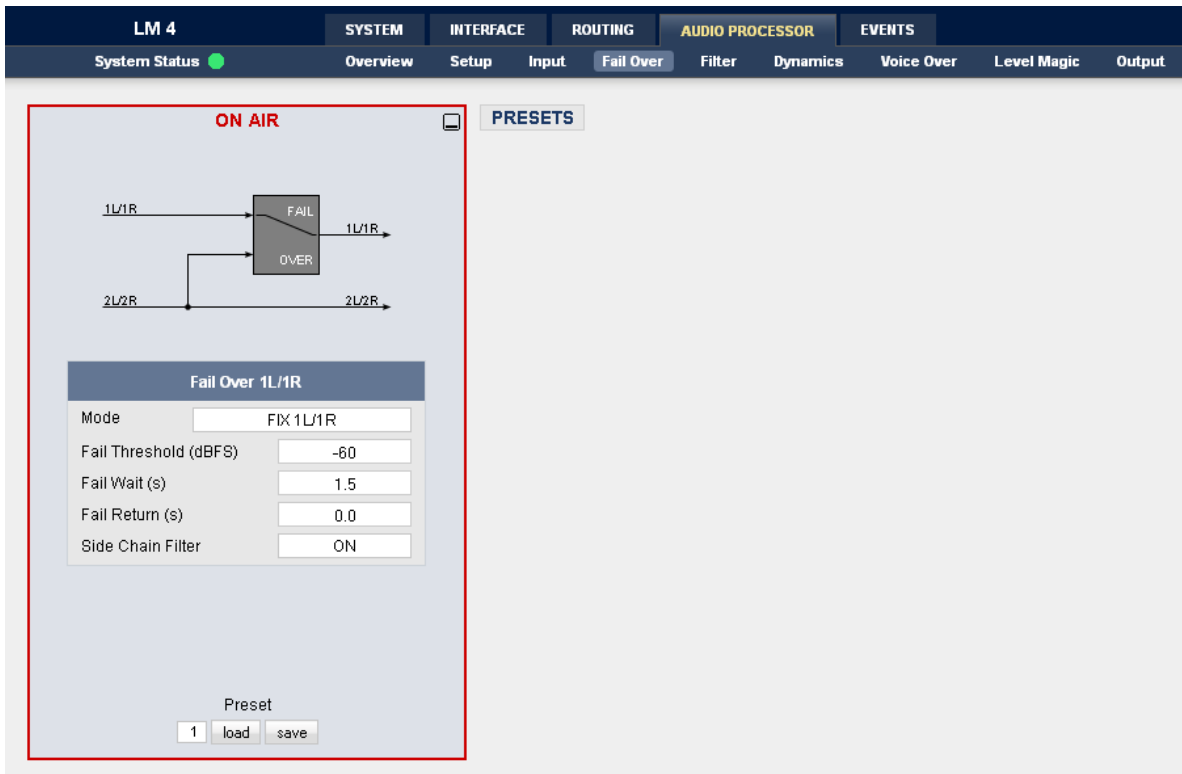
Web GUI – AUDIO PROCESSOR – Input



Link	[Linked / Unlinked] defines the coupling of the control circuits in order to maintain the listening balance for correlated signals and to provide a grouping of the setup parameters for two channel signals.
Input	[Enable / Disable] here there are numerous pre-conditioning options for the input audio signal(s).
Mute	will mute all channels controlled by the respective column.
Input Gain (dB)	sets the gain [-80 ... +20]
Input HPF (Hz)	high pass filter (6dB/oct) cut off frequency [OFF, 2, 20, 40, 80, 120]
Input LPF (kHz)	low pass filter (6dB/oct) cut off frequency [OFF, 15, 20, 22]
Input Delay (ms)	[1 ... 2000]

Web GUI – AUDIO PROCESSOR – Fail Over

Fail Over – Set the conditions for detecting loss of main audio in order to trigger switching to the secondary source.



For the program input 1L/1R, the source for the fail over circuit can be the second program input (input 2L/R). The Mode switch will select the respective signal path.

Fail Over 1L/1R

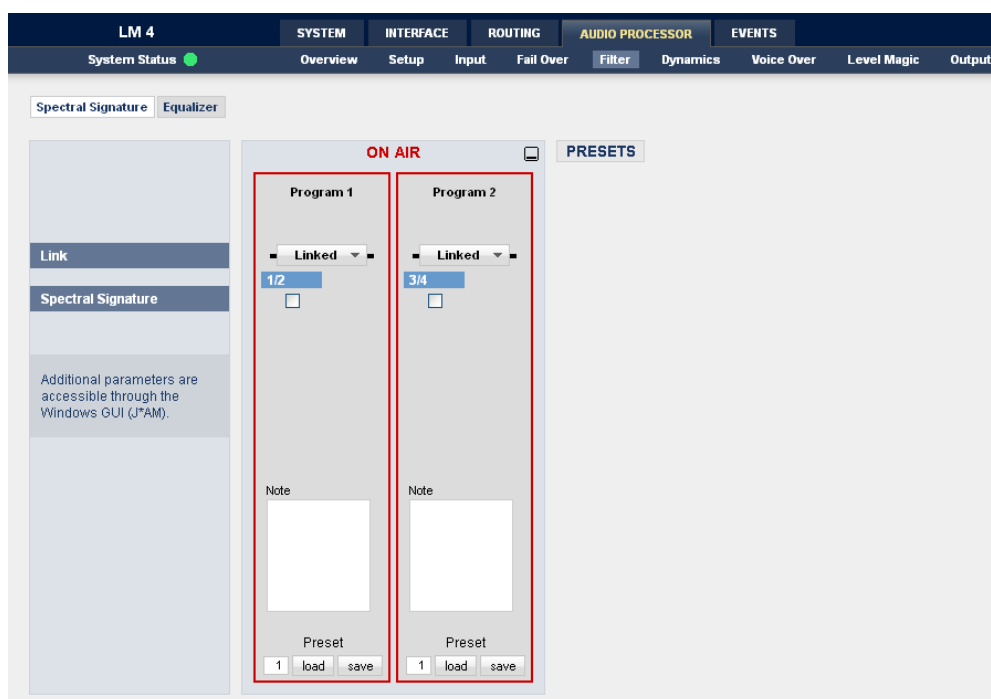
MODE	The Fail Over output can be permanently connected to : its program input 1L/1R the second program input 2L/2R or may be set to AUTO
-------------	---

Fail Threshold (dBFS)	[-80 ... -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.

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

Two options are available to modify the audio signal(s) :

AUDIO PROCESSOR – Filter – **Spectral Signature**



Link [Linked / Unlinked]

Spectral Signature [Enable / Disable]
is a dynamic multi band filter that allows precise control of the audio spectrum. It is useful in order to create a unique “signature sound” for audio broadcast.

Note that this feature requires the appropriate license and the additional J*AM Jünger Application Manager software to be installed separately.

The application manager may be downloaded from the Junger website :

www.junger-audio.com/download/soft-firmware/JungerApplicationManager_a.b.cdefg.zip

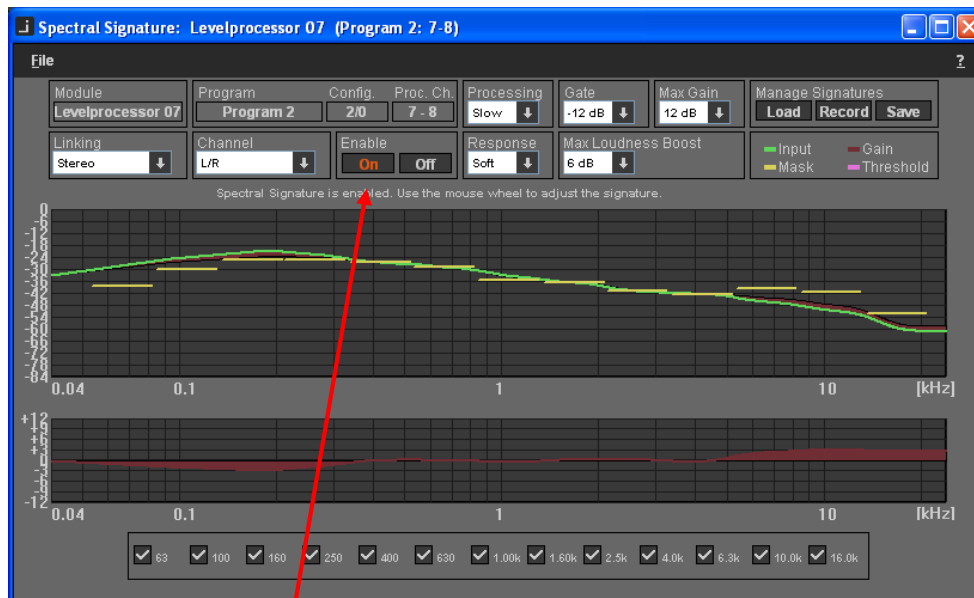
For details how to operate the J*AM, pls. also see separate manual :

http://www.junger-audio.com/uploads/media/JAM_manual_yymdd.pdf

For devices which have the license and for programs which are enabled for this feature you will get

If you highlight a program that is enabled for **Spectral Signature** the soft button **<Spectral Signature>** becomes active.

When you press the soft button this window shows up on the PC screen :

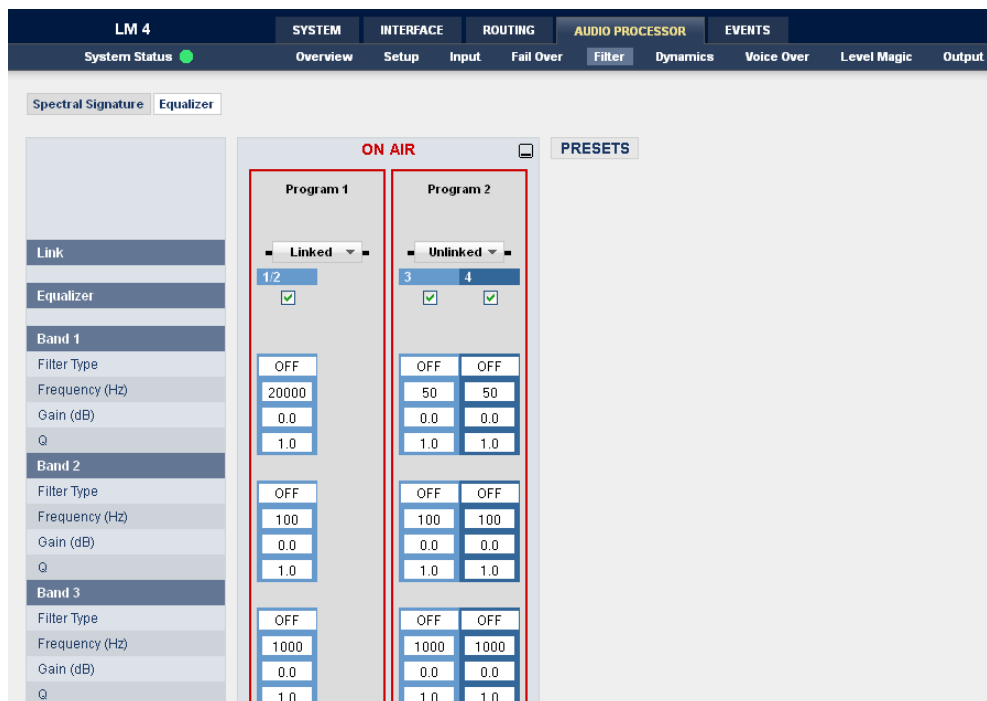


The process must be enabled ● in order to get the correct display. You can do it either from the **LM 4** GUI or from here. When starting this application the settings will be read from the **LM 4** and will be used and displayed here. Pay attention that **Max Gain** is not set to 0dB.

If you change settings you must store them in the **LM 4** by first selecting a preset number and pressing the **<save>** button in the ON AIR section of the **Spectral Signature** pane afterwards.

AUDIO PROCESSOR – Filter – Equalizer

Equalizer gives access to a 5 band Parametric EQ that can be adjusted independently for each audio input program.



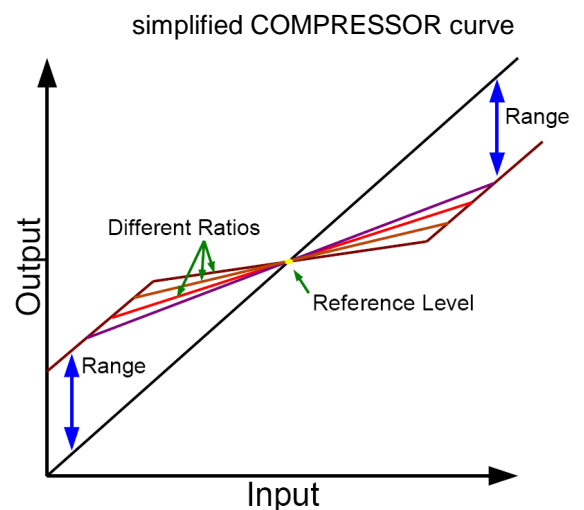
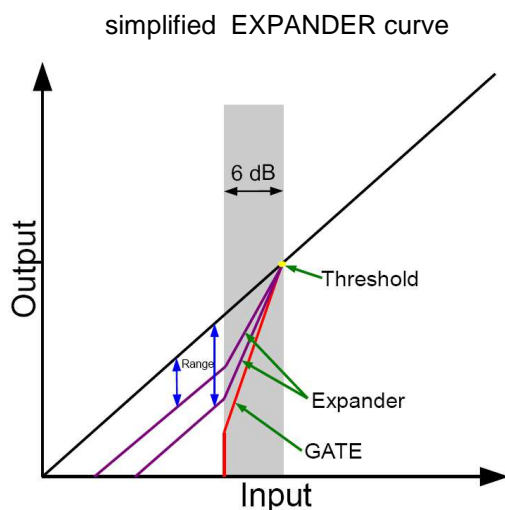
Link	[Linked / Unlinked]
Equalizer	[Enable / Disable]
Band 1	
Filter Type	[OFF, Lo Shelf, Peak, Hi Shelf]
Frequency (Hz)	[20 ... 2000]
Gain (dB)	[-20 ... +20]
Q	[0.4 ... 4.0]
Band 2	same as Band1
Band 3	same as Band1
Band 4	same as Band1
Band 5	same as Band1

Web GUI – AUDIO PROCESSOR – Dynamics

Dynamics – The LM 4 offers a powerful expander/compressor tool that can also be set independently per audio program source.



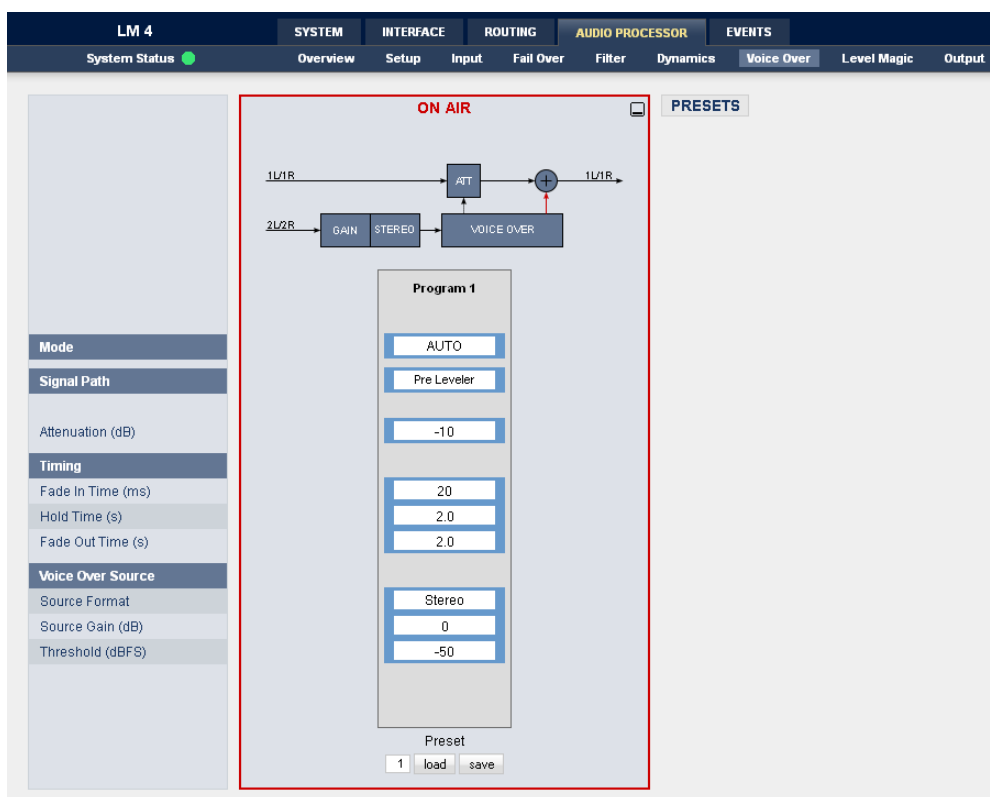
Expander	[Enable / Disable]
Threshold (dBFS)	[-60 ... -20]
Range (dB)	[0.0 20, Gate]
Release Mode	[0 ... 9]



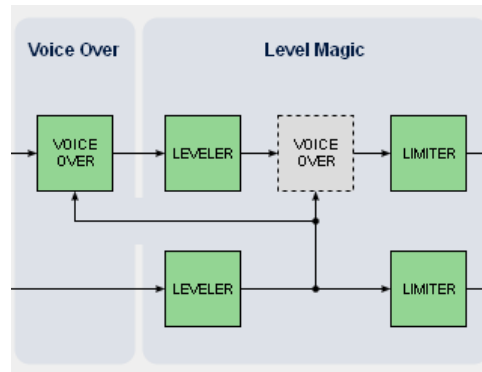
Compressor	[Enable / Disable]
Reference Level (dBFS)	[0 ... -40]
Range (dB)	[0.0 ... 20.0, Gate]
Ratio	[1 : 1.1 ... 1 : 4.0]
Processing	[Live, Speech, Pop, Uni, Classic]
Expert	[Enable / Disable]
Clear Processing History	<clear>

Web GUI – AUDIO PROCESSOR – Voice Over

Voice Over – Allows for the temporary insertion of a secondary audio source whilst attenuating (or ducking) the primary audio.



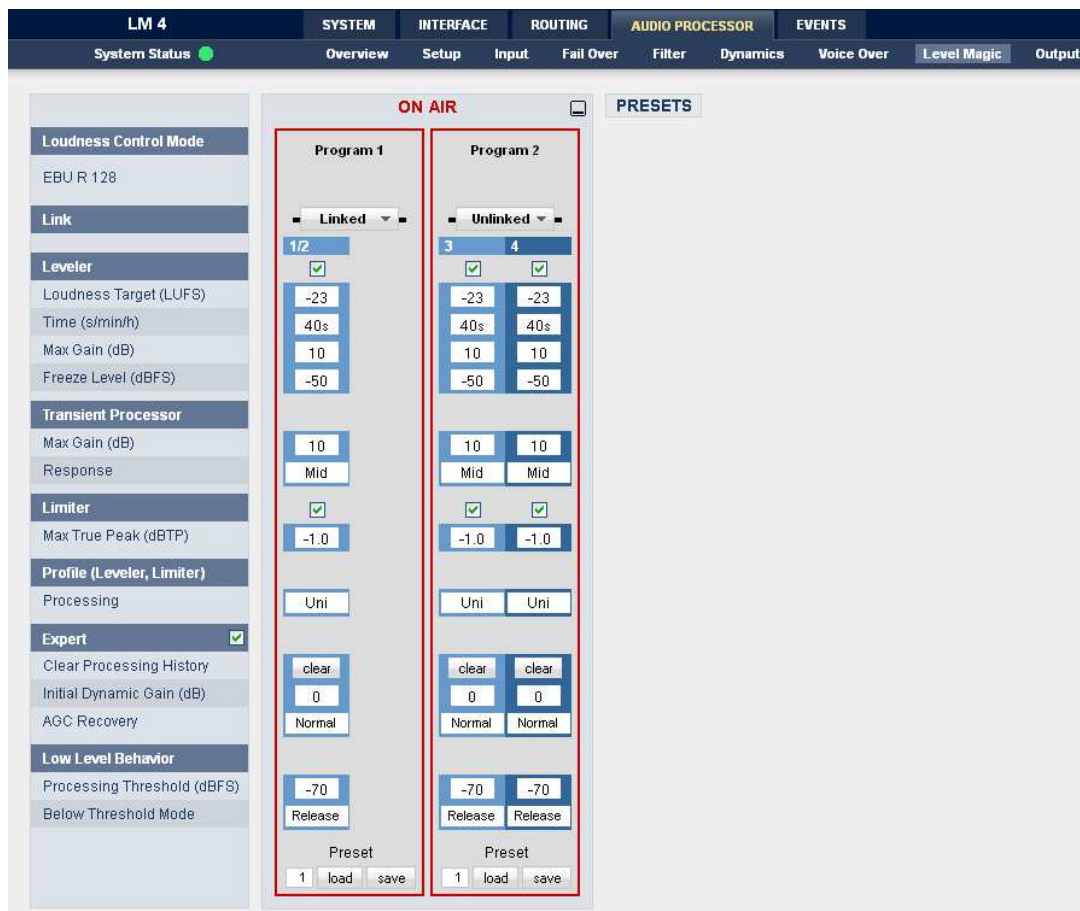
Mode	[OFF, Always ON, AUTO] sets the voice over operating mode
Signal Path	[Pre Leveler, Post Leveler] the position in the signal path regarding the leveler processing block. You will also see it in the AUDIO PROCESSOR > Overview sketch, highlighted in green and surrounded by a solid line that surrounds the Voice Over processing block in use.



Attenuation (dB)	[-30 ... 0dB] the attenuation of the program signal in case of active voice over
Timing	
Fade In Time (ms)	[10 ... 1000]
Hold Time (s)	[0.0 ... 10.0]
Fade Out Time (s)	[0.0 ... 10.0]
Voice Over Source	
Source Format	[Stereo, Mono LL, Mono RR, Mono L+R] the voice feed of the Voice Over circuit is a two channel signal. You may select here, from which input channel the voice feed will be taken. LL for example means the voice signal is taken from the first input channel and it will be mixed into both program channels. Mono L+R means that a mono signal is built from a stereo input signal and is mixed to both (stereo) program channels.
Source Gain (dB)	[-20 ... 20] sets the gain for the voice signal prior to mixing.
Threshold (dBFS)	[-60 ... -40] the threshold for the voice signal in AUTO mode.

Web GUI – AUDIO PROCESSOR – Level Magic

Level Magic – Is the proprietary Jünger algorithm used to maintain a constant output loudness irrespective of the incoming audio levels.



Loudness Control Mode

[EBU R 128 / Level / ITU-BS.1770-1 (A/85 2011) / -2 / 3]

Display of the pre selected mode see :

AUDIO PROCESSOR > Setup

Link

[Linked / Unlinked]

Note - the limiter and the leveler link are coupled. From the front panel you may set it in either function block!

Leveler

[enable / disable]

turns off Transient Processor as well.

Loudness Target

Level mode [0 ... -50dBFS]

ITU mode [0 ... -50LKFS]

EBU mode [0 ... -50LUFS]

Time (s/min/h)

[10, 20, 40 / 1, 2, 5, 10, 20, 40 / 1, 2]

Max Gain (dB)

[0 ... 40]

Freeze Level (dBFS)

[-20 ... -60]

Transient Processor

Max Gain (dB)	[0 ... 15]
Response	[Soft, Mid, Hard]
Limiter	[enable / disable]
Max True Peak (dBTP)	[0.0 ... -20.0]
Profile (Leveler, Limiter)	used by both the leveler and the limiter
Processing	[Live, Speech, Pop, Uni, Classic]
Expert	[on / off] The expert mode offers the possibility for manual intervention into the adaptive behavior of the LevelMagic process for critical material. For details pls. see the above mentioned document.
Clear Processing History	<clear> manual or preset controlled
Initial Dynamic Gain (dB)	[-40 ... 0 ... 15]
AGC Recovery	[Normal / Fast]

Low Level Behavior

Processing Threshold (dBFS)	[-80 ... -20] the threshold from where the processing gain will behave as defined by Below Threshold Mode.
Below Threshold Mode	[Release / Hold] returns slowly to 0dB gain change or stays at the Processing Threshold.

For the description of the **LevelMagic™** parameters see engineering bulletin :
 "LevelMagic-2_Parameters_yymmdd.pdf", which is available for download from our web site.

Web GUI – AUDIO PROCESSOR – Output

Output – The final screen in this section allows for the adjustment of numerous audio parameters directly on the final output signal.



Link	[enable / disable]
Output	[enable / disable]
Mute	[on / off]
Attenuation (dB)	[-80.0 ... 0.0]
Mono	[Stereo, L+R, LL, RR]
Output Delay (ms)	[0 ... 2.000]

Web GUI – EVENTS – Trigger – Trigger Configuration

EVENTS - In a broadcast facility, there are often requirements to integrate the Digital Audio Processor into the automation system in order to facilitate functions such as remotely re-calling presets, firing GPO commands etc. The events tab is where all relevant parameters can be set up.

A **Trigger** is the logical combination of up to two trigger sources. The **Trigger** may launch one or more events. An event runs like a flip-book inside the D*AP. This powerful technology spans from simply recalling a certain parameter to the complete reconfiguration of the **LM 4**. But it also enables several fail over scenarios where the **LM 4** will automatically react to the system and/or parameter status

Trigger – As a default, 8 standard trigger conditions are available. These can be configured to determine actions resulting from combinations of hotkey, GPI, network commands, parameter values, active events, other active trigger etc. stimulus :

LM 4

SYSTEMINTERFACEROUTINGAUDIO PROCESSOREVENTS

System StatusTriggerPreset EventsAction EventsBypass Events

Trigger ConfigurationRemote Hotkey SourcesNetwork SourcesParameter Sources

Trigger	Invert	Type	Source 1	Logic	Invert	Type	Source 2
			Source				Source
Input Gain +1dB	<input type="checkbox"/>	Hotkey	1 Gain up	or	<input type="checkbox"/>	Network	1 Omnibus Gain up
Input Gain 1dB	<input type="checkbox"/>	Hotkey	2 Gain down	or	<input type="checkbox"/>	Network	2 Omnibus Gain down
Trigger 3	<input type="checkbox"/>	Hotkey	3 Hotkey3	or	<input type="checkbox"/>	GPI	3
Trigger 4	<input type="checkbox"/>	Hotkey	4 Hotkey4	or	<input type="checkbox"/>	GPI	4
Trigger 5	<input type="checkbox"/>	Hotkey	5 Hotkey5	or	<input type="checkbox"/>	GPI	5
Trigger 6	<input type="checkbox"/>	Hotkey	6 Hotkey6	or	<input type="checkbox"/>	GPI	6
Trigger 7	<input type="checkbox"/>	Hotkey	7 Hotkey7	or	<input type="checkbox"/>	GPI	7
Trigger 8	<input type="checkbox"/>	Hotkey	8 Hotkey8	and	<input type="checkbox"/>	GPI	8

+ add Trigger

✖ remove Trigger

At the bottom of the **Trigger** table we have two icons :

Trigger 8

☐

Hotkey

8 Hotkey 8

or

☐

GPI

8

+ add Trigger

✖ delete Trigger

When you click on one of these icons you may add or delete a line of the above table.

When adding a trigger you may give it a name :

When removing a trigger you may select it by its name and press <OK>

Trigger name

i

Trigger 3

ok

cancel

Remove trigger

i

Preset Load

ok

cancel

Web GUI – EVENTS – Trigger – Remote Hotkey Sources

Remote Hotkey Sources – will assign the hotkeys of the **LM 4** names and will enable the respective key(s) :

LM 4

SYSTEMINTERFACEROUTINGAUDIO PROCESSOREVENTS

System StatusTriggerPreset EventsAction EventsBypass Events

Trigger ConfigurationRemote Hotkey SourcesNetwork SourcesParameter Sources

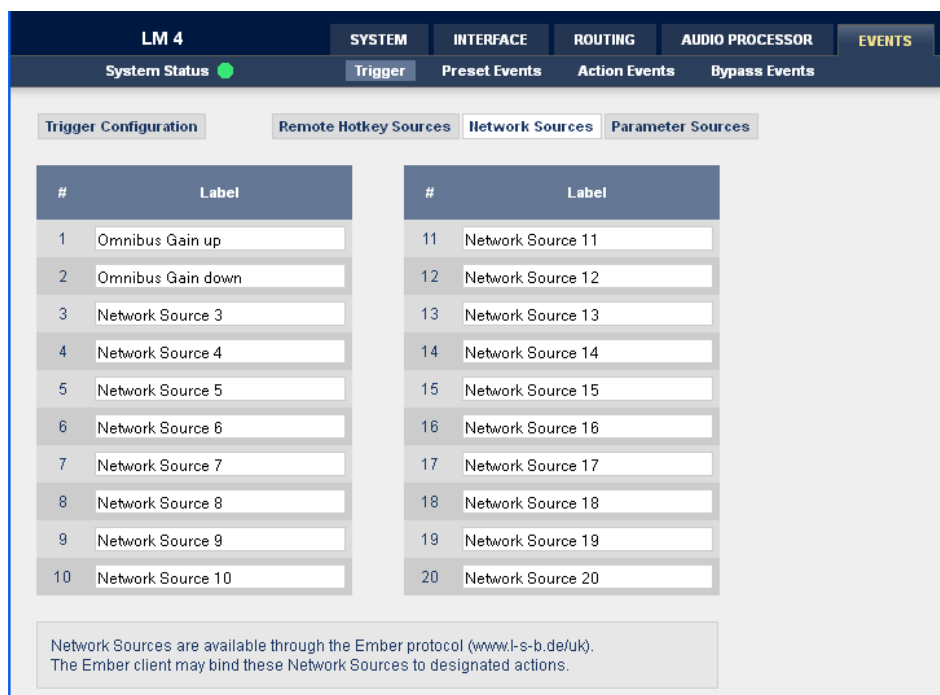
#	Label	Enable
1	Gain up	<input checked="" type="checkbox"/>
2	Gain down	<input checked="" type="checkbox"/>
3	Hotkey3	<input type="checkbox"/>
4	Hotkey4	<input type="checkbox"/>
5	Hotkey5	<input type="checkbox"/>
6	Hotkey6	<input type="checkbox"/>
7	Hotkey7	<input type="checkbox"/>
8	Hotkey8	<input type="checkbox"/>

Hotkeys are available on the front of the device or on the X*AP Remote Panel.

The example above shows two activated hotkeys #1 "Gain up" and #2 "Gain down". Which will be used later for other event configuration:

Web GUI – EVENTS – Trigger – Network Sources

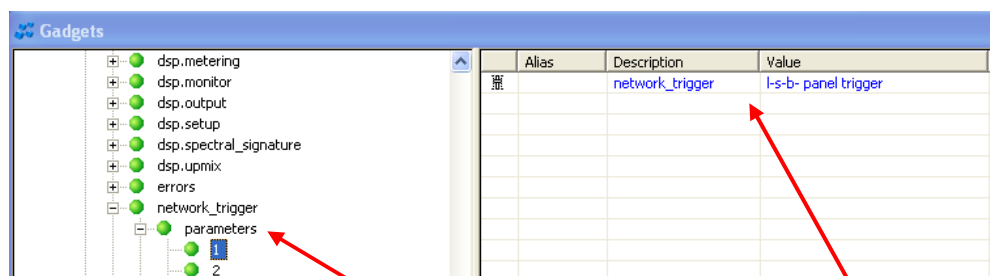
Network Sources – Allow to set up external trigger sent by an automation system to the **LM 4** :



Network trigger are based on the **EmBER+** protocol from Co. l-s-b <http://www.l-s-b.de/uk>
 The **LM 4** receives such trigger over the TCP/IP network. The triggers are issued by a device that has implemented the **EmBER+** protocol (e.g. VSM server). You may assign these triggers to virtual as well as physical (e.g. LBP) buttons of a VSM installation. But also a broadcast automation system may have an **EmBER+** client running that may send network trigger to the **LM 4**

number of the network trigger
Label label of that network trigger. It appears on the **Trigger Configuration** pane as well as in the **EmBER+** tree of the VSM Studio gadget connector.

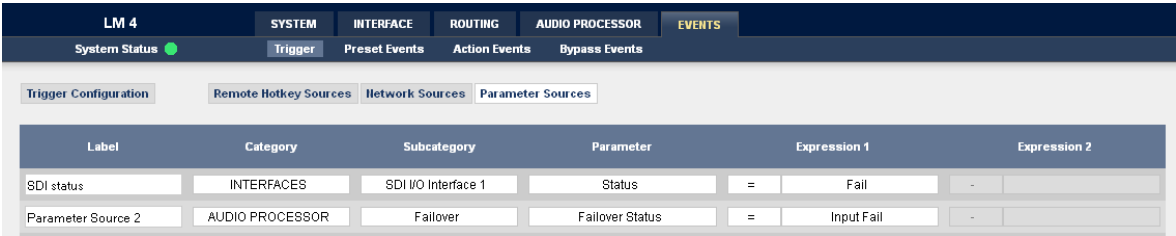
Below is a screen shot of the **VSM gadget connector** :



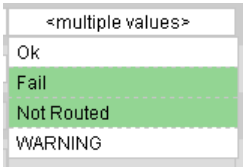
For the Ember tree you must select :
 "Device" > controller_dsp > network_trigger > parameters > #.
 As a value you will receive the trigger name from the **LM 4** In this example it is the default network trigger name.

Web GUI – EVENTS – Trigger – **Parameter Sources**

Parameter Sources – represent the status of selected parameters from selected function blocks :



- Label** input field for a label of a parameter trigger source
- Category** [INTERFACES / AUDIO PROCESSING]
- Subcategory** e.g. If Category = INTERFACES, possible Subcategories are : [SDI I/O interface 1 or AES I/O]
- Parameter** e.g. if Subcategory = SDI I/O Interface 1, possible parameters are: [Status / ARIB B39 Avaialbale / ARIB B39 Block Error/ ARIB B39 Audio Mode / SDI lock]
- Expression 1** e.g. if Parameter = Status, possible expressions are: [OK / Fail / Not Routed / WARNING].
The Expression allows **multiple values**. I.e. you may select [Fail & Not Routed]. In that case both status expressions are marked green and due to limited space in the pull down the word **<multiple values>** will be used

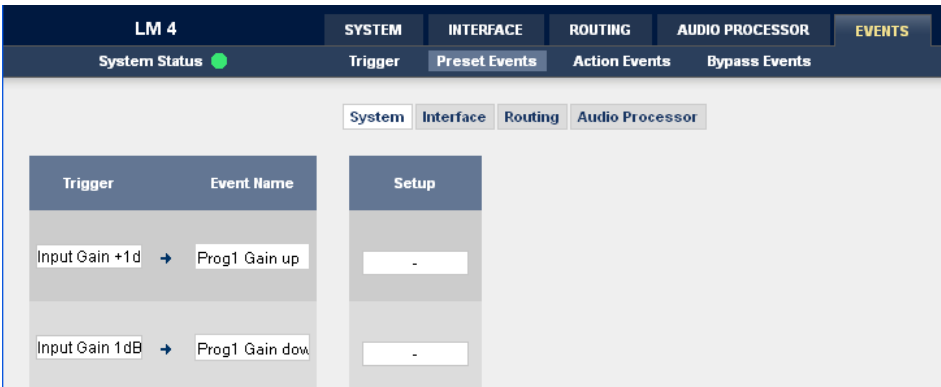


This is a logical or combination. Note that you are able to logical combine two or all of the expressions of the pull down no matter if it makes sense for the actual parameter source!

- Expression 2** will be implemented soon

Web GUI – EVENTS – Preset Events – **System**

A trigger will launch an event. The **LM 4** knows four different types of events which may be set up via page embedded tabs. Firstly we have the System tab :



Because the "SYSTEM" tab has presets only for the "Setup" sub-tab, we have just one column for recalling systems presets if necessary.

Web GUI – EVENTS – Preset Events – Interface

Trigger	Event Name	AES I/O	SDI I/O Interface
Input Gain +1d	Prog1 Gain up	-	-
Input Gain 1dB	Prog1 Gain down	-	-
SDI lost	Relay Bypass	-	Preset5

For this example a trigger "SDI lost" will launch the event "Relay Bypass". This event will then load "Preset 5" of the SDI I/O Interface while Preset 5 is set up to turn the SDI bypass relay on.

Web GUI – EVENTS – Preset Events – Routing

Trigger	Event Name	Routing
Input Gain +1d	Prog1 Gain up	-
Input Gain 1dB	Prog1 Gain down	-

Because the ROUTING tab has no sub-tabs we have just one column for recalling routing presets if necessary.

Web GUI – EVENTS – Preset Events – Audio Processor

Trigger	Event Name
Input Gain +1dB	→ Prog1 Gain up
Input Gain 1dB	→ Prog1 Gain dow
Trigger 3	→ Preset Event 3
Trigger 4	→ Preset Event 4

	Program	Setup	Input	Fail Over	Spectral Signature	Equalizer	Dynamics	Voice Over	Level Magic	Output
Input Gain +1dB	Program 1	-	plus1dB	-	-	-	-	-	-	-
	Program 2	-	-	-	-	-	-	-	-	-
Input Gain 1dB	Program 1	-	minus 1dB	-	-	-	-	-	-	-
	Program 2	-	-	-	-	-	-	-	-	-
Trigger 3	Program 1	-	-	-	-	-	-	-	-	-
	Program 2	-	-	-	-	-	-	-	-	-
Trigger 4	Program 1	-	-	-	-	-	-	-	-	-
	Program 2	-	-	-	-	-	-	-	-	-

Important Note! The **Preset Events** tab controls multiple preset categories which are represented by the page embedded tabs "System!", "Interface", "Routing" and "Audio Processor". You must be aware that one trigger is valid for an entire line from System over Routing to Audio Processor. If you change the Trigger on one of the embedded pages it will be changed on all other pages.

Web GUI – EVENTS – Action Events – GPO

Action events – Comprises of two options. Creating GPO control signals, and invoking Loudness Measurement “Start”, “Stop” and “Pause” commands.

Trigger	Event Name
SDI lost	→ SDI Alarm
-	→ Action Event 2

GPO 1	GPO 2	GPO 3	GPO 4	GPO 5	GPO 6	GPO 7	GPO 8
<input checked="" type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow
<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow	<input type="checkbox"/> follow

The **LM 4** has 8 physical GPO's (relay change over contacts) which may be incorporated into an action event. The example below will only activate **GPO 1** if the **"SDI alarm"** event is triggered by the SDI lost" trigger.

Action Events are independent from **Preset Events**. That is why you must define a new event name (e.g. SDI alarm). This event should be triggered by the **"SDI lost"** trigger, which you set up on the trigger pane (third one) :

Trigger	Invert	Type	Source 1	Logic	Invert	Type	Source 2
Input Gain +1dB	<input type="checkbox"/>	Hotkey	1 Gain up	or	<input type="checkbox"/>	Network	1 Omnibus Gain up
Input Gain 1dB	<input type="checkbox"/>	Hotkey	2 Gain down	or	<input type="checkbox"/>	Network	2 Omnibus Gain down
SDI lost	<input type="checkbox"/>	Parameter	1 SDI status	or	<input type="checkbox"/>	-	-

While the source for that trigger is a parameter source :

Label	Category	Subcategory	Parameter	Expression 1	Expression 2
SDI status	INTERFACES	SDI I/O Interface 1	SDI Lock	=	false
Parameter Source 2	-	-	-	-	-

Web GUI – EVENTS – Action Events – Loudness Measurement

The **EBU R128** implements the possibility to start, pause / continue, reset a loudness measurement.

Trigger	Event Name	Program	Measurement 2 x 2
SDI lost	SDI Alarm	Program 1	-
		Program 2	-
Start Loudness Measure	Start	Program 1	pause / continue
		Program 2	-
Stop Loudness Measure	Stop	Program 1	pause / continue
		Program 2	-

The example above defines two action events "Start" and "Stop". They will be triggered by : "Start Loudness Measure" and "Stop Loudness Measure" which have been setup previously on the trigger pane :

Trigger	Invert	Type	Source 1	Logic	Invert	Type	Source 2
Input Gain +1dB	<input type="checkbox"/>	Hotkey	1 Gain up	or	<input type="checkbox"/>	Network	1 Omnibus Gain up
Input Gain 1dB	<input type="checkbox"/>	Hotkey	2 Gain down	or	<input type="checkbox"/>	Network	2 Omnibus Gain down
SDI lost	<input type="checkbox"/>	Parameter	1 SDI status	or	<input type="checkbox"/>	-	-
Start Loudness Measure	<input type="checkbox"/>	GPI	1	or	<input type="checkbox"/>	-	-
Stop Loudness Measure	<input type="checkbox"/>	GPI	2	or	<input type="checkbox"/>	-	-

While the source for those two triggers are GPI #1 and #2

Web GUI – EVENTS – Bypass Events

Bypass events – The final screen allows the configuration of event sequences that will happen in the case of loss of input audio or selected forced bypassing of audio processing parameters.

LM 4

SYSTEMINTERFACEROUTINGAUDIO PROCESSOR**EVENTS**

System StatusTriggerPreset EventsAction EventsBypass Events

Current Bypass Status

Checkboxes may be set to force dedicated Bypass

Input	Fail Over	Spec. Sig.	Equalizer	Voice Over	Compressor	Expander	Leveler	Limiter	Output
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Trigger	Event
Remote Panel Bypass Button <input type="checkbox"/> Lock	Processing Bypass <input type="checkbox"/>

Trigger	Event Name
-	Bypass Event 1
-	Bypass Event 2

Input	Fail Over	Spec. Sig.	Equalizer	Voice Over	Compressor	Expander	Leveler	Limiter	Output
follow	follow	follow	follow	follow	follow	follow	follow	follow	follow
follow	follow	follow	follow	follow	follow	follow	follow	follow	follow

Input	Fail Over	Spec. Sig.	Equalizer	Voice Over	Compressor	Expander	Leveler	Limiter	Output
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

The **LM 4** has a dedicated **<BYPASS>** button on the front panel. The function of this button may be configured in the upper section of the **Bypass Events** pane.

You may lock the button and you may also control it with the **Processing Bypass** check box :

Current Bypass Status

Checkboxes may be set to force dedicated Bypass

Input	AUX Input	Upmix	Spec. Sig.	Equalizer	Expander	Compressor	Voice Over	Leveler	Limiter	Output
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Trigger	Event
Remote Panel Bypass Button <input type="checkbox"/> Lock	Processing Bypass <input type="checkbox"/>

Input	AUX Input	Upmix	Spec. Sig.	Equalizer	Expander	Compressor	Voice Over	Leveler	Limiter	Output
follow	follow	follow	follow	follow	follow	follow	follow	follow	follow	follow
follow	follow	follow	follow	follow	follow	follow	follow	follow	follow	follow

The top two rows of check boxes represent the bypass switches of the individual function blocks of the DSP. They may be used to force the bypass function of individual blocks manually.

If you turn the **<BYPASS>** button of the front panel **ON** the Processing Bypass check box will show it. You may also use this check box to turn the front panel button **ON / OFF** and the pre-selected "follow" function blocks will turn on the bypass mode.

In the lower rows you may configure the bypass function of the individual function blocks to be controlled by an **Bypass Events** trigger :

Trigger	Event name	Input	AUX Input	Upmix	Spec. Sig.	Equalizer	Expander	Compressor	Voice Over	Leveler	Limiter	Output
-	-	-	-	-	-	clear	set	set	-	-	-	-
Trigger 5	Bypass Event 1	-	-	-	-	clear	set	set	-	-	-	-

The Event named "Bypass Event1" may be triggered by "**Trigger 5**". It will turn the bypass **ON** for the function blocks: Expander, Compressor, and **OFF** for the Equalizer section.

Web GUI – EVENTS – Example setup

The way to set up the **EVENT** system is as follows :

1. **Define** trigger sources (Remote Hotkey - / Network - / Parameter -)
2. **Configure** a trigger by logical combination of up to two trigger sources
3. **Decide** what shall happen by setting up the respective presets which will be used for the events)
4. **Assign** trigger to event(s)

As an example we will pump up the input gain of the first program by +1dB and reduce it by -1dB. This should be automatically set by the Omnibus automation system. If the trigger is not set for the actual event in the run down list, an operator should be able to set it by a remote hotkey ...

1. **Define** trigger sources at the "EVENTS > Trigger > Remote Hotkey Source" pane we define labels for the first two hot keys :

#	Label	Enable
1	Gain up	<input checked="" type="checkbox"/>
2	Gain down	<input checked="" type="checkbox"/>

We also define two network trigger sources for the automation system on the "EVENTS > Trigger > Network Source" pane :

#	Label
1	Omnibus Gain up
2	Omnibus Gain down

#	Label
11	Network Source 11
12	Network Source 12

2. **Configure** trigger by logical combination of the hotkey trigger source and the network trigger sources :

Trigger	Invert	Type	Source 1	Logic	Invert	Type	Source 2
Input Gain +1dB	<input type="checkbox"/>	Hotkey	1 Gain up	or	<input type="checkbox"/>	Network	1 Omnibus Gain up
Input Gain 1dB	<input type="checkbox"/>	Hotkey	2 Gain down	or	<input type="checkbox"/>	Network	2 Omnibus Gain down

3. Decide what shall happen

we will do this gain change by loading respective presets for the input section of the audio processor for program 1.
Therefore we must set up two presets for the input section of program 1 : Preset 1 = "plus 1dB", Preset 2 = "minus 1dB"
4. Assign Trigger to events

because we are about to load presets we must set up preset events for the audio processor :
"EVENTS > Preset Events > Audio Processor".
On this pane we select the trigger "Input Gain +1dB" and "Input Gain -1dB" respectively and we give these two events the names "Prog1 Gain up" and "Prog1 Gain down".
Finally we must assign it the two pre defined presets from the audio processor input section – that's it :

LM 4

System Status

SYSTEM

INTERFACE

ROUTING

AUDIO PROCESSOR

EVENTS

Trigger

Preset Events

Action Events

Bypass Events

System

Interface

Routing

Audio Processor

Trigger	Event Name
Input Gain +1d →	Prog1 Gain up
Input Gain 1dB →	Prog1 Gain dow

Program	Setup	Input	Fail Over	Spectral Signature	Equalizer	Dynamics	Voice Over	Level Magic	Output
Program 1	-	plus1dB	-	-	-	-	-	-	-
Program 2		-		-	-	-		-	-
Program 1		minus 1dB	-	-	-	-		-	-
Program 2	-	-		-	-	-	-	-	-

This is just an example to underline the power of the event management system of the **LM 4**. Junger Audio provides you with the tools to support your creativity to deal with events of your interest.

Technical data

• Power supply	optional dual power supply, auto fail over AC 85 V – 264 V, 50 Hz ... 60 Hz 58W max
• AES inputs BNC	AES3id, 75 Ω, unbalanced, 24 Bit, 48 kHz, 0.32 ... 1.2 Vpp
• AES inputs XLR	AES3, 110 Ω balanced, 24 Bit, 48 kHz, 0.3 ... 5.0 Vpp Sample rate converters : 24 Bit, 32 kHz ... 192 kHz, THD+N: < 130 dB @ 0 dBFS Input auto selection : between AES3id (leading) and AES3
• AES outputs BNC	AES3id, 24 Bit, 48 kHz, nominal 1 Vpp @ 75 Ω power fail relay bypass
• AES outputs XLR	AES3, 3.3 Vpp @ 110 Ω power fail relay bypass
Latency (AES I/O)	323 samples / 6,73 ms @ 48 kHz (all processing blocks active)
Force Minimal Latency activated	194 samples / 4.04 ms @ 48 kHz (Spectral Signature disabled)
• Sync internal	48 kHz, +/- 10 ppm
• Sync input	AES3id: 48 kHz, 0,32 ... 1,2 Vpp @ 75 Ohm Wordclock: 48 kHz, 1 V ... 3 V @ 75 Ω Video: Black Burst or Tri Level, 0.5 V ... 1.0V @ 75 Ω
• Sync output	Wordclock: 2 Vpp @ 75 Ω
• Network	RJ45 rear connector 10/100MBit Ethernet auto sense, full duplex, auto MDI/X
• USB	USB 2.0 "B" build in FTDI USB to RS232 converter
• GPI	5 V – 30 V balanced, auto polarity
• GPO	relay change over contacts, 200 mA / 24 V (DC/AC)
• Environmental	operating temperature 0 °C to 50 °C Base Unit - fan cooled non operating -20 °C to 70 °C humidity 90%, non condensing
• Dimensions	19", 1RU, depth 27 cm
• Weight	net weight approx. 4 kg, shipping weight 6,5 kg

Technical data - base unit rear connectors - pin assignment

connector :	GPI
female	25-pin Sub-D
1	GPI_1a
2	
3	GPI_2a
4	GPI_3a
5	GPI_3b
6	GPI_4a
7	
8	GPI_5b
9	GPI_6a
10	GPI_6b
11	GPI_7a
12	GPI_7b
13	GPI_8b
14	GPI_1b
15	GPI_2b
16	
17	
18	
19	GPI_4b
20	GPI_5a
21	
22	
23	Isolated 5V +
24	Isolated 5V -
25	GPI_8a

connector :	GPO
female	25-pin Sub-D
1	GPO_1_NC
2	GPO_1_NO
3	GPO_2_common
4	GPO_3_NC
5	GPO_3_NO
6	GPO_4_common
7	GPO_5_NC
8	GPO_5_NO
9	GPO_6_common
10	GPO_7_NC
11	GPO_7_NO
12	GPO_8_common
13	
14	GPO_1_common
15	GPO_2_NC
16	GPO_2_NO
17	GPO_3_common
18	GPO_4_NC
19	GPO_4_NO
20	GPO_5_common
21	GPO_6_NC
22	GPO_6_NO
23	GPO_7_common
24	GPO_8_NC
25	GPO_8_NO

Technical data – interface modules – 3G SDI De-Embedder / Embedder [SDI 150]

• 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 Ω
 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 Ω
 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 channel audio de-embedder / embedder
 - VANC (SMPTE 2020-2) de-embedder / embedder
 - 16 x 4 de-embedder matrix (mono routing)
 - 20 x 16 embedder matrix (mono routing)
 - 320 ms audio delay per embedder channel
 - automatic compensation of non processed audio signals for video delay

Technical data – interface modules – 4x AES I/O [DD 188]

connector
25pin Sub-D female

inputs
110 Ω balanced or 75 Ω 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 Ω balanced or 75 Ω unbalanced jumper selection
4.0 Vpp balanced, 1.0 Vpp @ 75 Ω

power fail relay bypass

Technical data – interface modules – 4x analog I/O [AN 144]

connector
25pin Sub-D female

input
impedance: > 10 k Ω , 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 Ω , electronically balanced
max. output level @ 0 dBFS: 0.0 dBu ... +24 dBu adjustable in 0.5 dB steps
dynamic range: 110 dB
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 – interface modules – 8x analog I/O [AN 108]

connector
25pin Sub-D female

output
impedance: 5 Ω , electronically balanced
max. output level @ 0 dBFS: 0.0 dBu ... +24 dBu adjustable in 0.5 dB steps
dynamic range: 110 dB
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

Technical data - optional interface modules – pin assignment

4x analog I/O [AN 144]

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

4x AES I/O [DD 188]

connector :	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

8x analog out [AN 108]

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

safety information

Electrical

- Safety classification :** Class 1 – grounded product / Schutzklasse 1
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. The On / Off position is indicated by engravings [I] / [O] on the lever. It must be reached without difficulty.
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. 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. 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 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

D*AP

jünger

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