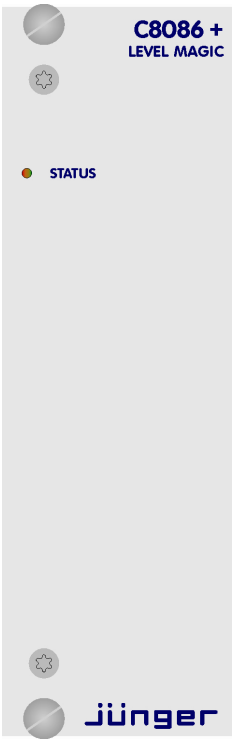
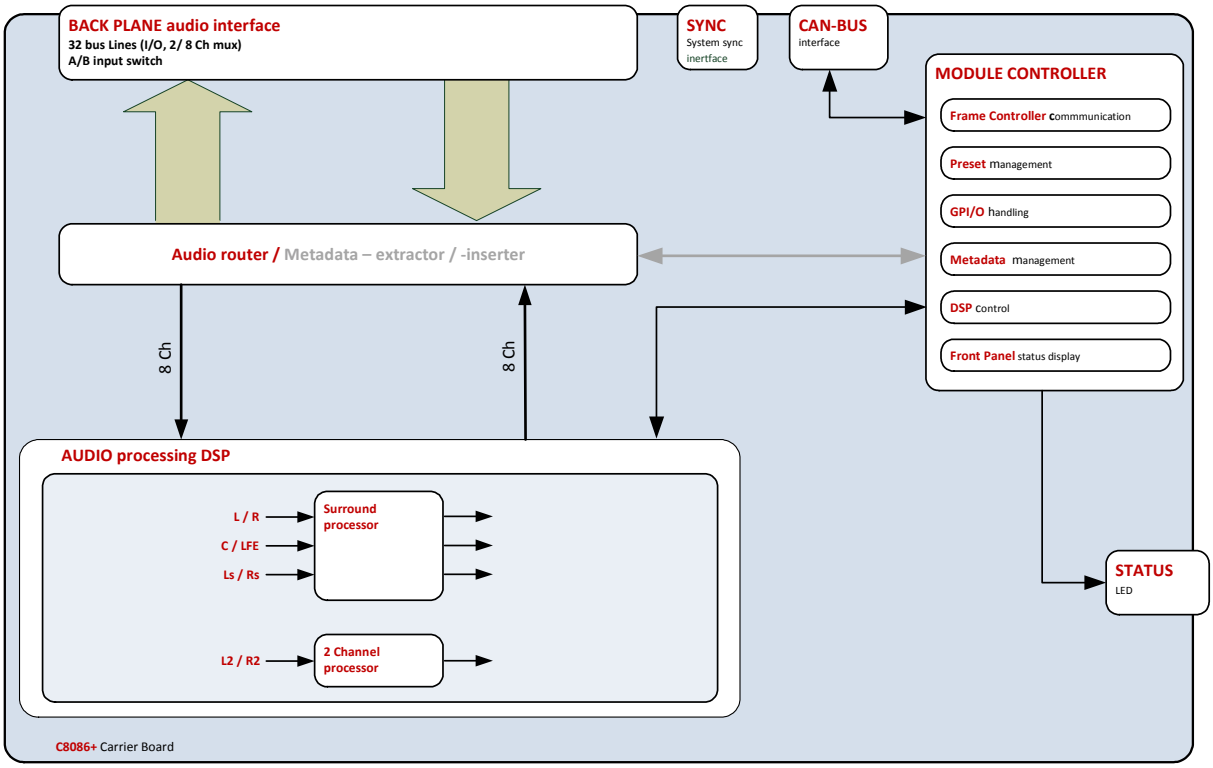
Enhanced 8 channel Level MagicII™ processor C8086+



features

- 8Ch **LevelMagicII™** processor for processing of two or four independent programs (5.1+2 or 4x2) or up to eight mono channels
- loudness control based on Level / ITU-BS.1770-1 / -2 / -3 / EBU R 128 / ARIB TR-B32 / ATSC A/85 (2011) / (2013)) / Free TV OP-59 / Portaria 354
- expander / compressor / delay
- brick wall true peak limiters
- surround downmix feature (Lo/Ro or mono, pre or post surround processor)
- alternative input bank
- automatic 2Ch bit transparent mode for non audio signals
- remote control via C8702 frame controller, GPI/Os, EmBER+ protocol

block diagram



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technical specifications

Audio :

audio data format :	24 Bit, transparent for C-Bit and U-Bit according to AES3
audio sample rate :	44.1 or 48 kHz synchronous to video-carrier
latency :	2 ms processing delay
audio processing :	LevelMagicII™

Process control selectable between Level mode ITU-BS 1770-1, -2, -3
EBU R128, ARIB TR-B32, ATSC A/85 (2011 / 2013),
Free TV OP-59, Portaria 354

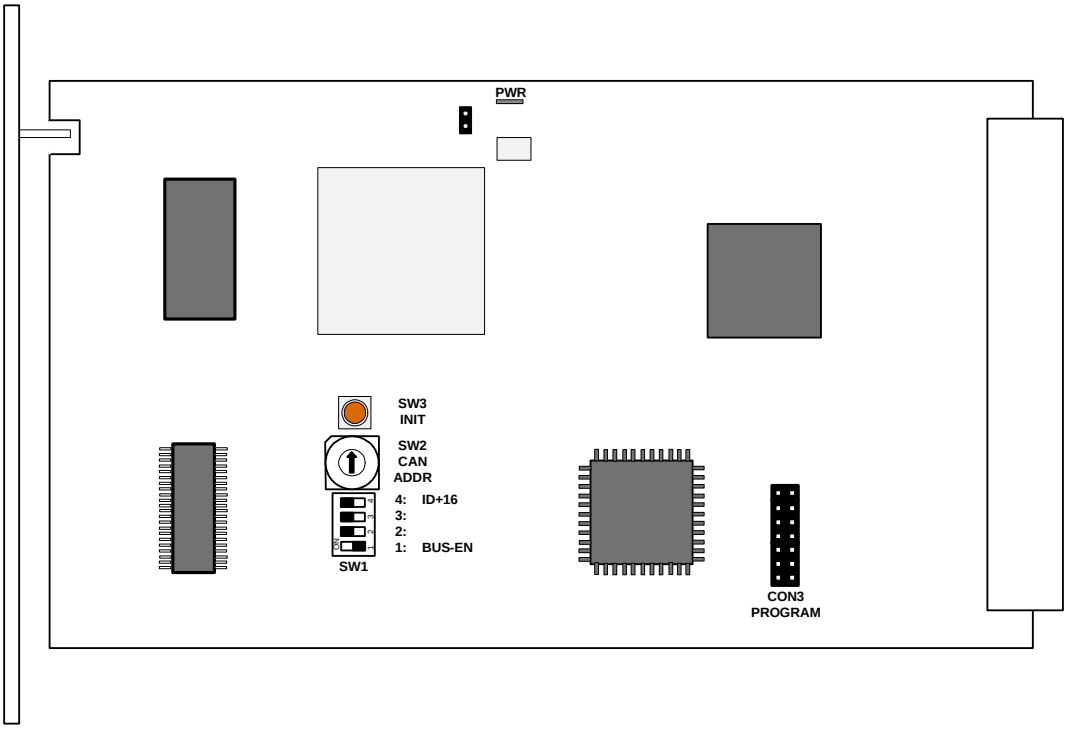
Input gain	–20dB	…	+20dB	
Operating Level	-40dBFS	…	0dBFS	[leveler mode]
Loudness Target	-50LKFS	…	0LKFS	[ITU modes]
Loudness Target	-50LUFS	…	0LUFS	[EBU mode]
Limiter Threshold	-20.0dBFS	…	0.0dBTP	[True Peak]

bit transparent mode for pairs of inputs for non audio signals (Dolby E pass through)

General :

backplane connector :	ref. to DIN41612, 64pin, a+b, male
power supply :	+5V DC
power consumption :	approx. 1.000mA
dimension :	3RU, 4HP, 160mm depth
temperature :	10°C … 40°C
humidity :	90%, non condensing

location of switches:



switch settings

SW1

1: BUS-EN

ON
the output configuration will be taken from the **NV** (non volatile) **memory** after power up.

OFF
will set all bus outputs to Tri-State-Mode (inactive). Now you may use the frame controller to configure the board. This configuration will automatically be stored into the **NV memory**. To enable the configuration for the next power up you must **pull out** the module and set **BUS-EN=ON** again.

Important note! Since this type of module has an electronic output routing facility, great care must be taken when installing or exchanging a module when such frame has components which are On Air!
If an unknown output bus configuration is stored, it can cause a conflict with other modules in the frame. If you are not sure about the output bus configuration you must turn **BUS-EN=OFF** before inserting such a module into a system that is On Air. If all settings are done remotely and the unit fits into the bus assignment scheme of that frame, you must remove it and place the switch back into position **BUS-EN=ON**.

2: Not used **OFF**

3: Not used **OFF**

4: ID +16

ON
CAN address range is extended by **+16**, ranges from 0x10 to 0x1F (16 – 31)

OFF
CAN address ranges from 0x0 to 0xF (0 – 15)

SW2

CAN ADDR

0 – F
sets the CAN bus address. Each module within a frame must be assigned a **unique** CAN bus address for proper communication with the frame controller and other modules of the frame.

Important note! This address also defines the position of the graphical box of that module within the **GUI** if you control the frame via the **C8702** frame controller. The absolute position is not important but will ease the control if you group such boxes for modules processing a certain TV channel.

Addresses from “0” to “7” will place the module graphic box into the third row (first row shows the frame controller and sync modules, second row is empty). Addresses “8” to “F” will place it into the fourth row and so on.
I.e. address “0” will place it in upper left position of row 3, while “1F” will place it in lower right position of row 6.
SW1 #4 **ID +16** will add an offset to that schema. If it is turned on, a module with CAN ADDR "0" will appear in place one of the fifth row and so forth.

SW3

INIT

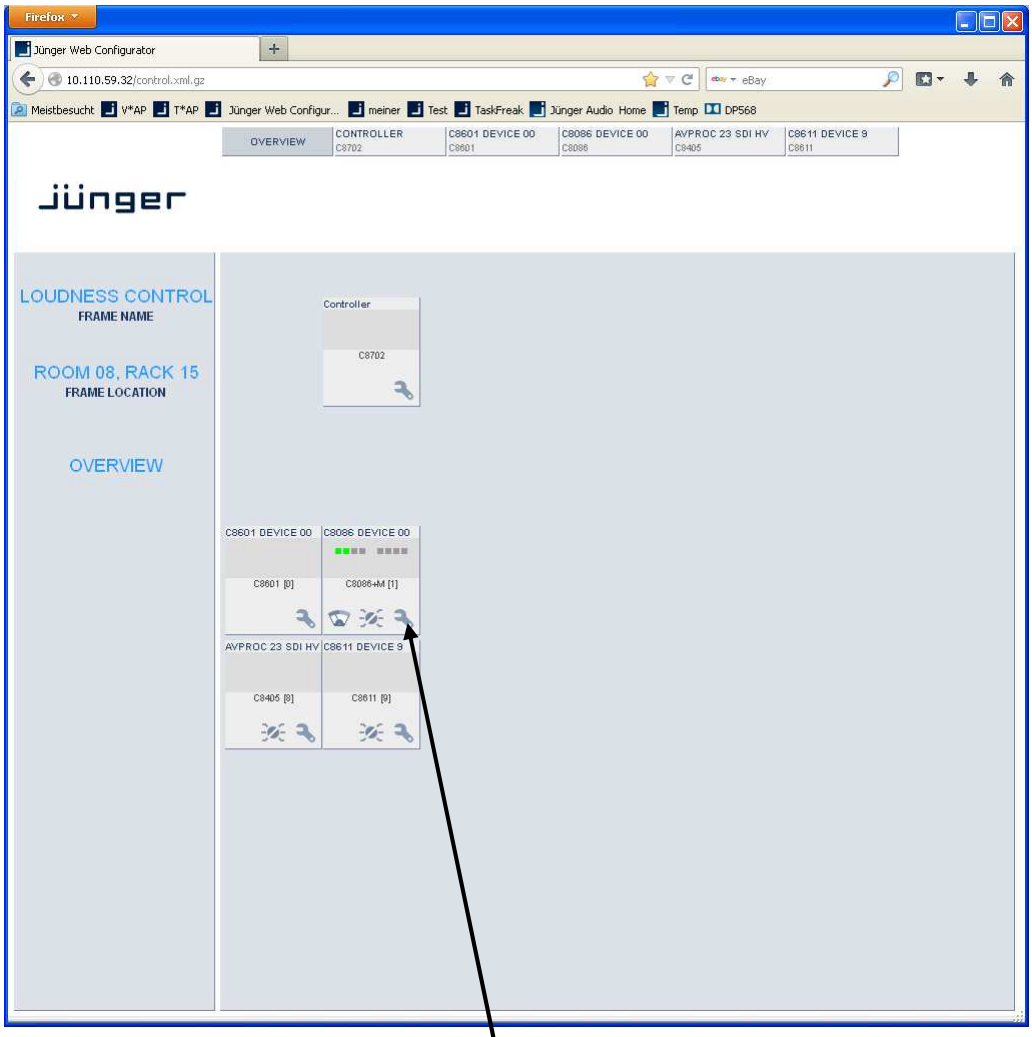
pressing the **INIT** button during power up will initialize the module parameters to factory default values.

web browser based GUI

Set up of all configurations, parameters and functions via a web browser.
See also C8702 Frame Controller.

OVERVIEW

The modules overview of a frame (below the display of an example frame) :

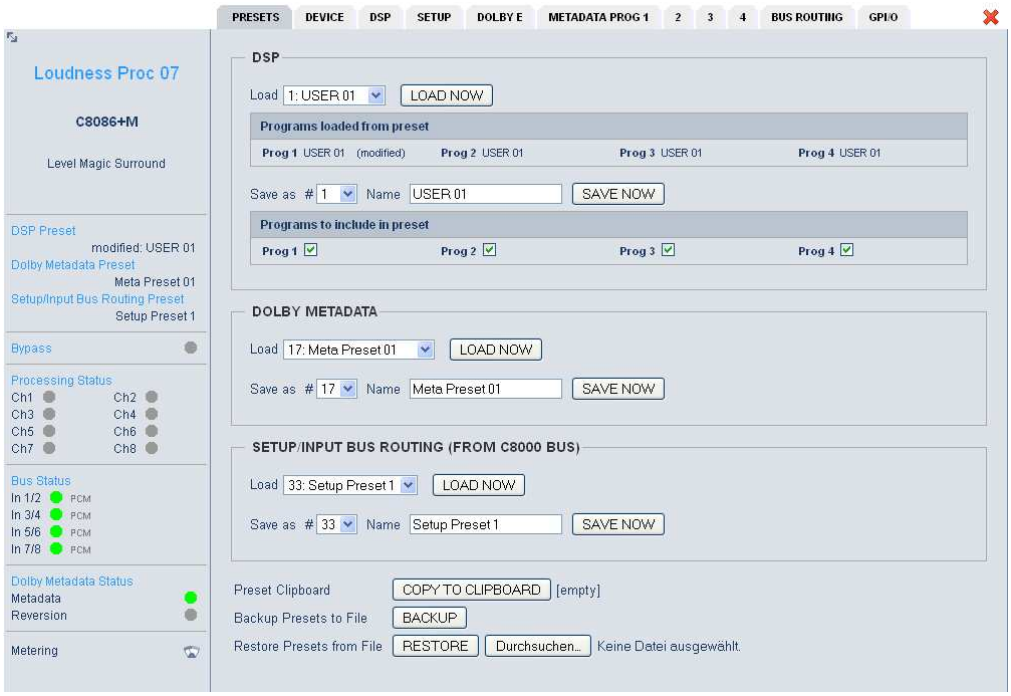


By simply clicking on the spanner tool symbol ● you will get the control pages of the **C8086+** and the status window on the left side, which you will also see on mouse over.

The first page of the module setup is the **PRESET** page:

PRESETS (Example for activated Dolby metadata option)

The **C8086+** offers **16 DSP** (audio) presets and **8 Setup/Bus Routing** presets. Additionally the **C8086+M** (metadata option) has another 16 Dolby metadata presets. The status window at the left hand side shows the names of the active preset. The word **"modified"** will appear in line with the preset name, if parameters from the loaded preset were changed.



DSP	bank of 16 presets to recall **DSP** (audio) parameters.
Load	select a preset by name and press **<LOAD NOW>.** The loaded preset number and name will automatically appear in the below **Save as #** and **Name** field.
Programs loaded from preset	shows the program number that is affected by the actually loaded preset.

Important Note! The audio structure of the C8086+ is program oriented and allows processing of two (5.1 + 2) or four programs (4 x 2). I.e. you can not mask independent channels but programs.

Save as #	select a preset memory number where you would like to save the actual audio program parameters to.
Name	assign the preset you are about to save a name (up to 16 digits).
Programs to include in preset	tick the check box(es) for which program the preset shall be saved and press **<SAVE NOW>.** The number and the name appears automatically in the load fields as well because they are active now.

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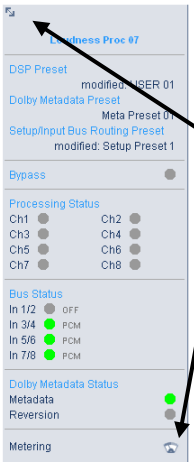
DOLBY METADATA — If the 8086+ has enabled the **"M"** (metadata) option this part of the preset pane will appear as well.

- **Load** — select a preset by name and press **<LOAD NOW>.** The loaded preset number and name will automatically appear in the below **Save as #** and **Name** field.
- **Save as #** — select a preset memory number where you would like to save the actual audio program parameters to.
- **Name** — assign the preset you are about to save a name (up to 16 digits) and press **<SAVE NOW>.**

SETUP/INPUT BUS ROUTING (FROM C8000 BUS) — a bank of 8 presets to recall device settings.

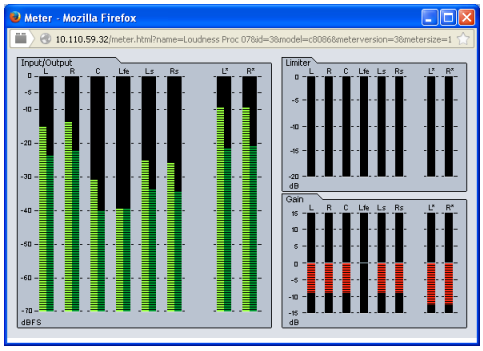
- **Load** — select a preset by name and press **<LOAD NOW>.** The loaded preset number and name will automatically appear in the below **Save as #** and **Name** field.
- **Save as #** — select a preset memory number where you would like to save the actual audio program parameters to.
- **Name** — assign the preset you are about to save a name (up to 16 digits) and press **<SAVE NOW>.**
- **Preset Clipboard** — copy the active preset to a **clipboard**, the data may be used by other modules inside the same frame.
- **Backup Presets to File** — creates a backup **XML file** which may be stored to the PC.
- **Restore Presets from File** — you can select [browse] a backup file from the PC.

STATUS DISPLAY



If you are controlling a specific module you will see a status frame on the left hand side that also appears if you hover with the mouse over the graphical boxes in the GUIs **OVERVIEW** display. If the GUI size does not fit your screen well you may decrease the size of the status display by clicking on the little arrows in the upper left edge to get a smaller view.

If you click on the "metering" symbol in the bottom of that display, an applet will be downloaded from the frame controller, that shows the level display :

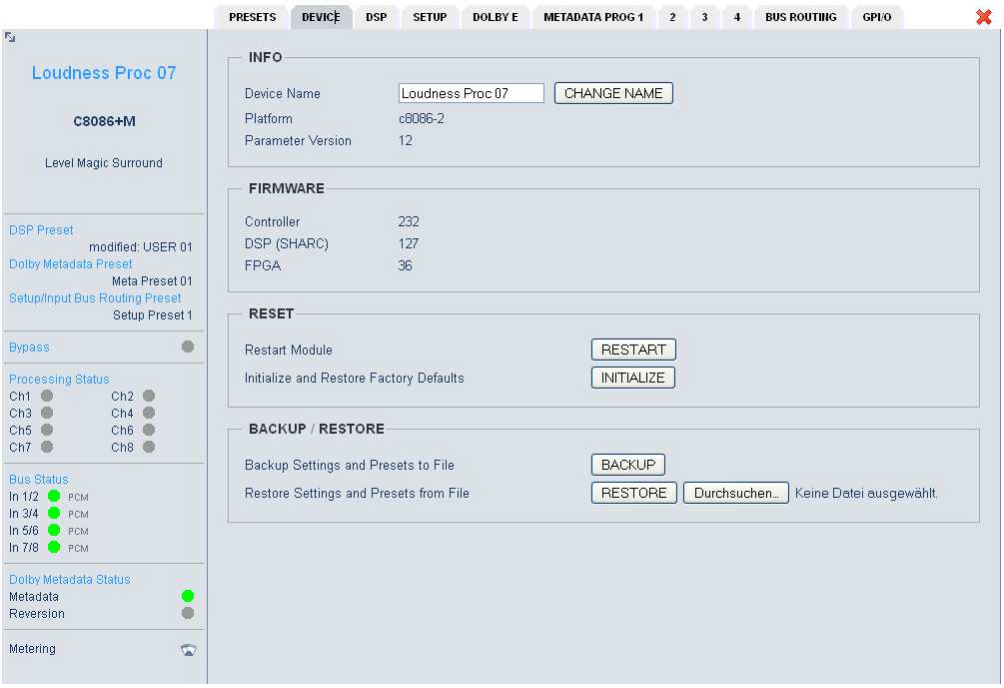


A JAVA Runtime Environment must be installed on the PC to run that applet. The metering data will be streamed via UDP protocol to the PC.

Make sure that you have opened the Windows fire wall for the required UDP port (see C8702 manual for details). If no UDP data are received by the applet, the meters will turn red from black. Since Java SE 7u21 an applet must be signed with a trusted certification. Junger Audio has certified its applets. You must have at least C8702 frame controller firmware 1.17.x in order to get it right. Details from **ORACLE** you will find here :

http://www.oracle.com/technetwork/java/javase/tech/java-code-signing-1915323.html.

DEVICE

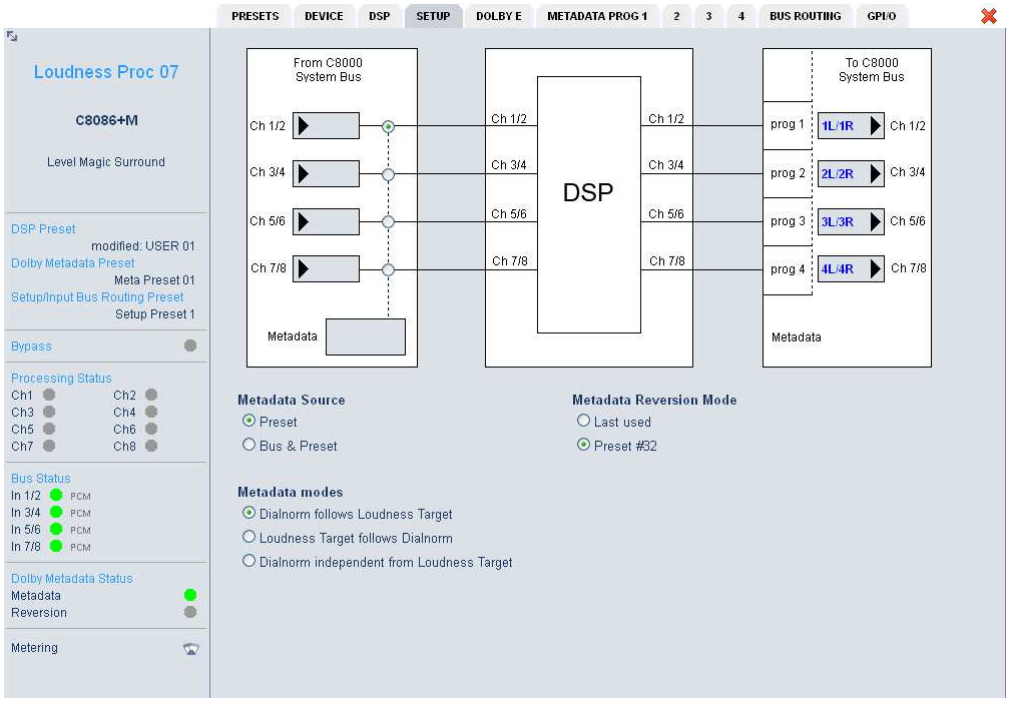


INFO

Device Name	you can assign the module a **name** (up to 16 digits).
Platform	hardware related information.
Parameter Version	indicates the set of control parameters.
FIRMWARE	displays the firmware versions of the **C8086+** components.
Controller	the module controller firmware version.
DSP (SHARC)	the audio processing DSP firmware.
FPGA	the DSP and interface FPGA.
RESET	
Restart Module	**<RESTART>** performs a warm start (soft reset).
Initialize and Restore Factory Defaults	**<INITIALIZE>** restores the factory default values for all parameters of the module including all presets.
BACKUP / RESTORE	
Backup Settings and Presets to File	**<BACKUP>** will put all active parameters and the content of all presets into an XML file. You may store such file on a PC.
Restore Settings and Presets from File	you may select [browse for] a matching XML file from a PC. **<RESTORE>** will overwrite all active parameters and the content of the presets with the content of the backup file. The name of the selected file will appear right from the **<Browse>** button

SETUP (Operating Mode = 4x 2 channels)

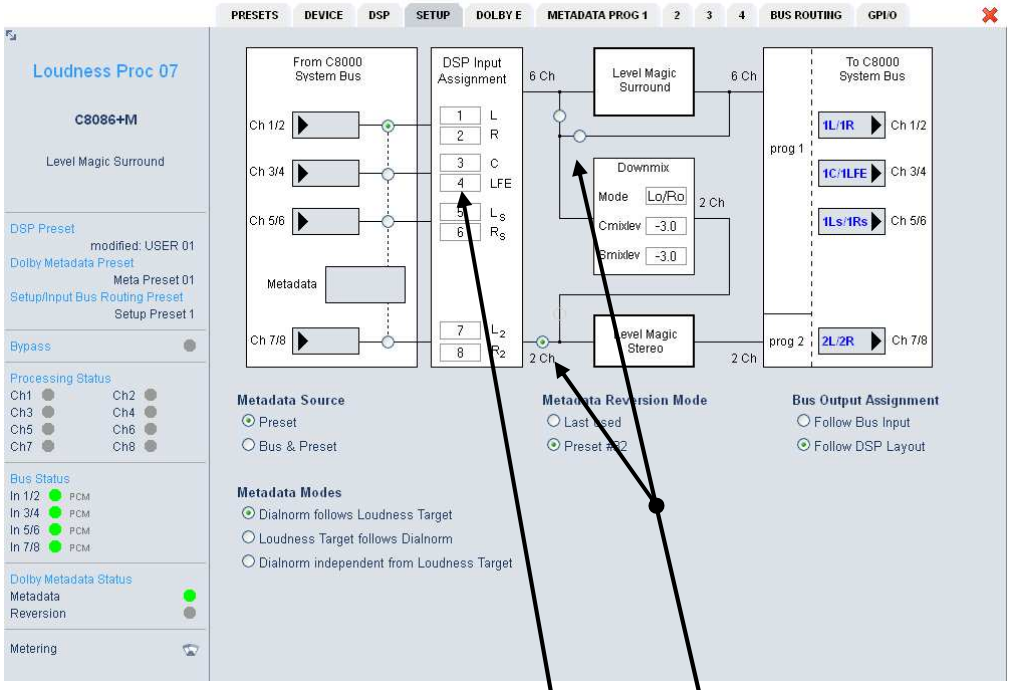
This page below shows the example Operating Mode 4x2 and its signal flow. The operating mode must be selected on the **DSP** pane :



The metadata related settings will only be shown if the **"M"** (metadata) option is activated.
The tabs named **"DOLBY E"** and **"METADATA PROG 1, 2, 3, 4"** will appear only in this case.

SETUP (Operating Mode = 5.1 + 2)

For the 5.1 + 2 operating mode (selected at the DSP pane) the 8 processing channels will be shared between a surround (5.1) and a stereo program. If the 5.1 downmix is activated the outputs 7/8 will be occupied by the output of the downmix block and no extra stereo program processing will be possible.



Here you can configure the DSP input assignment of the surround processor and the operation of the downmix unit (pre / post 5.1 level magic) as well as the input selection of the 2 channel (stereo level magic) audio processor.

You may change downmix parameters :

Downmix

Mode [Mute / Mono / Lo/Ro]
the operating modes of the downmix processor.

Cmixlev **[**-3 / -4,5 / -6dB]
center mix level.

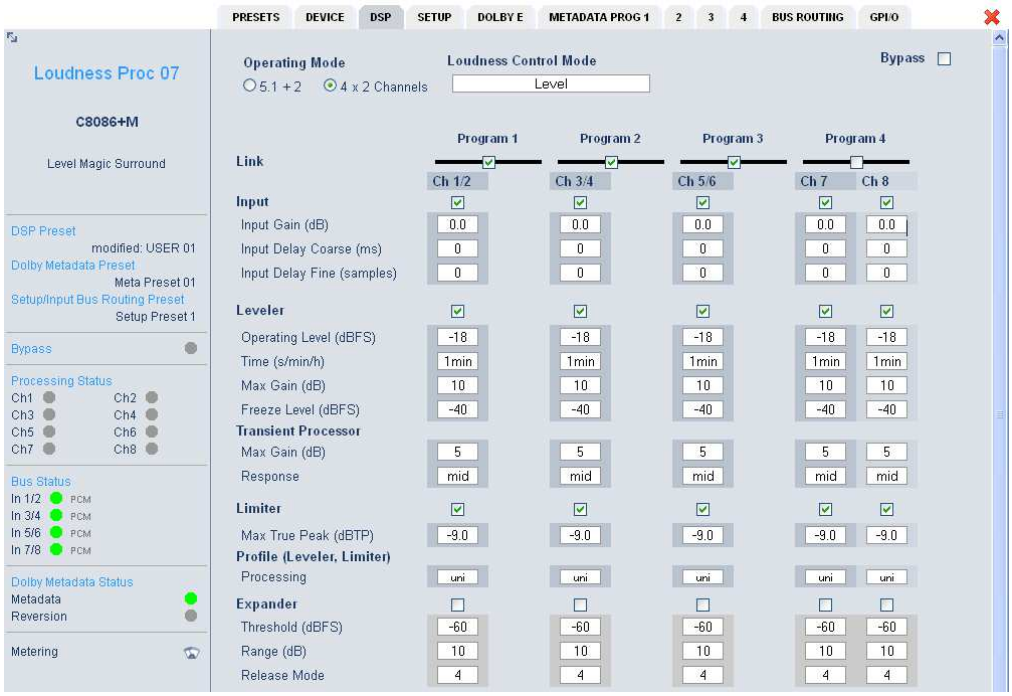
Smixlev [-3 / -6dB / OFF]
surround mix level.

To C8000 System Bus the signal structure of the DSP expects a certain surround channel assignment for its inputs (L, R, C, LFE, Ls, Rs). The operator must know it and decide about the assignment of signals coming from an upstream device.
If the **"M"** option is activated and Dolby Metadata is available from the source, the blue labels of the **"From C8000 System Bus"** box will show the physical channel assignment of the source material.

The metadata related settings will only be shown if the **"M"** (metadata) option is activated.

DSP (Operating Mode = 4 x 2 Channels / Loudness Control Mode = Level)

Assignment of audio channels to the respective programs :



Operating Mode [5.1 + 2 / 4 x 2]
general configuration of the module. One surround and one stereo program or 4 independent stereo or double mono programs, depending on the link settings
(see Program 4 above).

Loudness Control Mode [Level, ITU-BS.1770-1 / -2 / -3 / EBU R 128 / ARIB TR-B32 / ATSC A/85 (2011) / ATSC A/85 (2013) / Free TV OP-59 / Portaria 354]

The **Level** setting activates the Junger proprietary level based algorithm used for many years by a number of broadcast organizations with very good results for automatic program loudness and overall TV channels loudness harmonization.
The other modes refer to international standards. Pls. see respective documents for details.
Also see the engineering bulletin **"Junger_Processing-Parameters_yymmdd.pdf"** which you may download from the Junger web site : http://junger-audio.com/download/bulletin-board/.

Bypass the process parameters of all programs will be bypassed to validate the actual settings.

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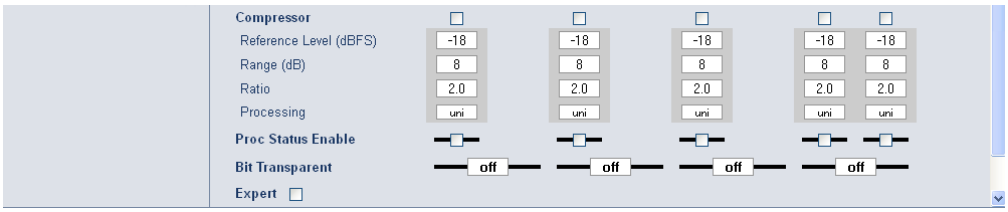
Link	for the processing of correlated audio signals, several control loops must be linked in order to maintain the sound image. The check boxes define whether or not the processing channels are linked for stereo operation.
Input	check boxes to activate the input section.
Input Gain (dB)	[-20.0 … 0.0 … -20.0].
Input Delay Coarse (ms)	[0 … 2000]
Input Delay Fine (samples)	[0 … 255]
Leveler	[On / Off] check boxes to activate the leveler part of the processing
Operating Level (dBFS) **Loudness Target (LKFS)** **Loudness Target (LUFS)**	[-50 … 0] if the **Level** mode is active. [-50 … 0] if one of the **ITU** modes is active. [-50 … 0] if **EBU** mode is active.
Time (s/min/h)	[10, 20, 40s / 1, 2, 5, 10, 20, 40min / 1, 2h]
Max Gain (dB)	[0 … 40]
Freeze Level (dBFS)	[-60 … -20]
Transient Processor	
Max Gain (dB)	[0 … 15dB]
Response	[soft, mid, hard]
Limiter	[Off / On]
Max True Peak (dBTP)	[-20.0 … 0.0]
Profile (Leveler, Limiter)	
Processing	[live / speech / pop / uni / classic]
Expander	[On / Off]
Threshold (dBFS)	[-60 … -20]
Range (dB)	[0 … 20, gate]
Release Mode	[0 … 9]



Enhanced 8 channel Level MagicII™ processor C8086+

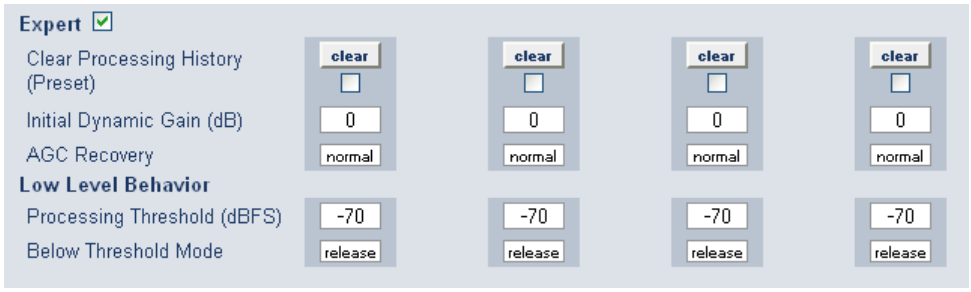
Compressor [On / Off]

- **Reference Level (dBFS)** [-40 … 0]
- **Range (dB)** [0 … 20]
- **Ratio** [1.1 / 1.2 / 1.3 / 1.5 / 1.8 / 2.0 / 2.5 / 3.0 / 4.0]
- **Processing** [live / speech / pop / uni / classic]

Proc Status Enable [On / Off]
it is possible to monitor the gain change of the control process. An error status will be provided if the average of the gain change is equal to, or **above**, the **Leveler Range** setting for **more than 10s**. If this option is turned on, a soft LED of the GUI will turn from red to green. This status information is combined for all processed channels and is presented as a module status to an external monitoring system by sending a **SNMP** trap and/or by firing a **GPO**. The parameter itself is also available for polling.

Bit Transparent [off / on / auto]
for pairs of input signals it is possible to switch the signal path into **"bit transparent"** mode. This allows to path **non audio** signals (e.g. Dolby E) through the processor without destroying it.
off – not transparent for **Non Audio** signals
o**n** **–** transparent for **Non Audio** signals, no processing
a**uto** **–** automatic switch over to transparent if a **Non Audio** signal is detected at the input.

Expert [On / Off]



- **Clear Processing History (Preset)** [clear]
  hold down the **<clear>** soft button to clear the history. Tick the checkbox if the preset must clear the processing history.
- **Initial Dynamic Gain (dB)** [-40 … 40]
- **AGC Recovery** [normal / fast]

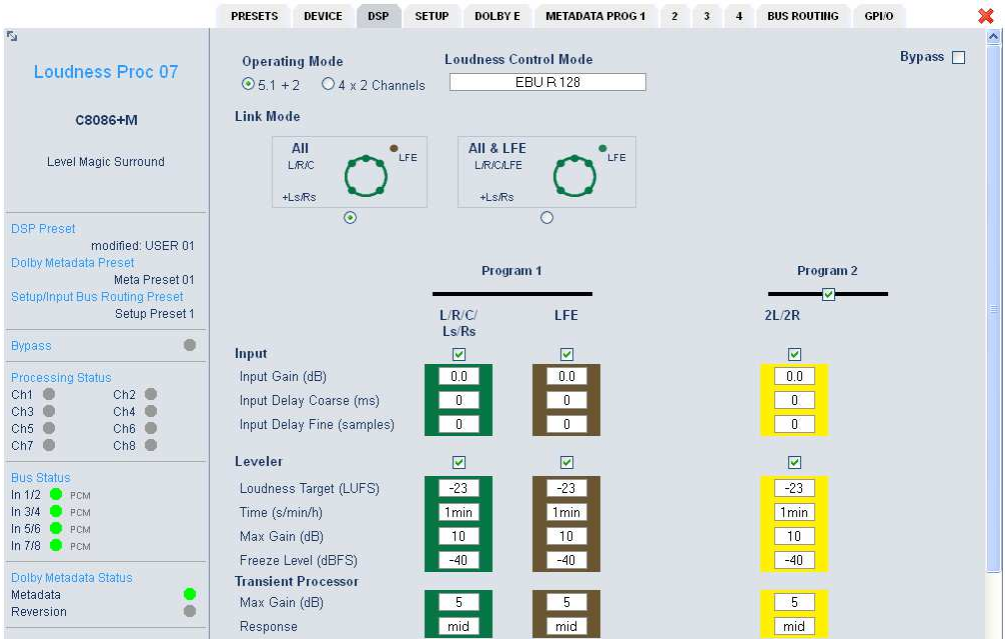
Low Level Behavior

- **Processing Threshold (dBFS)** [-80 … -20]
- **Below Threshold Mode** [release / hold]

Enhanced 8 channel Level MagicII™ processor

C8086+

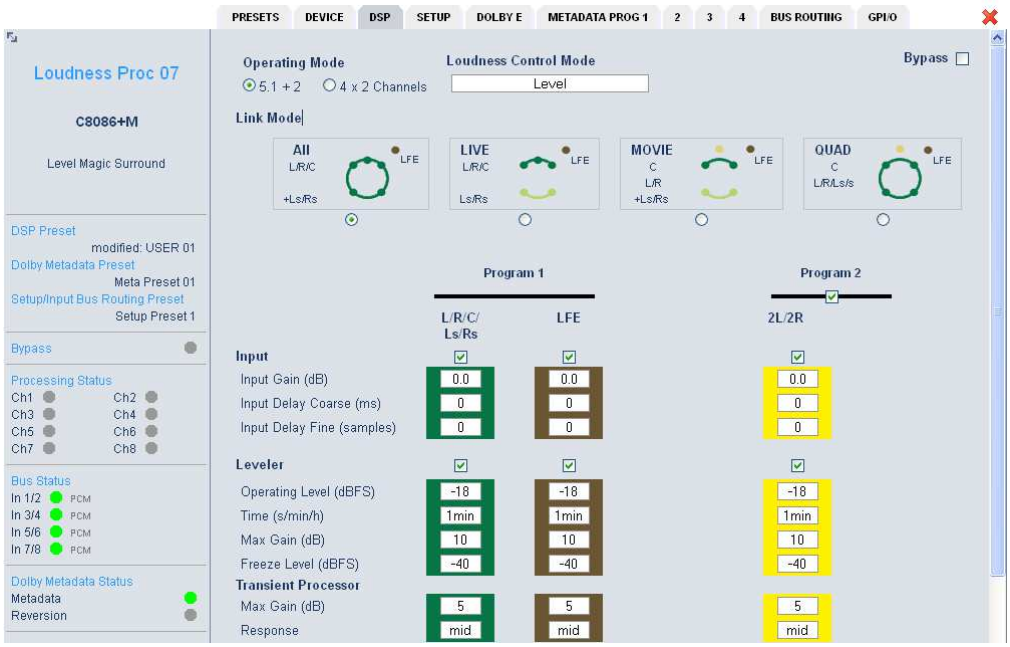
DSP (Operating Mode = 5.1 + 2, Loudness Control Mode = EBU R 128)



Link Mode - Program 1 You can link the dynamic behavior of the audio channels which belong to one program. In **ITU** and **EBU** mode it is only possible to make decisions about the **LFE linking** only.

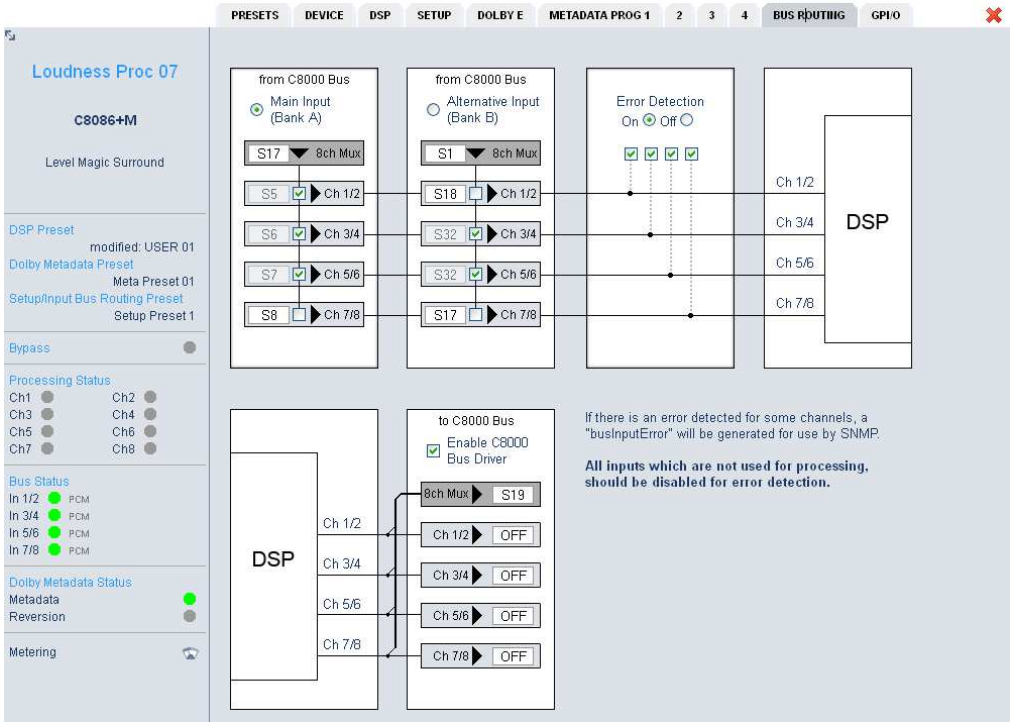
Link Mode - Program 2 audio channels **2L/2R** have an independent link mode switch. I.e. one may operate it in dual mono mode as well.

DSP (Operating Mode = 5.1 + 2, Loudness Control Mode = Level)



The Junger proprietary **Level** algorithm offers more detailed linking options since it is not related to program loudness measurement rules (ITU, ARIB, ATSC, EBU) but operating level oriented control.

BUS ROUTING



Here you may assign the audio signals from C8000 audio busses to the processing channels Ch 1/2 … Ch 7/8 of the DSP.

About "MixMux" : You may select if the input audio signals to the **C8086+** must be taken from a source that delivers it in 8 channel (time division) multiplex (Mux) or in 2 channel (time division) multiplex or you may select a **mixture** (Mix) of both formats.

from C8000 System Bus — The audio busses from the C8k frame must be assigned to the respective processing channels. If the module is connected to a bus that is in 8ch mux mode (e.g. S17), all signal pairs my be taken from there or from an individual 2ch mux buss (e.g. S8).

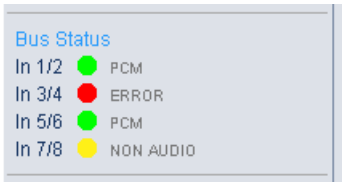
- **Main Input (Bank A)** — you may select a set of 8 signals as the **main input** for the DSP.
- **Alternative Input (Bank B)** — you may select a set of 8 **different signals** as an **alternative input.**

to C8000 Bus — here you select which mux format is used for the module output channels. You may move all 8 on one bus (e.g. S19) or in parallel in 2ch mux for selected signals (e.g. S21).

- **Enable C8000 Bus Driver** — [Off / On]
  for setup and maintenance applications one my turn off all 32 bus drivers (set it to tri state mode) to avoid interference with other modules of the same frame.

Error Detection

[Off / On]
the serial audio data from the frame bus can be monitored for proper positioning of an **Error-Flag**. A bad **Error-Flag** is an indication that there is disturbance upstream (input signal lost, input module broken, non audio signal).
The **Error Detection** can be turned **Off** and **On** in general and individually for each pair of input channels. You will see the status of the busses on the left hand side :
"Bus Status".



A **grey** "LED" shows that the detection is disabled. While **green** is OK, **red** indicates an error condition. In addition this display indicates if the signal is linear PCM or non audio. In case of non audio the soft LED becomes yellow and "NON AUDIO" will be displayed.

The bus status may be presented to external monitoring systems via **SNMP**. The frame controller summarizes such status information and generates **SNMP traps** for the frame as an entity or may activate GPOs (if GPI/O module(s) are installed). The **SNMP manager** may afterwards poll the **"modulesStatus"** for more detailed status information per input (see SNMP documentation for details).

GPI/O

GPIs are useful if you want to recall settings (e.g. by loading of a presets) or turn functions on or off remotely. A C8k frame can handle **127** independent virtual GPI numbers. You must assign a unique number to the respective preset / function. Such numbers will be generated by the **brc8x** Broadcast Remote Controller or by the C8817 **GPI/O** interface module. If the **C8086+** receives such a number via the CAN bus, it will for example load the respective preset.

GPOs are meant to present status information to external devices. A C8k frame can handle **127** independent virtual GPO numbers. You must assign a unique number to the respective preset / function. In case a preset is loaded either manually via the GUI or remotely via the **brc8x** or via a GPI/O module, the assigned number will be broadcasted over the CAN bus.
A GPI/O module which has that number assigned to a physical output will engage that relay or a **brc8x** may turn on an assigned button tally light.

Clear GPO on Preset modified

If a GPO indicates that a certain preset is loaded and if you change parameters which are related to that preset the word "modified" will be displayed in line with the preset name in the status window.
In this case you may clear that GPO to indicate that the parameters are not the same as the content of the previously loaded preset.

Important Note! GPOs from modules and GPIs to modules don't "see" each other.
I.e. you can't use a status GPO of module A to load a preset for module B by simply assigning a GPO number of module A as a GPI number of module B. If this is a requirement you **must** involve the GPI/O conversion function of the C8817 GPI/O module (see manual for details).