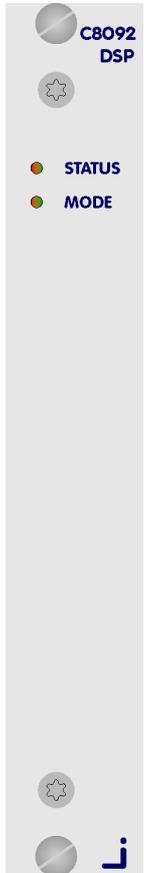


Features

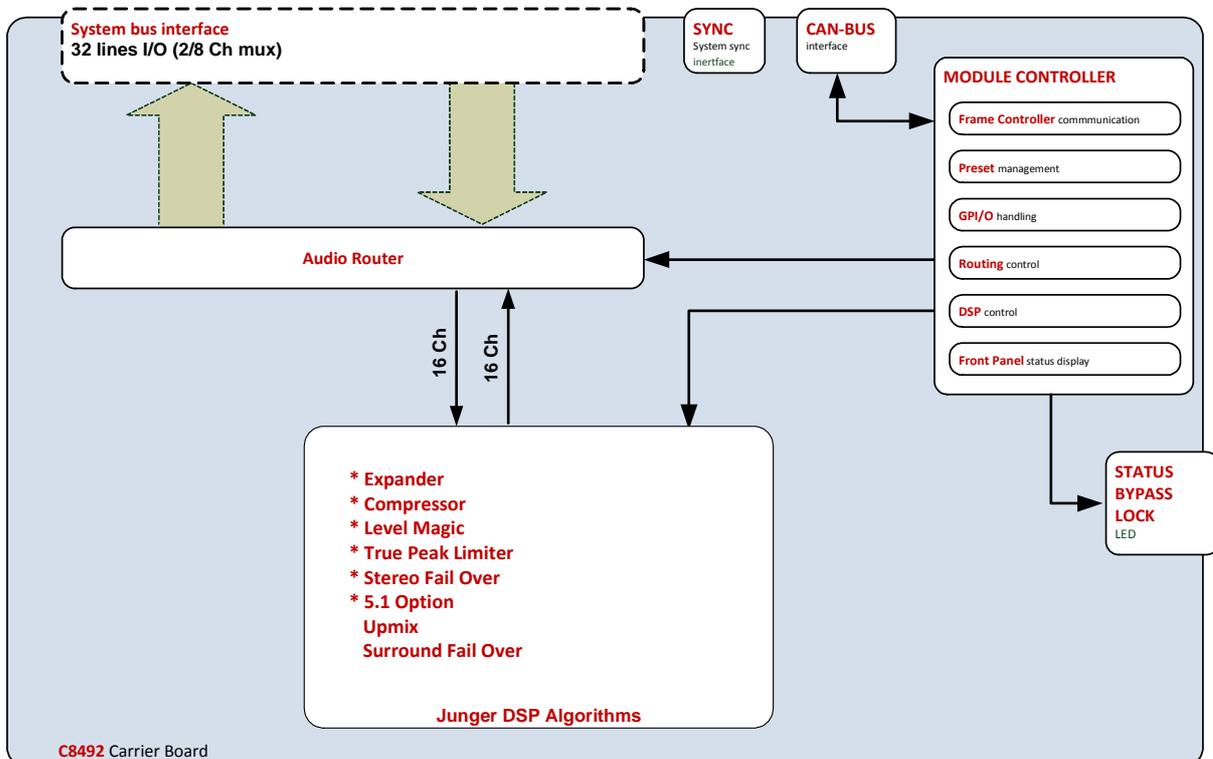
- 4 processing channels
- Level Magic™ loudness management according to: ITU-R BS.1770 (all revisions), EBU R128, ATSC A/85, ARIB TR-B32, Free TV OP-59 and Portaria 354
- Expander / compressor
- Stereo fail over
- True Peak limiter
- Remote control via GUI, GPI/Os, Ember+ protocol

Options and Variants

- 8 / 16 processing channels
- Surround processing
  - 5.1 Level Magic™
  - Automatic Upmix (from stereo or mono)
  - Surround fail over (via Upmix)
  - Downmix



Block diagram





## Initial set up

**ADDRESS:** This **rotary encoder** sets the **CAN ID** of the **C8092**. The 16 switch positions are hexadecimal numbers (0x0 to 0xF). The CAN address also defines the location of the module icon within the GUI overview of rows three to six.

### 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** to activate this setting for the next power up(s).

**#2 H-CAN**      **OFF** = CAN bus speed 256kBit/s  
**ON** = CAN bus speed 1Mbit/s

**Important Note!** For a limited number of modules like the **C8092** it is possible to communicate with a CAN bus speed of 1MBit/s. This provides more bandwidth to move measuring data from the module via the frame controller to the **J\*AM** based loudness logger. Be sure that all modules within a frame are operating with the same CAN bus speed.

**#3**      **OFF** = Internal use and **must** be set to **OFF**.  
**#4 ID +16**      **OFF** = **CAN** bus address range is standard (counting from 0x0 to 0xF) see rotary encoder settings above.  
**ON** = **CAN** bus address range is extended by **+16** (counting from 0x10 to 0x1F).  
**#5 MASTER**      **OFF** = Internal use and **must** be set to **OFF**.  
**#6**      **OFF** = Internal use and **must** be set to **OFF**.

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

**General Remark!** The **C8092** is a 16 channel device. Four channels are standard while eight or 16 channels are an option. Since the parameters are similar, this document describes the 16 channel processor version. The difference will be the number of fail-over circuits (one for the 4ch, two for the 8ch and four for the 16ch option) and that the surround option is bound to eight or 16 channels.

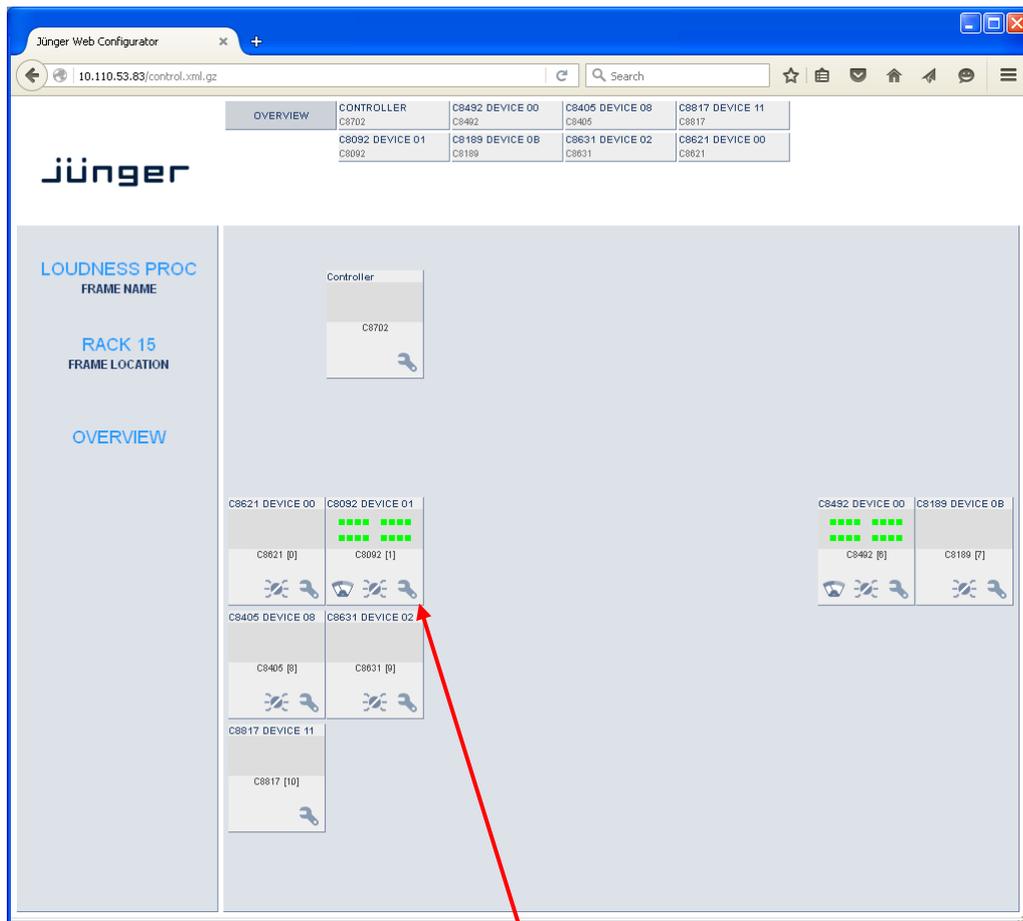
The **(S)** option stands for 5.1 surround processing. If this option is unlocked you may also perform permanent surround upmix from a stereo or even a mono source or you may use the upmix for surround fail over. A 5.1 downmix from the surround input is also available then.

This manual describes the **C8092-16S** because all other members of the family have a subset of features and options.

Web browser based GUI

**OVERVIEW**

The module 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 **C8092** and the status pane on the left hand side, which is also shown on mouse over.

**STATUS PANE**

The status area is quite big for the **C8092** so you may face difficulties when displaying it on lower resolution displays. You may shrink it by pressing on the little "fly foot print": 

Now some information are suppressed and you are able to see the most relevant status information without the need to put the browser into full screen mode.



**C8092 DEVICE 01** - Given name of the module (may be changed on the DEVICE pane). It will be default set during initialization to module type amended by the word **DEVICE** and the CAN address **01** the module had at that moment.

System name of the module and short description.

**DSP Preset** "Name" of the actual loaded preset

**Routing/SDI Preset** "Name" of the actual loaded preset

**Failover/Upmix Preset** "Name" of the actual loaded preset

**BYPASS** [grey / red]

**DSP1 DSP2** turns red if a bypass is activated

**Bit Transparent** shows the bit transparent status of the respective DSP channel pairs

**Ch 01/02 ... 07/08**  
**Ch 09/10 ... 15/16** turns green if function is active

**Failover/Upmix**  
**A B Upmix 1**  
**C D Upmix 2**

**Bus/Input Status** Error status of the bus inputs (see ROUTING)

**Processing Status** turns green if observation of processing status is enabled. Turns red if processing status is bad (see DSP1-A Processing Status Enable)

**Temperature** Module temperature measured on the carrier board

**Metering** clicking on that symbol will open the applet to display meter bar graphs (see page 24 for an example) for the DSP processing channels.

**Front panel Status LEDs color code**

	off	green	flashing green	red	flashing red
<b>STATUS</b>	never	OK	OK, GUI access	boot error	boot error, GUI access
<b>MODE</b>	if STATUS = red	at least one program active	all programs bypass	never	never

PRESETS

Example for the C8092-16S

The screenshot displays the control interface for the C8092-16S Level Magic™ Processor. The interface is organized into several sections:

- Navigation:** PRESETS, DEVICE, ROUTING, SETUP, DSP 1A, DSP 1B, DSP 2A, DSP 2B, GPIO.
- Device Information:** C8092-16S, Level Magic™ Processor.
- DSP Section:**
  - Load: 1: Moderate (dropdown), LOAD button.
  - Loaded from preset table:
 

1-6	7	8	9/10
11/12	13	14	15
16			
  - Save as # 1, Name: Moderate, SAVE button.
  - Channels stored in preset table:
 

1-6	7	8	9/10
11/12	13	14	15
16			
- ROUTING Section:**
  - Load: 17: ROUT Preset 01 (dropdown), LOAD button.
  - Save as # 17, Name: ROUT Preset 01, SAVE button.
- FAILOVER/UPMIX Section:**
  - Load: 33: Byp (Lat Comp) (dropdown), LOAD button.
  - Loaded from preset table:
 

Fail A,B Upmix	Fail C	Fail D
----------------	--------	--------
  - Save as # 33, Name: Byp (Lat Comp), SAVE button.
  - Processing blocks stored in preset table:
 

Fail A,B Upmix	Fail C	Fail D
----------------	--------	--------
- Other Settings:**
  - Bypass: DSP1 (off), DSP2 (on).
  - Bit Transparent: Ch 01/02...07/08, Ch 09/10...15/16.
  - Failover/Upmix: A, B, C, D, Upmix 1, Upmix 2.
  - Bus/Input Status: Ch 01/02, 03/04, 05/06, 07/08, 09/10, 11/12, 13/14, 15/16.
  - Processing Status: Ch 01-06...07/08, Ch 09/10...15/16.
  - Temperature: 39°C.
  - Metering: icon.
- Utility Buttons:**
  - Preset Clipboard: COPY TO CLIPBOARD [empty]
  - Backup Presets to File: BACKUP
  - Restore Presets from File: RESTORE, Browse... No file selected.

The **C8092** has 3 banks of **Presets: DSP / Routing / Failover/Upmix**

The status window on the left hand side shows the names of the active presets. The word “**modified**” will appear in line with the preset name if any preset parameter was changed since loading this preset.

**DSP**

Is dedicated to audio processing (Leveler, Compressor / Limiter / Expander).

**Load**

Select a preset by name and press **<LOAD>**.

**Loaded from preset**

The soft LEDs show the channels which will be controlled by the active preset. The number of soft LEDs depends on the program configuration. E.g. channels 1-6 are represented by one soft LED because they belong to a 5.1 program while 7/8 represent a stereo program as well as 9/10 and 11/12. Channels 13, 14, 15, 16 belong to mono programs whereas channel 15, 16 are not part of the preset currently loaded.

Here another example where channels 15 and 16 are not part of the actual loaded preset:

Loaded from preset			
1-6 <input checked="" type="checkbox"/>	7/8 <input checked="" type="checkbox"/>	9/10 <input checked="" type="checkbox"/>	11/12 <input checked="" type="checkbox"/>
13 <input checked="" type="checkbox"/>	14 <input checked="" type="checkbox"/>	15 <input type="checkbox"/>	16 <input type="checkbox"/>

**Save as #**

Select a preset NV memory number.

**Name**

Assign the preset a name (up to 16 digits). and press **<SAVE>**.

**Channels stored in presets**

The check boxes define which channels will be stored when you save a preset. The number of check boxes depends on the program configuration.

Here an example where DSP1 (Ch 1 – 8) is set for 5.1 + 2 operating mode and DSP 2 (Ch 9 – 16) is set for 4 x 2 operating mode. Ch 9/10 and 11/12 are linked for stereo operation and 13, 14, 15, 16 are not linked (mono mode).

The parameters of channels 15 and 16 will not be stored:

Channels stored in preset			
1-6 <input checked="" type="checkbox"/>	7/8 <input checked="" type="checkbox"/>	9/10 <input checked="" type="checkbox"/>	11/12 <input checked="" type="checkbox"/>
13 <input checked="" type="checkbox"/>	14 <input checked="" type="checkbox"/>	15 <input type="checkbox"/>	16 <input type="checkbox"/>

**ROUTING**

controls the bus routing.

**Load**

Select a preset by name and press **<LOAD>**.

**Save as #**

Select a preset NV memory number.

**Name**

Assign the preset a name (up to 16 digits). and press **<SAVE>**.

**FAILOVER/UPMIX**

The third group (#33 ... #40) is intended for fail over and upmix parameters.

**Load**

Select a preset by name and press **<LOAD>**.

**Loaded from preset**

The soft LEDs show the Fail Over circuit(s) controlled by the preset currently loaded:



I.e. a preset may change the parameters for one 2ch fail over without changing the parameters for another one.

**Save as #**

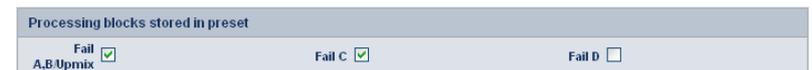
Select a preset NV memory number.

**Name**

Assign the preset a name (up to 16 digits) and press **<SAVE>**.

**Processing blocks stored in preset**

The check box(es) define from which processing block parameters will be stored next:



The number of processing blocks involved depend on the operating mode for the DSPs.

**Preset Clipboard**

**<COPY TO CLIPBOARD>** copies the active preset to a clip board, the data may be used by other modules inside the same frame.

**Backup Presets to File**

**<BACKUP>** creates a backup **XML file** which may be saved on a PC.

**Restore Presets from File**

**<Browse... >** opens a file dialog to select a previously stored preset file. **<RESTORE>** will upload the file and overwrite existing presets for this module.

DEVICE

INFO

- Device Name** You can assign the module an individual **name** (up to 16 digits). Press **<CHANGE NAME>** to make the new name effective.
- Platform** [C8092-1]  
Hardware platform of the module.
- Parameter Version** [x]  
The firmware of the module undergoes revisions where parameters may be added while others become obsolete. The parameter version indicates it.

**Important Note!** It is mandatory to **initialize** the module to **factory defaults** if the parameter version has changed in order to clean the memory from rubbish data. Otherwise you may experience malfunctions.

- FIRMWARE** displays the firmware versions of the **C8092** components:
  - Controller** The module controller
  - DSP** The processing DSP
  - FPGA** The routing and audio interface for the DSP

**RESET**

**Restart Module**

Pressing **<RESTART>** performs a warm start (soft reset)

**Initialize and Restore Factory Defaults**

Pressing **<INITIALIZE>** restores the factory default values for all parameters of the module including all presets. You will lose your presets and settings. It's highly recommended to backup the settings and presets to a PC first.

**BACKUP / RESTORE**

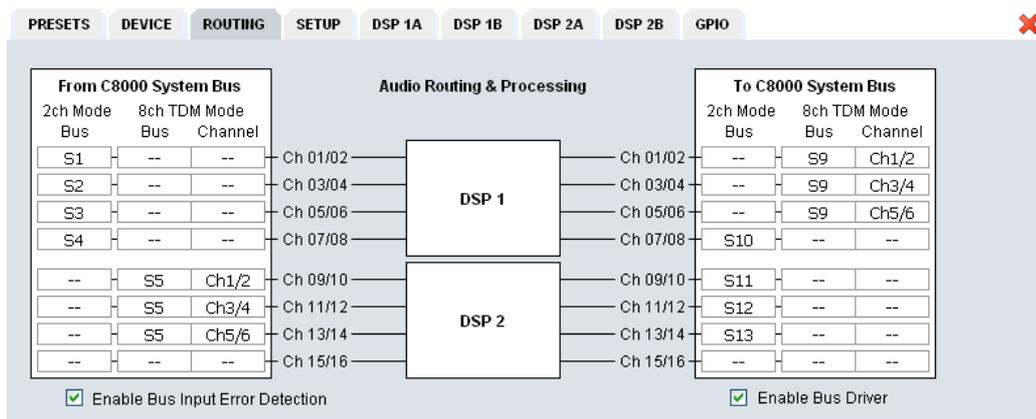
**Backup Settings and Presets to File**

Pressing **<BACKUP>** will put all active parameters and the content of all presets into an XML file. You may store such file on a PC.

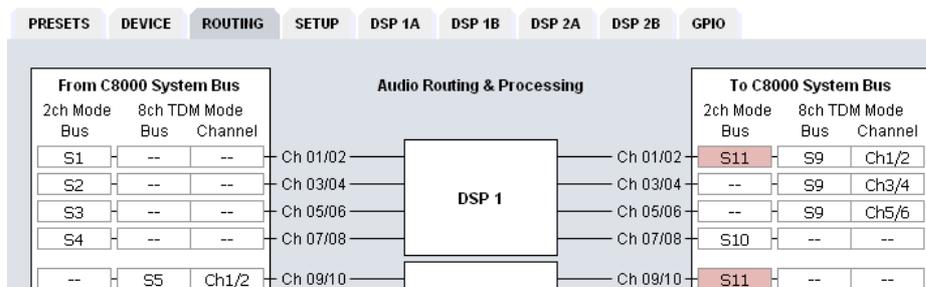
**Restore Settings and Presets from File**

You may browse a matching XML file from a PC. Pressing **<RESTORE>** will overwrite all active parameters and the content of the presets with the content from the backup file.

**ROUTING**



The bus interface allows for very flexible interconnection from and to the c8k audio busses, either in two channel or eight channel multiplex mode. The inputs to the DSPs (Ch 01/02 ... Ch 15/16) exclude each other (see example below). You can select a specific DSP input pair from the c8k bus either in 2ch [S1 ... S4] or eight channel [S5] mode. When you select an input bus that is fed up-stream in 8ch mode [S5] you must also select a signal pair from that bus [Ch1/2, Ch3/4, Ch5/6] for a dedicated DSP input:



Similar applies to the output routing. [S9] is fed in 8Ch and [S10] in fed 2Ch mode. Duplicated busses [S11] are marked red as a warning because the signal will be disturbed if you connect two outputs [Ch 01/02, Ch 09/10] to the same bus.

### Audio Routing & Processing

#### From C8000 System Bus

Select a 2ch or 8ch (multiplex) mode bus as an input for the DSP.

#### To C8000 System Bus

Decide between 2ch or 8ch (multiplex) mode and assign a bus to it.

#### Enable Bus Input Error Detection

[ON / OFF]

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, input module). The **Error Detection** can be turned off and on in general. Each input in use will automatically be observed. You will see the status on the left hand side:

“**Bus/Input Status**”. A **grey** soft LED shows that the detection is disabled. While **green** is OK, **red** indicates an error condition.

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 a GPI/O module is installed).

The **SNMP manager** may afterwards poll the “**modulesStatus**” for more detailed status information per input (see SNMP documentation for details).

#### Enable Bus Driver

[ON/OFF]

You can disable the output drivers by un-checking the **Enable Bus Driver** check box. The state of this check box also depends on the setting of **SW1** on the PCB.

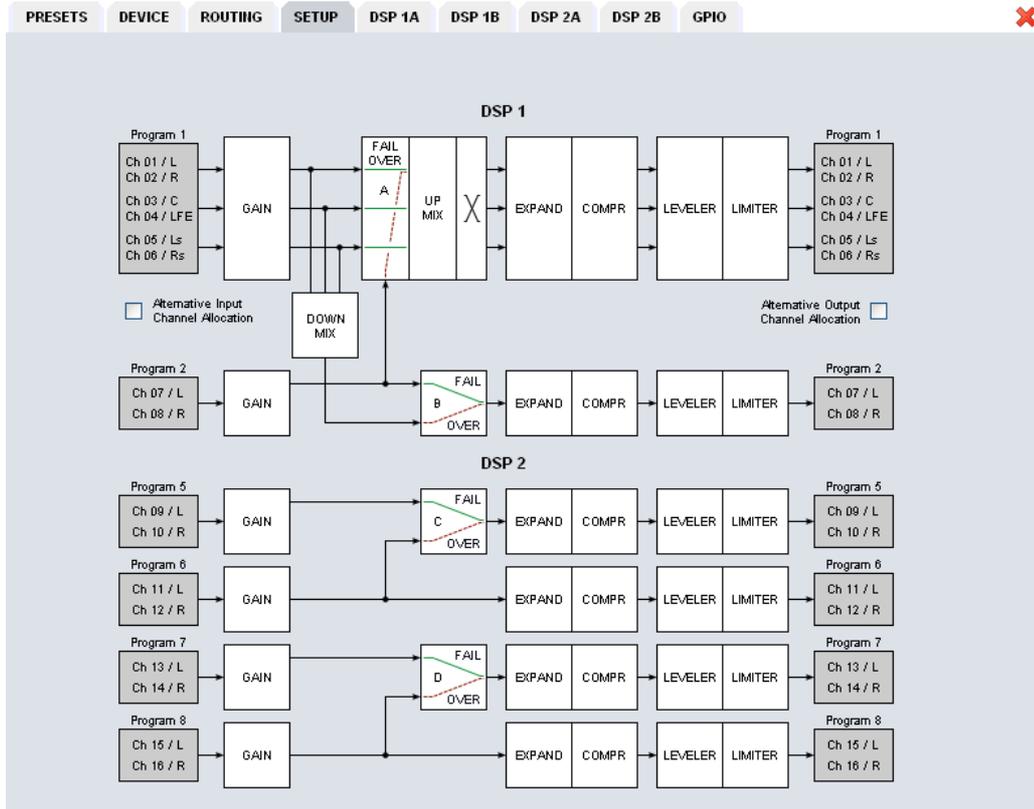
If **SW1 #1** is turned off, this checkbox will be off after a power cycle. You can turn it on temporarily to check out your settings but you must keep in mind that after the next power cycle it will be off again unless you have turned **SW1 #1** on.

This procedure is useful if you must insert a module into a frame that is on air and other services must not be interrupted or disturbed.

**Important Note!** The remainder of this manual refers to the **C8092-16** version (16 channel and surround license enabled). Some settings are impossible for a four channel license, but the parameters for the audio processor are the same.

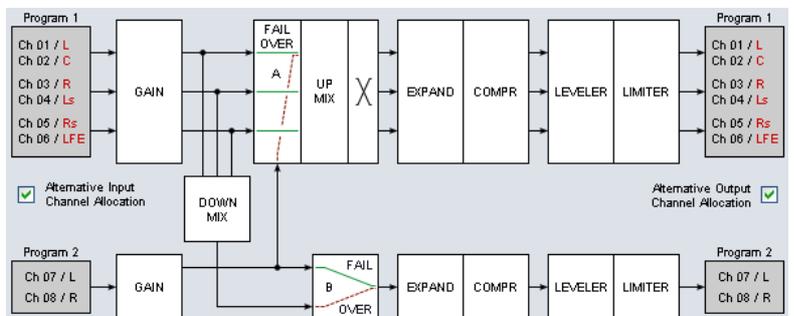
**SETUP**

This page shows the function blocks which are available for the respective programs. The display depends on the program configuration of the DSPs. Below an example where DSP 1 is configured for 5.1 + 2 whereas DSP 2 is configured for 4 x 2 program processing:



**Alternative Input Channel Allocation**

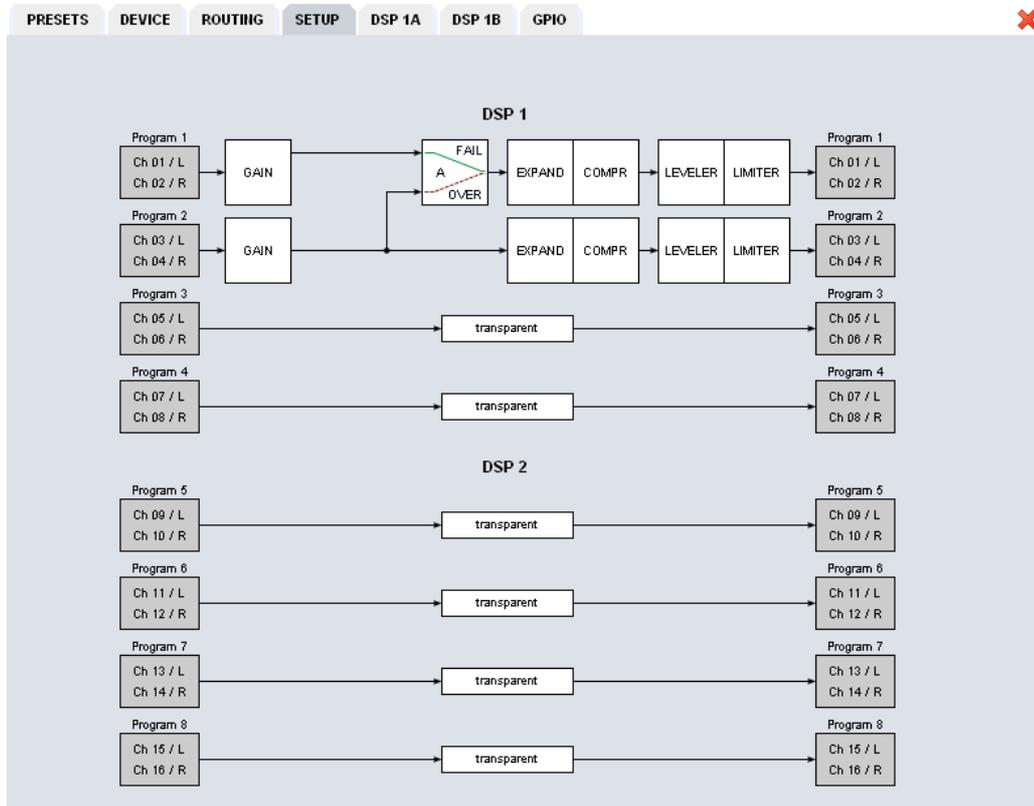
Due to the fact that the DSP is fed in 2Ch mode and in case of surround operation it is possible to select between the standard TV broadcast (L / R / C / LFE / Ls / Rs) and the alternative movie picture (L / C / R / Ls / Rs / LFE) channel allocation.



**Alternative Output Channel Allocation**

See above

**Important Note!** The available number of processing channels depends on the license that is enabled for the particular module. Here is an example for the basic configuration that has **four** processing channels only (no channel license is enabled):



DSP 1A - 4 x 2 mode

From here you can control the audio parameters of the **C8092** function blocks.  
For detailed explanation of the LevelMagic parameters pls. see the separate document:  
**Junger\_Processing-Parameters\_xxyyzz.pdf** which you may download from our web site.

The screenshot shows a control interface for DSP 1A in 4x2 mode. It features a top navigation bar with tabs for PRESETS, DEVICE, SETUP, DSP 1A, DSP 1B, DSP 2A, DSP 2B, DE-EMBED, EMBED, GEN, and GPIO. The main area is divided into sections: Operating Mode (set to 4 x 2), Loudness Control Mode (EBU R 128), and a Bypass checkbox. Below these are four program columns (Program 1 to Program 4) with their respective link status (Linked or Unlinked) and channel groupings (C1+2, C3+4, C5, C6, C7, C8). Each program has a set of parameters including Input Gain, Delay, Leveler settings (Profile, Target, Time, Max Gain, Freeze Level), Transient Processor (Max Gain, Response), Limiter (Profile, Max True Peak), Expander (Threshold, Range, Release Mode), and Compressor (Reference Level, Range, Ratio, Profile).

**Operating Mode**

[5.1 + 2 / 4 x 2]  
defines the number of audio channels which are used for one audio program. All relevant processing blocks will be configured to meet the selected mode.

**Loudness Control Mode**

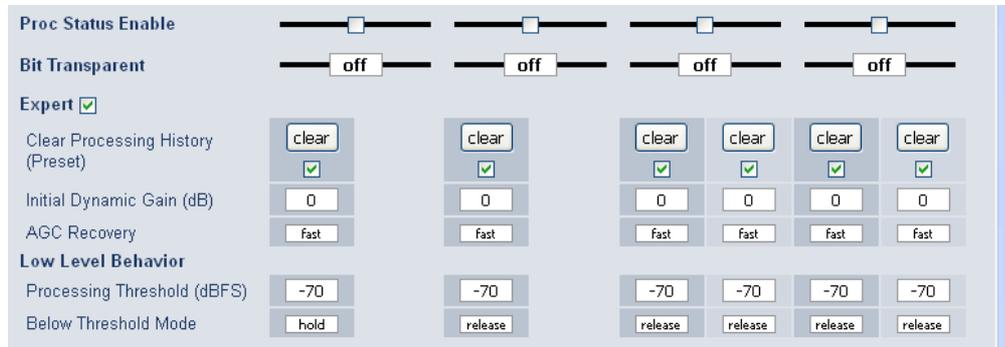
[Level / ITU BS.1770-1, -2, -3, -4 / EBU R 128 / ARIB TR-B32 ATSC A/85 (2011 7 2013) / Free TV OP-59 / Porteria 354]

**Bypass**

[ON / OFF]  
The processing parameters will be bypassed to validate the actual settings. If enabled, the respective **Bypass** DSP1 or DSP2 soft LED turns **red** in the status panel:



<b>Link</b>	[Unlinked / Linked] defines the coupling of the control circuits in order to maintain the listening balance for correlated signals or to provide a grouping of the setup parameters for multi channel signals.
<b>Input</b>	[ON / OFF]
<b>Input Gain</b>	[-20 ... +20 dB]
<b>Input Delay Coarse (ms)</b>	[0 ... 2000]
<b>Input Delay Fine (samples)</b>	[0 ... 255]
<b>Leveler</b>	[ON / OFF] turns off Transient Processor as well.
<b>Processing Profile</b>	[live / speech / pop / classic]
<b>Loudness Target (dBFS)</b>	Level mode [0 ... -50]
<b>(LKFS)</b>	ITU mode [0 ... -50]
<b>(LUFS)</b>	EBU mode [0 ... -50]
<b>Time (s/min/h)</b>	[10, 20, 40 sec. / 1, 2, 5, 10, 20, 40 min / 1, 2 h]
<b>Max Gain (dB)</b>	[0 ... 40]
<b>Freeze Level (dBFS)</b>	[-20 ... -60]
<b>Transient Processor</b>	
<b>Max Gain (dB)</b>	[0 ... 40]
<b>Response</b>	[soft, mid, hard]
<b>Limiter</b>	[ON / OFF]
<b>Processing Profile</b>	[live, speech, pop, uni, classic]
<b>Max True Peak (dBTP)</b>	[0.0 ... -20]
<b>Expander</b>	[ON / OFF]
<b>Threshold (dBFS)</b>	[-60 ... -20]
<b>Range (dB)</b>	[0 .... 20, Gate]
<b>Release Mode</b>	[0 / 1 live / 2 speech / 3 pop / 4 uni / 5 / 6 classic / 7 / 8 / 9]
<b>Compressor</b>	[ON / OFF]
<b>Reference Level (dBFS)</b>	[0 ... -40]
<b>Range (dB)</b>	[0 ... 8 .... 20]
<b>Ratio</b>	[1: 1.1 ... 1: 4.0]
<b>Processing</b>	[0 / 1 live / 2 speech / 3 pop / 4 uni / 5 / 6 classic / 7 / 8 / 9]



**Proc Status Enable**

[ON / OFF]

If the average gain of the module is equal or above the **Leveler Max Gain** for more than 10s the respective **Processing Status** soft LED turns **red**. This status information is condensed for all processing channels by the module controller. The frame controller will condense the status information for all processing modules within a frame and may generate a **SNMP trap** and/or fire a **GPO**. In this case the **SNMP manager** may poll the frame for details to “see” which processing channel sticks.

**Bit Transparent**

[off / on]

indicates that a channel pair is in bit transparent mode to let non audio signals pass through without the DSP processing to maintain data structure for non audio signals.

**Expert**

[show / don't show]

The expert mode offers the possibility for manual intervention of the adaptive behavior of the **LevelMagic** process for critical material. For details pls. see the above mentioned document.

**Clear Processing History (Preset)**

manually or GPI controlled  
[disable / enable]

defines if the switch is included in a preset. This allows clearing the processing history if a preset is loaded.

**Initial Dynamic Gain (dB)**

[-40 ... 1 ... 15]

Start value for the LevelMagic process after Clear Processing History.

**AGC Recovery**

[normal / fast]

**Low Level Behavior**

**Processing Threshold (dBFS)**

[-80 ... -70 ... -20]

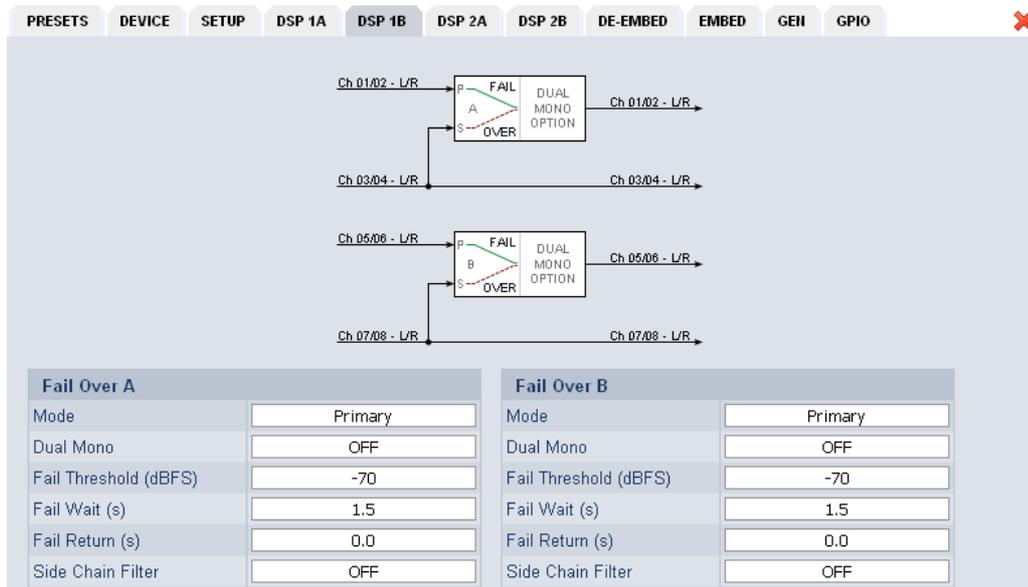
The threshold from where the processing gain will behave as defined by Below Threshold Mode.

**Below Threshold Mode**

[release, hold]

returns slowly to 0 dB gain change or stays at the Processing Threshold.

DSP 1B – 4 x 2 mode

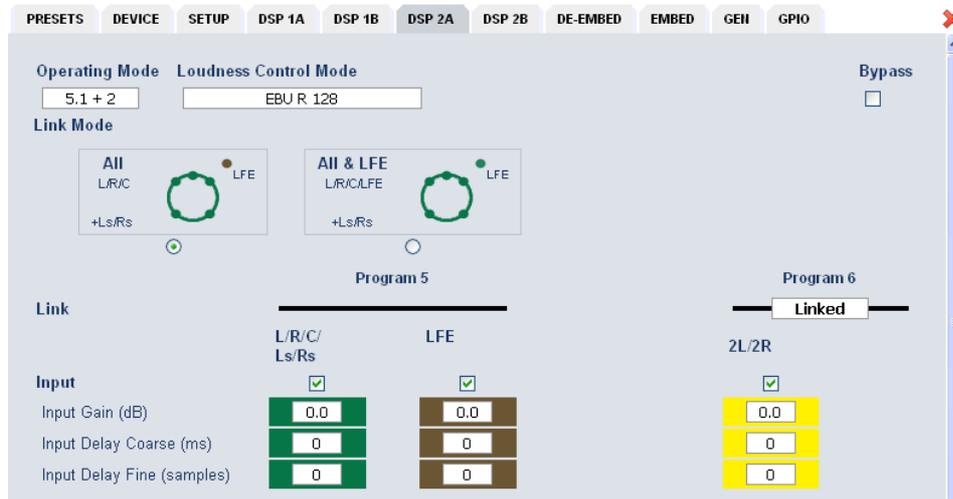


The **C8092** offers the feature to use pairs of channels in a fail over mode. I.e. if the audio signal fails in the first audio pair, the processor may switch over to the adjacent (e.g. 1/2 >> 3/4) pair automatically. The functions of the circuits Failover A – Failover B are similar. The switch over will be performed by a cross fade.

**Failover A**

- Mode** [Primary / Secondary / AUTO]  
Selection between both inputs and the auto mode.
- Dual Mono** [OFF / AUTO]  
If the fail over input is fed by a dual mono signal, the circuit may automatically copy the opposite one if one fails.
- Fail Threshold (dBFS)** [-60 ... -40]  
Trigger threshold for the fail detector.
- Fail Wait (s)** [1.5 ... 10.0]  
Time from detection of an audio loss to the moment of switch over.
- Fail Return (s)** [0.0 ... 10.0]  
Time from the detection of an audio until switch back.
- Side Chain Filter** [ON / OFF]  
A high pass filter (300 Hz) and a low pass filter (3000 Hz) are applied to the detector side chain (not the audio path) to prevent hum and noise from blocking fail over switching.

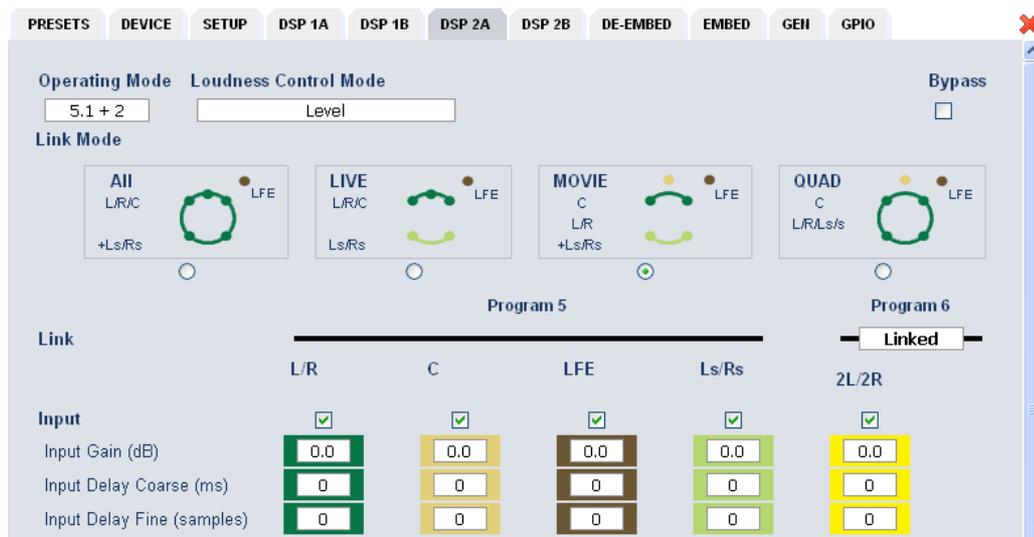
DSP 2A – 5.1 + 2 mode



As mentioned above there is also a 5.1 + 2 program configuration available if you have bought the **surround option** for the C8092. In this case the first 6 channels of the DSP are linked for surround processing. This will also apply to **DSP 1** if 5.1 + 2 is selected. The example above shows a condition where the LFE is not linked to the other surround channels and may be controlled independently.

The remaining two channels may be used for an independent stereo audio program or for two mono channels. Above it is linked for stereo operation.

Depending on the loudness control mode, the link options are different. While ITU defines a certain link condition for loudness control and measurement, the proprietary Junger "**Level**" mode allows for more detailed link variances. The screen shot below shows the most sophisticated **MOVIE** mode:



**DSP 2B – 5.1 + 2 mode**

If you have bought the surround option you will get the option to do an upmix either for permanent operation or as a fail over feature to maintain a surround image if the input surround signal disappears. Also a downmix block is available that can be used to feed a stereo program path or it may be used as a fail over source for the stereo path.

Beside the upmix algorithm, the upmix block has a surround detector that will decide if an input surround signal has disappeared under certain conditions:

The screenshot shows the DSP 2B configuration interface with a signal flow diagram at the top and several control panels below. The signal flow diagram shows inputs for Ch 09/10 - L/R, Ch 11/12 - C/LFE, Ch 13/14 - Ls/Rs, and Ch 15/16 - L/R. These feed into a DOWN MIX block, which then feeds into two FAIL OVER blocks (C and D). Both FAIL OVER blocks have a DUAL MONO OPTION. The output of FAIL OVER C goes to an UPMIX block with Latency Compensation. The output of FAIL OVER D goes to a Latency Compensation block. The outputs of both UPMIX and Latency Compensation feed into a mixer (X), which produces L/R, C/LFE, and Ls/Rs outputs. The Ch 15/16 - L/R output is also shown.

Fail Over C (Upmix)	
Mode	Primary
Dual Mono	OFF
Fail Threshold (dBFS)	-70
Fail Wait (s)	1.5
Fail Return (s)	0.0
Side Chain Filter	OFF

Fail Over D (Stereo)	
Mode	Primary
Dual Mono	OFF
Fail Threshold (dBFS)	-70
Fail Wait (s)	1.5
Fail Return (s)	0.0
Side Chain Filter	OFF

Surround Detect	
Switch	AUTO
Detection	Center
Fail Threshold (dBFS)	-70
Fail Wait (s)	1.5

Downmix	
Out Gain (dB)	0.0
Center Mix Level (dB)	-11.0
Surround Mix Level (dB)	-11.7

Options	
Latency Compensation	OFF

Upmix	
Enable	OFF
Upmix Mode	Mono
Profile	90
Processing Time (ms)	90
Center Divergence	0.25
Surround Gain (dB)	-23.5
Surround Balance Stereo	0.00
Surround Balance Mono	0.00
LFE Enable	10
LFE Cutoff Freq (Hz)	60
LFE Gain (dB)	14.0
LFE Effect Gate Threshold (dB)	-20.0

**Fail Over C (Upmix)**

This can be used to provide a two stage fail over in case of upmix. The upmix source signal can be either the incoming L/R surround pair "Primary" or an extra two channel input "Secondary". If the surround input is driven by an upstream Dolby E decoder and the signal changes from decoded D-E to PCM stereo on L/R, this stereo will for example be used as an upmix source. But it may also be desirable that in case surround fails a different input is used as the upmix source or the upmix is performed permanently from the secondary input.

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16 channel DSP

C8092

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<b>Mode</b>	[Primary / Secondary / AUTO / AUTO no Upmix] You can select between one of the 2ch inputs and the auto mode and auto mode with upmix disabled (e.g. for path through of announcements).
<b>Dual Mono</b>	[OFF / AUTO] If the fail over input is fed by a dual mono signal, the circuit may automatically copy the opposite one if one fails.
<b>Fail Threshold (dBFS)</b>	[-60 ... -40] Trigger threshold for the fail detector.
<b>Fail Wait (s)</b>	[1.5 ... 10.0] Time from detection of an audio loss to the moment of switch over.
<b>Fail Return (s)</b>	[0.0 ... 10.0] Time from detection of an audio loss until switch back.
<b>Side Chain Filter</b>	[ON / OFF] 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.
<b>Surround Detect</b>	To perform an automatic upmix in case the main surround fails.
<b>Switch</b>	[AUTO / FIX Surround / FIX Upmix] The surround switch may be permanently [FIX] connected to the surround input or the upmix output but it may also perform an [AUTO] switch over in case the surround input fails.
<b>Detection</b>	[Center / Surround / Center or Surround / Signal loss] Here you can decide which channels must be observed for signal loss to operate the surround switch.
<b>Fail Threshold (dBFS)</b>	[-80 ... -70 ... -40] If the RMS weighted input level drops below this value a fail signal will be generated.
<b>Fail Wait (s)</b>	[0.0 ... 10.0] Time from detection of an audio loss to the moment of switch over. The return from the fail condition (in case surround comes back) will be immediate.
<b>Downmix</b>	
<b>Out Gain (dB)</b>	[-20 ... 0 ... 20]
<b>Center Mix Level (dB)</b>	[-12.0 ... -3.0 ... 0.0]
<b>Surround Mix Level (dB)</b>	[-12.0 ... -3.0 ... 0.0]
<b>Options</b>	
<b>Latency Compensation</b>	[OFF / ON] Since the upmix has a certain latency (see Upmix > Processing Time) it can be compensated automatically for the stereo pair to avoid lip sync issues between an upmixed surround and the stereo path.
<b>Failover D (Stereo)</b>	
<b>Mode</b>	[Primary / Secondary / AUTO] The second fail over circuit can take the downmix as a fail over source in case the input signal fails. But it may simply put the downmix through permanently (Mode switch is set to Secondary). The other parameters are already described in the <b>DSP 1B</b> section.

**Upmix**

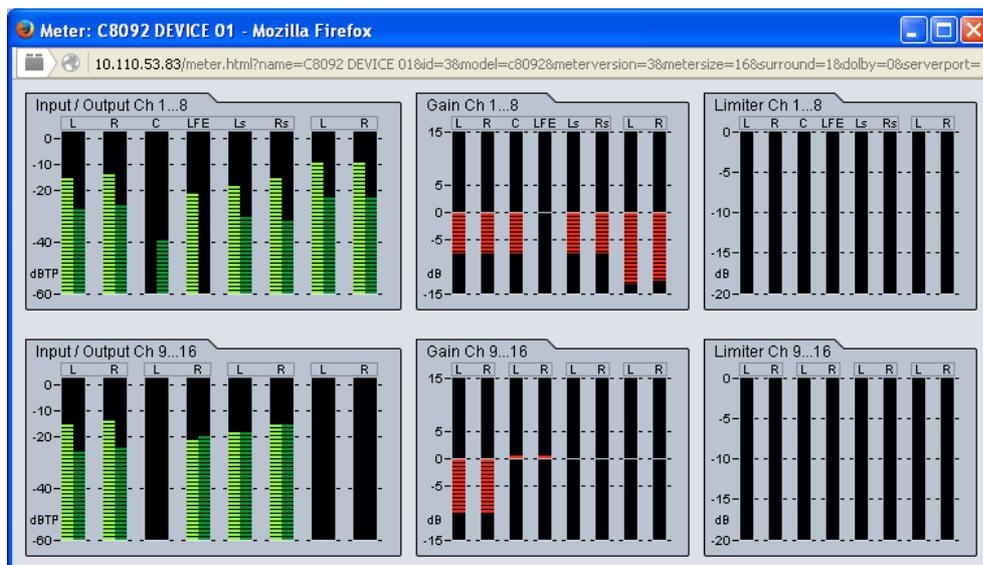
<b>Enable</b>	[OFF / ON]
<b>Upmix Mode</b>	[Mono / Stereo / AUTO]
<b>Profile</b>	[1 Front Projection, 2 Emphasize Front, 3 Balanced, 4 Emphasize Surround, 5 Wrap Surround]  1 Front Projection – Optimized for a stable surround image, independent of correlation of the input signal. Opens a stage-like presentation over the front speakers and uses the rear channels for ambience creation.  2 Emphasize Front – Based on setting 1 with a less strict front projection.  3 Balanced – A balanced distribution of the signal between the front and rear channels, without overemphasizing the rear channels.  4 Emphasize Surround – The distribution between the front and rear channels is highly dependent on the correlation of the input signal. Highly uncorrelated signals may create emphasized surround channels.  5 Wrap Surround – Even distribution of the signal between all channels, to create a feeling of being ‘wrapped in sound’ to create spectacular effects.
<b>Processing Time (ms)</b>	[3 ... 100] The processing time has great influence on the quality of the upmix process but of course alters the latency of the audio signal. It is highly recommended to allow as much processing time as possible. E.g. one can e.g. increase the processing time instead of adding audio delay to compensate for a delayed video line. Depending on the system latency requirements (ingest vs. live broadcast) you may change the processing time accordingly.
<b>Center Divergence</b>	[0.0 ... 1.0] The upmix process assembles a center signal from the input stereo. It may either be fed to the center channel only (0.0) or spread between L/R (1.0). The effect will be a wider presentation of center signals in a surround sound image. Please note that the signal does not completely disappear from one source (L/R or C), depending on the selected profile.
<b>Surround Gain (dB)</b>	[-24.0 ... 0.0] Sets the level of Ls/Rs channels.
<b>Surround Balance Stereo</b>	[0.00 ... 1.00] defines the amount of direct sound mixed into the surround channels. 0.0 provides pure ambient sound while 0.1 to 1.0 will increase the amount of direct sound. Works only if upmix mode is set to stereo or switched to stereo in auto mode.

<b>Surround Balance Mono</b>	[0.00 ... 1.00] defines the amount of direct sound mixed into the surround channels. 0.0 provides pure ambient sound while 0.1 to 1.0 will increase the amount of direct sound. Works only if upmix mode is set to mono or switched to mono in auto mode. For auto mode lower values (0.2 – 0.4) are recommended to prevent unwanted effects when auto switching between Mono and Stereo.
<b>LFE Enable</b>	[OFF / ON / Effect Gate] You may turn this option on if the upmix process is to generate a subwoofer signal that will appear in the LFE channel. When using the Effect Gate function the system interactively processes the subwoofer signal and generates a signal that comes very close to a real LFE signal, without creating permanent rumble and bass excitation.
<b>LFE Cutoff Freq (Hz)</b>	[60, 80, 100, 120] sets the cutoff frequency for the generated LFE signal.
<b>LFE Gain (dB)</b>	[-20.0 ... 20.0] You can set the LFE level here
<b>LFE Effect Gate Threshold (dB)</b>	[-20.0 ... 0.0] sets the relative threshold of the Effect Gate processor.

**Important Note!** If you encode the surround signals from this upmix to a Dolby format we recommend to set the center and the surround downmix level to -3dB for best downmix compatibility.

### Metering

If you click on the **Metering** icon  on the left hand side in the status window, a Java applet opens up. This feature is only available if a valid Java plug-in is available for the browser that is used to display the GUI.



## GPIO

The **C8092** has four dedicated sets the **DSP**, the **SDI**, the **Failover/Upmix GPIOs**. Moreover it offers the function to clear the DSP history (see level magic expert parameters) by control of an external device.

The screenshot shows the GPIO configuration interface for the C8092. It features a top navigation bar with tabs for PRESETS, DEVICE, ROUTING, SETUP, DSP 1A, DSP 1B, DSP 2A, DSP 2B, and GPIO. The GPIO tab is active. The main content area is titled 'GPI' and is divided into four sections:

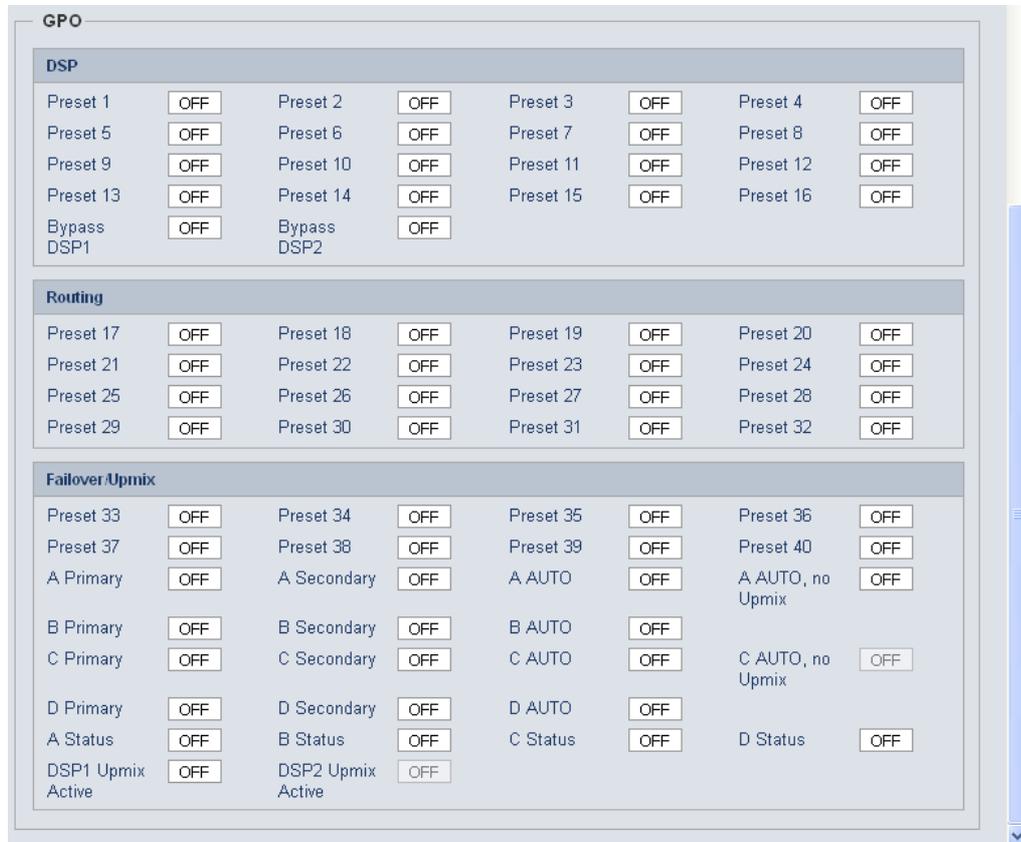
- DSP:** A 4x4 grid of controls for Preset 1 through Preset 16, plus Bypass DSP1 and Bypass DSP2. All buttons are currently set to 'OFF'.
- Routing:** A 4x4 grid of controls for Preset 17 through Preset 32. All buttons are currently set to 'OFF'.
- Failover/Upmix:** A grid of controls for Preset 33 through Preset 40, plus A Primary, A Secondary, A AUTO, B Primary, B Secondary, B AUTO, C Primary, C Secondary, C AUTO, D Primary, D Secondary, D AUTO, DSP1 Force Upmix, and DSP2 Force Upmix. All buttons are currently set to 'OFF'.
- Clear DSP History:** A 4x4 grid of controls for Ch 1 through Ch 16. All buttons are currently set to 'OFF'.

## GPIs

are useful if you want to recall settings remotely (e.g. via presets).

The C8k frame can handle **127** different virtual **GPI** numbers.

You must assign a unique number to the respective function. Such numbers will be generated by the **brc8x** Broadcast Remote Controller or by a **GPI/O** interface module **C8817**. If the **C8092** receives such a number over the internal CAN bus, it will for example load the respective preset or it will turn on a bypass function or clear the processing (DSP) history.



**GPOs (Tallies)**

may signal the status of a module for a **GPI** devices like legacy equipment monitoring systems.

The c8k frame can handle **127** different virtual **GPO** numbers.

If an event occurs, the **C8092** puts the assigned number on the CAN bus so a **C8817 GPI/O** module can engage a relay or the **brc8x** may activate its tallies.

**Important Note!** Virtual **GPI** and **GPO** numbers do not "see" each other on the CAN bus. I.e. you can't use a **GPO** number to trigger an event inside the frame directly. If this is the task you must use the **C8817 GPI/O** module that can do the **GPI/O** conversion and provides you with the possibility to set up logical combinations of physical and virtual **GPI/Os**.