
4Quadrant 3G-SDI to MADI and AoIP bridging

Netbridge UHD is an advanced interface for simple and fast bridging between Audio-over-IP (AES67 & Dante™), MADI and 3G-SDI infrastructures, supporting four quadrant UHD. With its 64 channel MADI and AoIP interface and the possibility to embed and de-embed up to 64 SDI audio channels, it may handle up to 192 audio channels in total.

Features

- Interface for AoIP (AES67 or Dante™)
- Two AoIP twork ports for redundant or switch operation
- Dual MADI I/O connection
- Dual AES3id MADI receiver and transmitter
- Word length 24bit
- Extended mode (64ch)
- 64 channel bridging between MADI and AoIP network
- 16 channel bridging between each SDI interface and MADI and AoIP network
- 128 channel shuffling inside the Netbridge AoIP network
- One or four 3G-SDI interfaces for HD and UHD operation
- Built in 3G-SDI video delay for lip-sync compensation for immersive audio processing for all four quadrants

General Remarks

Internally the Netbridge is built from c8k system components. I.e. 3G-SDI interfaces, the MADI and AoIP interface and a frame controller. It provides internal communications and a web server to set up the components. You can open the GUI by using the IP address of the frame controller as an URL.

Important Note! For Information on how to setup the IP configuration of the frame controller, pls. refer to the manual of the C8702 in the addendum.

The 19" frame has an audio bus system to route signals between the components. You can send signals from the SDI de-embedder to the bus and receive signals from the bus to embed them into SDI. Similar applies to the signals from and to the MADI interface as well as the AoIP interface.

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The transport of audio signals via the back plane must be synchronized to a reference clock provided by the clock master. The clockmaster must be selected via a hardware switch of either one of the SDI components or the AoIP component.

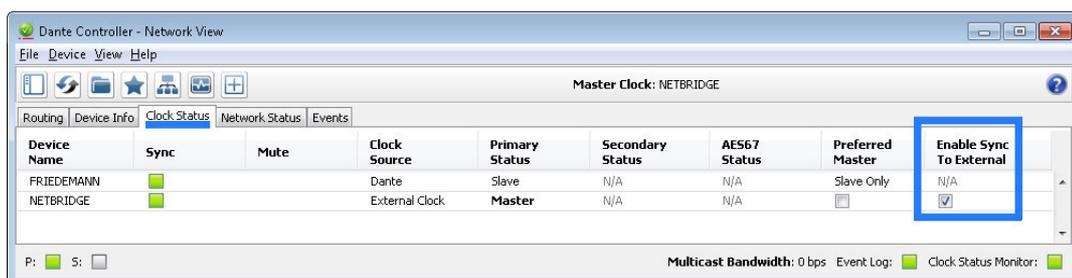
Important Note! You must observe the front panel MASTER LEDs to see which component provides the master clock for the Netbridge UHD. By default the SDI interface dedicated to the first UHD quadrant is set up for clock master. Please get in touch with the Jünger Audio support team for further instructions if you are not sure how to change the sync master.

All AoIP related parameters and AoIP routing are accessed via Audinate's Dante™ Controller software. Please download Audinate's Dante™ Controller from:

<https://audinate.com/products/software/dante-controller>

Install and run the software to configure your Dante™ network.

The AoIP interface automatically switches sync to the selected master clock, whenever the Dante™ interface is allowed to sync from external. This configuration can be found in the Dante™ Controller under the 'Clock Status' tab:



External means a sync source that may either be the SDI interface or the MADI port.

The routing inside the Netbridge UHD is done via the GUI, presented by the built-in web server.

Important Note! The Netbridge UHD is set up for a default routing at the factory. All 16 channels from each of the four SDI interfaces are sent to the back plane busses via 8ch mux mode. SDI Q1 > Bus 1,2 / SDI Q2 > Bus 3,4 and so forth. The AoIP interface picks up these signals and puts it on the AoIP network. From the AoIP interface 64 channels are routed to the SDI embedders of the four SDI modules. In parallel the audio channels of the SDI embedders are sent to the MADI interface.

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Technical Specifications – MADI interface

Standards	Relevant specifications comply with AES10-2008 and AES11-2009.	
Audio	24bits, transparent forwarding of PCM	
Audio Sample Rates	44.1, 48kHz	
BNC Input	64/56 channels @ 44.1 and 48kHz	
	Impedance	75Ohm
	Input level	0.15 ... 0.8Vpp @ 75Ohm
	Cable length (max.)	150m (Belden 1694A)
BNC Output	64/56 channels @ 44.1 and 48kHz	
	Impedance	75Ohm
	Output voltage	0.6Vpp (typ.) @ 75Ohm
General Features	<ul style="list-style-type: none"> • Input cable equalizer for extended range and robustness • Reference grade word clock recovery, master-sync capable • Dedicated routing for non-processed channels, all channels (max. 64) can be routed to/from the device or looped through • AES3 channel status management, non-audio detection 	

Technical Specifications – AoIP (AES67 / Dante™) interface

Standards	Audio-over-IP by Audinate Dante™ Digital Audio Networking Standard AES67 compliant
Audio	24bits, transparent forwarding of PCM and compressed audio
Audio Sample Rates	44.1, 48kHz
Inputs and Outputs	2 x Gigabit Ethernet RJ45 connectors (100M/1Gbit), primary and secondary port
Inputs	64 channels @ 44.1, 48kHz
Outputs	64 channels @ 44.1, 48kHz
General Features	<ul style="list-style-type: none"> • AES67 compliant • Network master-sync can be provided by c8k frame • Master-sync capable • Non-audio detection for input channels • Glitch-free Dante™ audio redundancy using dual Ethernet networks

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Technical Specifications – 3G-SDI interface

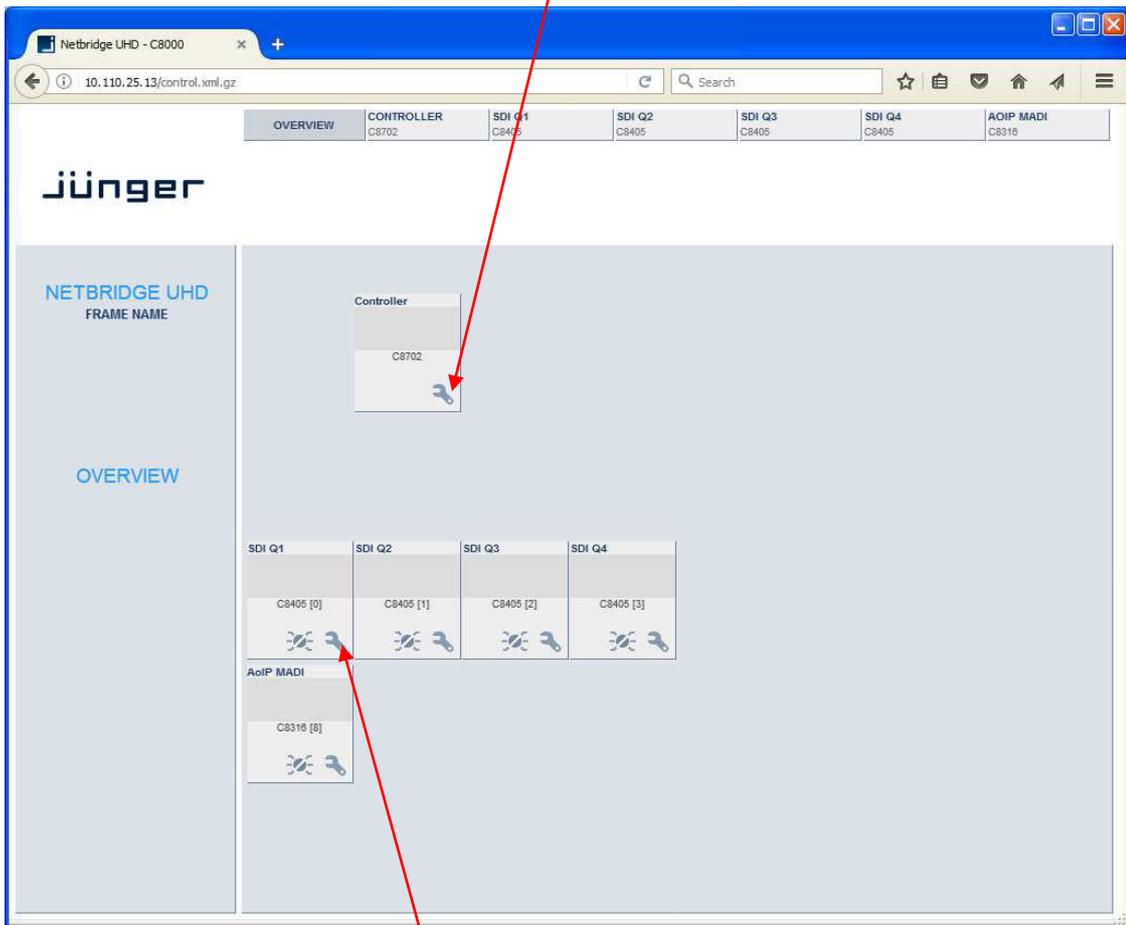
Standards	Video complies with SMPTE 424/425M (3G, Level A and B), SMPTE 292M (HD) or SMPTE 259M (SD). Automatic format detection. Audio embedding and de-embedding complies with SMPTE 299M (3G, HD) or SMPTE 272M-AC (SD). Metadata embedding and de-embedding complies with SMPTE 2020-2.	
Video Data Rate	2970/296Mbps (3G), 1485/1483.5Mbps (HD), 270Mbps (SD)	
Video Formats	1080p23.975, 24, 25, 29.97, 30, 50, 59.94, 60 1080i50, 59.94, 60 720p23.975, 24, 25, 29.97, 30, 50, 59.94, 60 625i50, 525i59.94, ...	
Video Delay	User selectable 0 ... 15frames, can be disabled	
Audio	24bits, transparent forwarding of PCM and compressed audio	
Audio Channels	16 inputs and 16 outputs (4 groups with 4 channels each)	
Audio Sample Rate	48kHz (SDI compliant)	
Audio Delay	Embedder audio delay selectable 0 ... 320ms per channel	
Metadata (RDD6)	1 channel input and 1 channel output, SDID selectable	
BNC Input	Impedance	75Ohm
	Return loss	> 15dB, 5 ... 1485MHz > 10dB, 1485 ... 2970MHz
	Cable length (max.)	250m @ SD for Belden 1694A cable 230m @ HD for Belden 1694A cable 140m @ 3G for Belden 1694A cable
	Jitter tolerance	> 0.7UI (Alignment)
BNC Output	Impedance	75Ohm
	Output voltage	0.8Vpp (typ.)
	Return loss	> 15dB, 5 ... 1485MHz > 10dB, 1485 ... 2970MHz
	Output jitter	< 0.2UI (Alignment), < 0.5UI (Timing)
Video Latency	Input to Output	120 ... 200pixel, depends on video standard
Audio Latency	Input to Output	Embedder and de-embedder combined HD, 3G < 0.6ms SD typ. 1.5ms (< 2ms)
General Features	<ul style="list-style-type: none"> • Power fail relay bypass (may be activated via GUI) • Lip-Sync compensation for processed and non-processed audio signals • Dedicated routing for non-processed channels, all channels (max. 16) can be routed to/from the device or looped through • Test pattern generator • Master-sync capable • ITU-R BT.1685 / ARIB STD-B39 metadata support 	

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Set-up GUI

The GUI shows the building blocks as grey squares. By clicking on the spanner tool you gain access to the settings of one of the building blocks of the Netbridge UHD.

Use the IP address of the Controller as an URL:



When you click on the spanner tool, the web pages of the respective module will open. Pls. refer to the attached Manuals:

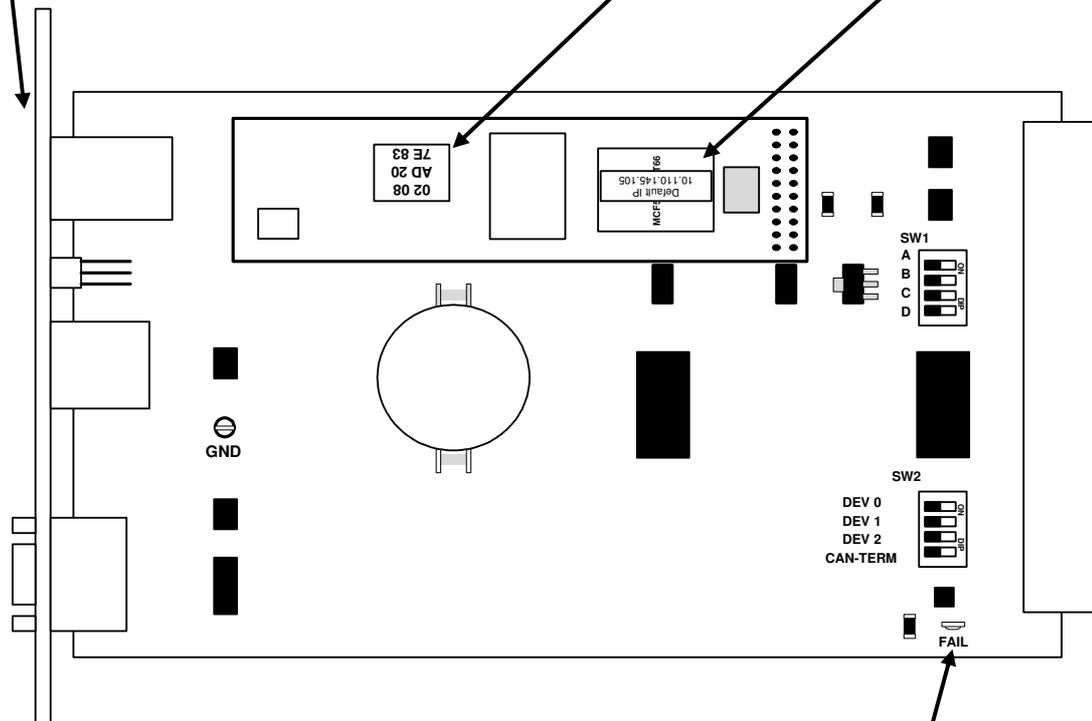
- C8702 Frame controller
- C8405 3G/HD/SD SDI interface
- C8316 MADI & AoIP interface

Installation

Location of labels and switches on the C8702 module.

The default IP address label is located on the “Coldfire” chip of the controller module and on the front panel of the module.

While the MAC address is printed on a label here:



The **FAIL** LED flashes red if a power failure is detected on the carrier board.

- SW1 #1** <A> must be **OFF**
- Set **SW1 #2** to **ON** (all other to OFF) if **only one power supply** is installed.
- Set **SW1 #3** <C> to **ON** (all other to OFF) if the Frame Controller is installed in a **C8942** frame.
- Set **SW1 #3** <C> and <D> to **ON** (all other OFF) if the Frame Controller is installed in a **C8912** frame.
- SW2 #1 - #3** <DEV 0> / <DEV 1> / <DEV 2> must be **ON**
- Set **SW2 #4** <CAN-TERM> to **ON** (terminate the CAN bus) if **no sync module** is installed. If a **brx 8x** remote panel is connected, it must be off.

Frame Controller

C8702

Important Note! For high density applications with C8491 or C8492 and C8492(B) compact modules, it is possible to operate the **CAN bus** with **1MBit/s** to increase the internal bandwidth for loudness logging and metering. After power-up the **C8702** checks the **CAN bus** and automatically sets its **CAN bus** speed accordingly. If by accident one inserts a low speed module afterwards, the C8702 will enter "CAN bus off mode" and will reboot after a while until that module is removed.

status display
if 1MBit/s is used:

Image Version	1.19.0
High CAN Bus Speed	enabled
Temperature	32.5 °C
Power Status	●

Don't mix up modules which are set to **different** CAN bus speeds.

For loudness logging, live plot or bar graph display you must use the **J*AM** from version 2.9.0 and higher.

Technical specifications

Controller Module	Processor	Motorola MCF8250 Coldfire
	RTC	DS1306
	Operating System	eCos
External Connectors	LAN	RJ45 10/100Mbit Ethernet
	RS232	D-Sub 9-pin controller serial interface #1
	CAN	RJ45 CAN1.1 extension of internal bus
Front panel switch	INIT	Reset (warm start) Initialize (factory default)
Front panel LED	STATUS	Yellow = booting / init feedback Green = operating
Default settings	IP address	10.110.xxx.yyy default calculated from Ethernet MAC address
	Net mask	255.255.0.0
	Gateway	No entry
	Controller CAN ID	0
	Frame address	0
	Can termination	OFF
Power Supply	5Vdc (4.75 ... 5.25V), max. 250mA	
Dimension	3RU, 4HP, 160mm depth	
Connector	DIN41612	
Environmental	Operating temperature	0 ... 40°C
	Non-operating	-20 ... 70°C
	Humidity	< 90%, non-condensing

Connector pin assignments

RJ45	LAN
Pin #	Function
1	Tx +
2	Tx -
3	Rx +
4	
5	
6	Rx -
7	
8	

RJ45	CAN
Pin #	Function
1	CAN-H
2	CAN-L
3	
4	GND
5	GND
6	
7	
8	

D-Sub	RS232
Pin #	Function
1	DCD
2	Tx D
3	Rx D
4	DTR
5	GND
6	DSR
7	CTS
8	RTS
9	N.C.

Set up of the module

The communication with the C8k modules is done via the CAN bus, i.e. the **Frame Controller** “talks” to the C8k modules via CAN bus while external applications communicate via TCP/IP over Ethernet with the C8702. The CAN bus is a simple two-wire differential serial bus, it operates in noisy electrical environments with a high level of data integrity. Its open architecture and user-definable transmission medium makes it extremely flexible. Capable of high-speed (1 Mbits/s) data transmission over short distances (40 m) and low-speed (5 kbits/s) transmissions at lengths of up to 10,000 m, the multi-master CAN bus is highly fault tolerant, with powerful error detection and handling designed in.

Important Note! Junger Audio uses a default bit rate of 125 kbit/s and guarantees **cable lengths** of up to **300m** if one connects a brc (broadcast remote controller). As an exception for high density application with C8942 and C8912 compact frames and C8491, C8492 and C8492(B) compact modules, the internal CAN bus **may** operate with 1Mbit/s. In this case it is **not** possible to use brc controllers!

Very important is the termination of the transmission medium to avoid signal degradation by reflections.

Setting the frame ID of a C8k frame:

- The frame address switches DEV0 – DEV2 must be set to ON. The frame controller does not support multiple frames anymore.

Termination of the CAN bus:

- The CAN bus must be terminated by two 120Ω resistors on both ends. The frames have one integrated terminator on the back plane. A decision must be taken how to deal with the second one. You may either use the Sync interface or the Frame Controller to terminate the bus. If the CAN connector of the **C8702** is used for an external remote controller (e.g. the brc), the bus must be terminated on the remote controller (at the far end).

Important Note! The **CAN-TERM** switch must be set to **OFF** if it is terminated on the Sync-Module. If **no Sync-Module** is installed (in case a MADI / SDI or AES interface operates in Master-Mode), the CAN bus **must be terminated** by SW2-4. If a brx 8x panel is connected it must be turned **off** and termination must be turned **on** on the **brx 8x** panel.

Setting the mode switch for single power supply operation:

- if only one power supply is installed (e.g. the C8911 frame has only one PS) the mode switch “**B**” must be set to **ON** in order to turn power fail monitoring off.

Setting the mode switch for C8942 high density frames:

- For the C8942 frames the mode switch “**C**” must be set to **ON** to turn **sync fail monitoring off** (this frame type has no central sync source) and **fan monitoring on**.

Setting the mode switch for C8912 dual power supply 19" 1RU frames:

- For the C8912 frames the mode switches “**C**” and “**D**” must be set to **ON** to turn **fan monitoring on**.

Reset the C8702:

- press the **INIT** button briefly at any time and the Frame Controller will reboot immediately.

Important Note! Rebooting the Frame Controller has **no effect** on **audio processing**.

Initialize the C8702 to **factory default** settings:

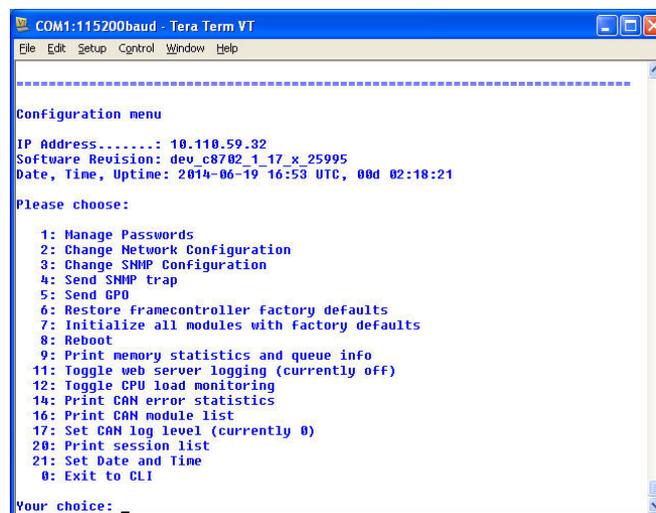
- Approx. 40 sec. after power is turned on or after pressing the **INIT** button briefly (reset function), the **STATUS LED** lights yellow. Now you may press the **INIT** button and hold it firmly until the **STATUS LED** flashes three times. This is an acknowledgement that the C8702 has been initialized to factory default settings (you may also hold down the **INIT** button at any time until the **STATUS LED** flashes three times).

Setting the IP address

Important Note! If you are not familiar with the Internet Protocol, you must contact an administrative person of your IT department for help.

There are two principal ways to change the IP configuration. You can use the so-called console interface or you may use a **Web Browser**.

1. Connect with a PCs COM port:
 - * use a physical or virtual (via a serial < > USB adaptor) COM port
 - * connect it via a 1:1 cable to the RS232 9-pin connector
 - * run a terminal program (115.2-8-N-1, no handshake)
 - * select that COM port
 - * press <ENTER>:



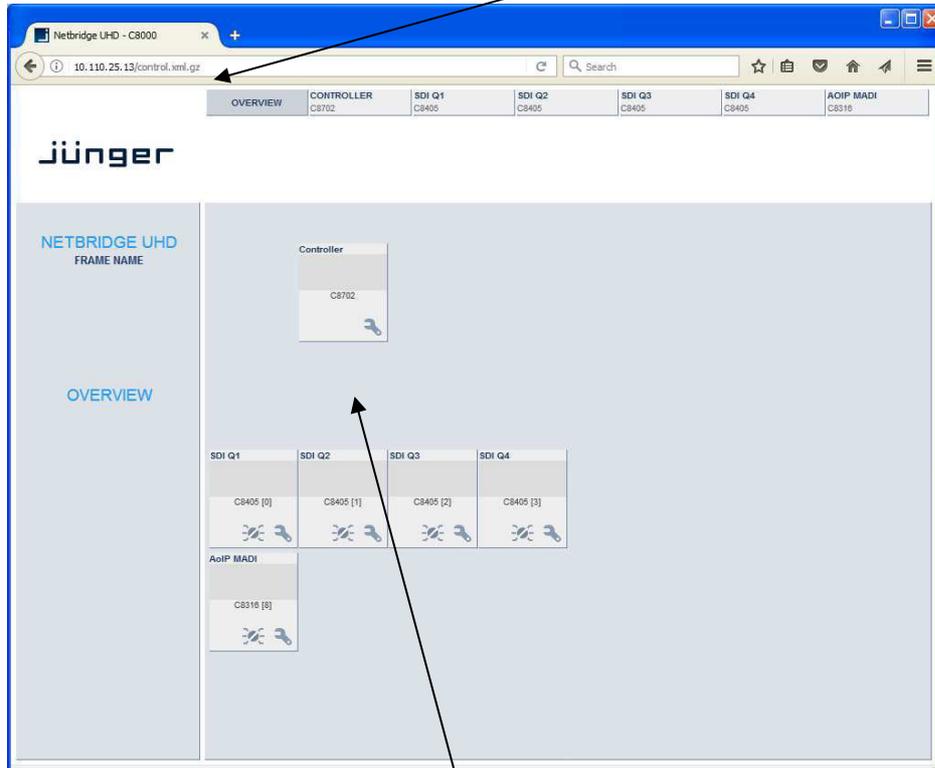
```
COM1:115200baud - Tera Term VT
File Edit Setup Control Window Help
-----
Configuration menu
IP Address.....: 10.110.59.32
Software Revision: dev_c8702_1_17_x_25995
Date, Time, Uptime: 2014-06-19 16:53 UTC, 00d 02:18:21
Please choose:
1: Manage Passwords
2: Change Network Configuration
3: Change SNMP Configuration
4: Send SNMP trap
5: Send GPO
6: Restore framecontroller factory defaults
7: Initialize all modules with factory defaults
8: Reboot
9: Print memory statistics and queue info
11: Toggle web server logging (currently off)
12: Toggle CPU load monitoring
14: Print CAN error statistics
16: Print CAN module list
17: Set CAN log level (currently 0)
20: Print session list
21: Set Date and Time
0: Exit to CLI
Your choice: _
```

You will get a similar window that shows the momentary IP configuration and a Configuration Menu. The layout depends on the screen settings and the OS. The content of that menu may vary depending on the **Frame Controller** firmware version.

- 1.1 Select: **“Change Network configuration”** <2> <ENTER>
You must set an IP address **and** the subnet mask. If you skip the “Netmask” the IP address will not be changed. Gateway address is optional and may be skipped.
- 1.2 Select: **“Reboot”** <8> <ENTER>
Press small <y> and <ENTER> to start the reboot process
2. Connect the C8702 via an Ethernet cross over cable to a PC:
 - 2.1 Change the network setting of the PC
The PC must be given an IP address from the address room of the C8702 **default IP address**. The factory **default IP address** is printed on a label on the controller module (see installation). The **subnet mask** of the factory default address is **255.255.0.0**.

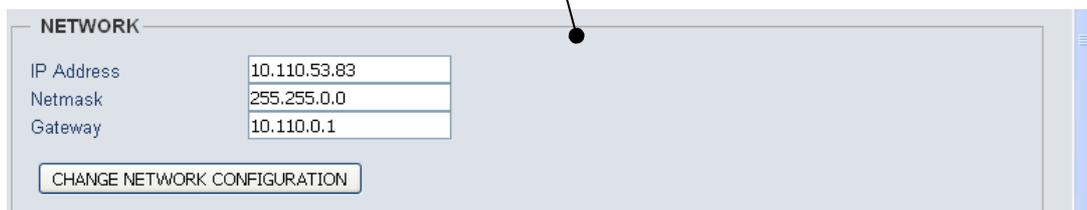
Important Note! If the **C8702** has an unknown IP configuration you may initialize it to factory default settings (see above). This will restore the factory default IP configuration.

2.3 Open a browser and enter the default IP address ● in the URL field:



2.4 On the web site click on the **spanner tool**. This opens the “**SYSTEM CONFIG**” tab of the Frame **CONTROLLER** setup.

2.5 Enter the desired **NETWORK** configuration:



2.6 Press <**CHANGE NETWORK CONFIGURATION**>

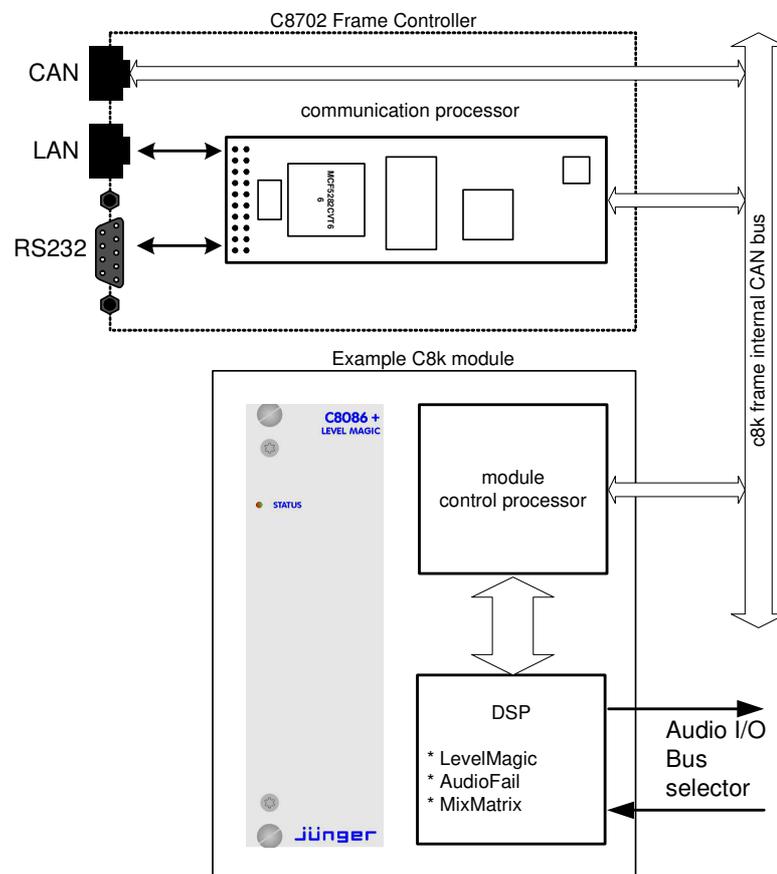
2.7 Reboot the C8702:



In order to make the IP configuration permanent you must reboot the frame controller.

Web technology based GUI

The **GUI** is based on common web technologies so you can display it nearly everywhere. External Ethernet based access to the Junger devices is maintained by a dedicated 32Bit **communication processor** that is part of the **C8702 Frame Controller** module. The **communication processor** does not control the module parameters directly. It transfers commands and data from and to a **module control processor** which on the other hand controls the module parameters as well as **GPI/Os**. The **module control processor** and the **communication processor** both communicate via the **CAN bus** internally. Therefore the external communication is shielded somewhat from the audio processing by this two tier approach. I.e. you can update the firmware of the **Frame Controller** without disturbing the audio processing.



The **communication processor** runs a **HTTP** and an **UDP** server. You may also activate a **Telnet**, an **Ember server** and a **Proxy** to communicate with the **brc** remote controller. As a fee-based option you may activate a **SNMP agent** as well.

Over a serial 1:1 connection (RS232: 115200, 8, N, 1, no protocol) you will gain access to the **console interface** (see IP set up above). It offers low level communication for administrative, service and testing purposes. The functions available from the console interface may vary from different **Frame Controller** firmware versions.

Settings for the browser

The GUI functions are based on web technology. Due to the permanent changes of browser versions we try to support Windows **IE** and Google **Chrome** as best we can, but we do all testing on Mozilla **Firefox** (54.x at the moment of editing this document).

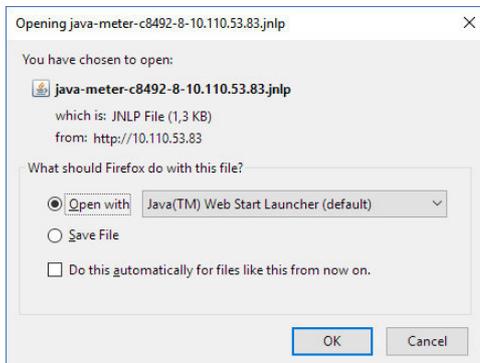
For proper operation, the environment needs some settings which are not always set up by default when installing the OS, so you must check it yourself:

- * You must **“allow cookies”** from the Junger Units.
- * Pay attention to settings of **3rd party tool bars** (like Yahoo) which may overwrite the browser general settings!
- * In order to receive any kind of files (e.g. frame back-ups, presets) from the Frame Controller, the security options must be checked to allow for downloads.
 - Automatic prompting for downloads = Enable
 - File download = Enable

Important Note! To display bar graph meters the C8702 will launch a **JAVA Web Start** application. This requires the installation of an actual **Java Runtime Environment 8.x** (or higher) on the PC. You will get it as a free download from a lot of sites around the world or directly from the license owner Oracle:

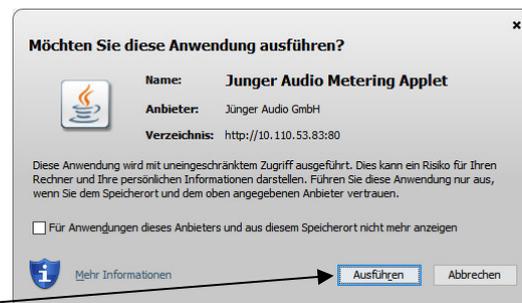
<https://www.java.com/en/download>

If you click on the meter icon of a c8k module, The frame controller will provide a ***.jnlp** file for download :

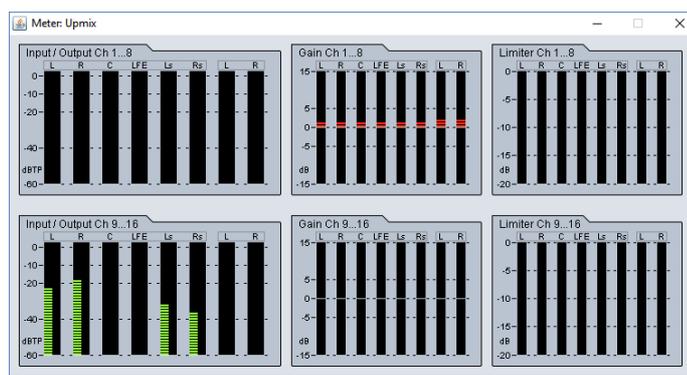


This file contains all necessary information for the **JAVA Web Start** launcher that in turn will start the **JAVA Virtual Machine (JVM)**.

You will be prompted if you want to run the application:



If you confirm, ● the applet will display the respective bar graph meters:



- * If the PC is part of a MS Domain, you must check if the LAN settings are correct. If you have configured your IE settings manually you must disable "Automatically detect settings". Otherwise it could happen that your settings are overwritten automatically at next reboot.
- * You must declare the browser as an exception for the **Windows® Firewall** in order to maintain proper **UDP** data transfer from and to the **JAVA Web Start** application. If you see security issues for your system you may use the **METERING** configuration (see further below) to limit the **UDP** port numbers instead of making an exception for all incoming network connections.

Setting of frame information

SYSTEM CONFIG | BACKUP / RESTORE | SOFTWARE UPDATE | REBOOT CONTROLLER

FRAME

Frame Name: Loudness Control
Frame Location: Room 08, Rack 15
System Contact: support@junger-audio.c

SET FRAME INFORMATION

The **Frame Name** and the **Frame Location** as well as the **System Contact** are used by the SNMP **sysObject** OIDs (Object Identifier).

Activation of the security feature

The web interface of **Junger Audio** units offers a two tier **security schema**.

- * **Operators** can view everything and load presets.
- * **Administrators** can set up C8k frames including their modules.
They are allowed to change parameters and write presets.

You must check "**Password checking enabled**" to activate this feature, you will be notified about the default settings:

You are about to enable password checks on the device. The default accounts will be "admin" with password "admin" and "operator" with password "operator". Do you really want to do this?

OK | Abbrechen

If you click **<OK>** the Frame Controller will close all open sessions and you must log in again as user **"admin"** with the default password **"admin"**.

Now you may change passwords for both the admin and the operator:

PASSWORDS

Password checking enabled

Change password for: operator

Password: [masked]
Repeat password: [masked]

CHANGE PASSWORD

Setting UDP port range for metering

In order to receive data for the meter bar graph display, **if a local firewall is active**, you must open it for the browser application or you must reserve UDP ports (for which the firewall will be held open). Here you can tell the frame controller which UDP port(s) are reserved for metering:

The screenshot shows a window titled "METERING" with two input fields: "UDP Port Range Start" containing the value "49152" and "UDP Port Range End" containing the value "65535". Below these fields is a button labeled "CHANGE METERING CONFIGURATION".

After the launch of the **JAVA Web Start** bar graph meter application it will be told by the frame controller which ports it may check for receiving UDP data packets.

On the counterpart, the PC, you must define an exception for the firewall. Open Fire Wall settings and go to exceptions (example from Windows XP OS):

1. right click on the network symbol in the windows task bar
2. select **"Change Windows Firewall settings"**
3. click on the **"Exceptions"** tab
4. open the **"Add Port"** menu:

The screenshot shows a dialog box titled "Add a Port". It contains the following text: "Use these settings to open a port through Windows Firewall. To find the port number and protocol, consult the documentation for the program or service you want to use." Below this, there are two input fields: "Name:" with the value "c8k frame #17" and "Port number:" with the value "49152". There are two radio buttons: "TCP" (unselected) and "UDP" (selected). At the bottom, there is a link "What are the risks of opening a port?", a "Change scope..." button, and "OK" and "Cancel" buttons.

Here you must give this rule a unique name (e.g. "c8k frame #17") and assign it a **UDP port** number.

Important Note! If you want to connect from different PCs with one and the same c8k frame, it is sufficient to use one UDP port per c8k frame because different PCs will open different IP socket connections with the same frame controller.

If you want to connect from one PC with different frames, a unique UDP port number for every remote frame is necessary! Therefore you may assign a range of UDP ports for the Frame Controller:

This is an identical screenshot to the one above, showing the "METERING" configuration window with "UDP Port Range Start" set to "49152" and "UDP Port Range End" set to "65535", and a "CHANGE METERING CONFIGURATION" button.

Important Note! Connection of multiple **JAVA** applets from the **same PC** with the **same module** is not implemented! In such case the previous applet will be closed/killed.

Setting of CAN BUS speed



You can select between the two CAN bus speeds: **Normal** (125kBit/s) or **High** (1Mbit/s) and the **Automatic** detection of the installed modules.

Important Note! Don't mix up modules which are set to **different** CAN bus speeds. High speed CAN bus is **only** available for C8491, C8492, C8492(B) and C8817-3.

Selecting services

For special applications you may activate the following services:



Maintenance Interface via RCP is for internal use only.

Telnet Server For remote access to the console interface via TCP/IP you must enable the Telnet Server (TCP port 22).

BRC Proxy If a **brc 8x** is connected via the CAN bus one must activate this option. Compared with previous implementation, the brc remote panel no longer talks to the modules directly. A proxy instance is used as the "man in the middle".

Enable EmBER protocol support



VSM Support / Ember enabled You may directly connect with a **VSM** application or use the Ember or Ember+ protocol to remote control the c8k frame.

For details of the VSM system see <http://www.l-s-b.de/uk> and for Ember code depository go to: <http://code.google.com/p/ember-plus/>

Important Note! Right now we support both, the old Ember and the **Ember+** protocol. It is our intention to remove the old Ember server as soon as **VSM** fully supports **Ember+**. We highly recommend you base your implementation on **Ember+**.

Setup of SNMP functions

Important Note! SNMP protocol is a licensed feature that must be purchased for the C8k system. Pls. contact your local dealer.

Junger Audio supports **SNMPv1 GET** PDUs (Protocol Data Unit) for polling the c8k frame only. We do **not** support **SNMP SET** PDUs. The agent may also send **Traps** on predefined conditions and/or may fire **GPOs** via the C8k GPI/O interface (C8817).

The setup of the **SNMP** functions is done via the Frame Controller **SYSTEM CONFIG** menu, if the **SNMP** option is activated:

Event	GPO
<input type="checkbox"/> Cold-start	OFF
<input type="checkbox"/> Warm-start	OFF
<input type="checkbox"/> Temperature High	OFF
<input type="checkbox"/> Power Failure	OFF
<input type="checkbox"/> Sync Lock Failure	OFF
<input type="checkbox"/> Module Failure	OFF
<input type="checkbox"/> Interface Input Lost	OFF
<input type="checkbox"/> Bus Input Error	OFF
<input type="checkbox"/> Processing Error	OFF
<input type="checkbox"/> Authentication Failure	OFF

Here you can tell the Frame Controller a **Trap Sink IP Address**, its **Port Number** and the **Community string** which must be used for basic authorization.

You may enable **Traps** and/or set a respective **GPO** number for use by GPI/O module(s).

In principle, the module generates various status information and sums (or rather condenses) fail conditions if there are multiple inputs or processing channels.

The **Frame Controller** polls the modules permanently for such status information and sums (condenses) that information for the entire frame. An external monitoring tool (SNMP Manager) may poll the SNMP agent based on the **Junger-C8K-MIB-4**. The **MIB** and the associated document can be requested from **Junger Audio**.

The **SNMP manager** can also “sit and wait” to receive **Traps** from the SNMP agent and may poll the frame afterwards. The procedure depends on the implementation of the management tool. For legacy monitoring applications, the c8k frame may be equipped with GPI/O module(s). In this case the system can fire GPOs (relay closures) based on the above settings.

Retrieving diagnostics information



The diagnostic file is an assembly of log information from the frame controller for investigation by Junger Audio staff. After pressing the **<SAVE DIAGNOSTIC FILE>** soft button an XML file will be generated. You must download it to your PC and send it to Junger Audio GmbH if requested.

Important Note! “Thorough diagnostics” is a more comprehensive procedure that will interrupt audio processing in some of the modules. Only use this process if advised by Junger support team.

Update of the Frame Controller firmware

The firmware for the C8702, called “**image**” (example: "rel_c8702_1_19_0-32665.img"), must be “burned” into the flash memory of the Frame Controller.

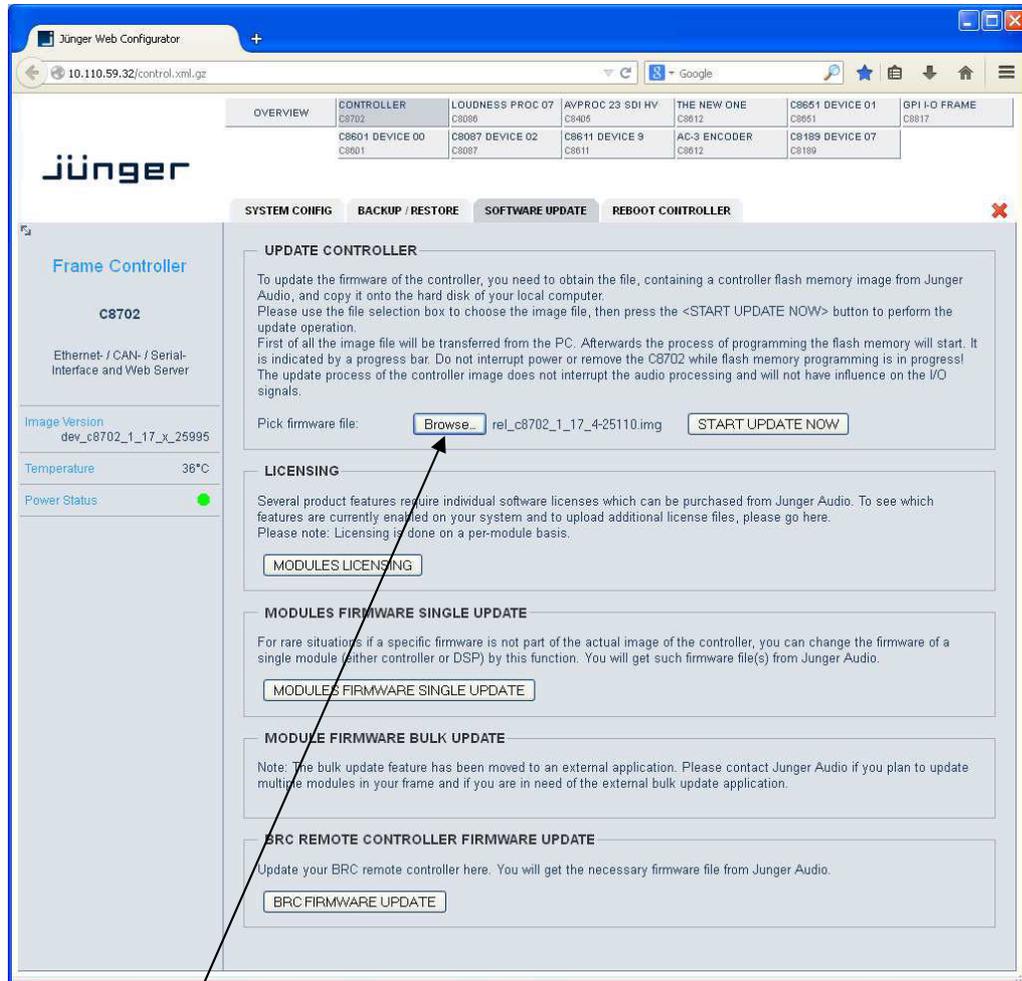
You may get such an image by **http download** of a ZIP file from Junger Audio.

Below is an example of a respective URL:

www.junger-audio.com/download/firmware/C8000/C8702/rel_c8702_1_19_0-32665_fw-32679.zip

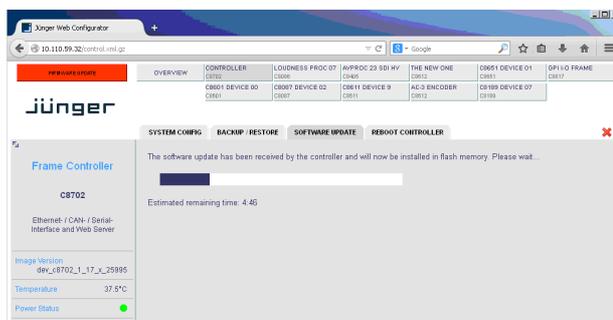
Such zip file contains an image file and actual module firmware packed into an archive file (example: "rel_c8000_1_19_x_fw-32679.arc") as well as updated manual(s) and other relevant current documents. After downloading you must unzip it and store the file(s) locally.

Open the **SOFTWARE UPDATE** pane of the Frame Controller:



You must browse for the appropriate image file from the previously unpacked ZIP. Once done you must press the **<START UPDATE NOW>** soft button. This process has 3 steps. The controller will upload the image file from the **PC** into its memory, afterwards it will erase the flash memory and finally burn the new image file into it.

First you will get the message that the file is being transferred. Afterwards you will see a **progress bar** when the process has started:



When finished, the browser will show a message:



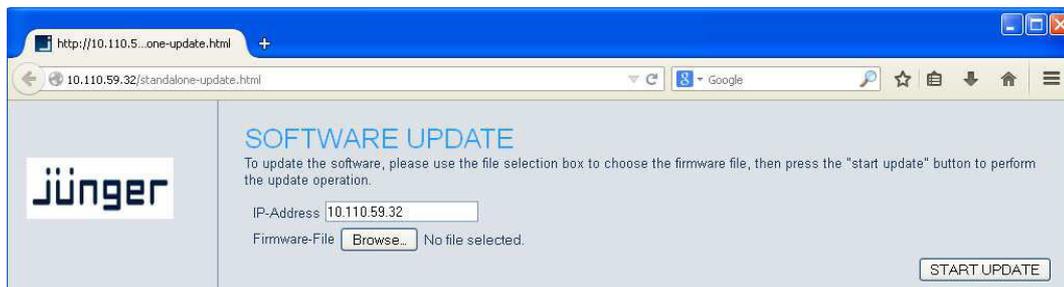
Click **<OK>** and the browser will reload the web site from the Frame Controller in order to be up to date. It is recommended to flush the browser cache to get rid of older content.

Possible problems when updating from older Frame Controller firmware

If you can not reach the GUI via an actual browser you must do a little trick to update the frame controller. You must reboot the C8702 by briefly pressing the **<INIT>** button (or rebooting it from the console interface). After approx. 60sec (boot up time) you should open the browser again and enter the URL:

<http://<C8702-IP-address>/standalone-update.html>

The following page will open:



Proceed with the image update as described above. When finished you will get a pop up, saying the update was o.k. (it takes approx. 4 - 5 mins – be patient pls.).

Important Note! There was a change in the way the Frame Controller image is sent from the PC to overcome a possible bottleneck of non-fragmented RAM. If you update from an older version (< 2660) you should reboot the Frame Controller before starting the image update. This will ensure that there is enough non-fragmented RAM for the existing update procedure.

If the Frame Controller reboots with the old firmware you must use the **"-a"** image:
(example) "rel_c8702_1_17_8-28002-**a**.img".

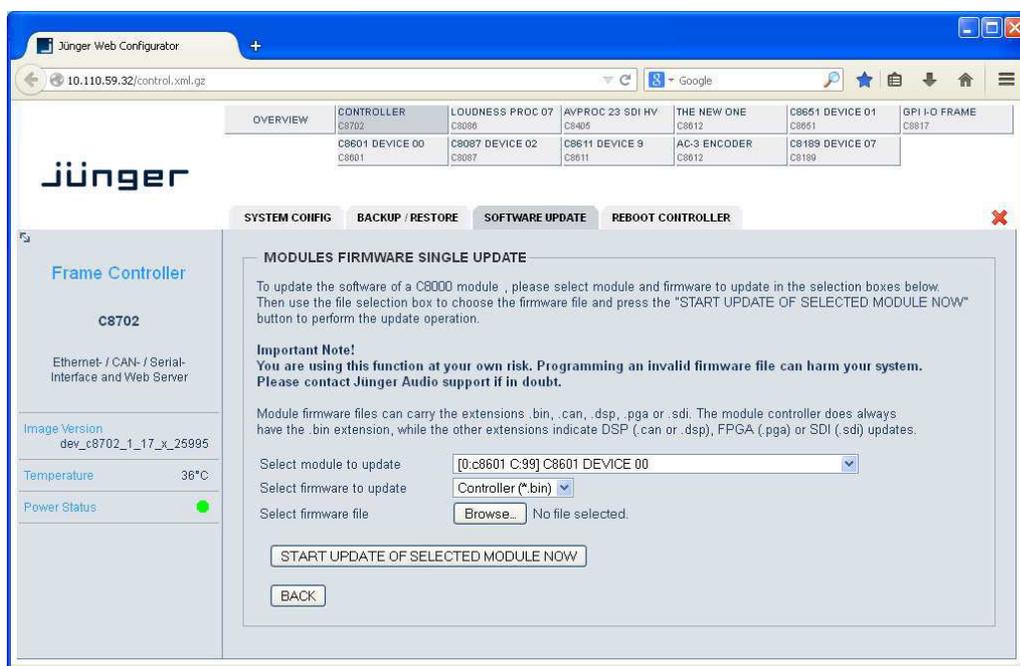
In rare events (if you come from a very old firmware it might be necessary that the update is performed in a two tier approach: First use the **"minimal"** image:
"rel_c8702_minimal_image_1_0_1-30583.img" (the image number may change over time) and as a second step update the actual release.

Modules firmware update

Modules firmware update will normally be done via the **Bulk Updater** software.

If there is the need for special firmware combinations or you don't want to use the latest firmware for any reason, you can make use of the **MODULE FIRMWARE SINGLE UPDATE** function. This function gives you a drop down list of the modules of a frame, their addresses and their actual firmware.

Important Note! Before you update any module firmware and a new image comes with the module firmware archive, you must update the **Frame Controller**. Otherwise the GUI may show incorrect module control pages or the module is displayed in orange or red color.



This is a basic tool and it needs a bit of care when using it. You must update module by module and for each module you must choose the respective part of the firmware, all one by one.

Select module to update [address:type actual firmware] module name
 module controller firmware is indicated by **C:xx**
 DSP firmware is indicated by **DSP:xx**
 FPGA firmware by **FPGA:xx**
 SDI firmware is indicated by **SDI:xx**
 NXP processor based modules C:xx DSP:xx FPGA:xx

Select firmware to update [Controller (*.bin)]
 [DSP (*.can)]
 [FPGA (*.pga)]
 [SDI (*.sdi)]
 [Controller, DSP, FPGA, SDI (*.nxp)]

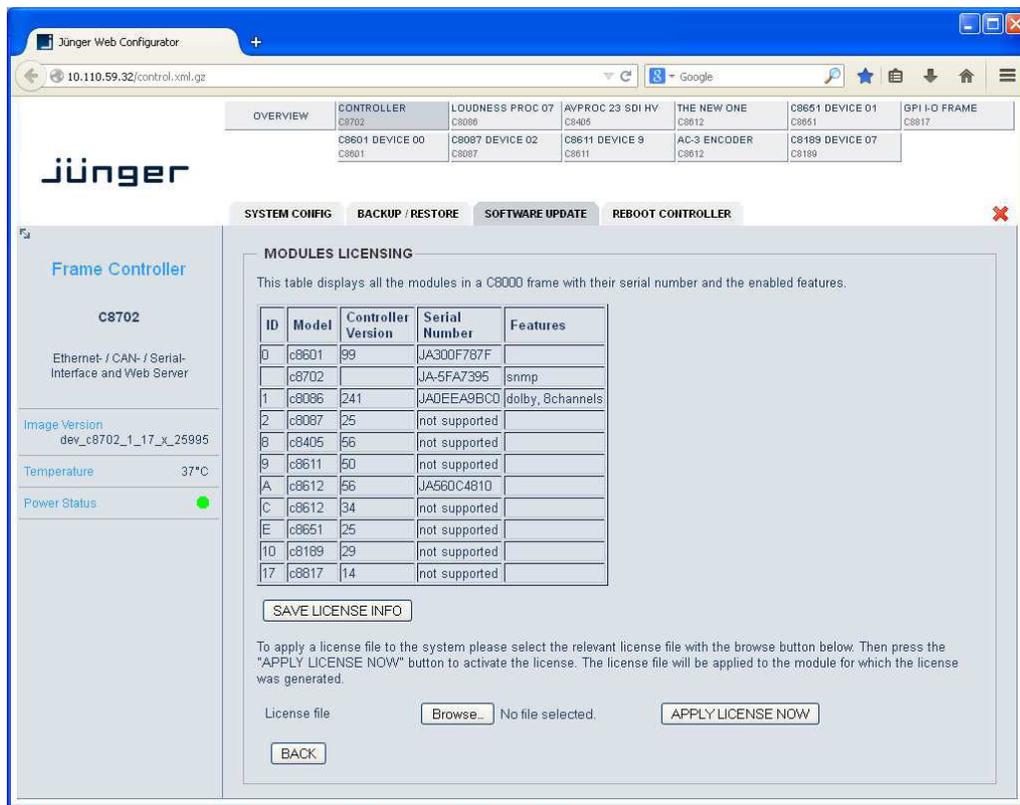
Select firmware file You must browse for the location of the respective file (where you have unpacked the archive or where a single file received from Junger is stored).

Important Note! It is not possible to select a firmware file directly from an archive folder. You must unpack that archive in order to use the individual firmware file(s).

Modules licensing

The **SNMP feature** of the Frame Controller and several special functions of modules like the **Metadata Option** for the LevelMagic processor or number of channels and/or the **surround** feature of compact modules like the **C8492** are options which may be purchased later and which must be enabled in the field.

In order to get the correct licensing file from Junger Audio you must send the Licensing Information file to Junger Audio. You must go to **CONTROLLER > SOFTWARE UPDATE > MODULES LICENSING**:



The table above shows the current license status of an example frame.

You must press: **<SAVE LICENSE INFO>**.

The Frame Controller will now generate an XML file that you must download to your PC and send to Junger Audio for reference.

In return you will get the “License file” that you must upload to the Frame Controller.

You can browse for the file and press **<APPLY LICENSE NOW>**.

Important Note! Some license features need the latest module firmware. Therefore it is recommended that you update the frame before applying the license key file to the frame.

System backup and restore

For safety reasons or when doing module firmware updates you may want to backup the on air parameters and presets of the modules in a frame:

When you press **<BACKUP>** the frame controller will gather all information stored in individual modules of the frame and will build an **XML file** that contains such information. Due to the size of the frame and the complexity of the modules installed it may take a little while. When it's done you will be notified by a pop up. You must select "save file", press **<OK>** and a file dialog will open.

If you drop the preset content of the modules the process will be much faster.

In this case you must check the **"Don't Backup Presets (faster)"** option.

If you want to restore settings of a whole frame you must browse for a backup file stored on the PC and press **<RESTORE>**:

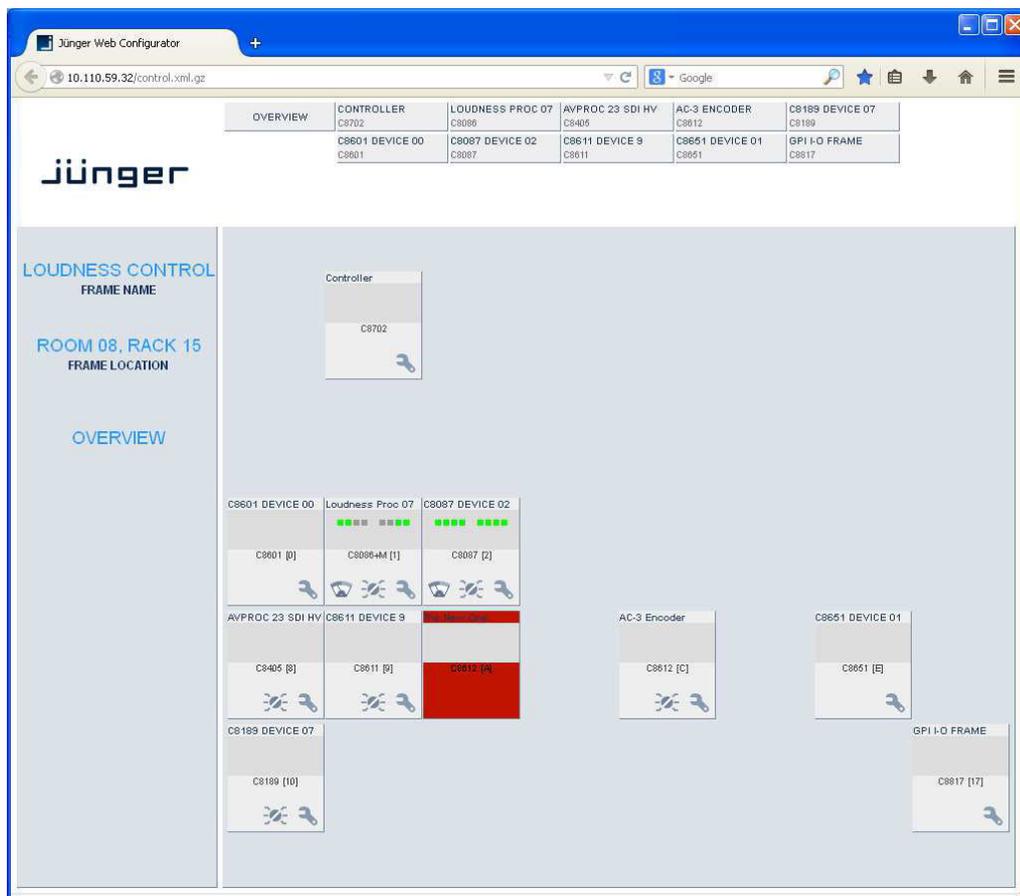
"Don't Restore Frame Controller IP Configuration" option:

If the backup file is from a different frame but with the same configuration or from a partially equipped frame from the test bench, you can prevent overwriting your current frame IP address by the one from the backup file.

Hints for operation

The common web technology has many advantages but also a few disadvantages. Most of the information displayed relies on the data the **browser** receives on demand from the web server of the **communication processor**, i.e. it polls the web server for data. The polling process is divided into time slices of different priorities and the browser content will not be updated automatically for all areas, so a manual reload is recommended if you are not sure about the parameters you see in the GUI.

If a module dies or someone removes a module from the frame, the module graphic turns **red**:



You can only get rid of the **red** coloured module graphic by inserting a working module. If the module is permanently removed you must reboot the Frame Controller. Press the **RESET** button on the front panel briefly, select **REBOOT CONTROLLER** from the web interface or select **“Reboot”** from the console menu. If the reboot was not initiated by the browser you will get a pop up that you have been logged out and you must press the **<OK>** button.

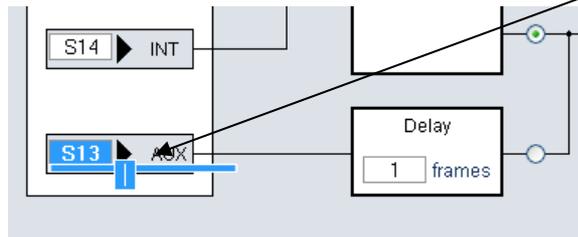
If a module has problems with updating a firmware component (rarely seen with older hardware) it may happen that this process is not successful and the module may stay in programming mode. That mode is indicated by **orange** color instead of **red** as above. If you experience such behavior you must start the update process again. On some occasions it might be necessary to power cycle that specific module before starting the update process again.

It is always a good idea to connect to the console of the Frame Controller either by Telnet via TCP/IP or natively by RS232 or USB to RS232 converter and to run a terminal program to observe the debug printouts (see page 5).

Important Note! The module for replacement **must** be of the **same type** and **must** have the **same CAN address**. If a **different module type** is used with the **same CAN address** as the one removed, you **must reboot** the Frame Controller!

Under some circumstances the **browser session** with the web server of the **C8702** Frame Controller will **expire**. In this case you must reload [F5] or close the browser and start it again in order to open a new session.

To change values of parameters more comfortably we use a little **slider**.



After clicking into such an input field, the slider may either be **moved** by the **mouse pointer** or the **arrow keys** of the keyboard or by the **mouse wheel**.

Error monitoring and **auto switch over** on error conditions

The screenshot shows the 'EMBEDDER' tab of the web interface. It includes settings for SDI Bypass, Relay Bypass, 3G-B Stream Select, and SNMP: Input Lost. The 'Embedder Bus Input' section lists channels 1/2 through 15/16, each with a main input, an alternative input, and an auto mode 'TEST' button. Error detection is enabled for all channels. A 'Relay Wait Time After Power Up' is set to 6 seconds. A note explains that error detection triggers a red LED and an SNMP error, and that auto mode is only possible if error detection is on.

This function is implemented for the **C8402/03/04/05 SDI** modules. It allows the detection of an error condition downstream in the signal path. Such an error condition may happen if a downstream DSP module like the C8086+ has a problem or its input signal is gone. This function offers you the possibility to switch over to an alternative bus for fail save operation. Such an alternative bus may be the input of the DSP module for simply bypassing it (if the module fails) but it may also be an alternative audio signal such as a pre-recorded announcement.

For details see C8402/03/04/05 manual.

Monitoring the processing status of a processing module

The major parameter of the audio processing is the **momentary GAIN** of the module. This gain is permanently changed by an adaptive dynamic process like **LevelMagic™**. If this gain sticks at one end of its working range for too long, the settings of the processing parameters should be checked.

For the Level Magic process we have defined the “stick” condition as follows:

If the **low pass weighted average gain** of the process is **equal** or **above** the Leveler **max Gain** for more than 10 secs. the respective **Processing Status** soft LED will turn from **green** to **red** (see status panel left hand side):



The monitoring of the processing status may be turned **ON / OFF** via the respective check boxes: **"Proc Status Monitor"** above. It is important to turn it off if a processing channel is not in use or the leveler max gain settings are too low for good reasons so it will cause an error by definition. This will prevent the system from generating unfounded alarms (if the bad condition is monitored by an external entity).

Enhanced bit transparent mode

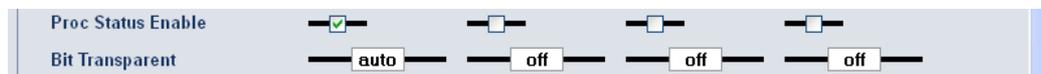
The SDI I/O or AES modules generate a **non audio** flag that indicates if the de-embedded data are marked as non audio.

Important Note! This information does **not** mean that there is **no** signal.

This is the case for coded signals like **Dolby E** or **Dolby Digital (AC3)** or similar formats. These are data streams sent over two ordinary digital audio channels as a transport media. Audio processing equipment must not modify such data stream. Therefore you may turn the signal chain into the **Bit Transparent** mode.

In the past, the knowledge about such data streams came from external equipment or was gathered from play lists of automation systems.

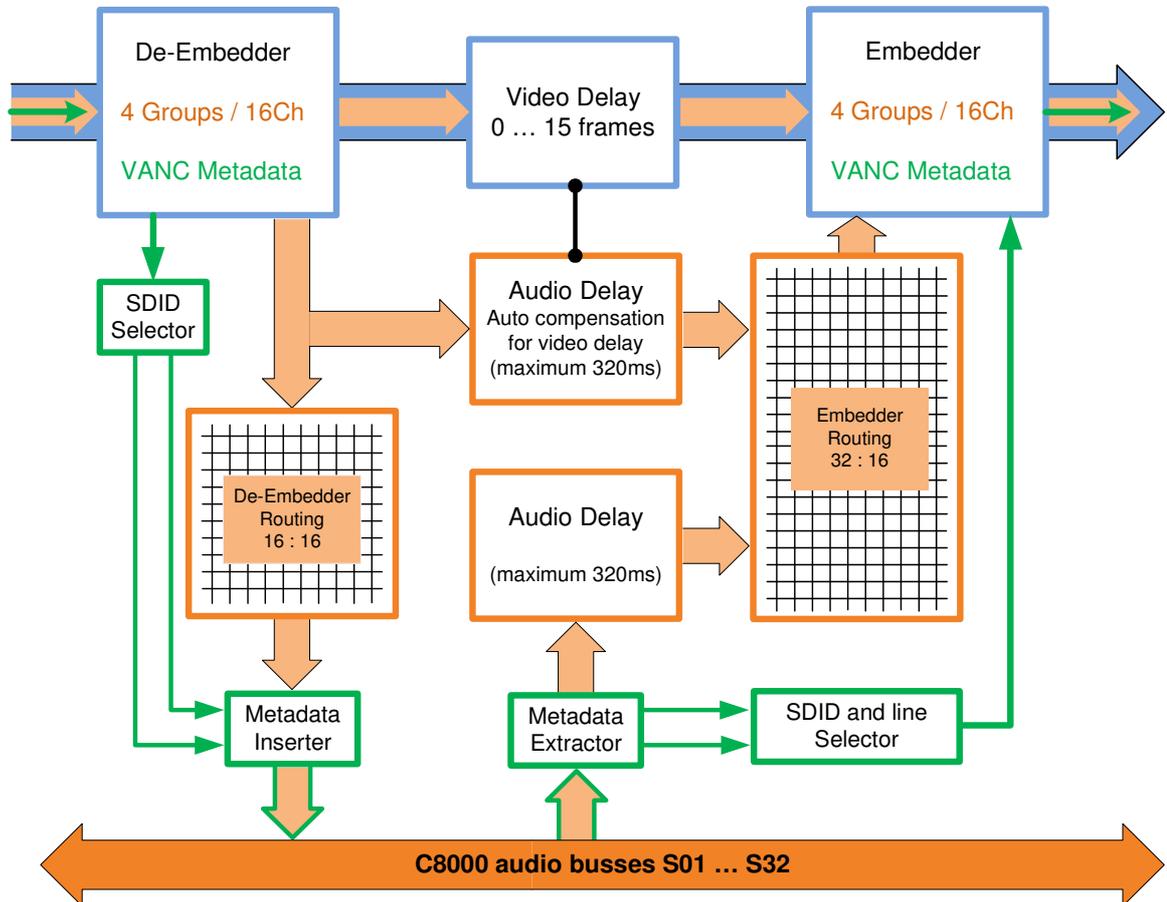
Now the Junger processing channel may be set up to **Bit Transparent** mode = [**off / on / auto**]:



In "**auto**" mode the module detects the **non audio** flag and will then pass the stream through the processing module without touching it to avoid damage to the data structure.

You may also turn it "**on**" manually or via a preset for external control.

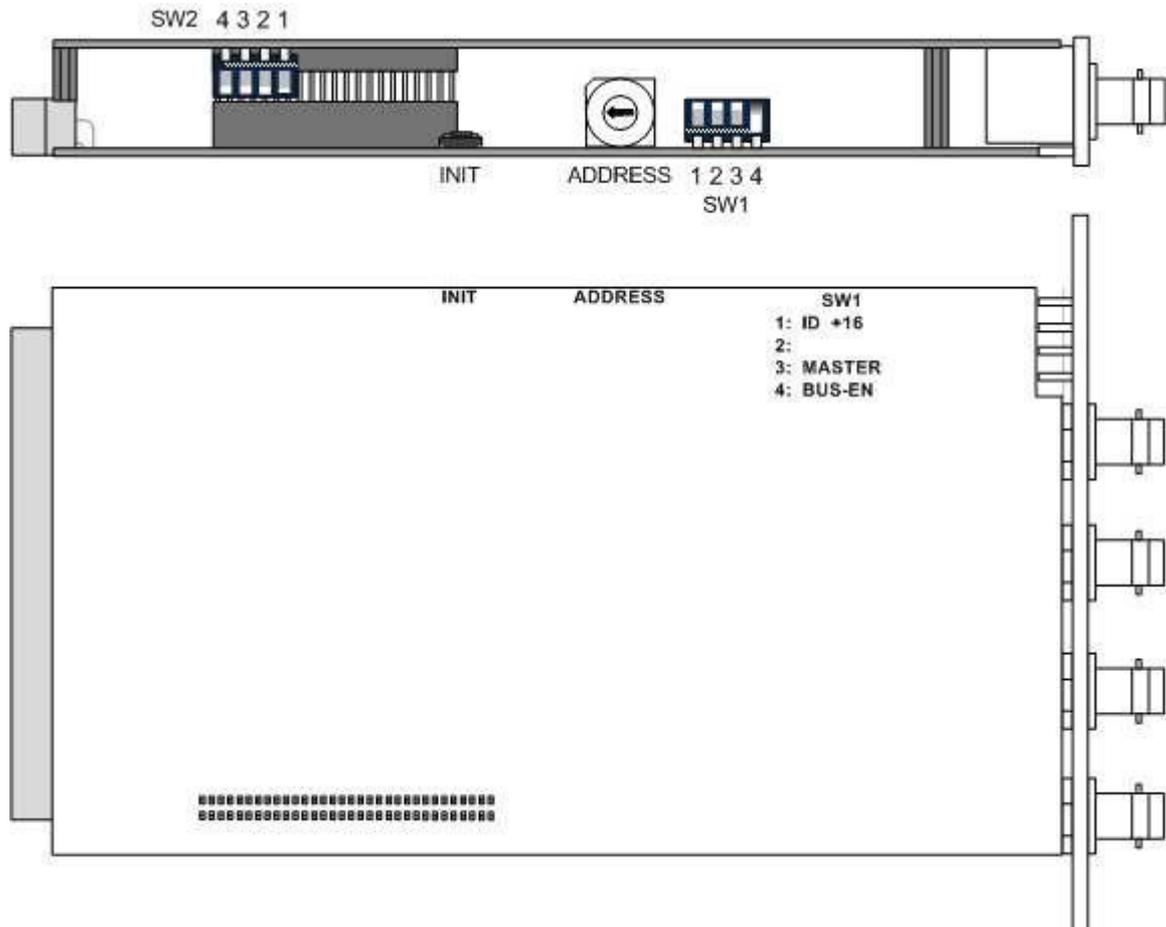
block diagram



3G/HD/SD SDI 16ch embedder/de-embedder
with video delay and VANC Dolby Metadata

C8405

location of switches:



initial set up / bus assignment

For the initial setup the **CAN address** selection is the most important setting. To avoid address conflict with other C8k modules the CAN address setting must be done with care. See C8k System manual for details.

The **MASTER MODE** is important if the **C8405** must deliver the audio clock for signal distribution within the C8k frame.

The **BUS-EN** switch controls the driver circuits when power is turned on. This allows you to insert a new module into an existing system without the risk of disturbing signals on other busses if the drivers are disabled when the module is inserted into a frame with unknown bus configuration.

switch settings

INIT

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

ADDRESS

Set the **CAN ADDR** rotary encoder to an address, which is not in use by another module of a C8000 frame (for details regarding CAN addressing, see C8000 system manual).

SW1

1 = ID +16

ON

CAN address is extended by **+16** (counting from 0x10 to 0x1F)

OFF

CAN address is standard (counting from 0x0 to 0xF)

2 = Not Used

OFF

3 = MASTER:

ON

The C8405 is clock master for the C8000 system

Important note! In **Master Mode** the **C8405** must be inserted into one of the red color coded slots of the C8k frame. Any other sync module must be removed from the frame in such a case!
For the **C8934** Split-Frame there is no special slot.

OFF

Standard operation, no special care is needed

4 = BUS-EN:

ON

Connects the outputs to the C8k audio buses on power up

OFF

Disconnects the module outputs from the C8k buses on power up

Important note! To avoid audio bus conflicts when you replace a **C8405** or install an additional one and the configuration is unknown, the output bus drivers must be disabled before inserting it. If all settings are done remotely and the unit fits into the bus assignment scheme of a frame, you must remove it and place the switch back into position **BUS-EN=ON**.

SW2

1 = Not Used

OFF

2 = Not Used

OFF

3 = Not Used

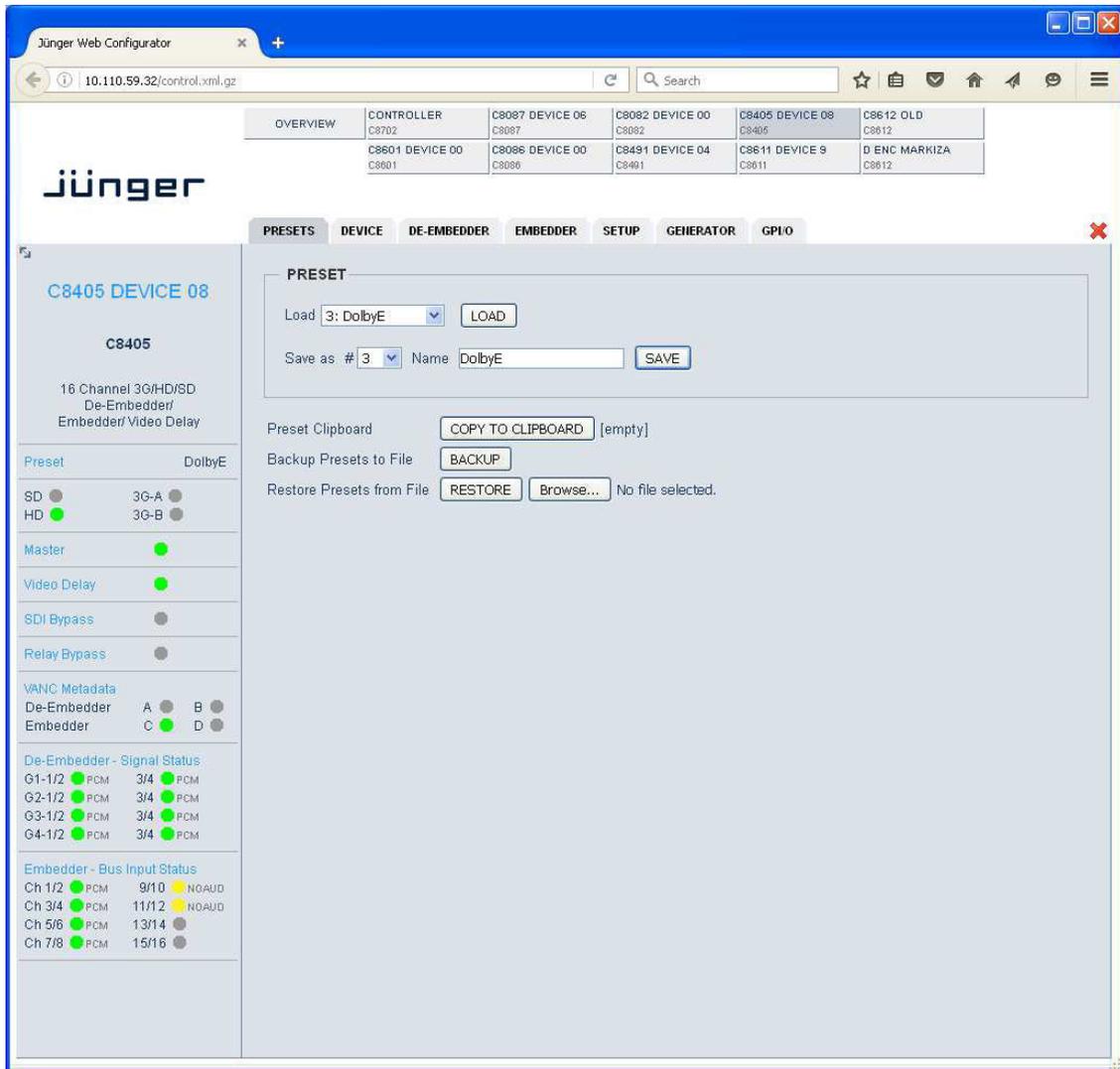
OFF

**4 = HD progressive
switching mode**

ON

For progressive HD formats carrying Dolby E signals, it is mandatory to switch only every second HD frame, because a Dolby E data frame [40ms] spans over two progressive video frames. Otherwise one may cut the Dolby E data frame present at the switching moment in the middle resulting in audio noise after decoding. Dolby recommends using a synchronous BB as a reference for the switching point. In this case the system must be synchronized by a C8840 and the C8405 **must not** be set to master mode! In addition to that, **SW2-4** must turned **ON** to use the V-sync derived from the BB to act as the switching point reference for the internal matrix as well, instead of the SDI frame reference itself.

PRESETS



The **C8405** has **16 Presets**. These Presets are named **PRESET 01** to **PRESET 16** by default. The status window at the left hand side shows the name of the active preset. The word “**modified:**” will appear in line with the Preset name, if a preset parameter was changed by the operator.

Load Preset

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

Save as Preset #

Select a preset memory number.

Name

Assign the preset a **16 digit name** and press **<SAVE NOW>**.

Preset Clipboard

Copy the active preset to a clip board, 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 a **backup file** from the PC.

DEVICE



On the **DEVICE** page you can assign a **16 digit name** to the module, perform a warm start by pressing **<RESTART>** or initialize the module to factory default settings by pressing **<INITIALIZE>**.

You can **BACKUP / RESTORE** all module settings and parameters including presets as well as the actual set of parameters used by the module controller.

FIRMWARE

Controller
SDI
FPGA

The firmware of the module controller
The firmware of the SDI part
The version of the FPGA on the audio board

DE-EMBEDDER



On the **DE-EMBEDDER** page you will get a matrix overview of the signals which are extracted from the SDI data stream and sent to the C8k audio frame bus. The de-embedder can route all of the 16 embedded audio channels in any combination to the C8k audio busses.

In addition to the 16 signals from the 4 groups, a **Silence** source is provided.

8 channels may be grouped and sent in **8CH Multiplex Mode** over **one** bus line.

You can enable / disable the Bus Drivers to set up the module without interference with other modules already installed.

VANC Metadata

The **C8405** may receive, decode and insert **VANC Dolby Metadata** into the c8k Metadata distribution system for use by other modules inside a frame.

The transport of Dolby Metadata embedded into the Vertical Ancilliary data space of an SDI signal is defined by **SMPTE 2020** suite of standards. For details pls refer to such documents.

In general the mechanism may provide up to eight independent Dolby Metadata Streams. The format of the streams is asynchronous data like one will find on the Dolby 9-pin serial Metadata Interface of the Dolby decoders and encoders as well as the C8601 Dolby E/D decoder, the C8611 Dolby E encoder and the C8612 Dolby D/D+ encoder from Junger Audio.

The streams are identified by a DID Data Identifier (value 0x45). Each individual stream is identified by its Secondary Data Identifier SDID. The SDIDs range from 1 to 9.

SDID 2 – 9 are used to identify the streams associated with a respective program. The SDID number also tells which embedded audio signal pair (e.g. G1-1/2) carries the first pair of audio channels for that program. The rule is that further audio channels belonging to the same program must be embedded in consecutive order.

SDID 0x01 identifies a Dolby Metadata stream that is not associated with an audio channel pair and may be used if only one VANC stream is embedded.

The Junger Audio system allows to de-embed up to two independent VANC Dolby Metadata streams named **A** and **B**. You can select the respective SDID for the de-embedder.

The table at the bottom of the DE-EMBEDDER page shows the VANC streams found in an embedded signal :

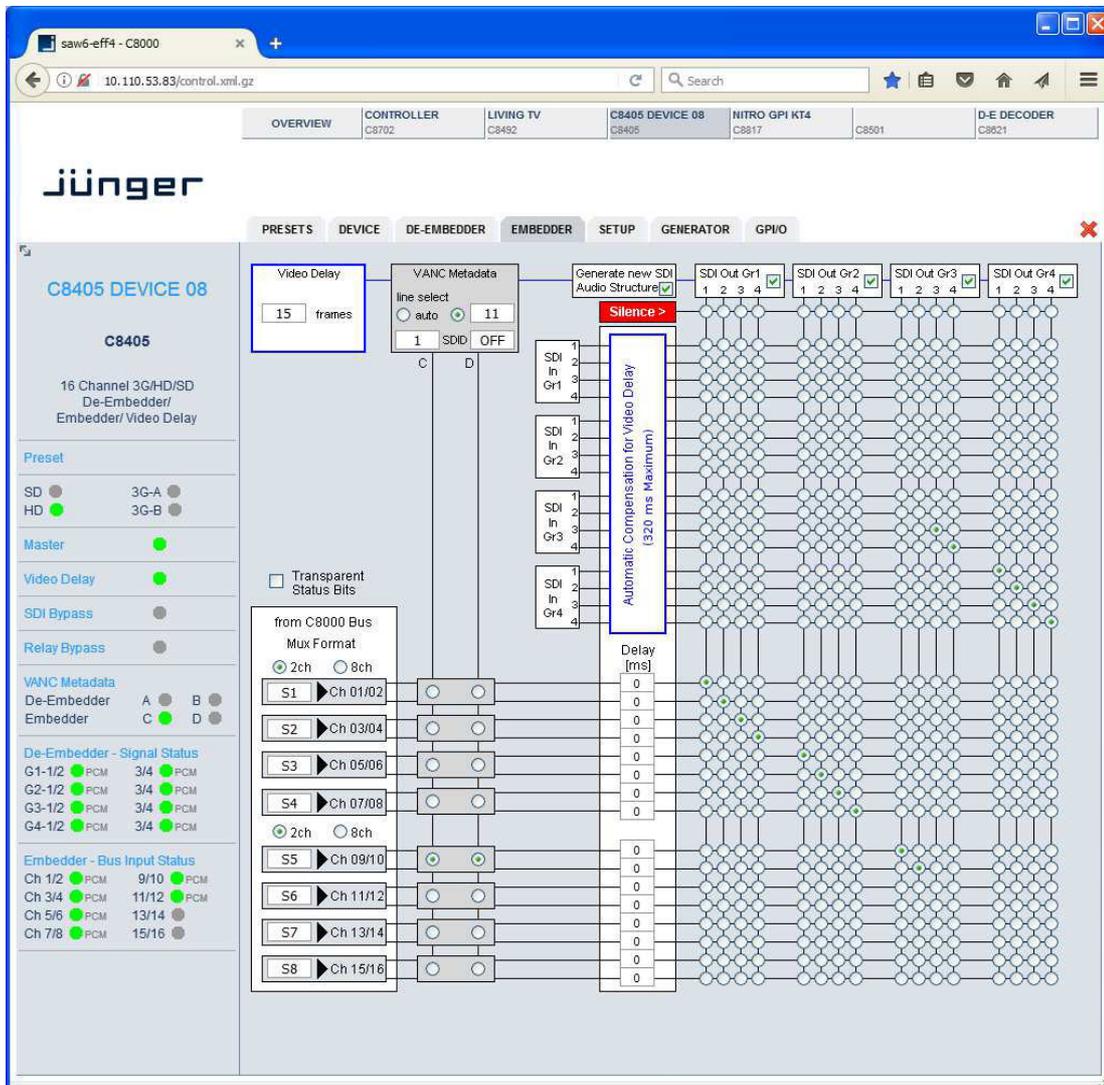
VANC Metadata received									
SDID	1	2	3	4	5	6	7	8	9
	●	●	●	●	●	●	●	●	●
Associated audio channel	non	GR1 Ch1/2	GR1 Ch3/4	GR2 Ch1/2	GR2 Ch3/4	GR3 Ch1/2	GR3 Ch3/4	GR4 Ch1/2	GR4 Ch3/4

Via the VANC de-embedder routing you may link the respective Metadata to their audio channels. The Junger Audio Metadata system inside the c8k frame makes use of the ASE User Bits to move Metadata to other modules. If you disable the VANC routing these User Bits are transparent again and carry the information from their source somewhere upstream.

The status panel at the left hand side in the GUI shows if the pre selected stream carries valid Metadata (green) or not (red) :

VANC Metadata				
De-Embedder	A	●	B	●
Embedder	C	●	D	●

EMBEDDER



The **EMBEDDER** page is a little more complex because it allows routing within the SDI domain as well as in any combination with signals returned from the audio busses.

A word on embedding

There are two principle methods to embed audio. First of all you can leave the **Ancillary Audio Data** structure as it is and simply replace the audio samples. If there is no Group existing from the input you must build a new one and place it somewhere in the Ancillary Data area. Unfortunately **SMPT E** left room for freedom where to place the data. This may cause fragmented data blocks after the embedding process, with wrong parts left over. If this is the case a downstream de-embedder will be confused and may reassemble the audio samples in a wrong way causing distortion. That's why the C8405 offers a mode where you can clean up the incoming data structure and generate a new one.

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 the delay function off.

Important note! The video delay is a static setting. I.e. you **must not** change it on air! This will cause a resynchronization of the SDI stream. Since the video delay is part of the presets, you must be careful when creating presets to use the same value in all presets!

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 there is no **SDI Out Grx** checked.

SDI Out Grx

This check box enables each of the 4 SDI audio groups to be used individually by the C8405 embedder. If it is not checked and "**Generate new SDI Audio Structure**" is not enabled, the audio data from the input will travel untouched from the SDI input to the output.

Silence

Mutes the respective audio channel at the embedder side.

Delay

The inputs of the embedder routing matrix can be taken either from the de-embedder or from the C8k audio busses in any combination. If they are taken from the de-embedder and a **Video Delay** is introduced, the Video Delay will **automatically** be **compensated** for those signals.

For signals coming from the C8k audio busses an **independent delay** per single channel to the embedder is available.

Important note! These delay settings are also static. You **must not** use this feature if you shuffle audio signals with different delay times. It will cause strange effects at the moment of switching, because the delay length is changing!

Mux Format

The signals from the C8k audio busses may be received in **2CH or 8CH multiplex mode**. If they must be received in **8CH** multiplex mode there is only one bus selector available for each of the two eight channel groups.

Transparent Status Bits

For the signals coming from the C8k audio busses, you can decide whether the **AES Channel Status Bits** are taken from their source (transparent) or if you want to generate new ones.

In this case the **Channel Status** will be set to:

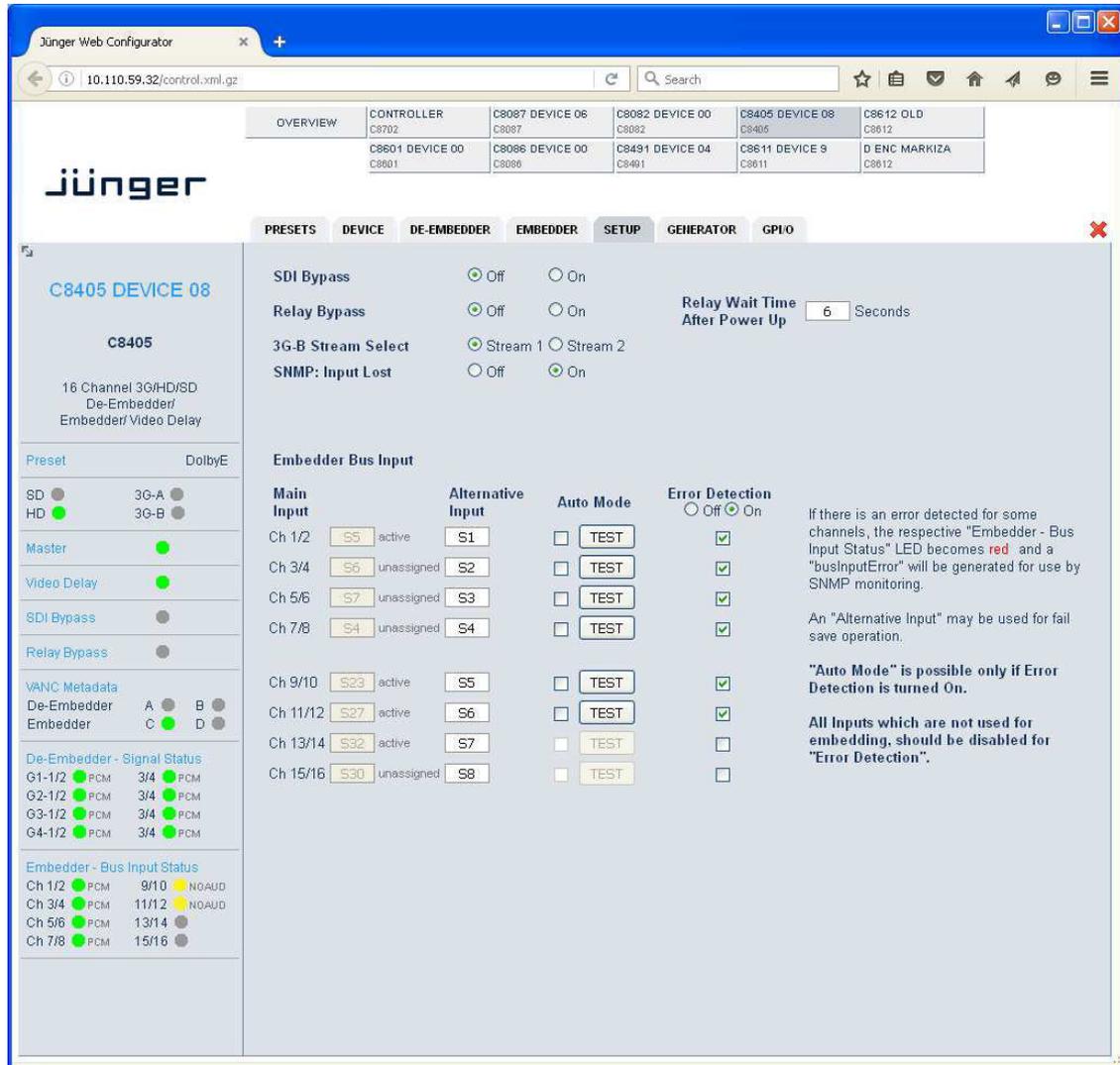
Format :	Professional
Audio Mode :	Audio
Emphasis :	None
Freq. Mode :	Locked
Sample Freq. :	48kHz
Channel Mode :	Not Indicated
User Bits :	None
Auxiliary Bits :	24Bit
Audio Word Length :	Not indicated

VANC Metadata

The **VAC Dolby Metadata** embedder allows you to embed two independent Metadata streams **C** and **D**. You may assign each stream an independent SDID (see page 9 for details). The Metadata to be embedded are extracted from the User Bits of the audio data received by the respective c8k audio busses.

You can select a line where the Metadata must be embedded or you can leave it in "**auto**" mode. In this case the next possible line that has nothing embedded will be selected.

SETUP



From here you can set up several hardware related functions :

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.

Relay Bypass

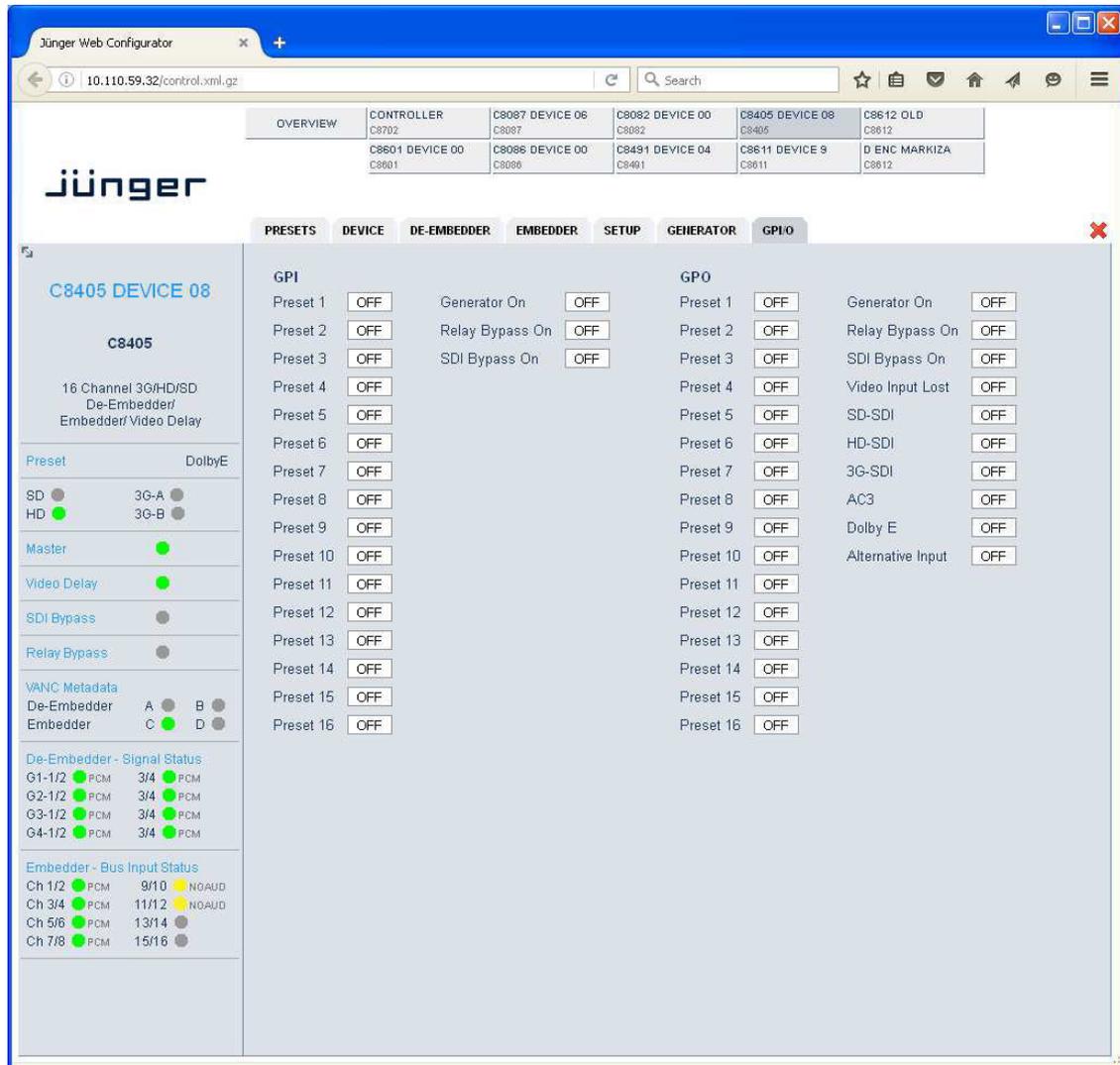
will deactivate the **Bypass Relay**. It provides a short cut from **SDI-IN** to **SDI-OUT1** and disconnects the de-embedder from the SDI input. This relay also serves as a **fail bypass** if the power is off. This feature maintains the SDI signal for downstream equipment.

SNMP: Input lost

The monitoring function of the physical SDI can be disabled for the SNMP agent, to prevent from unwanted traps if the module is frequently taken out of service. The SDI status display within the GUI is not affected.

Relay Wait Time After Power Up	The time from powering the C8405 up till the relay is engaged. To avoid audio interruptions you should not engage the relay before you are sure that all other equipment in the signal chain is up and running. Because this is an asynchronous process the relay switch over causes a glitch in the SDI signal.
Error Detection	<p>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, DSP module).</p> <p>The Error Detection can be turned Off and On for each input from the bus. You will see the status on the left hand side: "Embedder (Bus Status)". A grey "LED" shows that the detection is disabled. While green is OK, red indicates an error condition and yellow indicates a Non Audio signal (e.g. Dolby E stream).</p> <p>The bus status as well as the SDI input 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).</p>
Main Input	This is a display of the audio busses which have been assigned at the EMBEDDER page.
Alternative Input	For automatic bypass of a (e.g. faulty) processing module or switching over to an emergency announcement you may set up alternative inputs. Switch over may be tested with the TEST button.
Auto Mode	Enables the automatic switch over in case an error is detected for the Main Input.
Important Note! Auto Mode is possible only if Error Detection is turned on.	
<TEST>	The soft button may be used for testing the switch over function.

GENERATOR



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

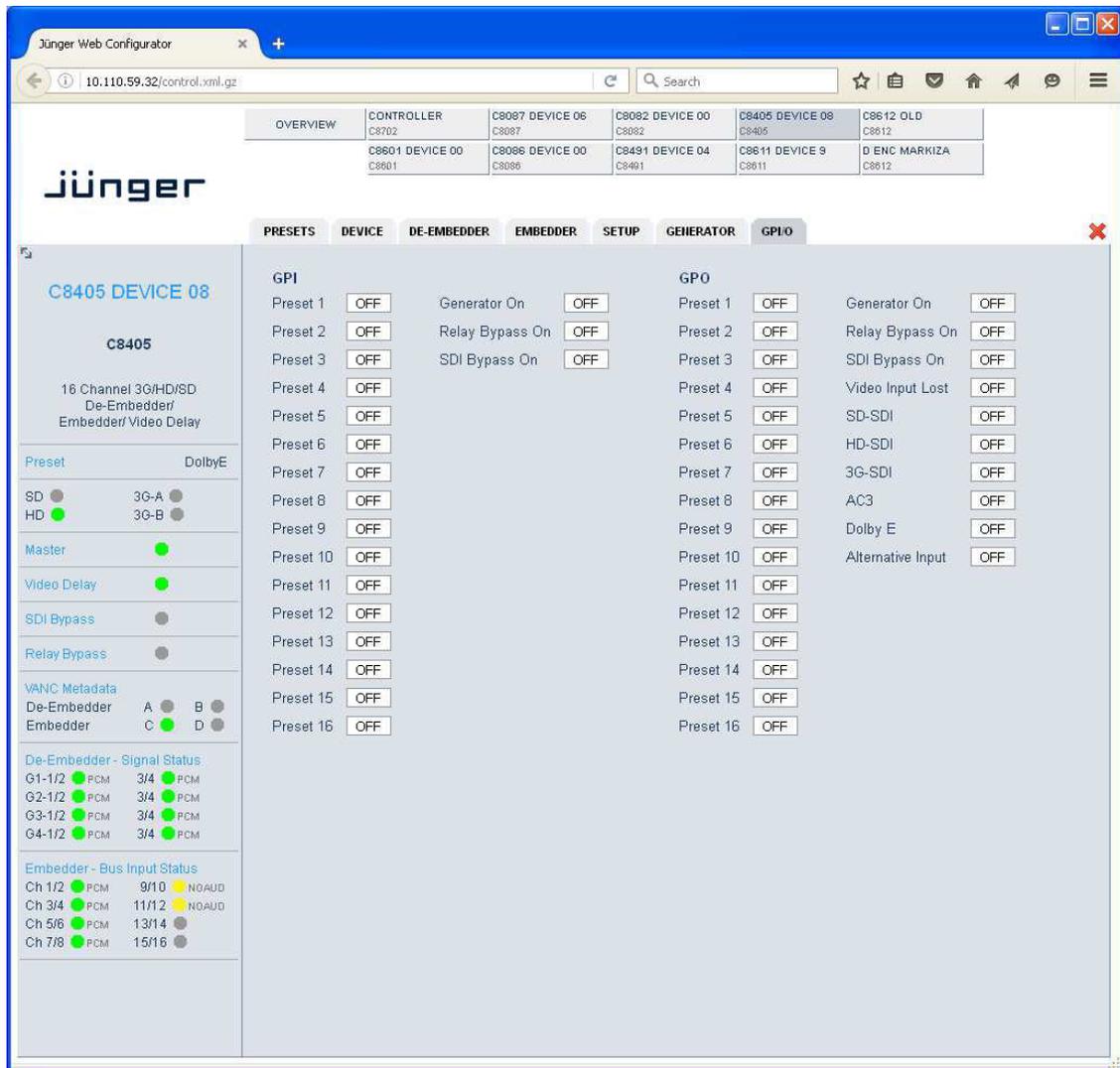
If the **Automatic** mode is selected and the Generator is enabled, it turns on if the SDI input signal fails. In this case it will generate the same video format as the previous input signal.

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.

The **SDI input will be ignored** but you may embed signals from the C8k audio busses for testing purpose or you can use the SDI stream as a carrier to send 16 audio channels from A to B over one coax cable.

GPI/O

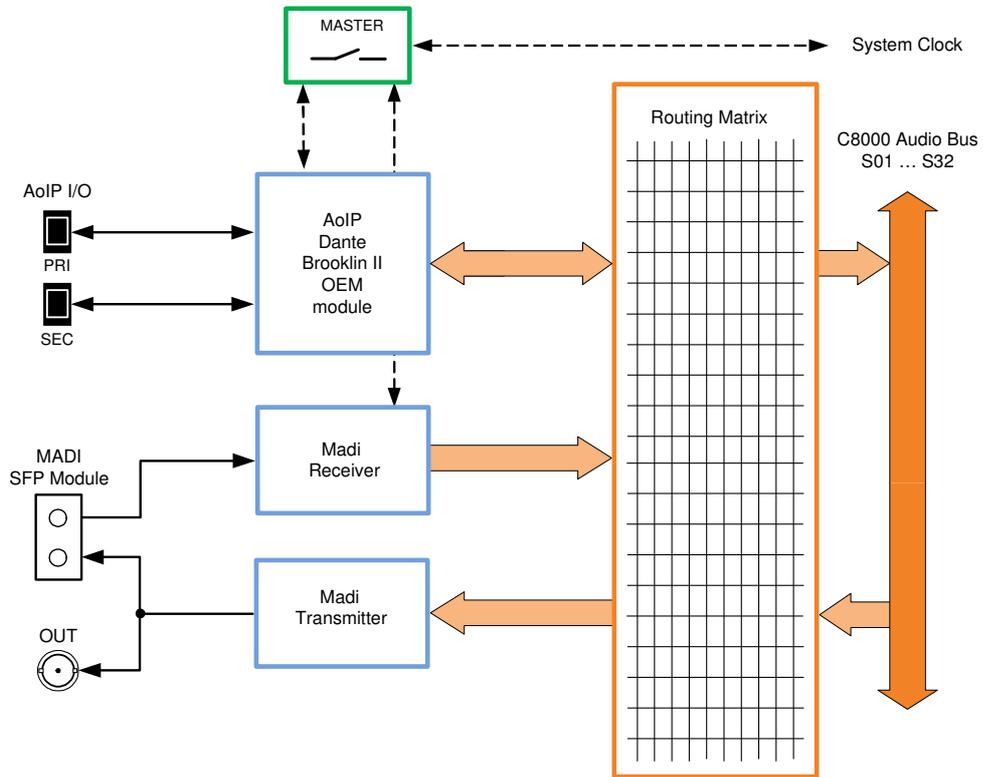


GPIs are useful if you want to recall settings remotely e.g. by presets.

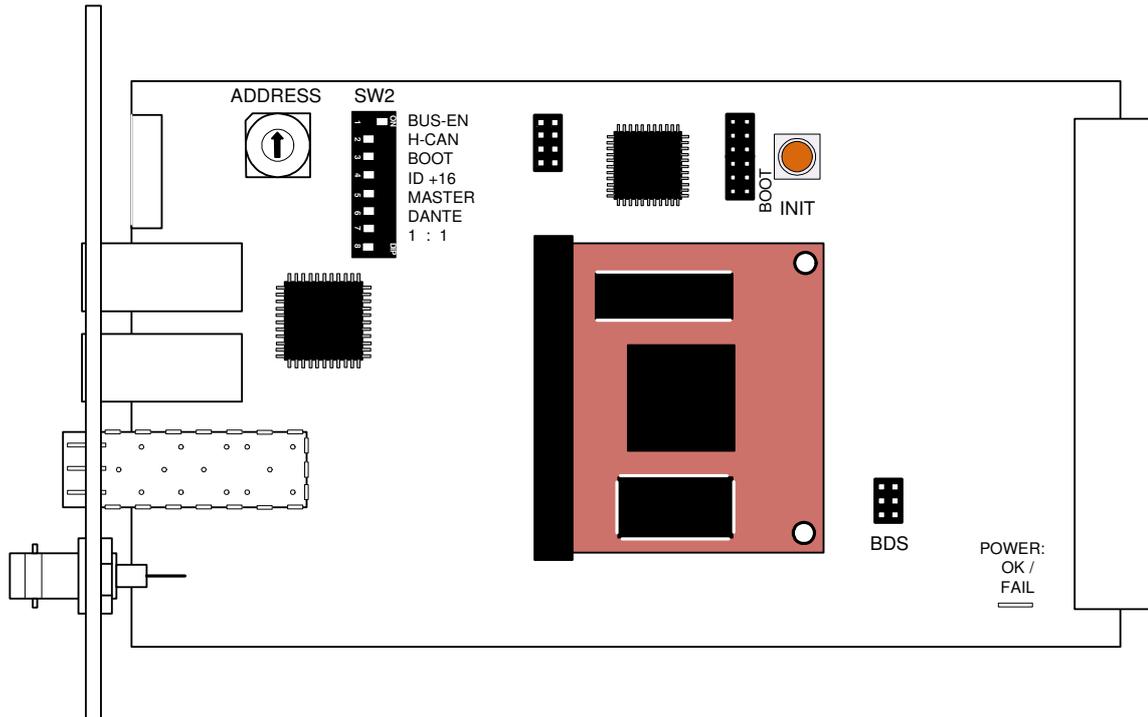
The C8k frame can handle **127** different **GPIs**. You must assign a unique number to the respective function. Such numbers will be generated by the **brc8x** Broadcast Remote Controller or by a **GPI/O interface module GPO** (see C8817 manual for details). If the **C8405** receives such a number it will for example load the respective preset or will turn the generator on.

GPOs (Tallies) may signal the status of a module. The **GPI/O module** permanently listens for such numbers. If it reads such a number it will engage the respective **GPO** (see C8817 manual for details). This allows for easy interconnection with more generic monitoring equipment.

block diagram



Initial set up



64ch optical MADI & AoIP I/O

C8316

ADDRESS: This **rotary encoder** sets the **CAN ID** of the **C8316**. The 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.

SW2:

#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 **C8316** 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 BOOT **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** = Sync is taken from the **c8k** frame
ON = The **C8316** will be **sync master** of the frame (or an C8934 island).
Sync source is defined by SW2 #6

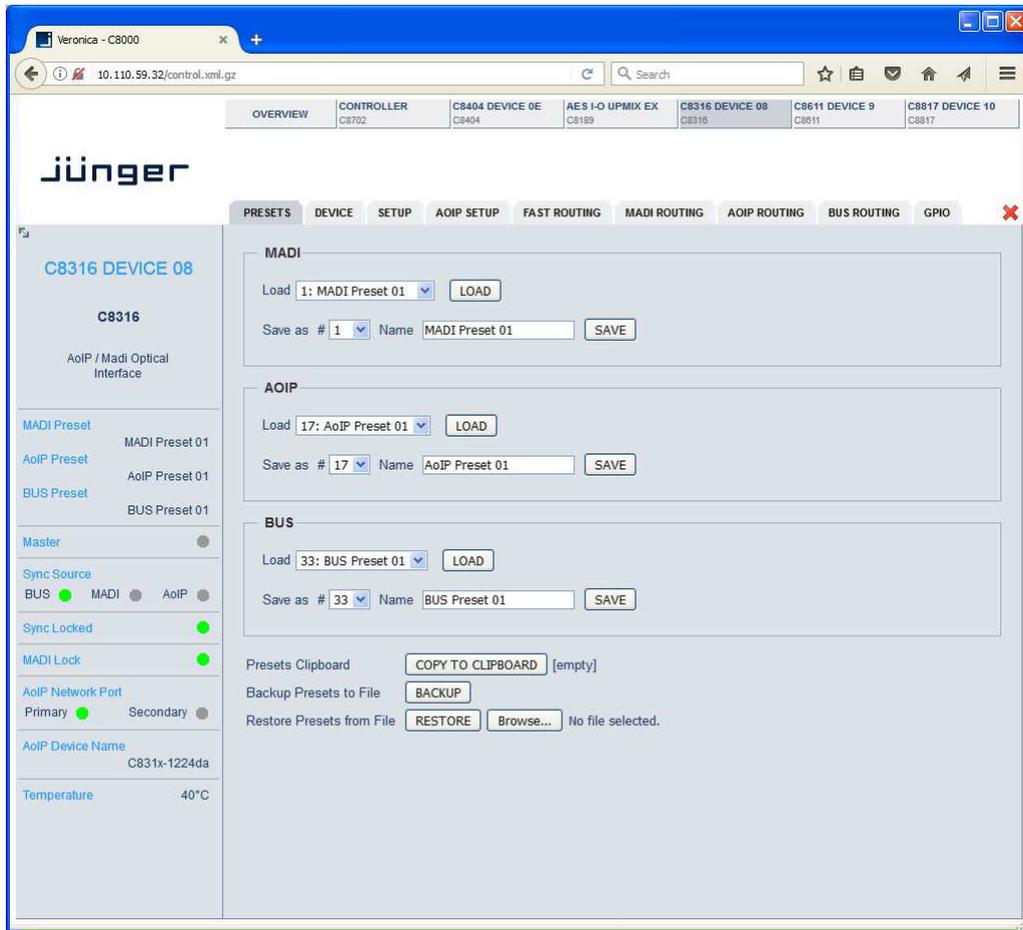
#6 DANTE **OFF** = **MADI** is sync reference.
ON = **DANTE** is sync reference.

#7 1 : 1 **OFF** = Remote controlled operation by **C8702** frame controller.
ON = Stand alone operation. **MADI** and **AS67** interfaces are bridged.

#8 **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.

PRESETS: Each of the three preset banks holds the parameters of the respective MADI, DANTE and c8k internal BUS routing.

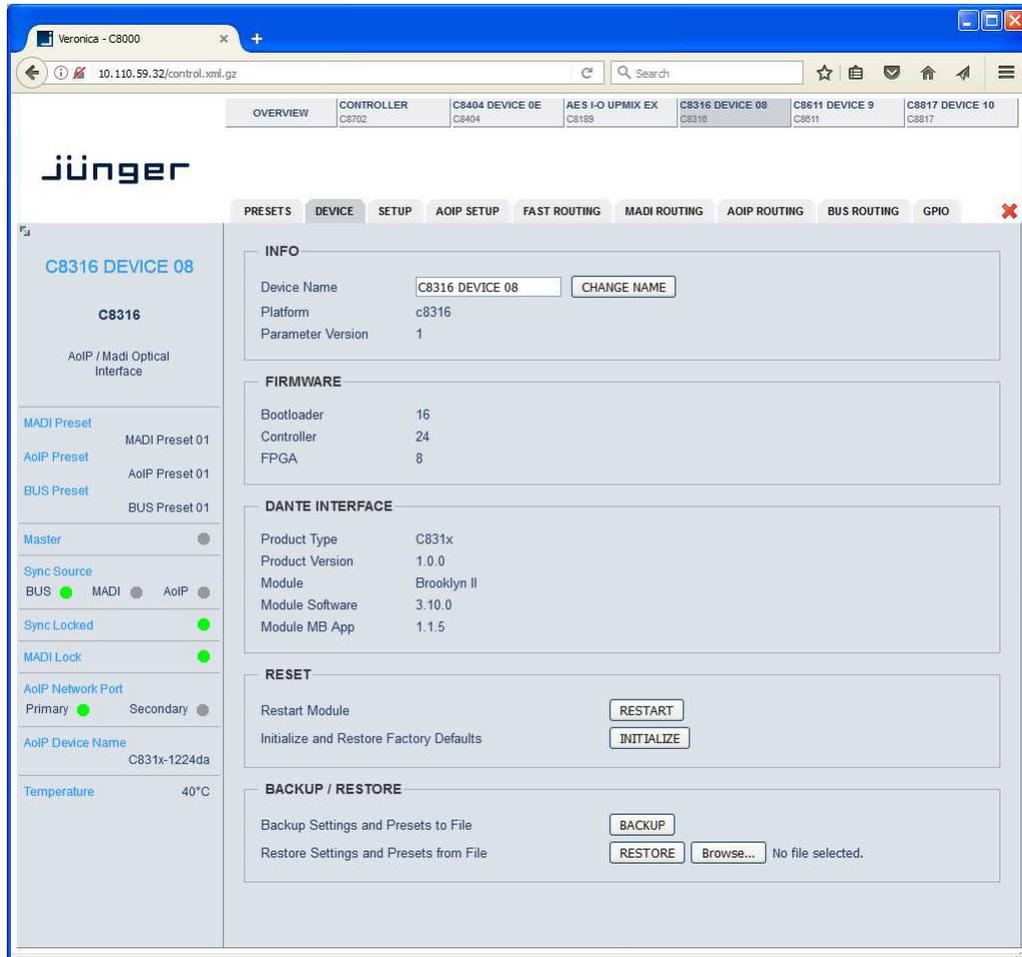


There are presets for each of the three banks for the main function blocks of the **C8316**.

Since the **C8316** offers two interfaces each one has an individual bank of 16 presets to recall parameters at any time.

MADI	refers to the MADI ROUTING pane
Load	[1: "name" ... 16: "name"] Select a preset by number/name and press <LOAD> . The preset number and name loaded automatically appear in the Save as # and Name field below.
Save as #	[1 ... 16] You must elect a preset memory number where you would like to save the actual metadata parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save here and press <SAVE> . The number and the name automatically appear in the "Load" fields as well because they are active now.
AoIP	Refers to the AOIP Routing pane
Load	[17: "name" ... 32: "name"] Select a preset by number/name and press <LOAD> . The preset number and name loaded automatically appear in the Save as # and Name field below.
Save as #	[17 .. 32] Select a preset memory number where you would like to save the actual audio program parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save (up to 16 digits) and press <SAVE> .
BUS	Refers to the BUS pane A bank of 8 presets to recall device settings.
Load	[33: "name" ... 48: "name"] Select a preset by number/name and press <LOAD> . The preset number and name loaded automatically appear in the Save as # and Name field below.
Save as #	[33 ... 48] Select a preset memory number where you would like to save the actual audio program parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save (up to 16 digits) and press <SAVE> .
Preset Clipboard	Copies the presets to a frame internal 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 <browse> for a backup file from the PC and restore it by pressing the <RESTORE> soft button.

DEVICE: Display of device specific hardware information



INFO

Device Name [16 digit ASCII text]
Pressing **<CHANGE NAME>** will do so.

Platform [C8316]
Hardware related descriptor.

Parameter Version [x]
Software related descriptor (descriptor of the feature set).

FIRMWARE

Bootloader [xy]
Actual version of the card boot-loader.

Controller [xy]
Actual version of the module controller firmware.

FPGA [xy]
Actual version of the system FPGA.

DANTE INTERFACE

Product Type	[c8k_x] Customized version for the c8k system
Product Version	[x.y.z] HW of the DANTE OEM module
Module	[Brooklin II] DANTE OEM module
Module Software	[3.10.0] Software version of the module FPGA
Module MB App	[1.1.5] Software version of the FPGA embedded controller

RESET

Restart Module	<RESTART> Pressing the soft button will warm start the module.
Initialize and Restore Factory Defaults	<INITIALIZE> Pressing the soft button, will clear the parameter memory and will initialize all parameters to their factory default values.

BACKUP / RESTORE

Backup Settings and Presets to File	<BACKUP> Pressing the soft button will create an XML file that one may store on a PC.
Restore Settings and Presets from File	<RESTORE> Pressing the soft button will upload a backup file that has been selected via soft button <BROWSE> and move the previously stored settings back to the module.

SETUP: Set up of general device parameters



Common Config

Enable Bus Driver	[ON/OFF] You can temporarily disable the bus drivers by selecting OFF here. The state of this soft switch also depends on the setting of SW1 on the module PCB. If SW1 #1 is turned off, this switch 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.
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64ch optical MADI & AoIP I/O

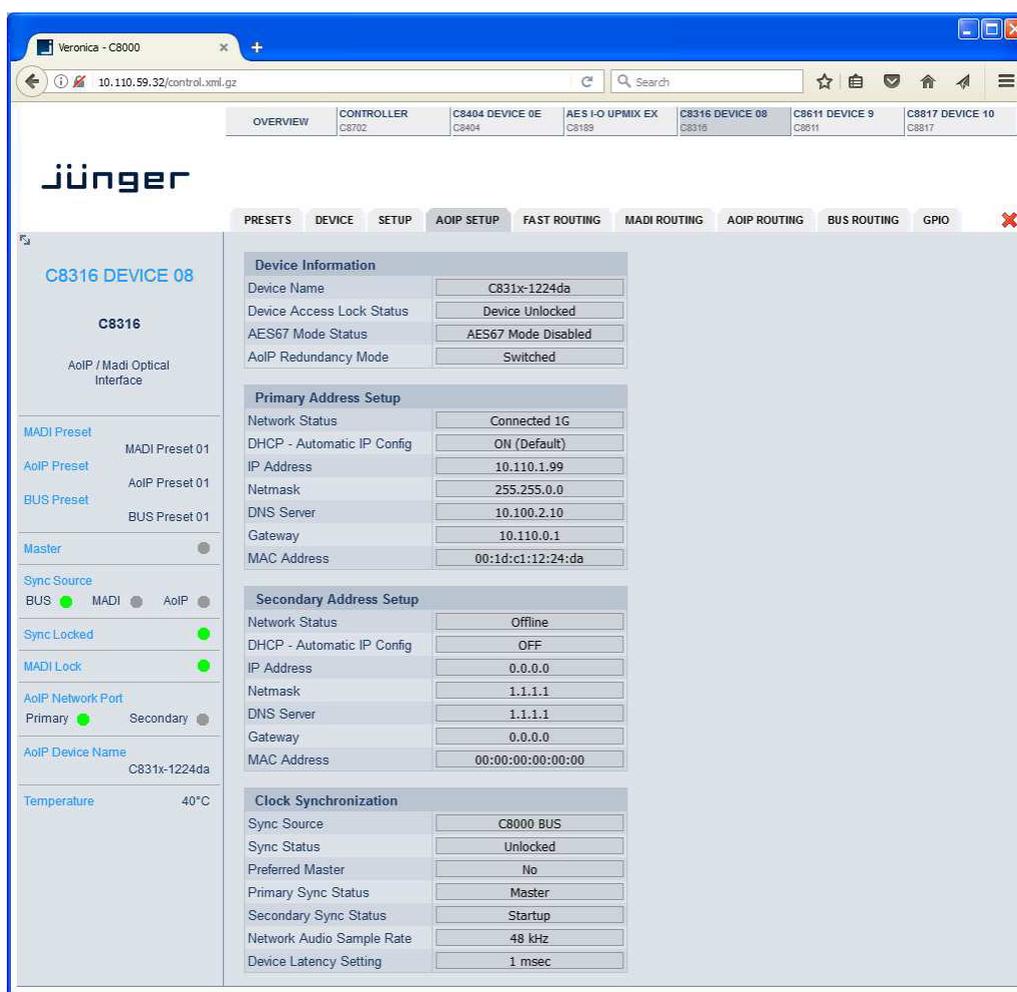
C8316

- MADI Channel Count** [64 / 56]
General set-up of the number of MADI channels in use. It must be equal to the channel count of the device from where the **C8316** receives from or where it transmits to.
- MMA Sync** [OFF/ON]
Will enable a dedicated sync signal for use by the Junger MMA meta data generator. It will be inserted into MADI Ch 64.

Important Note! If MMA Sync is turned on, MADI transmitter Ch 64 is blocked and can't be used for audio transport.

AOIP SETUP: General settings of the AoIP (Dante OEM) module used for the **C8316**

Important Note! This page content is informational only for the first release of the **C8316**. Parameters may only be changed by use of the DANTE Controller software from Audinate.



Device Information

Device Name	The name that appears in an AoIP network. It may be set by the DANTE controller software.
Device Access Lock Status	[Device Unlocked / Device Locked] Display if the device access from the network controller is locked or not.
AES67 Mode Status	Shows whether the AES67 mode for the DANTE Brooklin II OEM module is enabled or not.
AoIP Redundancy Mode	[Switched / Redundant] The AoIP interface allows redundant network operation. Pls. refer to manufacturer's documentations of your Ethernet equipment on supported switching configuration and redundant operation. Redundant – The interface will duplicate the audio traffic to both Ethernet ports. Both ports must have different IP addresses. Switched – The secondary port behaves like an Ethernet switch port allowing daisy-chaining through the interface. I.e. IP configuration of the second port is only available for redundant mode.

Important Note! When set to switched mode, do **not** connect both ports to the same network (same Ethernet switch) if it does not support STP (Spanning Tree Protocol). This is the case for most of off-the-shelf (office grade) switches. Doing so will cause a race condition where IP packets are circling around from the external switch to the second DANTE (switch) port and back via the first port. This will tear down your network and may create a bunch of new "friends" in your facility.

Primary Address Setup	Setup of the primary network interface
Network Status	[Offline / Connected + bandwidth]
DHCP – Automatic IP Config	[OFF / ON]
IP-Address	[0.0.0.0 / address]
Netmask	[1.1.1.1 / mask]
DNS Server	[1.1.1.1 / address]
Gateway	[0.0.0.0 / address]
MAC Address	[00:00:00:00:00:00 / address]
Secondary Address Setup	Setup of the secondary network interface
Network Status	[Offline / Connected + bandwidth]
DHCP – Automatic IP Config	[OFF / ON]
IP-Address	[0.0.0.0 / address]
Netmask	[1.1.1.1 / mask]
DNS Server	[1.1.1.1 / address]
Gateway	[0.0.0.0 / address]
MAC Address	[00:00:00:00:00:00 / address]

Clock Synchronization

Sync Source [AoIP Network / C8000 Bus / Madi]
Source of the reference clock for the Dante module.
See also MASTER switch (page 4).

Important Note! If this parameter is set to "Dante Network", the c8k frame must be synchronized to the same clock as the network clock master (whoever it is). It **must** be set to "Dante Network" if this module is to become the "Preferred Master" of the network.

Sync Status [Unlocked / Locked / Locked-Async]
The sync source for the **Dante** interface is the **AoIP** network. If no network cable is connected the interface is "Unlocked". If it is connected to a network it will be "Locked". If the **C8316** is set to synchronize to other than the **AoIP** interface it will show "Locked-Async".

Preferred Master [No / Yes]
The **Dante** algorithm automatically looks for the best clock master inside the network but one may force a **Dante** module to become the clock master.

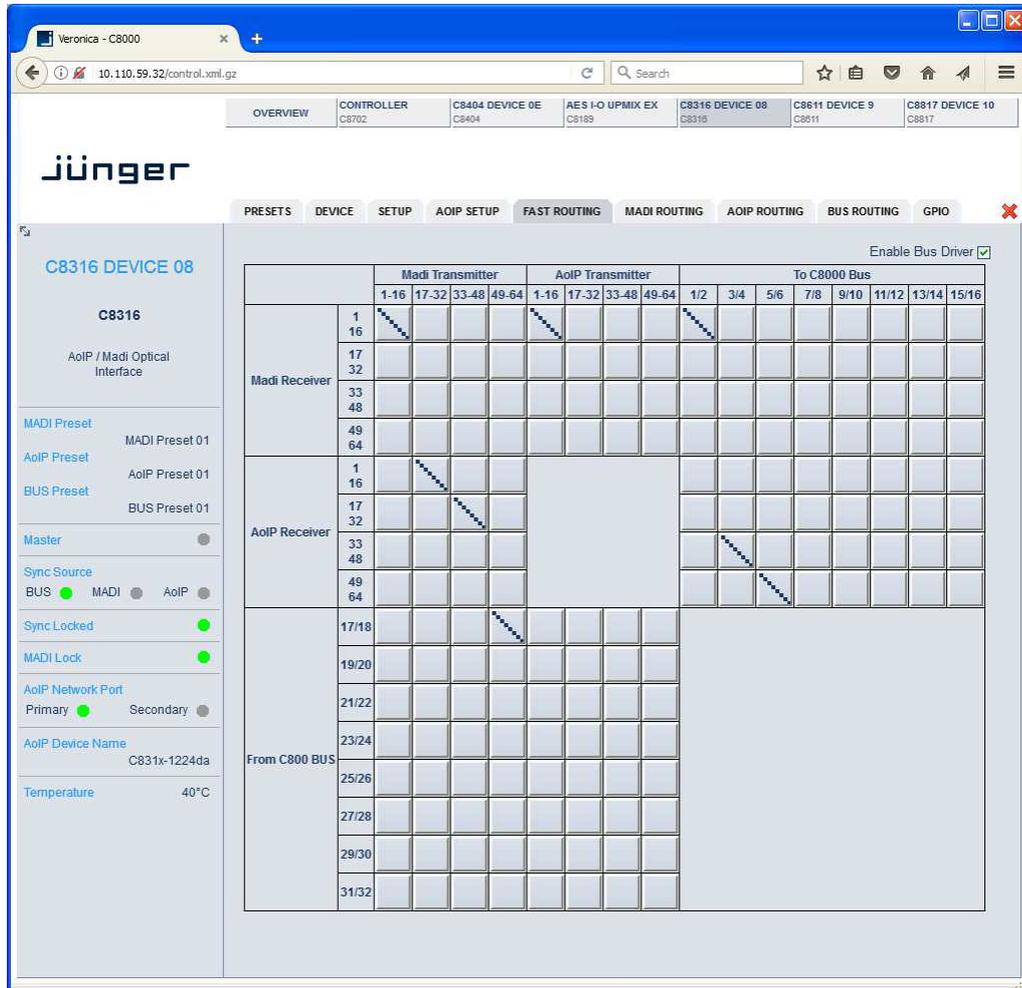
Primary Sync Status [Startup / Initializing / Faulty / Disabled / Listening / Premaster / Master / Passive / Uncalibrated / Slave]

Secondary Sync Status [Startup / Initializing / Faulty / Disabled / Listening / Premaster / Master / Passive / Uncalibrated / Slave]

Network Audio Sample Rate [48kHz]
The c8k system is set to use 48kHz sample rate only.

Device Latency Setting [xms]
You can allow for a certain transmission latency if you face network problems of any kind.

FAST ROUTING: Easy to use matrix for routing of groups of signals with a single button.



MADI Transmitter

Routing destination for the MADI interface. 16 adjacent MADI channels are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of four pre-defined MADI destination groups. The diagonal dotted line shows the connected source and destination group.

AoIP Transmitter

Routing destination for the AoIP interface. 16 adjacent AoIP channels are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of four pre-defined AoIP destination groups. The diagonal dotted line shows the connected source and destination group.

To C8000 BUS

Routing destination for the c8k frame busses. Two adjacent c8k Bus lines are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of eight pre-defined pairs of bus lines. The diagonal dotted line shows the connected source and destination group.

Important Note! The c8k bus drivers are automatically set to 8ch mux mode for fast routing. I.e. two adjacent busses (both in 8ch mux mode) will carry the 16 source signals.

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MADI Receiver

Routing sources of the MADI interface. 16 MADI channels are grouped for fast routing. I.e. you can select a group of 16 source channels from the MADI input and route them to one of the available destination groups.

AoIP Receiver

Routing sources of the AoIP interface. 16 AoIP channels are grouped for fast routing. I.e. you can select a group of 16 source channels from the AoIP network and route them to one of the available destination groups.

From C8000 BUS

You can select pairs of c8k bus lines (both operating in 8ch mux mode). 16 channels from the c8k busses are grouped for routing. I.e. you can select a pre-defined group of 16 c8k channels and route them to one of the available destination groups.

MADI ROUTING

PRESETS DEVICE SETUP AOIP SETUP FAST ROUTING **MADI ROUTING** AOIP ROUTING BUS ROUTING GPIO ✖

From C8000 System Bus			AoIP	MADI	MADI
2ch Mode Bus	8ch TDM Mode Bus	Channel	RX	RX	TX
--	--	--	--	Ch1/2	Ch1/2
--	--	--	--	Ch3/4	Ch3/4
--	--	--	--	Ch5/6	Ch5/6
--	--	--	--	Ch7/8	Ch7/8
--	--	--	--	Ch9/10	Ch9/10
--	--	--	--	Ch11/12	Ch11/12
--	--	--	--	Ch13/14	Ch13/14
--	--	--	--	Ch15/16	Ch15/16
--	--	--	Ch1/2	--	Ch17/18
--	--	--	Ch3/4	--	Ch19/20
--	--	--	Ch5/6	--	Ch21/22
--	--	--	Ch7/8	--	Ch23/24
--	--	--	Ch9/10	--	Ch25/26
--	--	--	Ch11/12	--	Ch27/28
--	--	--	Ch13/14	--	Ch29/30
--	--	--	Ch15/16	--	Ch31/32
--	--	--	Ch17/18	--	Ch33/34
--	--	--	Ch19/20	--	Ch35/36
--	--	--	Ch21/22	--	Ch37/38
--	--	--	Ch23/24	--	Ch39/40
--	--	--	Ch25/26	--	Ch41/42
--	--	--	Ch27/28	--	Ch43/44
--	--	--	Ch29/30	--	Ch45/46
--	--	--	Ch31/32	--	Ch47/48
--	S17	Ch1/2	--	--	Ch49/50
--	S17	Ch3/4	--	--	Ch51/52
--	S17	Ch5/6	--	--	Ch53/54
--	S17	Ch7/8	--	--	Ch55/56
--	S18	Ch1/2	--	--	Ch57/58
--	S18	Ch3/4	--	--	Ch59/60
--	S18	Ch5/6	--	--	Ch61/62
--	S18	Ch7/8	--	--	Ch63/64

This pane shows the possible sources for the MADI transmitter. The above example is the result of the **FAST ROUTING** settings above.

From C8000 System Bus

2Ch Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

8ch TDM Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Eight audio channels are put onto one bus line.

Channel

[Ch1/2 ... Ch7/8]

A channel pair of the eight multiplexed

AoIP

RX

[Ch1/2 ... Ch63/64]

One of the 32 channel pairs provided by the DANTE OEM interface.

MADI

RX

[Ch1/2 ... Ch63/64]

One of the 32 channel pairs provided by the MADI interface.

MADI

TX

[Ch1/2 ... Ch63/64]

One of the 32 channel pairs of the MADI transmitter.

AOIP ROUTING

PRESETS DEVICE SETUP AOIP SETUP FAST ROUTING MADI ROUTING AOIP ROUTING BUS ROUTING GPIO ✖

From C8000 System Bus			MADI	AoIP
2ch Mode	8ch TDM Mode		RX	TX
Bus	Bus	Channel		
--	--	--	Ch1/2	Ch1/2
--	--	--	Ch3/4	Ch3/4
--	--	--	Ch5/6	Ch5/6
--	--	--	Ch7/8	Ch7/8
--	--	--	Ch9/10	Ch9/10
--	--	--	Ch11/12	Ch11/12
--	--	--	Ch13/14	Ch13/14
--	--	--	Ch15/16	Ch15/16
--	--	--	--	Ch17/18
--	--	--	--	Ch19/20
--	--	--	--	Ch21/22
--	--	--	--	Ch23/24
--	--	--	--	Ch25/26
--	--	--	--	Ch27/28
--	--	--	--	Ch29/30
--	--	--	--	Ch31/32
--	--	--	--	Ch33/34
--	--	--	--	Ch35/36
--	--	--	--	Ch37/38
--	--	--	--	Ch39/40
--	--	--	--	Ch41/42
--	--	--	--	Ch43/44
--	--	--	--	Ch45/46
--	--	--	--	Ch47/48
--	--	--	--	Ch49/50
--	--	--	--	Ch51/52
--	--	--	--	Ch53/54
--	--	--	--	Ch55/56
--	--	--	--	Ch57/58
--	--	--	--	Ch59/60
--	--	--	--	Ch61/62
--	--	--	--	Ch63/64

This pane shows the possible sources for the AoIP interface. The above example is the result of the **FAST ROUTING** settings above.

From C8000 System Bus

2Ch Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

8ch TDM Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Eight audio channels are put onto one bus line.

Channel

[Ch1/2 ... Ch7/8]

A channel pair from the eight multiplexed channels.

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 **SW2** on the module PCB. If **SW2 #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 **SW2 #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.

AoIP

RX

[CH1/2 ... Ch63/64 ... --]

One of the 32 channel pairs provided by the AoIP interface.

To C8000 System Bus

2Ch Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

8ch TDM Mode

Bus

Eight channel mux mode

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Eight audio channels will be muxed onto one bus line.

Channel

[Ch1/2 ... Ch7/8]

A pair from the eight multiplexed channels.

MADI

RX

[CH1/2 ... Ch63/64 ... --]

To C8000 System Bus

2Ch Mode

Bus

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

8ch TDM Mode

Bus

Eight channel mux mode

[S1 ... S32 ... --]

One of the 32 bus lines of the c8k back plane. Eight audio channels may be muxed onto one bus line.

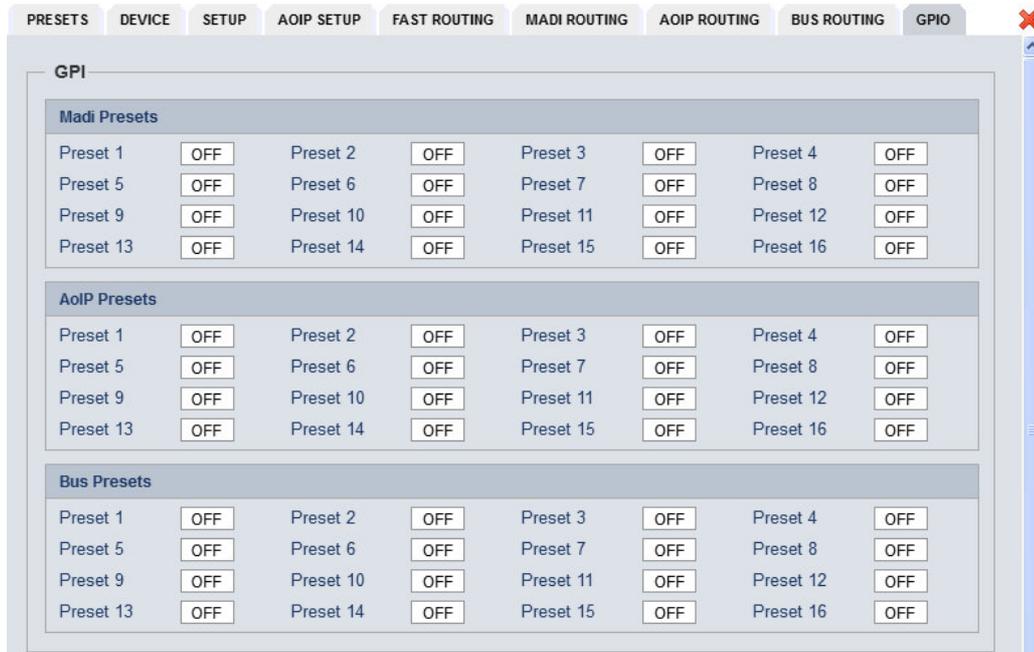
Channel

[Ch1/2 ... Ch7/8]

A pair from the eight multiplexed channels.

GPIO

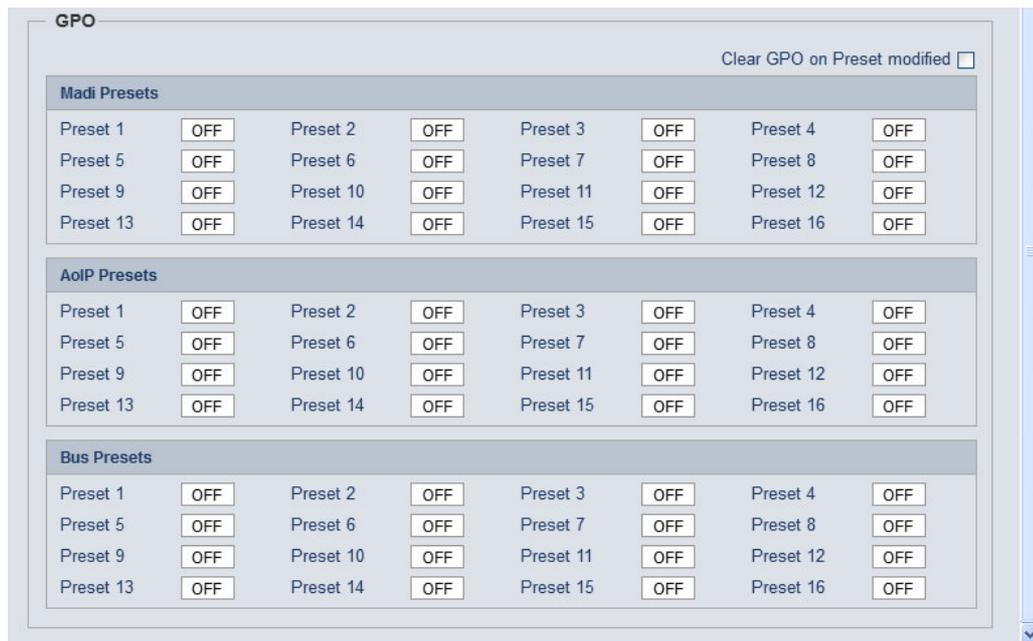
The **C8316** has three dedicated sets of GPIOs to remote control the **MADI-**, the **AoIP-** and the **Bus Presets**.



GPIOs

are useful if you want to recall settings remotely (e.g. via presets). The C8k frame can handle **127** different virtual (system) **GPIO** 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 **GPIO/O** interface module **C8817**. If the **C8316** 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 **GPI** driven devices like legacy equipment monitoring systems. The c8k frame can handle **127** different virtual (system) **GPO** numbers. If an event occurs, the **C8316** 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.



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! Virtual **GPI** and **GPO** numbers do not "see" each other on the CAN bus. I.e. you can not 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 system **GPI/O** link-up that also provides you with the possibility to set up logical combinations of physical and virtual (system) **GPI/Os**.