C8000

Modular Audio System

Manual

System Manual

Modular chassis

General information

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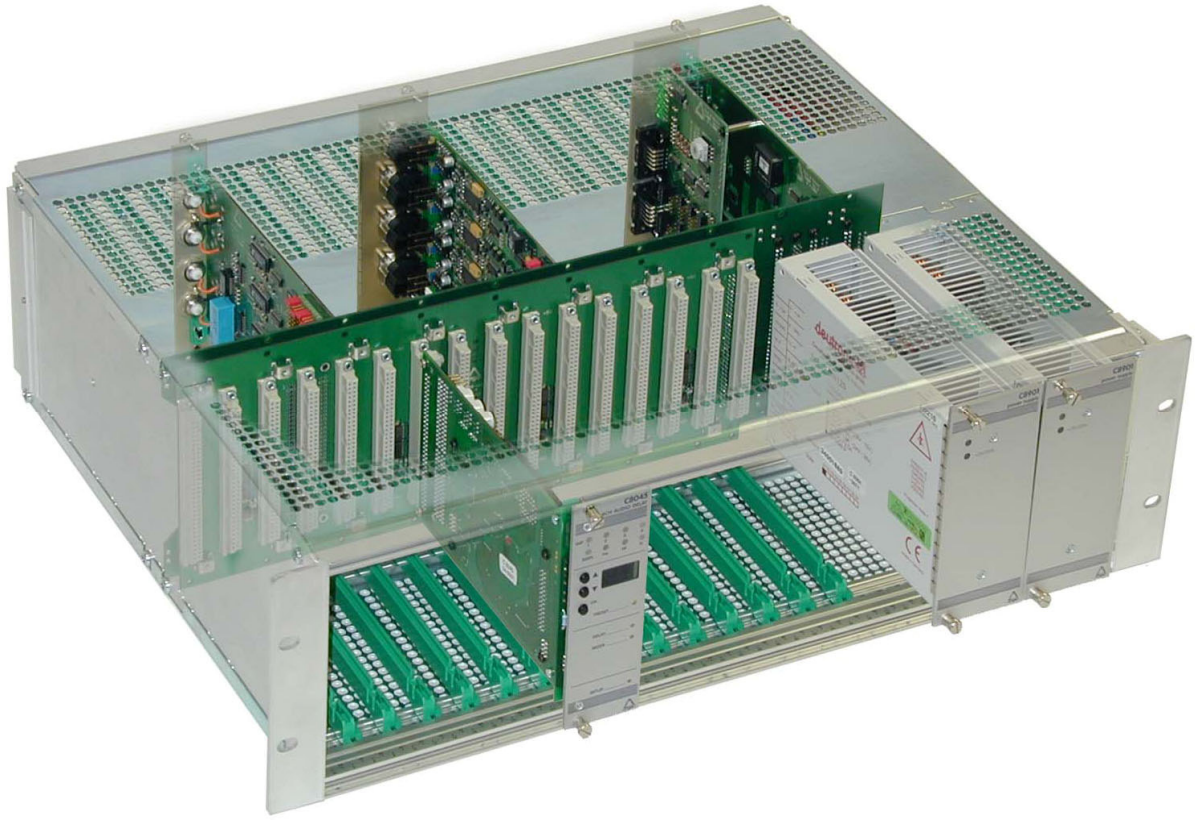
Warrenty information

Declaration of conformity



modular chassis C8911/C8912/C8922/C8932/C8934/C8942

- aluminium side panels chromated, aluminium cross extrusions
- RF protection by 0.8mm steel covers, zinc passivated
- external dimensions in accordance with DIN 41494

C8911

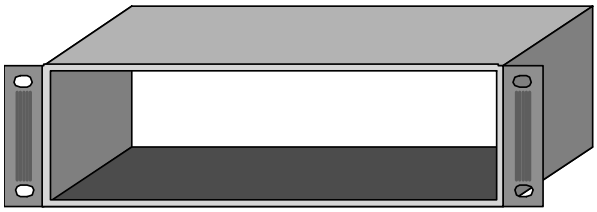
- 19" modular chassis, 1RU
- up to 3x 8HP or 6x 4HP space available
- one power supply with mains filter and power-switch
- card installation from front side
- 240mm depth

C8912

- two power supplies with mains filter and power-switch
- card installation from rear or front side

C8922

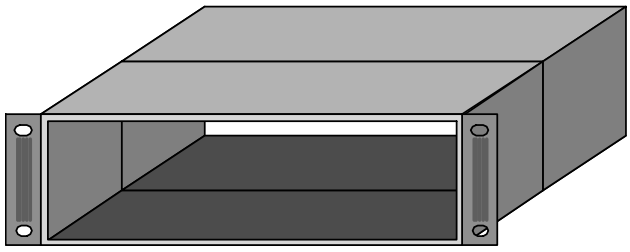
- 19" modular chassis, 3RU
- one internal power supply,
  appliance socket with mains filter and power-switch
- card installation from one side only
  (front **or** rear), 76HP
- 240mm depth



C8932

- 19" modular chassis, 3RU
- two power supplies C8901, redundant mode, load balanced
- appliance sockets with mains filter and power-switch
- card installation possible from both sides: front side - 72 HP, rear - 76 HP
- 435mm depth

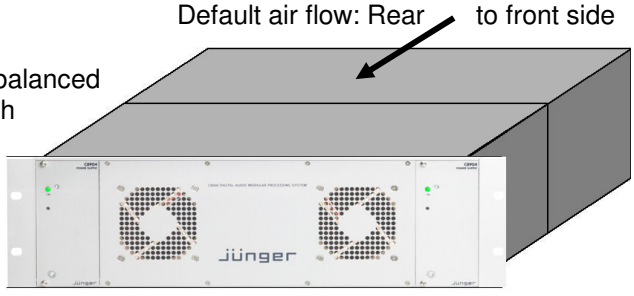
C8934 split frame features



- 4 islands each one with 8 slots back to back
  marked by colored slides
- audio clock distribution and busses are local
  for each island
- only the CAN bus is wired across all slots
- card installation possible from both sides: front side - 64 HP, rear - 76 HP

C8942

- 19" modular chassis, 3RU
- two power supplies C8904, redundant mode, load balanced
- appliance sockets with mains filter and power-switch
- card installation from one rear - 76HP
- 420mm depth
- 2 front panel fans with SNMP monitoring
- Air flow may be reversed by mounting the fans
  the other way around



general information / installation

GENERAL FEATURES

Configurable and scalable audio processing system
3RU-cards for installation in 19" modular chassis in accordance with DIN 41494
Efficient system design for multichannel applications
Up to 64 audio processing channels in one frame

I/O INTERFACING

Digital 8ch I/Os (AES/EBU: bal. XLR, 110 Ohm or unbal. BNC, 75 Ohm)
Switchable sample rate converters
MADI interfaces
Analog I/Os based on sophisticated ADC and DAC technology
24bit audio resolution
3G-, HD- and SD-SDI interface for embedded audio processing

AUDIO PROCESSING

Scalable digital audio processing system
3RU-cards with functionality equivalent to 19" 1RU units from Junger Audio
24 bit processing, specific modules can operate up to 96kHz sampling rate

DOLBY PROCESSING

Dolby E decoding / encoding
Dolby Digital (AC-3), Dolby Digital plus (EAC-3), AAC decoding / encoding

SYNCHRONIZATION

Sync sources: AES, Word Clock, BB, Tri-Level, SDI, MADI

REMOTE CONTROL

TCP/UDP/IP over Ethernet
Web technology based GUI
Application specific GUI
EmBER plus server
Build in SNMP agent
Hardware remote controller brc8x

CODING OF MODULE IDENTIFIERS

C8xyz

x = 0 Processing
1 Digital I/O
2 Analog I/O
3 Digital multichannel I/O
4 SDI I/O
5 Monitoring
6 Dolby processing
7 System controller
8 Sync
9 Frames and power supplies

y = Number of audio channels (1 – 8), 9 (16) / specific module identifier
z = Specific module identifier

general information / installation

The table below shows the current and power consumptions of the actual c8k modules, measured under operating conditions:

Module	Current [mA]	Power [W]
C8086+	300	1,5
C8087	290	1,45
C808x	200	1
C8092	420	2,1
C8189	340	1,7
C8234	200	1
C8306	590	2,95
C8404	1090	5,45
C8405	810	4,05
C8491	1200	6
C8492	1170	5,85
C8601	440	2,2
C8611	410	2,05
C8612	770	3,85
C8621	640	3,2
C8631	820	4,1
C8651	130	0,65
C8685	90	0,45
C8817	320	1,6

The frame controller C8702 plus a sync module C8840 together consume 660mA (3.3W).

Frames C8932 are equipped with power supplies C8903. They deliver 5V/14A.
Frames C8934 may equipped with either C8903s or C8905s. The latter delivers 5V/25A.
Frames C8942 are generally equipped with C8905s.
The 1RU frame C8912 has two built in redundant power supplies which provide 5V/8A.

The power supplies are operating in load balancing mode by sharing the output current. In case of a PS failure, the other one will take over the full load.

The heat produced by the power supplies depends on input voltage, output current and operating temperature. As an average for calculation one may assume a degree of efficiency of 75%.

general information / installation

UNPACK THE UNIT

The digital audio processing system C8000 was carefully packed in the factory and the packaging was designed to protect the equipment from rough handling.
Please examine carefully the packaging and its contents for any signs of physical damage, which may have occur in transit.

POWER SUPPLY

The digital audio processing system C8000 is a device under the safety category “Schutzklasse1” in keeping with the VDE 0804 standards and may only used with power supply installations built according to regulations.
Check the voltage details printed at the rear if it meets your local mains power supply.

CONNECTIONS

The digital audio processing system C8000 is equipped with standard connectors (see also module description). Before connecting the digital audio processing system C8000 switch the power off at all connected units.

RACK MOUNTING

The digital audio processing system C8000 is made as standard 19" unit (EIA format). It occupies 3RU (132 mm height) rack space.
Please allow at least additional 3" depth for the connectors on the rear.
When installing the unit in a 19" rack the rear side of the unit needs some support, especially for mounting in flight cases.
Cooling of C8000 system is done by passive air ventilation. It is necessary to have 1RU space below and above the unit to guarantee constant and sufficient air flow.

OPERATION SAFETY

The digital audio processing system C8000 should not be installed near units which produce strong magnetic fields or extreme heat. Do not install it directly above or below power amplifiers.
If, during operation, the sound is interrupted or displays are no longer illuminated, or if abnormal smell or smoke is detected immediately disconnect the power plug and contact your dealer or Junger Audio.

SYNCHRONIZATION OF THE C8932 FRAME

The digital audio processing system C8000 is using one master clock for the whole frame. All digital outputs are locked to this master clock.
The master clock is determined either by using the sync module C8840 one SDI or one MADI interface module in master mode. With the C8840 sync module it is possible to use the internal reference clock or an external sync source.

THE C8934 SPLIT FRAME

The C8934 offers 4 independent clocking islands. Each island must be clocked by an I/O module that operates in Master Mode. This technique allows to process four independent asynchronous TV channels in one frame.

THE C8942 COMPACT FRAME

The C8942 compact frame serves as a cage for the C8486/91/92 sandwich modules. It provides 5V power and CAN-bus interconnection for remote control operation. It has two integrated fans which may be monitored via SNMP protocol and/or GPO.

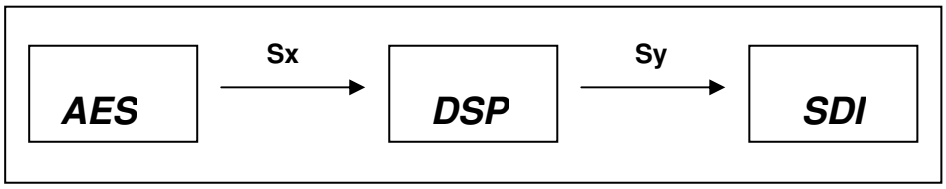
system configuration

Configuration of a C8000 frame

The C8k frame holds the cards physically. They are electrically connected to the back plane of the frame by a 64pin connector. The back plane distributes 5V power, several clocks, the CAN-bus, a few status and address signals as well as the digital audio data from and to processors or I/O devices.

Audio bus line assignment:

32 audio bus lines **S01** to **S32** are used for the distribution of digital audio data. The majority of the modules use the same 2ch format, i.e. 2 audio channels are multiplexed on to one output. Considering a 2ch processing (DSP) module, one needs 1 of these 32 lines to connect an input device (e.g. AES IN) via **Sx** to the processing module (DSP) and one line to connect the output of the DSP module to an output device (e.g. SDI embedder) via **Sy**.



There is no rule how to use the 32 lines with one exception:

! You must not connect more than one device output to a bus line at a time. If you connect more than one device output to a bus line, you will destroy the audio signal.

But you can connect as many device inputs as needed to one device output
(e.g. for signal distribution or signal conversion purposes).

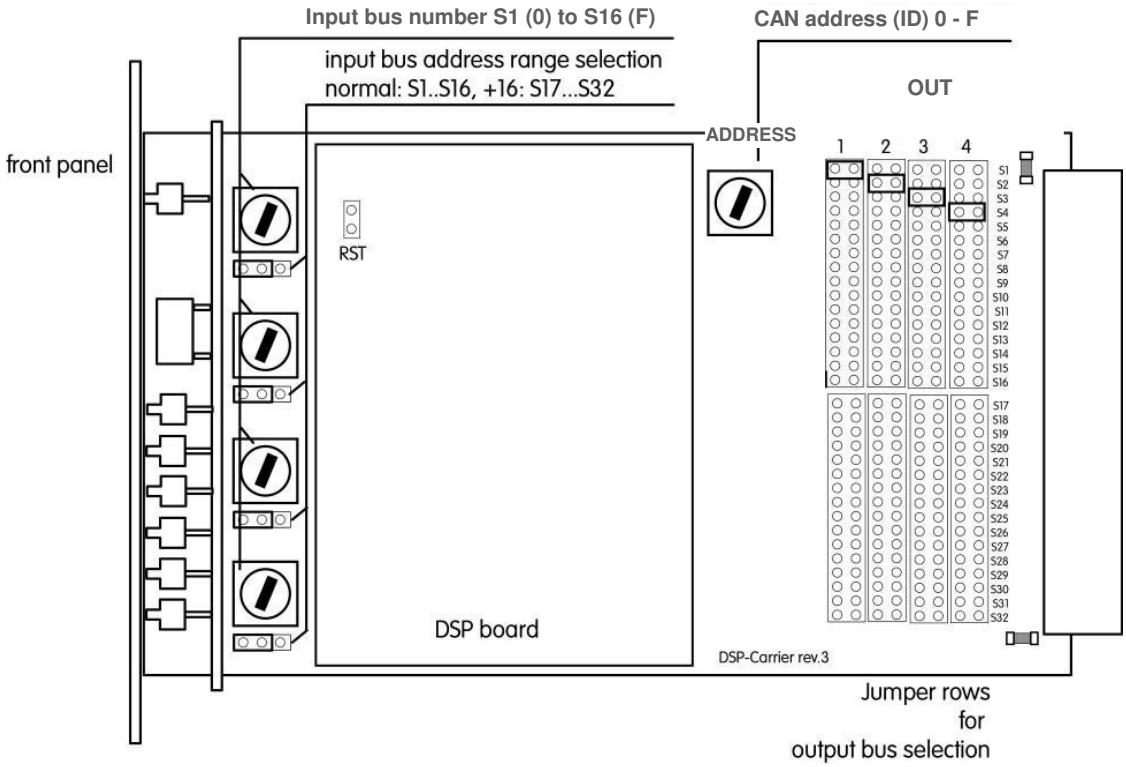
Each of the legacy modules has rows of jumpers to connect its output(s) to one of the 32 bus lines.
Some modules have more than one input / output so they need more than 2 bus lines to connect to other devices.

At the module input side we have different solutions. Old devices also have rows of jumpers to connect to a bus. Newer devices will select the relevant bus line by an electronic routing circuit.
You must tell it by one or more rotary encoder(s) from which bus line it should gather the audio data.

Newer devices like the **C8402/03/04/05** (SDI Embedder / De-Embedder), the **C8086+** (8 channel LevelMagic), **C8082** (5.1 fail over / switch over / ducking) as well as the **8305/06** (new MADI I/Os) and **8601/11/12** (Dolby Encoder / Decoder modules) and their successors **C8621/31/32** have electronic output routing also and the ability to **multiplex 8 audio channels** on one bus line. This increases the density of the audio bus system dramatically. Such devices are backward compatible because they can also send and receive 2 channels per bus line. See an example of such module carrier boards further below.

Please refer to the respective manual for details.

Below is an example of a module carrier board for an old processing module:

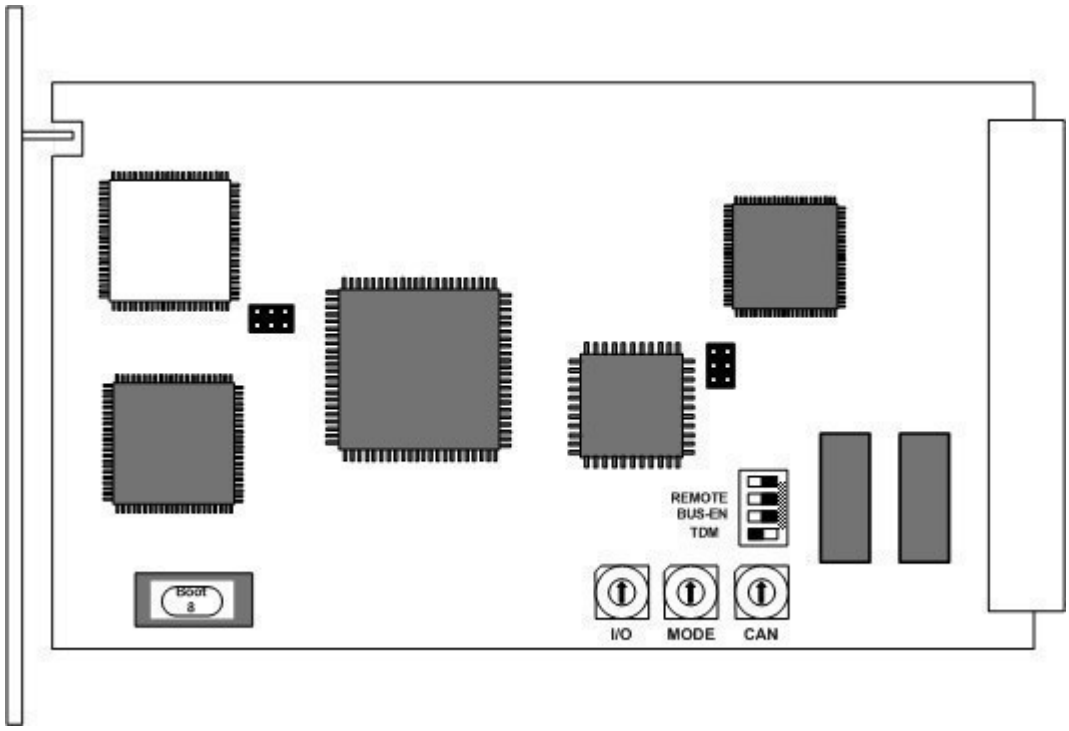


On the left hand side you see the rotary encoders. They have 16 settings (0 to F) to select one of the bus lines **S1** to **S16**. If you need access to bus lines higher than 16, you must replace the adjacent range jumper labeled: “+16”. Now the rotary encoder will select bus lines **S17** (0) to **S32** (F).
For two channel devices the rotary encoder labeled “IN-1” and jumper row labeled “OUT1” are used. For 4 channel devices the rotary encoders labeled “IN-1” and “IN-2” and jumper rows labeled “OUT1” and “OUT2” are used, and so forth.

! On some modules the IN4 rotary encoder and the range jumper are used to setup special application modes (see respective manual for details).

system configuration

Below is an example of a module board of a newer generation processing module - **C8086**:



Since this type of module has an electronic output routing facility, great care must be taken when installing or exchanging a new module for an existing system!

DIP-switch #1 (no label) serves for the CAN address **"+16"** selection. If it is set to ON, the range for the CAN address rotary encoder lasts from 0x10 to 0x1F.

If a frame controller is installed, the **DIP-switch #2** must be set to **REMOTE=ON**. All settings after power up are taken from an **NV** (non volatile) **memory** and the remote control via the Frame Controller is enabled. Otherwise a basic configuration will be taken from the settings of the **I/O** and **MODE** rotary encoders if implemented (see individual module manuals for details).

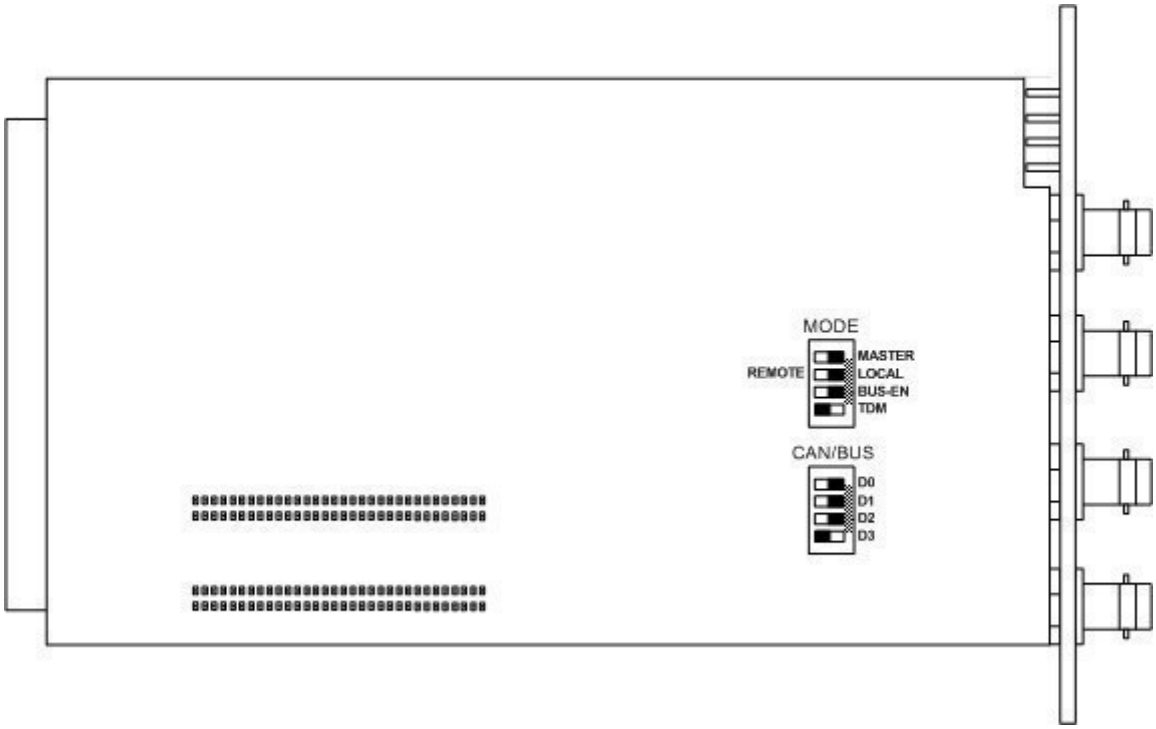
If the above **DIP-switch #3** is set to **BUS-EN=ON**, the bus configuration will be taken from the **NV memory** after power up. If an unknown bus configuration is stored, it can cause a conflict with other modules inside the frame (short cuts between several outputs).

Important Note! If you are not sure about the output bus configuration you must turn **BUS-EN=OFF** before inserting such module. Now all bus outputs are in **Tri-State-Mode** (i.e. off).

You can use the frame controller to configure the board. The configuration will automatically be stored into the **NV memory**. For testing purposes you may temporarily enable the bus drivers via the GUI.
To enable the configuration for the next power up you must pull out the module and set **BUS-EN=ON**.

DIP-switch #4, TDM=ON enables the multiplexing of eight audio channels on one bus line on the first available audio bus when **not** in REMOTE mode.

Nearly the same applies to the **C8402/03/04** SDI Embedder / De-Embedder with slightly different DIP-switch labeling:



The **MODE** DIP-switch allows for setting of the operating modes:

If **DIP-switch #1** is set to **MASTER**, the module provides the necessary clocks for audio signal distribution for the C8k frame. In this case the Sync-Module must be removed!

You **must** use the frame controller to configure the board. Therefore the **DIP-switch #2** must be set to **REMOTE=ON**. All settings after power up are taken from an **NV** (non volatile) **memory** and the remote control via the Frame Controller is enabled.

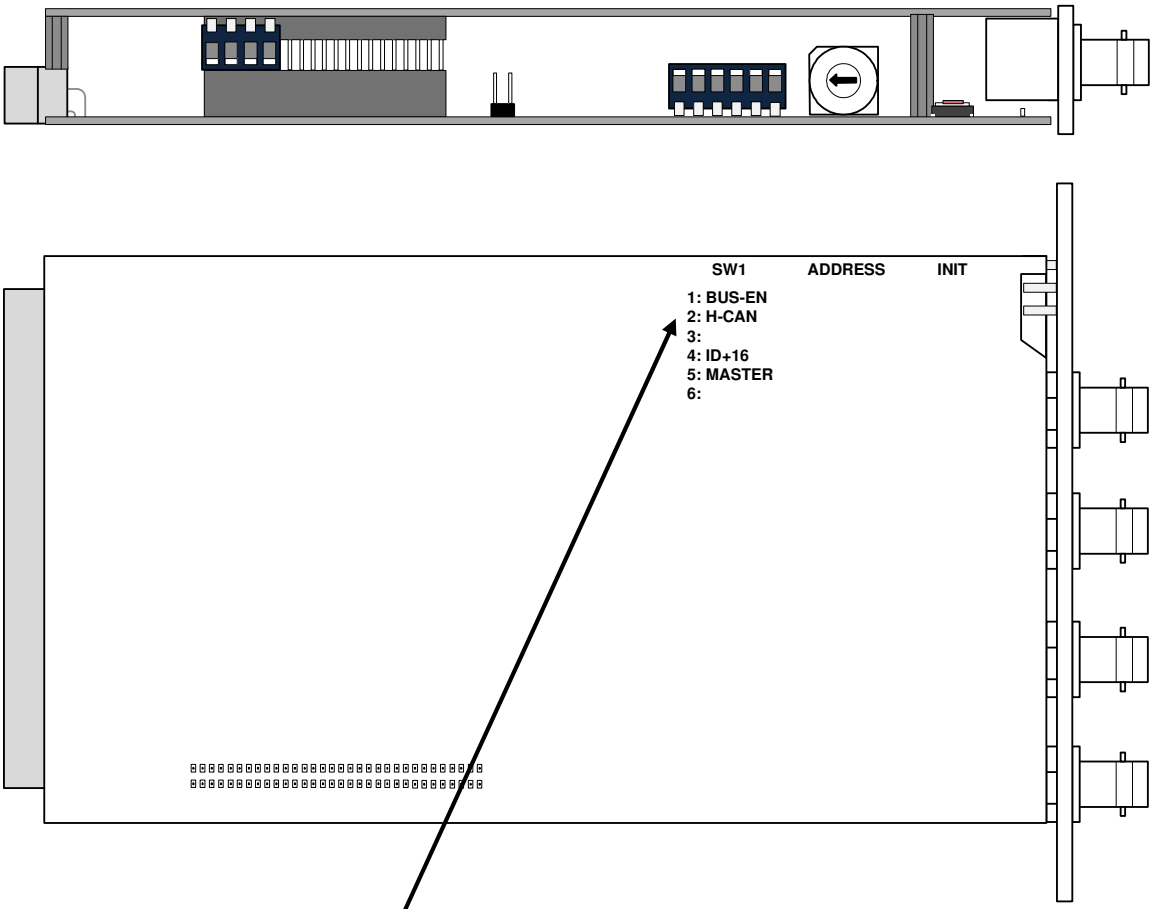
If the upper **DIP-switch #3** is set to **BUS-EN=ON**, the bus configuration will be taken from the **NV memory** after power up. If an unknown bus configuration is stored, it can cause a conflict with other modules inside the frame (short cuts between several outputs).

TDM=ON enables the multiplexing of eight audio channels on one bus line.

The **CAN/BUS** DIP-switch determines the CAN-bus address of the module in hexadecimal values from 0 – F. The coding is binary (D0=LSB, D3=MSB).

Older versions had a few more DIP-switches for hardware based settings of the Embedder and the De-Embedder.

And finally here you see the actual design of a c8k module here from the compact **C8492** module, the 16 channel SDI I/O processor with optional bus access:



As a new feature you see the **CAN-H** switch above. That allows the module to operate with 1Mbit/s CAN-bus speed. This speed enhancement is helpful if you must log multiple programs from multiple **C8492s** in a compact 64 or compact 256 frame.
Since only a selected number of modules will support the higher CAN-bus speed, grate care must be taken when setting up such a frame. All modules on the same CAN-bus must run on the same CAN-bus speed!

system configuration

CAN address assignment:

In the above images you can see a very important switch labeled **"ADDRESS"** or **"CAN"** or **"CAN/BUS"** respectively. It determines the module address for the **CAN-bus**. All devices that can be remote controlled are connected to the **CAN-bus** of the frame. The **CAN-bus** is a two wire bi-directional bus. Each party must have a unique address to allow for proper communication. Therefore it is of **major importance** that you set a **unique address** for each module inside a frame. This scheme allows for 32 different module addresses per frame: **0**x**0 – 0x1F** (in hexadecimal notation).
Each module has a switch to set its addresses from 0x0 to 0xF (rotary encoder or BCD encoded dip-switch). A defined DIP-switch is used to set the CAN address **"+16"** offset. See manual for details. Special modules like the early GPI/O module **C8817** have an automatic **"+16"** offset.
Other modules like the **C8702** frame controller have a fixed CAN address (0x02).

Because the C8k System does not have slot encoding, you may place a module where ever you like. The virtual location of modules in the **OVERVIEW** window of the **GUI** is derived from its **CAN address**. The window is divided into **6 rows** with **8 columns**. First row contains the Frame Controller and Sync-Module(s). Second row is empty. 3rd to 6th rows show all kind of manageable modules. Address "0" puts the modules graphical box to the upper left place (row #3 left hand side), while address "1F" puts it to the bottom right place (row #6 right hand side).

Synchronizing a frame:

The C8k frame is a digital audio processing system. Therefore it is of major importance that you synchronize its digital inputs and outputs with other equipment in a signal distribution chain.
For standard applications the frame is equipped with a Sync-Module C8840 (see manual for details).
This module generates all relevant processing clocks and puts those clock signals on the back plane so all devices can be synchronized properly. Because the sync signal distribution is driven by active components on the back plane, there are only 4 slots (marked with red slide bars) at the rear of a frame at left hand side which must be used to insert a module that synchronizes the whole frame. The sync module can run on internal clock for stand alone applications or may be synchronized externally either by AES sync, Word Clock or Video Black Burst. On a BNC output it provides the internal **Word Clock** of the frame to synchronize other external devices.

Fail save operation with two sync modules:

For automatic fail over operation the frame may be equipped with two Sync-Modules (see manual for details). One acts as the master while the other one is the slave. If the master loses its reference, the slave automatically takes over the clock generation for the frame.
To ease this area of fail save operation, we have designed the **C8840** Sync module that provides two independent sync inputs and an automatic fail over inside.

Synchronizing a frame to an input signal:

If there is a demand by the application, the frame can also be synchronized via SDI or MADI. This must be performed with great care because the synchronization relies on one signal feed. If this SDI or MADI signal fails for any reason the whole frame is no longer synchronized. In this case the frame will run "free" on approx. 48 kHz sample rate. Processing channels of other services will be influenced (clicks and pops).

If synchronizing the frame via SDI or MADI, such interface must be inserted instead of a SYNC-Module into one of the four above mentioned red colored slots. Such module must be set to MASTER mode in order to provide the clocks.

Working with asynchronous input signals:

In case it is not possible to synchronize the frame to the signal source, you must use Sample Rate Converters at the input stage. Such Sample Rate Converters where available for AES/EBU input modules as an option (piggyback PCB) or are designed in for the C8188/89. The SDI Embedder / De-Embedder modules C8402/03 may have built-in SRCs as an option, which you can activate on demand.

Important Note! If an embedded SDI stream contains **Dolby®** (E, D, D+) encoded or other **Non Audio** signals you **must not use SRCs** because they will destroy the structure of the data stream. In this case you **must** feed the Dolby® encoded PCM tracks directly from the De-Embedder to the Embedder, while the other audios are routed through SRCs.

For greater flexibility Junger Audio has developed the so called **Split Frame C8934**. Such a **Split Frame** has **four** independent **clocking islands** (clusters) with 32 audio busses available per island, while the CAN-bus runs throughout the frame. Each cluster must be clocked by an I/O (SDI or MADI) or Sync-Module.

For high density of number of channels per frame Junger Audio provides the SDI-DSP modules **C8486 C8491** and **C8492** "sandwich" modules. It is a combination of a HD/SD-SDI front end with a LevelMagic™ processor. These modules fits into a special frame **C8942** which delivers power and CAN communication to the modules so they can be remote controlled via GUI, the brc8x, GPI/Os or the Junger API while they look like stand alone to the TV channel.
The number of audio channels and the HD-SDI interface are field upgrade options per module.
This type of module also perfectly fits into an asynchronous environment because it does not need external synchronization.

Fail save operation with two power supply C8903:

Two power supplies **C8903** (or C8905) can operate in parallel and share their load. If one of the two power supplies fails, the other one takes over the full load automatically. The brightness of the front panel LED lets you judge the load status. If you turn the power off, this LED is unfortunately still illuminated a little bit for quite a while.

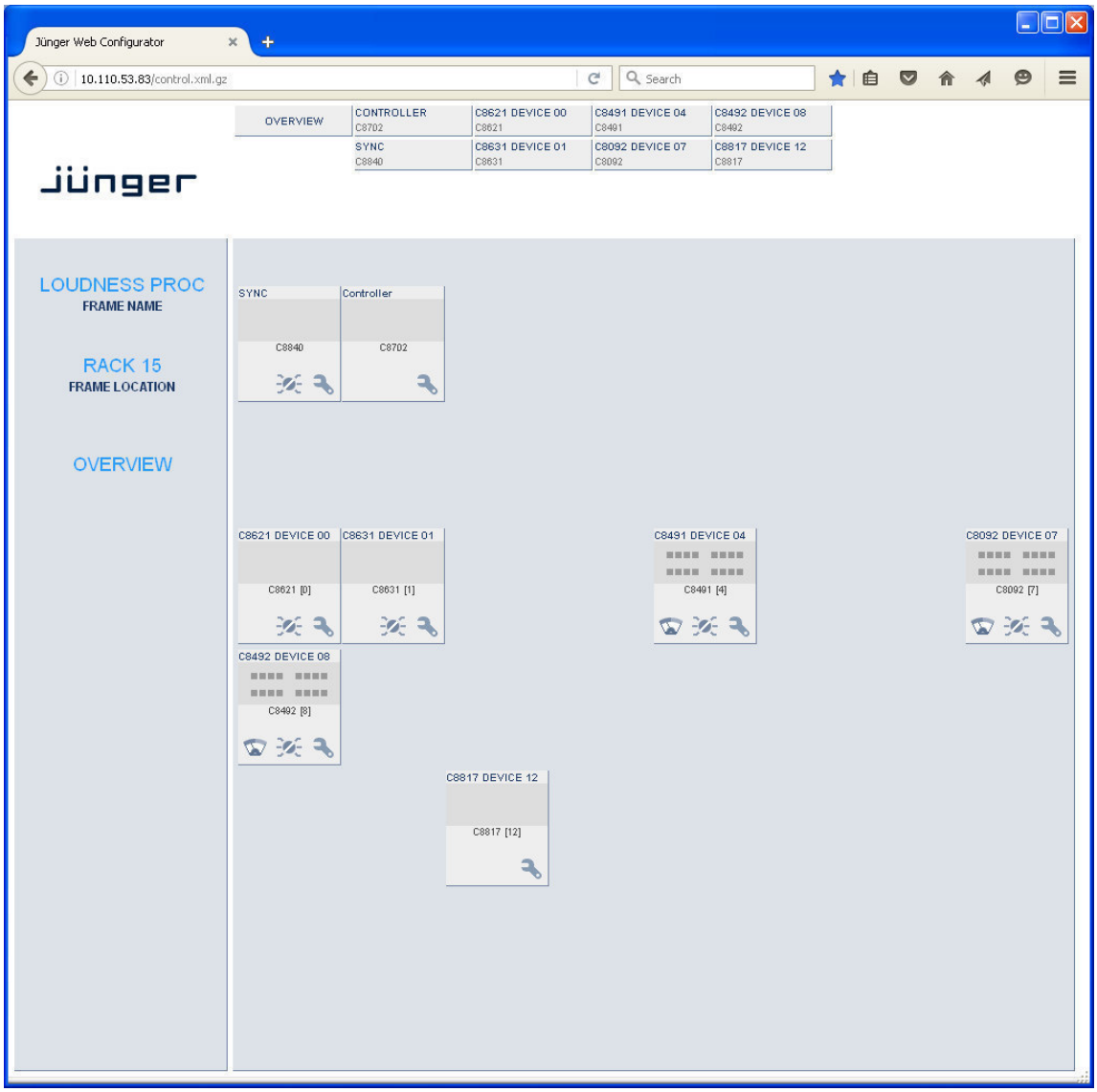
If the **"Power Fail"** signal is used for monitoring purposes, it is **extremely important** to set the output voltage for both power supplies within a tight range. Otherwise it may happen that one of the two power supplies takes over full load and the power fail signal is activated, indicating a critical status.

Important Note! Do not align the brightness of both module LEDs without **measuring** the **output voltage.**

Therefore, you must put them into a test frame one by one or you must turn power off for the one you are not about to align. You can obtain extender boards from Junger Audio to get access to the +5V rail for measuring.

Remote Control of the frame:

Each frame must have a Frame Controller **C8702**. It has a built-in web server to setup and operate a frame. This controller also provides connectivity for top level systems like SNMP managers or 3rd party applications. You can get access to each frame via a web browser (Firefox45.x and higher) by simply typing its IP address into the URL field:



From here you can observe the module status, activate graphical meter applets, set up the parameters of each module, store and recall presets, back up and restore the settings of individual modules or the whole frame. It is also the tool to update the firmware of the installed modules and the firmware of the Frame Controller itself. The firmware of the Frame Controller is called **image** (an image of the flash memory of the Frame Controller). It also contains the latest module firmware that was available at the time of the image build.

For details see the **C8702** Frame Controller manual and the module manuals as well.

warrenty and service information

JÜNGER AUDIO GmbH grants a one-year warranty on the

digital audio modular processing system C8000

If the unit or parts of the system has to be serviced, please send it, ideally in the original box, to:

JÜNGER AUDIO - GmbH

Justus-von-Liebig-Strasse 7

D - 12489 Berlin
GERMANY

Tel.: +49-30-677721-0
Fax.: +49-30-677721-46
info@junger-audio.com
www.junger-audio.com

CE

DECLARATION TO EU DIRECTIVE 2011/65/EU (RoHS2) AND 2002/96/EG (WEEE) & DECLARATION OF CONFORMITY

Type of equipment : **Modular Digital Audio Processor**

Product : **C8000**

The aforementioned product complies with the following Europaen Council Directive(s) :

2011/65/EU (RoHS2)	Junger Audio GmbH confirmes that this product does not contain mercury, hexavalent chromium, cadmium, polybromiert biphenyl (PBB), respectively polybromiert diphenylether (PBDE) in higher concentrations than described in RoHS directives. In addition to that we do not use PVC in that device.
2002/96/EC (WEEE)	Obligations to retraction with clients, being concerned by WEEE (waste electrical and electronic equipment) directive, can be agreed by individual contracts.
2004/108/EC	Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directives 89/336/EEC
2006/95/EC	Directive of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits

To fully comply with these Directives, the following standards have been used :

DIN EN 61000-3-2	:	01/01	DIN EN 61000-4-3	:	11/03
DIN EN 61000-3-3	:	05/02	DIN EN 61000-4-4	:	07/05
DIN EN 55022	:	09/03	DIN EN 61000-4-5	:	12/01
prEN 55103-1	:	2005	DIN EN 61000-4-6	:	12/01
DIN EN 61000-4-2	:	12/01	DIN EN 61000-4-8	:	12/01
prEN 55103-2	:	2005	DIN EN 61000-4-11	:	02/05
DIN EN 50514	:	2008			

This certification is based on test report(s) generated by EMC-test laboratory and internal regulations for safety check.

Teseq GmbH : Landsberger Str. 255
D - 12623 Berlin, Germany

Holder of certificate : Jünger Audio GmbH
Justus-von-Liebig-Strasse 7
D - 12489 Berlin, Germany

Jünger Audio GmbH
Justus-von-Liebig-Str. 7 · 12489 Berlin, Germany
phone:+49 30 677 721-0 · fax:+49 30 677 721-46
www.jungeraudio.com · info@jungeraudio.com
VAT Reg.No.: DE 811 479 050 · StNr.: 37/444/389

Berlin, (Place) 01.10.2011 (Date)

..... (Reno Falkenberg, Managing Director)

Headquarters
Jünger Audio GmbH
Sales • Service & Support
Justus-von-Liebig-Straße 7
12489 Berlin, Germany
phone +49 30 677 721 0
fax +49 30 677 721 46
sales@jungeraudio.com
www.jungeraudio.com

Jünger Audio Asia
Junger Audio Asia Pte. Ltd.
Sales • Service & Support
33, Ubi Av. 3, no. 06-62 Vertex
408868 Singapore
phone +65 6509 8171
fax +65 6748 1740
asia@jungeraudio.com

Jünger Audio (China Office)
Junger (Beijing) Technology Ltd.
Sales • Service & Support
Unit 068, 2nd Floor, No. 38 GuangQu Road,
ChaoYang District, 100020 Beijing, China
phone +86 137 0102 6664
fax +86 10 5320 3420

Jünger Audio USA
Service & Support
2100 B2 Walsh Ave
Santa Clara, CA 95050-2590, USA
phone +1 408 330 9215
usa@jungeraudio.com

www.facebook.com/jungeraudio **www.twitter.com/jungeraudio**