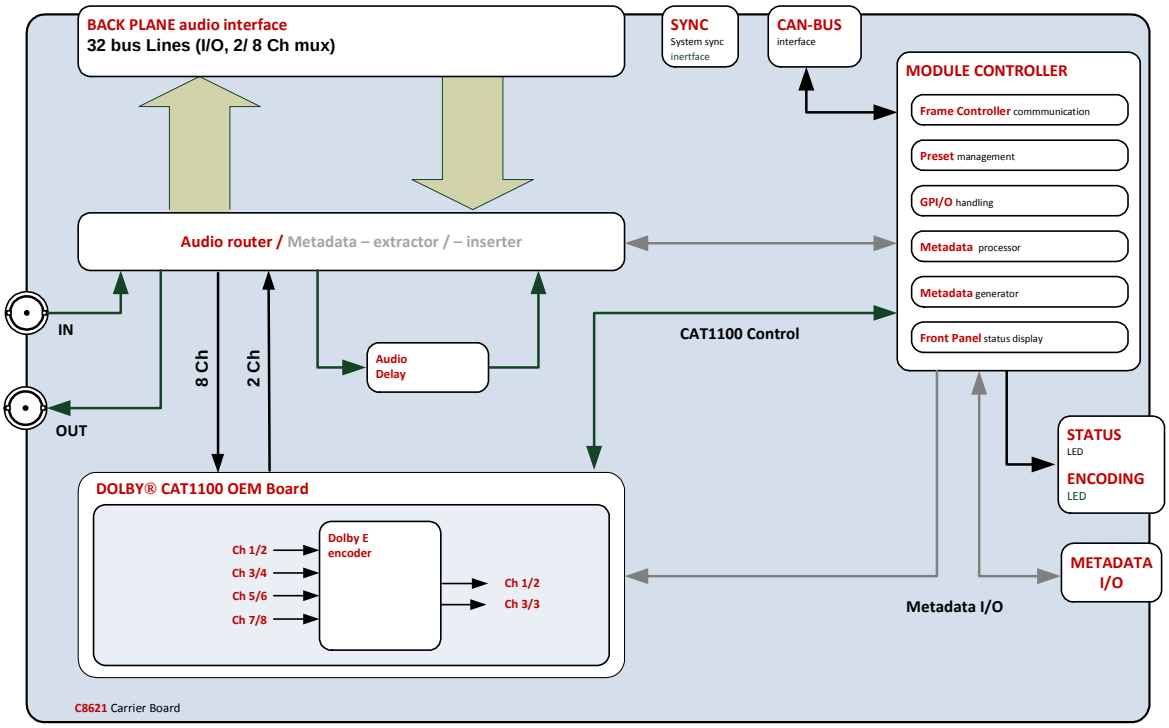
Dolby® E encoder

C8631

Features:

- Dolby® E encoding
- Metadata generator
- RDDD-6 metadata input / output
- Unbalanced AES output for Dolby® E encoded signal or delay output
- Unbalanced PCM input for two channel delay
- Unique Dolby® subset metadata transport (via AES USER Bit)
- RDD6 metadata transport inside the frame
- 2Ch Delay for PCM audio and / or metadata

Block diagram:



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Technical data:

Standards	Encoder for multichannel audio, supporting proprietary Dolby® E format.	
Audio Formats	PCM (24bits) Dolby® E (16/20 bits, video frame rates: 23.975, 24, 25, 29.97, 30fps)	
Audio Channels	Six two channel inputs (un-compressed PCM – encoder input, delay input) One Dolby E encoded output One delay output	
Program Configuration	5.1+2, 4x2, 5.1, 3x2,	
Channel Modes	1+1, 1/0, 2/0, 3/0, 2/1, 3/1, 2/2, 3/2	
Audio Sample Rate	48kHz	
Audio Delay	Coarse 0 … 335ms, fine 0 … 240sample	
AES/EBU Input (External)	Relevant specifications comply with AES3-X-2009, IEC 60985 and AES11-2009	
	2 channels (1 stereo input), BNC connector	
	24bits, PCM or compressed audio, delay input	
	Impedance	75Ohm
	Input level	0.3 … 5Vpp @ 75Ohm single-ended
AES/EBU Output (External)	Relevant specifications comply with AES3-X-2009, IEC 60985 and AES11-2009	
	2 channels (1 stereo output), BNC connector	
	24bits, PCM audio, encoder output	
	Impedance	75Ohm
	Output voltage	1Vpp (typ.) @ 75Ohm single-ended
Metadata Output (External)	Relevant specifications comply with SMPTE RDD6-2008 (Dolby® Metadata).	
	Connector type	D-Sub9 connector female
	Output conditions	3Vpp (typ.) @ 110Ohm differential, RS485, 115kbaud
Encoding Latency	Dolby E	1 video frame, depending on signal

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Power Supply	5Vdc (4.75 … 5.25V), max. 800mA
Dimension	3RU, 4HP, 160mm depth (DIN41612 backplane connector)
Environmental	Operating temperature 0 … 40ºC, Non-operating -20 … 70ºC, Humidity < 90%, non-condensing
General Features	• Encoding of un-compressed multichannel audio • Auxiliary delay path (stereo) to compensate encoder latency • Metadata extraction from audio user bit • Metadata generator to generate or alter Dolby® metadata • Metadata insertion into audio user bit

Metadata I/O pin assignment (D-Sub9 female):

Pin	Function
1	GND
2	TX-
3	RX+
4	GND
5	
6	GND
7	TX+
8	RX-
9	GND
Shell	GND

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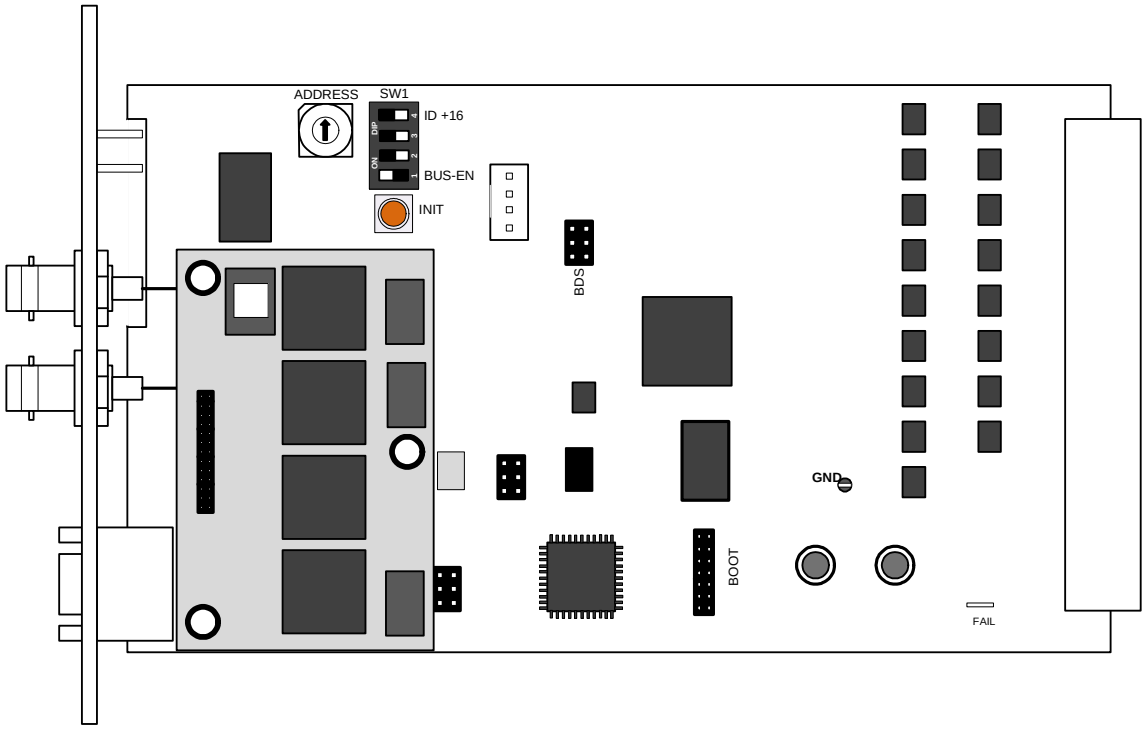
Installation:



Set the **ADDRESS** rotary encoder to an address, which is not in use by another module of a C8000 frame (for details regarding CAN addressing, see C8k system manual).

BUS-EN = **OFF** will disable the bus driver circuits on power up
SW-1B = not used, must be OFF
SW-1C = not used, must be OFF
ID +16 = **ON** enables the CAN **"+16"** address scheme to handle up to 32 modules

Important Note! If the module has an unknown bus configuration, you must set BUS-EN=OFF, before inserting the module into a C8000 frame. Otherwise you risk disturbing other channels of the frame.

When you press the **INIT** button during power up, it will initialize the module parameters to factory default values.

Status LEDs:

On the front panel are 2 status LEDs:

STATUS	**green**	=	OK
	red	=	bad
	flashing	=	module is in focus of the frame controller (under GUI control)
ENCODING	**green**	=	encoder is encoding a Dolby E signal
	off	=	encoder is booting

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Remote configuration via web interface:

OVERVIEW:

Clicking on the **spanner tool** within the module graphics of the **C8631** will open the pages of that module.

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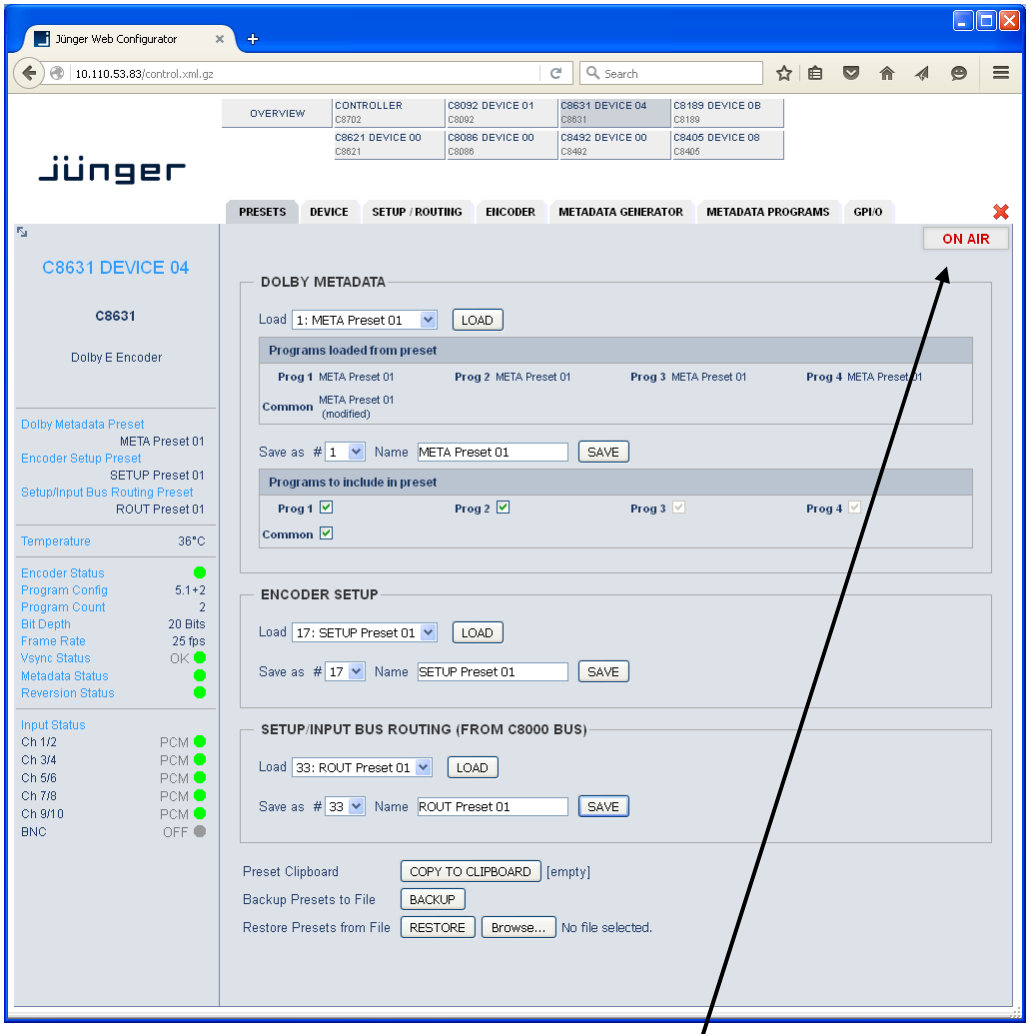
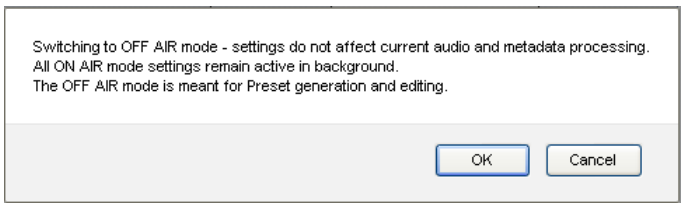
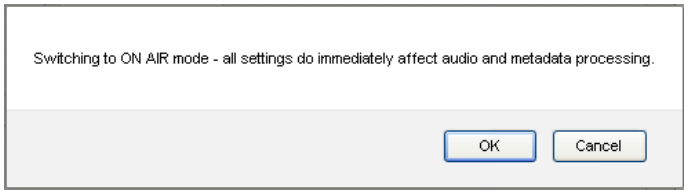
PRESETS



Important Note! The module may be controlled in **ON AIR** mode I.e. all settings have immediate effect.
While in **OFF AIR** mode you may prepare presets without affecting the current operation.
In this case online functions like **preset clip board** are **not available**.



If you hover with the mouse over that switch in **OFF AIR** mode the hint: "**Processing is active, but settings are offline**" will be displayed.



This pop-up appears when you switch back to **ON AIR** mode.

DOLBY METADATA

Since the **C8631** also offers a metadata generator a bank of 16 presets to recall **Dolby metadata** parameters is implemented.

Load

[1: "name" … 16: "name"]
Select a preset by number/name and press **<LOAD>**.
The preset number and name loaded will automatically appear in the **Save as #** and **Name** field below.

Programs loaded from preset

[**Prog 1** – "preset name xy" … **Prog 4** – "preset name xy" / **Common** - "preset name xy"]
Shows the preset name and number [xy] from which the respective program metadata or **common** ones (e.g. Dolby E frame rate, program configuration etc.) have been loaded.
Initially the preset names and numbers are empty, represented by a dash.

Important Note! The metadata structure of the c8k system is defined for a maximum number of four supported programs. I.e. the metadata generator will generate up to four independent sets of metadata for a RDD6 compliant stream. If derived from the metadata input, the generator will enter the **reversion** mode if the number of programs of the received metadata does not match this definition.

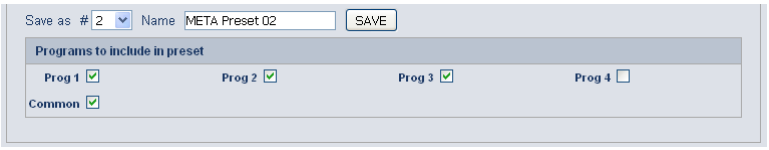
Save as #

[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.

Programs to include in preset



Tick the check box(es) for which program this preset shall be saved and press **<SAVE>.**
The number and the name automatically appear in the **"Load"** fields as well because they are active now.

ENCODER SETUP

Refers to the **ENCODER** pane

Load

[17: "name" … 32: "name"]
Select a preset by number/name and press **<LOAD>.**
The preset number and name loaded will automatically appear in the **Save as #** and **Name** field below.

Save as #

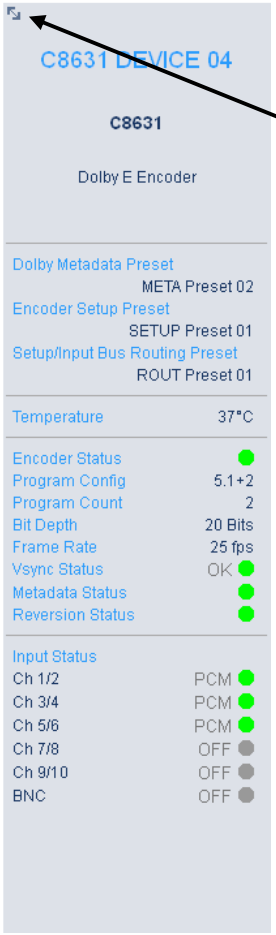
[17 .. 32]
Select a preset memory number where you
would like to save the actual audio program parameters.

Name

[16 character ASCII text]
Assign a name to the preset you are about to save
(up to 16 digits) and press **<SAVE NOW>.**

SETUP/INPUT BUS ROUTING (FROM C8000 BUS)	Refers to the **SETUP / ROUTING** pane A bank of 8 presets to recall device settings.
Load	[33: "name" … 40: "name"] Select a preset by number/name and press **<LOAD>.** The preset number and name loaded will automatically appear in the **Save as #** and **Name** field below.
Save as #	[33 … 40] 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	Copy the active presets to a **clipboard**, the data may be used by other modules inside the same frame.
Backup Presets to File	Creates a backup **XML file** which may be stored to the PC.
Restore Presets from File	You can **<browse>** for a backup file from the PC and restore it by pressing the **<RESTORE>** soft button.

STATUS DISPLAY



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

Dolby Metadata Preset	"Name" of the actual preset loaded
Encoder Setup Preset	"Name" of the actual preset loaded
Setup/ Input Bus Routing Preset	"Name "of the actual preset loaded The word "modified" appears as a prefix if a parameter has been changed by the operator
Temperature	Temperature of the module PCB
Encoder Status	[Dolby E / Dolby Digital / Digital +]
Program Configuration	[5.1+2 / 4x2 / 5.1 / 3x2]
Program Count	[1 … 4]
Bit Depth	[16 / 20 Bits]
Frame Rate	[25 / 29,97 / 30]
Vsync Status	[grey / red]
Metadata Status	[External BNC / Internal]
Reversion Status	Signal status of the respective input
Input Status	Signal status of the respective input
Ch 1/2 **….** **Ch 9/10** **BNC**	[OFF (grey) / PCM (green) / Dolby E / D/D+ (yellow) / ERROR (red)]

DEVICE

INFO

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

Platform [C8631]
Hardware related descriptor.

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

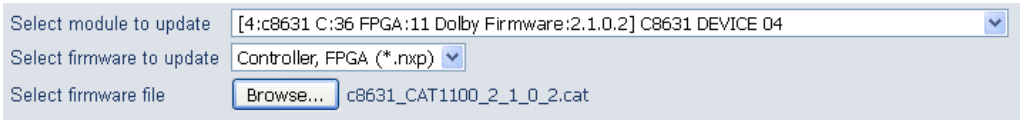
FIRMWARE

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

FPGA [xy]
Actual version of the system FPGA.

Dolby Firmware [e.g. 1.6.0.7]
Actual firmware version of the Dolby OEM board CAT1100.

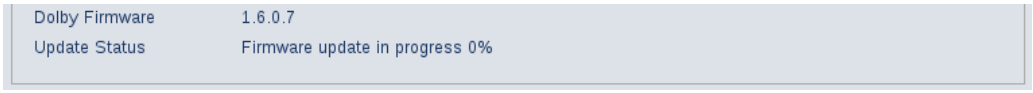
Important Note! The firmware of the Dolby OEM board **CAT1100** can be updated via the frame controller: **C8702 > SOFTWARE UPDATE > MODULES FIRMWARE SINGLE UPDATE:**



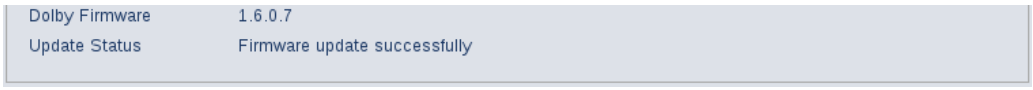
The process of uploading the firmware from the PC via the frame controller will take approx. **20mins**. The GUI can not display the progress, it just polls the frame controller to find out if the upload has finished. If you want to see some progress you may connect a terminal program to the serial port of the frame controller (see C8702 manual for details) and observe the acknowledge dots of the flash programming of the module.

It is a two tier process. After the upload is finished you must go to this **DEVICE** page and start the update of the **CAT1100** from here by pressing the **<UPDATE>** button:

You will get a progress display:



And a success message (or not if it fails):



This process will take approx. 2mins. Afterwards the module will automatically restart.

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.
Restart CAT1100	In case of a malfunction of the Dolby module you may warm start it by pressing **<RESTART>**.

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>** I 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.

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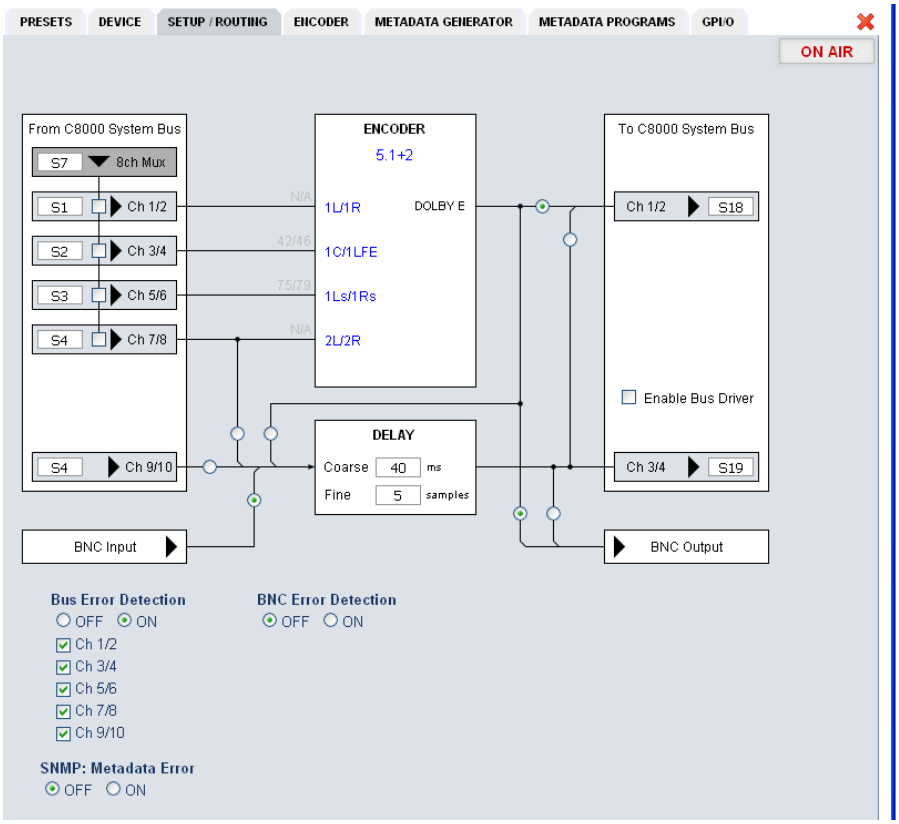
SETUP/ROUTING: Setup of the module and the audio bus routing



From C8000 System Bus

8 Ch Mux [S1 … S32]
Selection of a backplane bus that carries an eight channel multiplex. The check boxes select which pair from the multiplex stream will feed the respective input(s) of the ENCODER.

Ch 1/2 … Ch 9/10 [S1 … S32]
Here you may select the inputs of the encoder. An extra delay is provided for a 2Ch PCM signal. The delay can be used to match the Dolby encoding latency for a stereo program. It may also be used to delay the encoded signal.

BNC Output You may either send the Dolby E encoded signal or the delay output to the BNC front panel connector.

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Encoder [5.1+2 / 4x2 / 5.1 / 3x2]
Within the encoder box you will see the program configuration which the encoder is using.

DELAY An independent two channel delay block.

Coarse [0 … 335] ms

Fine [0 … 240] samples

To C8000 Bus The output from the encoder can be assigned to the C8k audio busses.

Ch 1/2 Select the Bus for output Ch 1/2 (the encoded signal) here.

Enable Bus Driver [OFF / ON]
You can disable the output drivers by un-checking the Enable Bus Driver check box.

Ch 3/4 Select the Bus for output Ch 3/4 here.

BNC Output Select between encoded or delay output here.

Bus Error Detection
BNC Error Detection [ON / OFF]
The serial audio data from the frame bus can be monitored for proper positioning of an **Error-Flag**. A bad **Error-Flag** is an indication that there is disturbance upstream (input signal, input module). The BNC input is monitored for the AES status.
The **Error Detection** can be turned off and on in general or per input. You will see the status on the left hand side: **"Input Status"**.
A **grey** "LED" shows that the detection is disabled. While **green** is OK, **red** indicates an error condition and yellow will signal non audio format signals.

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

SNMP: Metadata Error [OFF / ON]
The metadata error is part of the module status information presented via SNMP. To avoid unnecessary alarms you may disable this function in case the module is temporarily not in use.

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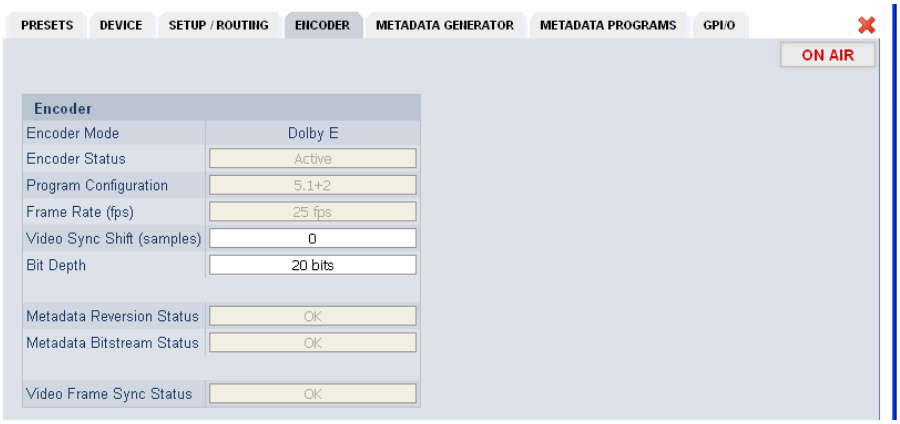
ENCODER: display of general encoder parameters and setup of encoder functions:



Encoder

Encoder Mode Is set fixed to Dolby E.

Encoder Status

Program Configuration [5.1+2 / 4x2 / 5.1 / 3x2]

Frame Rate (fps) [25 / 29,97 / 30 fps]

Video Sync Shift (samples) [-256 … 0 … 256]

Bit Depth [16 bits / 20 bits]

Metadata Reversion Status [OK / Reversion]

Metadata Bitstream Status [OK / Fail]

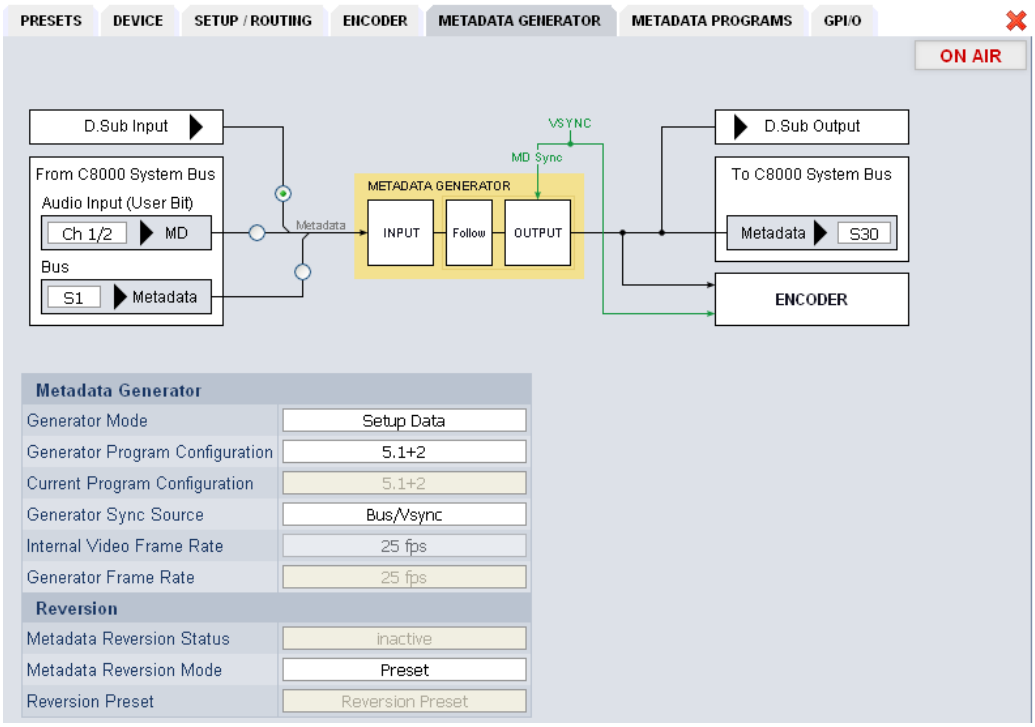
Video Frame Sync Status [OK / Fail]

The Dolby metadata system is too complex to describe in detail in a product manual such as this.
If you are not familiar with it, we recommend you study the many publications from **Dolby Inc.**
Especially the **Dolby Metadata Guide** is essential for understanding the parameters.
For details please visit the Dolby web site:

http://www.dolby.com/gb/en/professional/technology/landing.html

We cannot guarantee that the link is active forever so you may browse other Dolby resources as well.
Specifically concerning metadata we also recommend the **SMPTE** document **RDD6-2008**.

METADATA GENERATOR



The **C8631** provides an extra metadata generator that can be used transparently (input metadata appear at the outputs) or controlled via the set-up data. In the latter case the output metadata may be derived selectively from the input.

D.Sub Input — RDD6 asynchronous input via D.Sub connector

From C8000 System Bus

- **Audio Input (User Bit)** — Dolby subset metadata input, derived from the selected channel pair
- **Bus** — RDD6 metadata input

D.Sub Output — The output of the metadata generator is available at the D-Sub connector in asynchronous RDD6 format.

To C8000 System Bus

- **Metadata** — A specific bus can be used to move metadata alongside the back plane in asynchronous RDD6 format like at the D-Sub output.

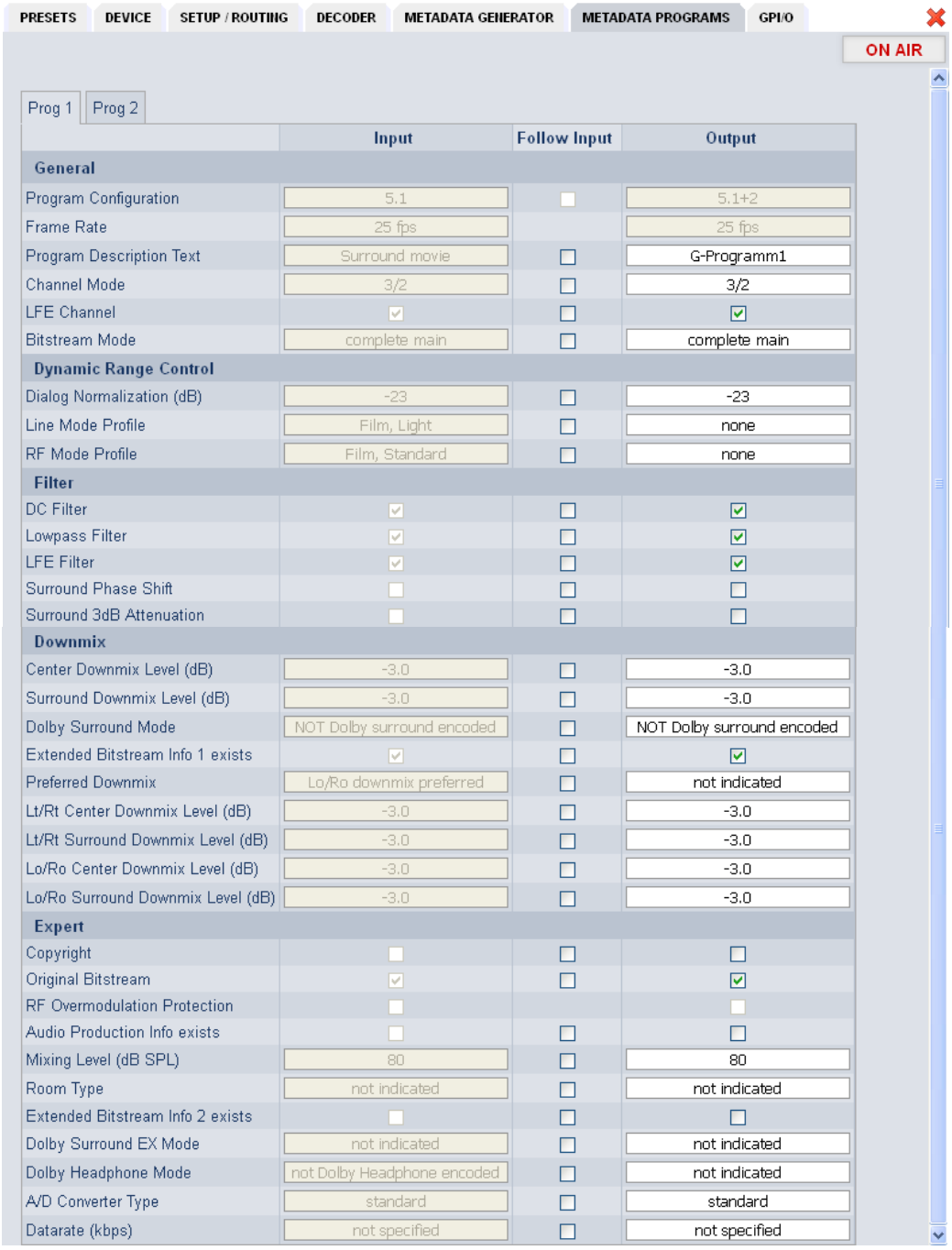
ENCODER — Metadata will be fed to the encoder as well.

Metadata Generator

Generator Mode	[Transparent / Setup Mode]
Generator Program Config	[5.1+2 / 4x2 / 5.1 / 3x2 / Follow Input]
Current Program Config	[5.1+2 / 4x2 / 5.1 etc]
Generator Sync Source	[Bus/Vsync / Audio (25 / 29.97 / 30fps)]
Current Frame Rate	[25 / 29,97 / 30fps]
Reversion	In case of an input failure or a mismatch between input program configuration and the possible system program configurations, the generator may enter the reversion mode.
Metadata Reversion Status	[Inactive / Reversion]
Metadata Reversion Mode	[Preset / Last Valid] The generator can either continue using previous metadata or it will use the metadata from a preset
Reversion Preset	[Metadata Preset x] A pre-defined preset that will automatically be recalled if the generator enters the reversion mode.

METADATA PROGRAMS: Display of program-specific Metadata

These Input values are for display only, that is why the fields are grey and the content can not be changed. The **Follow Input** check boxes determine if metadata is used from the input or from a preset.
The example below shows the metadata of the first program of a Dolby E stream that must be encoded to transmit two programs 5.1 +2 (surround and stereo).

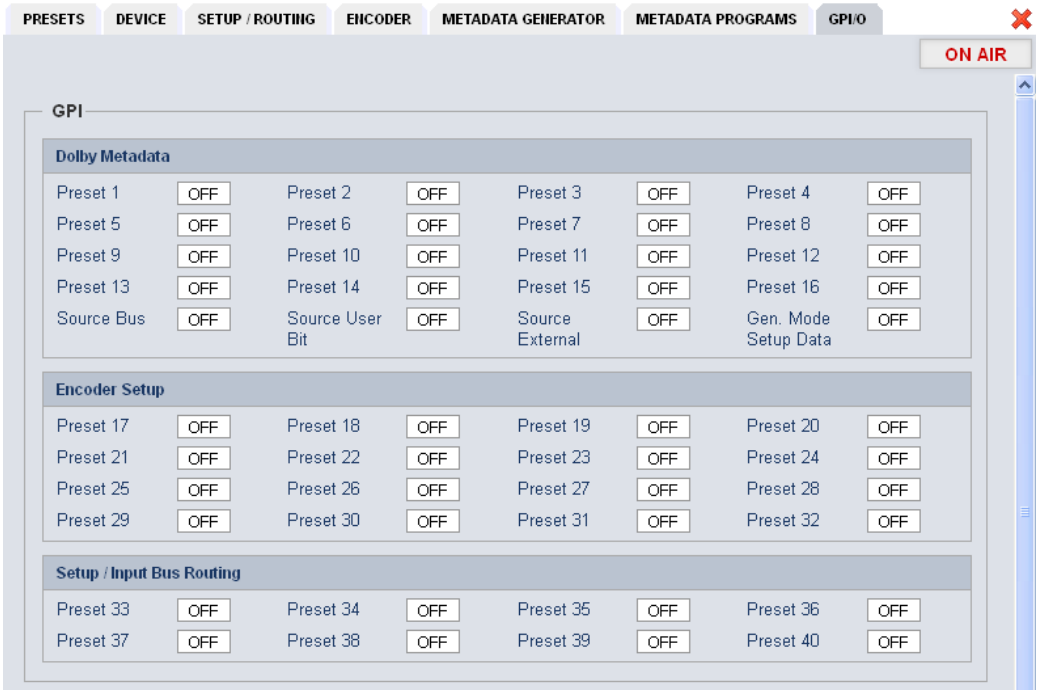


	Input	Follow Input	Output
General			
Program Configuration	5.1	☐	5.1+2
Frame Rate	25 fps		25 fps
Program Description Text	Surround movie	☐	G-Programm1
Channel Mode	3/2	☐	3/2
LFE Channel	☑	☐	☑
Bitstream Mode	complete main	☐	complete main
Dynamic Range Control			
Dialog Normalization (dB)	-23	☐	-23
Line Mode Profile	Film, Light	☐	none
RF Mode Profile	Film, Standard	☐	none
Filter			
DC Filter	☑	☐	☑
Lowpass Filter	☑	☐	☑
LFE Filter	☑	☐	☑
Surround Phase Shift	☐	☐	☐
Surround 3dB Attenuation	☐	☐	☐
Downmix			
Center Downmix Level (dB)	-3.0	☐	-3.0
Surround Downmix Level (dB)	-3.0	☐	-3.0
Dolby Surround Mode	NOT Dolby surround encoded	☐	NOT Dolby surround encoded
Extended Bitstream Info 1 exists	☑	☐	☑
Preferred Downmix	Lo/Ro downmix preferred	☐	not indicated
Lt/Rt Center Downmix Level (dB)	-3.0	☐	-3.0
Lt/Rt Surround Downmix Level (dB)	-3.0	☐	-3.0
Lo/Ro Center Downmix Level (dB)	-3.0	☐	-3.0
Lo/Ro Surround Downmix Level (dB)	-3.0	☐	-3.0
Expert			
Copyright	☐	☐	☐
Original Bitstream	☑	☐	☑
RF Overmodulation Protection	☐		☐
Audio Production Info exists	☐	☐	☐
Mixing Level (dB SPL)	80	☐	80
Room Type	not indicated	☐	not indicated
Extended Bitstream Info 2 exists	☐	☐	☐
Dolby Surround EX Mode	not indicated	☐	not indicated
Dolby Headphone Mode	not Dolby Headphone encoded	☐	not indicated
A/D Converter Type	standard	☐	standard
Datarate (kbps)	not specified	☐	not specified

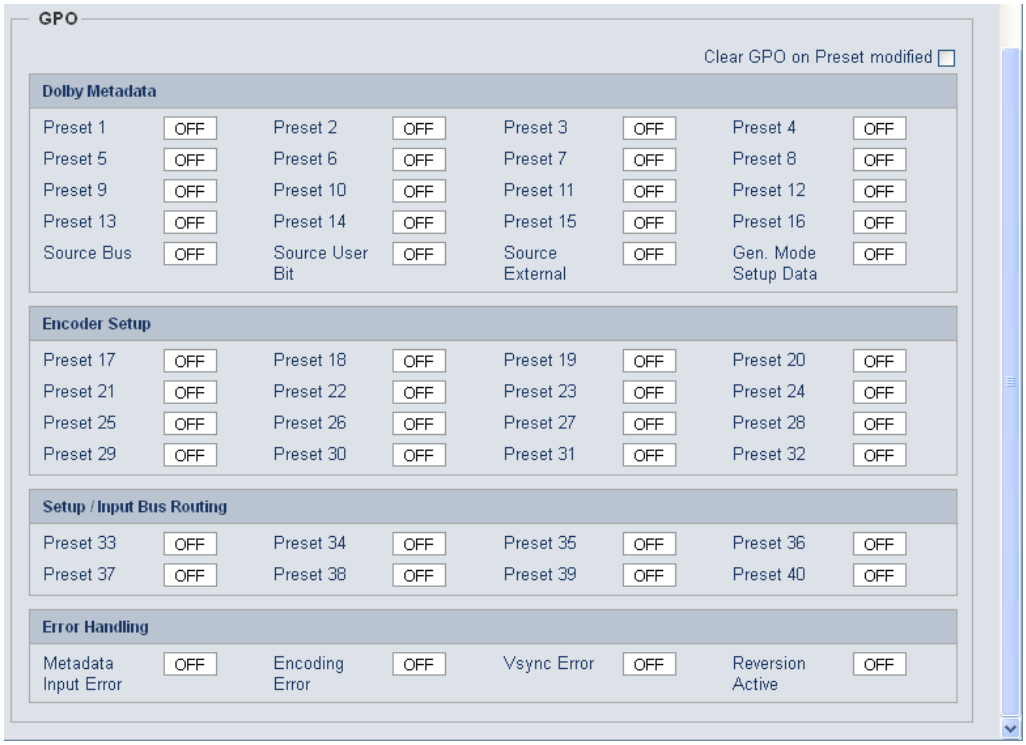
In the example above we receive RDD6 metadata via 9-pin for a 5.1 program configuration.
As per definition the Junger Dolby implementation only supports the program configurations:
5.1 / 3x2 / 5.1+2 / 4x2 so a maximum of 4 tab sheets will contain **Output** metadata.
The other tabs are for the display of incoming metadata only (if the number of programs is higher than the generator set-up). In this example we have two program tabs, **Prog 1** and **Prog 2,** because the generator is set for **5.1+2** and the input only has one program.

GPI/O

GPIs are useful if you want to recall settings (e.g. by loading presets) or turn functions on or off remotely. A C8k frame can handle **127** independent virtual GPI numbers. You must assign a unique number to the respective preset / function. Such numbers are generated by the **brc8x** Broadcast Remote Controller or by the C8817 **GPI/O** interface module. If the **C8631** receives such a number via the CAN bus, it will load the respective preset.



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



Clear GPO on Preset modified

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

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