

Reference Manual

P DM 5290 D

P DM 5290 U

**SD / HD / 3 GBit/s Multi-format AES Audio & Data Embedder /
Deembedder & Shuffler**

**Revision: 1.1
August 2013**

This Manual Supports Device Revisions:	
P DM 5290 Firmware Revision	564
Control System GUI Release	6.5.0

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Warranty

LYNX Technik AG warrants that the product will be free from defects in materials and workmanship for a period of three (3) years from the date of shipment. If this product proves defective during the warranty period, LYNX Technik AG at its option will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, customer must notify LYNX Technik AG of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik AG, with shipping charges prepaid. LYNX Technik AG shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik AG service center is located. Customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.


This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non LYNX Technik supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

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Regulatory information

Europe

Declaration of Conformity

We	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany
<i>Declare under our sole responsibility that the product</i>	
TYPE: P DM 5290 D, P DM 5290 U	
<i>To which this declaration relates is in conformity with the following standards (environments E1-E3):</i>	
EN 55103-1 /1996	
EN 55103-2 /1996	
EN 60950-1 /2006	
<i>Following the provisions of 89/336/EEC and 73/23/EEC directives.</i>	
	Winfried Deckelmann
Weiterstadt, July 2013	
<i>Place and date of issue</i>	<i>Legal Signature</i>

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense

Getting Started

Most CardModules are installed into the rack frames and system tested in the factory. If this is an upgrade part or service exchange item then the module is supplied in a padded cardboard carton which includes the CardModule, rear connection plate and mounting screws.

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case subsequent shipping of the product becomes necessary. Do not remove the module from its protective static bag unless observing adequate ESD precautions. Please see below.

ESD Warning



This product is static sensitive. Please use caution and use preventative measures to prevent static discharge or damage could result to module.

Preventing ESD Damage

Electrostatic discharge (ESD) damage occurs when electronic assemblies or the components are improperly handled and can result in complete or intermittent failure.

Do not handle the module unless using an ESD-preventative wrist strap and ensure that it makes good skin contact. Connect the strap to any solid grounding source such as any exposed metal on the rack chassis or any other unpainted metal surface.

Caution

Periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 Megohms.

Product Description

The P DM 5290 is a high quality 3GBit/s AES audio & Data embedder and de-embedder & shuffler suitable for use in SDTV applications and HDTV applications, with support for a variety of HDTV formats.

The eight audio ports can be individually configured by the user as audio inputs or outputs. Already embedded audio as well as the audio from the up to eight external audio inputs are automatically assigned to a 32 mono channel audio processing unit.

The audio processor provides mono crossbars and a 32 channel internal audio processing stage incl. mono gain, phase invert, mute and stereo mix down. Overload and silence detection is also provided. The module applies automatic timing compensation as well as adjustable user delay.

One Dolby E Synchronizer is provided which allows synchronization and automatic guard band adjustment of one Dolby E stream.

Metadata Extractor and Embedder - The module provides visualization of digital ANC packets that are present in HANC and VANC. These can be passed transparently, removed or overwritten with new data. When embedding new data we have provided considerable flexibility; you can specify the line number and if it's to be embedded in HANC or VANC, where applicable. Also, SMPTE 2020 Audio Metadata can be decoded from the SDI signal and output on the RS 422 port provided, likewise external SMPTE 2020 Audio Metadata can be injected into the RS 422 port and embedded on the SDI output. Timecode in three different formats can be received and decoded if present; ATC-LTC, ATC-VITC and D-VITC. An external port can be user configured as an LTC Audio Timecode input or output allowing the extraction or embedding of any supported time code format.

Timecode can be inserted into the output SDI signal as a burn-in (switchable on/off).

The module also provides support for 2 external GPI input / output triggers (ON / OFF) which can be transported as metadata in the SDI stream (embedded into a Timecode signal). Fully automatic timing compensation is provided for all metadata processing ensuring input to output timing accuracy.

The module is multi-format (3GBit/s, HD and SD) and multimode in operation. The input video standard (and format) is detected and the module automatically switches its operation to the detected format.

The module provides support for balanced AES audio inputs or outputs on a 25 pin SubD connection plate (P DM 5290 D) and for unbalanced AES audio inputs or outputs on 75Ohm MiniDin connectors (P DM 5290 U).

Note. The P DM 5290 is shipped as a 4 x AES Embedder (AES1..4) and 4 x AES Deembedder (AES5..8) (factory default). To configure audio ports, please use the GUI application (APPolo Control, see page 27).

Note. Please check connected peripheral equipment before using the P DM 5290 to make sure the audio ports of the P DM 5290 are configured correctly, e.g. an output is not connected to an output of another device, this might damage the equipment.

Key Features

- Support for SDTV, HDTV and 3GBit/s standards
- Automatic video standard and format detection
- Audio ports can be individually configured as inputs or outputs
- Existing embedded audio can be deembedded
- Delete or replace existing embedded audio
- Mono audio crossbar
- Audio processing (e.g. mono gain)
- Internal Test Tone generator
- Automatic AV/Data delay compensation
- Adjustable audio and video user delay
- Audio Delay up to 10 and video delay up to 62 frames
- Individually selectable ON/OFF sample rate converters for each AES input
- Dolby E compatible (SRC will be switched off automatically)
- One Dolby E Synchronizer
- Embedded audio group selection
- Embedding into Test Signal output video frame with no SDI input signal
- All audio ports transformer isolated
- 2 x SDI outputs
- Selectable Horizontal and Vertical Video Blanking
- Internal meta data handling
- Insertion and extraction of external meta data (Audio Meta Data SMPTE 2020, LTC Audio Timecode and GPI/Os)
- Timecode burn-in (switchable on/off)

Input Formats

The module has one multi-format serial digital input with automatic input detection. The module will detect the following input standards and configure the module automatically for operation in the connected format.

SDTV Formats	HDTV Formats	3GBit/s (Level A) Formats
525 / 59.94Hz	1080i / 50Hz	1080p / 50Hz
625 / 50Hz	1080i / 59.94Hz	1080p / 59.94Hz
	1080i / 60Hz	1080p / 60Hz
	1080p / 23.98Hz	
	1080p / 24Hz	
	1080p / 25Hz	
	1080p / 29.97Hz	
	1080p / 30Hz	
	1080psf / 23.98Hz	
	1080psf / 24Hz	
	1080psf / 25Hz	
	720p / 23.98Hz	
	720p / 24Hz	
	720p / 25Hz	
	720p / 29.97Hz	
	720p / 30Hz	
	720p / 50Hz	
	720p / 59.94Hz	
	720p / 60Hz	

Output Formats

Same as the input format, or the pre-selected format, if no input is connected (see above)

Video and Audio Delay

The SDI signal can be delayed up to 62 frames in steps of frames, lines and pixels. The delay adjustment is applied after the embedding stage, i.e. the embedded audio is delayed with the same amount.

Audio can be adjusted in various ways (see GUI section of this manual). The audio delay is always in reference to the video delay and can be negative to video, depending on the video delay. Max. audio delay is 10s in steps of single audio samples.

Audio Embedding with No Video Input

With no SDI signal connected the module will switch to the last connected video standard (default) and will produce a test pattern video output with the audio embedded. The test pattern can be selected using the GUI of the APPolo Control SW.

Note: It is possible to disable this automatic generation of an output SDI signal. When this function is disabled, and no SDI input is connected, the SDI output will not generate any signal at all.

If used in standalone mode with no SDI input connected the output standard can be changed from the default using the format selections provided in the GUI or local menus.

Note. The modules are supplied set to “*default to the last connected video standard*”. This will be 1080i / 50Hz for new modules. This can be cleared by connecting a different video input, or by selecting the required video format (using the selections provided) – waiting approx. 10 seconds for the module LEDs to flash yellow three times and then switching it back to “*follow last input*”. This will have the same effect.

If the SDI video input is removed during operation, then the embedder will continue to embed audio into a test pattern video frame in the selected format until the video is restored.

Note. *Settings will be written to flash RAM automatically after 10 seconds with no activity. This will be indicated by the alarm LED flashing yellow three times. If power is removed before the settings have been stored the module will revert back to the previous settings when powered up*

Sample Rate Converters

Each AES input has selectable sample rate converters (default is on), these will resample the audio to 48KHz required for embedding. If DolbyE / AC3 (or any other non-PCM audio format) is to be embedded then the sample rate converter will be switched off automatically to avoid that the audio will be corrupted / destroyed.

Note. With the Sample rate converters switched OFF its important to make sure the AES audio is synchronous with the input SDI signal prior to embedding.

Audio Processing

All internal and external audio signals can be processed in an audio processing stage including mono gain, phase invert, test tone, stereo mix down as well as overload and silence detection.

Audio Mono Crossbar

All AES signals (external and deembedded) are fed through the audio processing stage into a mono audio crossbar where individual left and right audio channels can be re-assigned / swapped prior to embedding resp. mapping to the external AES outputs .

Audio Group Deletion

The P DM 5290 will detect any audio groups present in the SDI stream, and each group can be selected individually. The user has the choice of passing any existing embedded audio group(s) intact, replacing the audio group(s) or deleting the audio group(s).

Metadata Handling

One SubD15 connector (wiring details see page 16) offers all external meta-data signal connections:

- 3 pins : LTC Audio Timecode as one differential signal (input or output, configurable at runtime)
- 5 pins : RS422 as two differential pairs (RX/TX plus common ground)
 - embedding / deembedding of a DolbyE Audio Metadata bit stream according to SMPTE2020 (A/ B)
- 4 pins : two GPI output closure contacts (one pair each)
- 3 pins : two GPI input (device senses a shortcut to common ground).

All meta-data paths are delayed in accordance to other relevant signal paths, to avoid introduction of delays in between Audio, Video or Metadata

Timecode can be deembedded from the SDI signal in all three of the following formats simultaneously (with the associated ANC-line information being displayed to the user):

- ATC-LTC
- ATC-VITC
- DVITC

The LTC Audio Timecode output can be connected to any of these three data signals.

For embedding Timecode into the outgoing SDI stream, the Timecode information can be selected from one of the following sources.

- external LTC Audio Timecode input
- decoded ATC-LTC
- decoded ATC-VITC
- decoded DVITC

The resulting signal can then be embedded into the outgoing SDI stream in any of the three formats mentioned above (on/off decision per format by user)

Other types of meta-data can be passed transparently or deleted individually (see GUI Section – MetaData – Advanced TAB).

Incoming, embedded SMPTE 2020 MetaData can be deleted or re-embedded into the SDI output. Source for output embedding can also be the external SMPTE 2020 MetaData on the SubD15 connector.

Timing

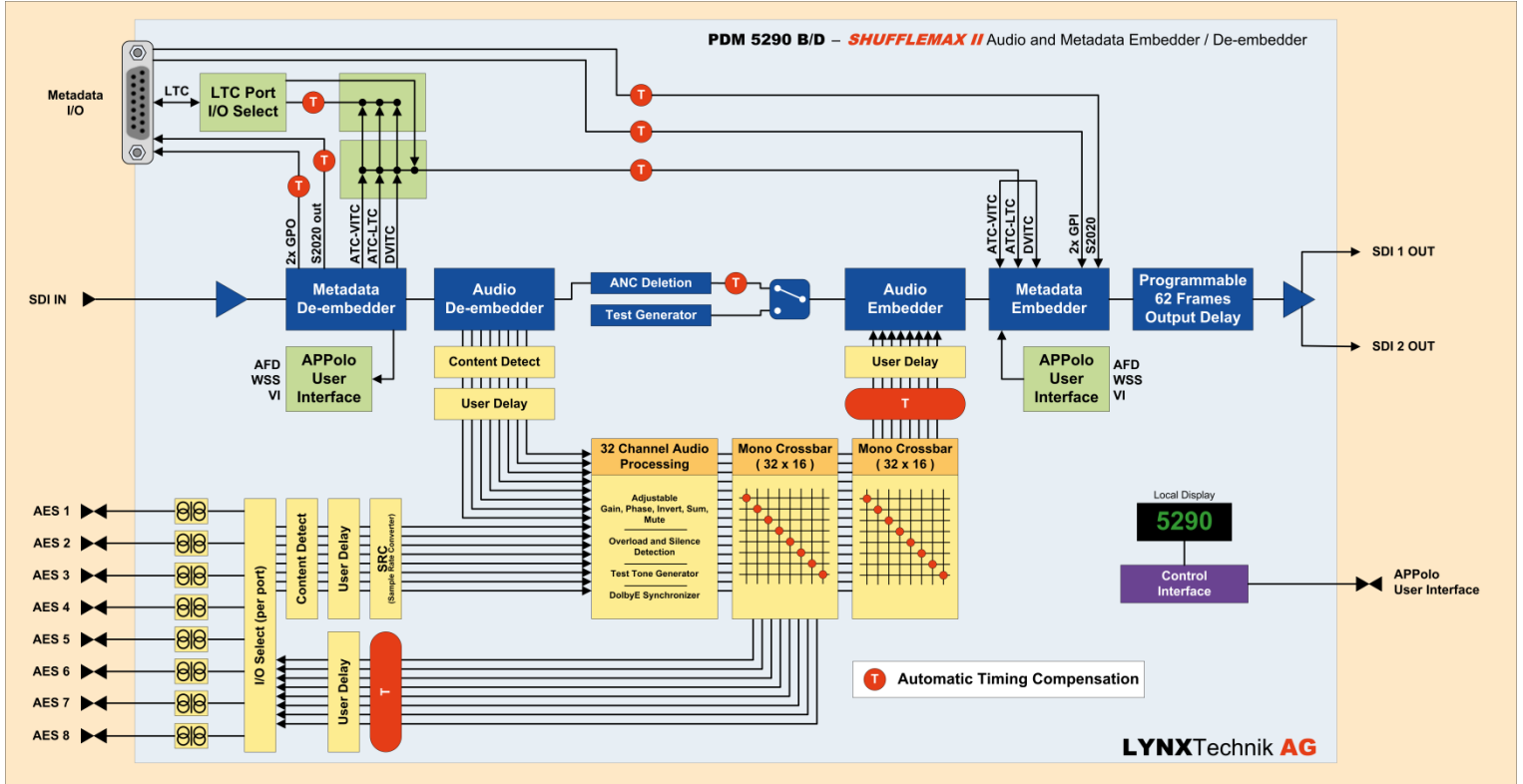
With regard to the total video delay (SDI input to output) of the product, the user can select between two different modes of operation:

1. **Frame Delay Mode:**
The total video delay input-to-output is exactly one (1) video-frame (in the current video standard).
2. **Minimum Delay Mode:**
The total video delay input-to-output is minimal (i.e. 1/2 line of video in the current standard).
In this mode, embedding of external data (such as LTC Audio Timecode, S2020 Audio Metadata) and all Audio-Data will be embedded as soon as possible, disregarding accurate positioning. I.e. there will be an A/V delay of ~20 lines, depending on the actual processing time of the embedder.

Note: *In Minimum Delay mode no MetaData can be deleted*

- Automatic timing compensation will be applied to all signal channels (audio / video / metadata, as applicable), so that the current mode of operation is achieved.
- In addition, the user can specify an individual compensation delay (for video and per audio-AES-channel). This can be useful for a manual compensation of timing problems that originate outside of this device.
- Such user audio delay settings are accepted per AES-channel and in the context of the audio inputs (from deembedder and from external AES), as well as in the context of audio output (towards embedder and external AES).
- Depending on the amount of internal automatic compensation delay (which is not visible to the user), the manual user delay can also be negative (reducing the influence of the automatic compensation delay).

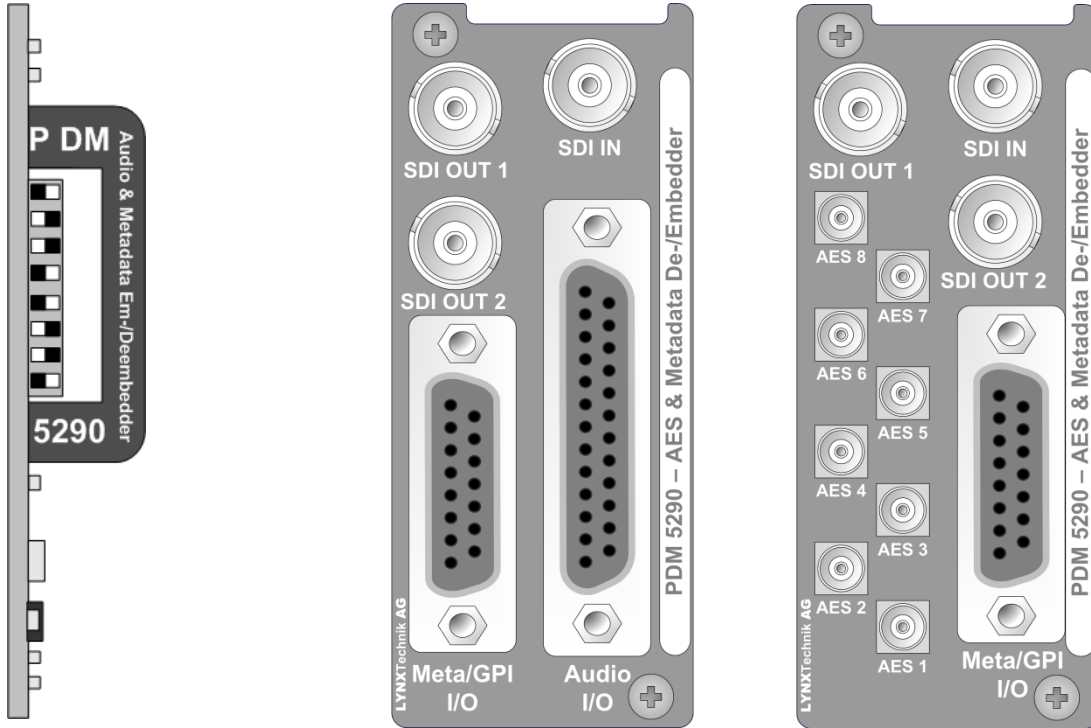
Functional Diagram (P DM 5290)



Note. The P DM 5290 is shipped as a 4 x AES Embedder (AES1..4) and 4 x AES Deembedder (AES5..8) (factory default). To configure audio ports, please use the GUI application (APPolo Control, see page 27).

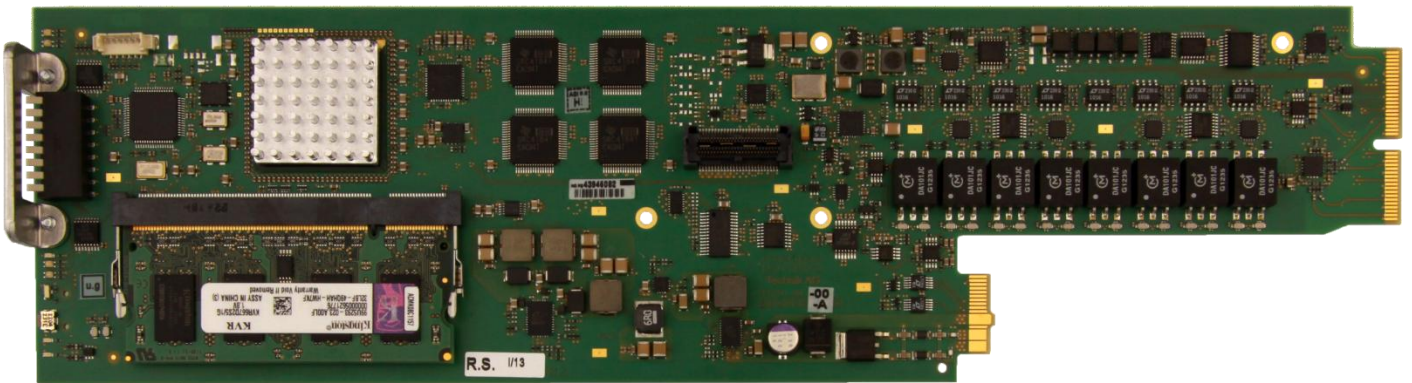
Note. Please check connected peripheral equipment before using the P DM 5290 to make sure the audio ports of the P DM 5290 are configured correctly, e.g. an output is not connected to an output of another device, this might damage the equipment.

Module Layout



Module Front Panel

Module Rear Termination Panels



CardModule Layout

Connections

Video

The P DM 5290 uses standard 75 Ohm BNC connectors. We recommend the use of high quality video cable for digital video connections to reduce the risk of errors due to excessive cable attenuation. Max cable lengths supported are shown below.

SDTV = 250m Belden 8281 (270Mbits/s)

HDTV = 140m Belden 1694A (1.4Gbits/s)

3Gbit/S = 80m Belden 1694A (2.97Gbits/s)

Note. Due to the compact design of the connection plate it will be necessary to use a connection tool to secure the BNC video connectors.

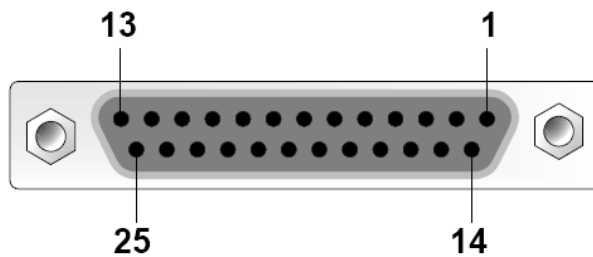
Audio: Balanced AES3

The module provides for both Unbalanced (AES3id on MINI DIN connectors) and Balanced (AES3) external audio connections.

The **P DM 5290 U** version provides MiniDIN (DIN1.0/2.3) connections for unbalanced AES3id

The **P DM 5290 D** version provides a SubD connector for balanced AES3

Pin Number	Connection	Pin Number	Connection
1	AES 8 +	14	AES 8 -
2	AES 8 GND	15	AES 7 +
3	AES 7 -	16	AES 7 GND
4	AES 6 +	17	AES 6 -
5	AES 6 GND	18	AES 5 +
6	AES 5 -	19	AES 5 GND
7	AES4 +	20	AES 4 -
8	AES 4 GND	21	AES3 +
9	AES3 -	22	AES3 GND
10	AES 2 +	23	AES2 -
11	AES 2 GND	24	AES 1 +
12	AES1 -	25	AES 1 GND
13	n.c.		



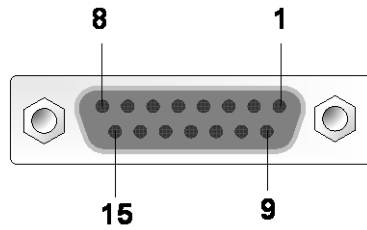
View looking INTO connector as seen on module

We recommend you use high quality screened (twisted pair) cable for the balanced audio connections. LYNX has an optional audio breakout cable which will bring out all audio connections to in line XLR connectors. Model number **R AC M 25-8** or **R AC F 25-8**

Metadata Connector

The rear connection plate of the P DM 5290 provides a 15 pin female SubD connection for external Metadata. Connector wiring is shown below.

Pin Number	Connection	Pin Number	Connection
1	UART_RX_A + (serial IF)	9	LTC_IO_P
2	UART_RX_B - (serial IF)	10	LTC_IO_N
3	GND	11	GND
4	UART_TX_A + (serial IF)	12	GPO_0_A
5	UART_TX_B - (serial IF)	13	GPO_0_B
6	GND	14	GPO_1_A
7	GPI[0]	15	GPO_1_B
8	GPI[1]		



View looking INTO connector as seen on module

Termination: For RS422/RS485 the Rx Pair is terminated with 120 Ohm between A and B. Tx is not terminated.

Installation

If this module was supplied as part of a system it is already installed in the rack enclosure. If the module was supplied as a field upgrade please follow the installation procedure below.



NOTE Observe static precautions when handling card. Please see ESD warnings on Page 6.

Each Card Module is supplied with a rear connection panel and two mounting screws. Please follow the following procedure for installation of the card module into the Series 5000 Card Frame.

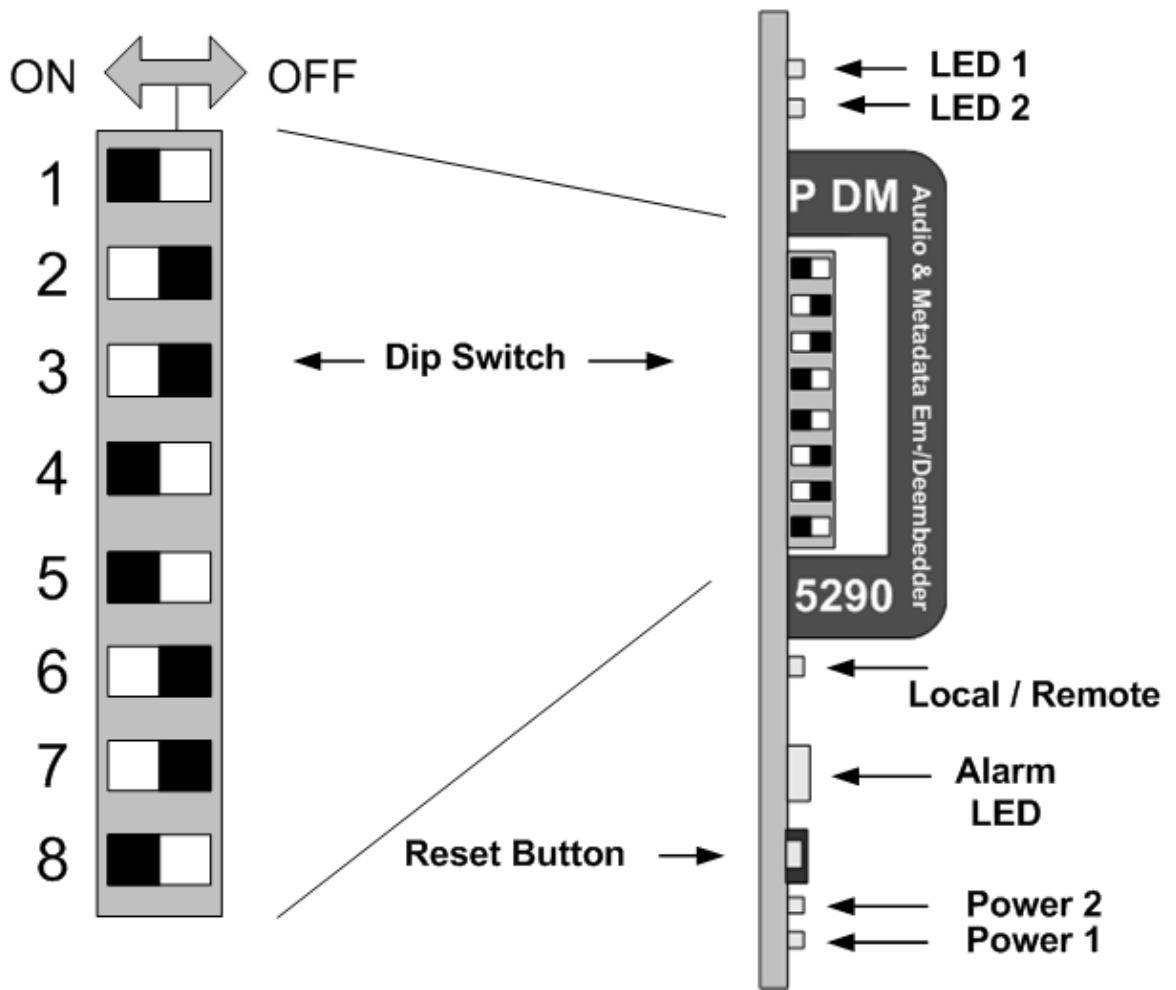
1. Select a slot in the card frame where the CardModule will be located.
2. Remove the blank connection panel from the rear of the rack (if fitted)
3. Install the rear connection panel using the screws supplied. Do not tighten the screws fully
4. Slide the card module into the card frame and carefully check the CardModule connects to the rear connection plate. The card should fit easily and should not require excessive force to insert, if you feel any resistance, there could be something wrong with the rear connection panel location. Do not try and force the connection this may damage the connectors. Remove the rear connection panel and check alignment with the CardModule.
5. Insert and remove the CardModule a few times to ensure correct alignment and then tighten the two screws to secure the rear connection plate.

Settings and Control

The P DM 5290 has an integrated micro-controller, which enables the module to be configured and controlled locally via the dip-switch or from remote when using one of the optional controllers and control software.

Once set, all settings are automatically saved in non-volatile internal memory. (Flash RAM) The module will always recall the settings used prior to power down.

PCB Front View



Switch and LED locations

Switch Settings

Below the switch settings for the 8-position dip-switch are defined.

Switch	Setting	Function
1	ON	Enable Local Adjustment
	OFF	Disable Local Adjustment
2	ON	Audio Embedder for Group 1 active
	OFF	No Embedding for Audio Embedder Group 1
3	ON	Audio Embedder for Group 2 active
	OFF	No Embedding for Audio Embedder Group 2
4	ON	Audio Embedder for Group 3 active
	OFF	No Embedding for Audio Embedder Group 3
5	ON	Audio Embedder for Group 4 active
	OFF	No Embedding for Audio Embedder Group 4
6	ON	Erase content in H-Blanking interval
	OFF	Content in H-Blanking interval preserved
7	ON	Erase content in V-Blanking interval
	OFF	Content in V-Blanking interval preserved
8	ON	Auto Test pattern enabled if no SDI input detected
	OFF	Auto Test pattern disabled

Switch Function Detail

Dip Switch 1

This switch is used to enable or disable local adjustments. Set to **ON** enables the setting of the other dip switches to configure the module. Set to **OFF** will prevent any switch settings taking effect.

Note. It is recommended to set it to **OFF** to prevent accidental changes to the stored module configuration if the switches are moved.

Dip Switch 2

This switch configures audio embedder for group 1. **ON** enables the embedder, new audio is then embedded into the SDI signal. Already embedded audio of group 1 will be overwritten, **OFF** disables the embedder, already embedded audio in the SDI signal will be preserved

Dip Switch 3

This switch configures audio embedder for group 2. **ON** enables the embedder, new audio is then embedded into the SDI signal. Already embedded audio of group 2 will be overwritten, **OFF** disables the embedder, already embedded audio in the SDI signal will be preserved

Dip Switch 4

This switch configures audio embedder for group 3. **ON** enables the embedder, new audio is then embedded into the SDI signal. Already embedded audio of group 3 will be overwritten, **OFF** disables the embedder, already embedded audio in the SDI signal will be preserved

Dip Switch 5

This switch configures audio embedder for group 4. **ON** enables the embedder, new audio is then embedded into the SDI signal. Already embedded audio of group 4 will be overwritten, **OFF** disables the embedder, already embedded audio in the SDI signal will be preserved

Dip Switch 6

If this Dip Switch is set to ON all content in the horizontal blanking intervals will be erased
If set to OFF the content in the horizontal blanking intervals will be preserved

Dip Switch 7

If this Dip Switch is set to ON all content in the vertical blanking intervals will be erased

If set to OFF the content in the vertical blanking intervals will be preserved

Dip Switch 8

With this Dip switch a test pattern can be activated in case no SDI input is detected. The SDI signal will be generated in the SDI format which was last detected on the SDI input.

ON enables this function.

The test pattern can be pre-selected through the GUI application of the APPolo Control SW.

Factory Preset Condition

The P DM 5290 is delivered programmed and preset for the following mode of operation:

Switch 1 **ON** Local Adjustment Enabled

Switch 2 -5 **OFF** Embedders for Group 1..4 enabled

Switch 6 **OFF** Content in H-Blanking interval preserved

Switch 7 **OFF** Content in V-Blanking interval preserved

Switch 8 **ON** Auto Test Pattern disabled

If this is the required mode of operation, then no adjustments are necessary.

Auto Store

If no parameters are changed for 10 seconds then the current settings will be written into the flash memory automatically. This can be seen by the channel status LEDs flashing yellow three times.

Reset Button

If this button is pressed for 5 seconds all parameters will be reset to their factory default settings. To confirm this reset, the device will blink all LEDs once (OFF – ON – OFF) and then return to their normal state.

Alarm/LED Status Indicators

The P DM 5290 module has integral LED indicators, which serve as alarm and status indication for the module. Function is described below.

LED 1: SDI Status

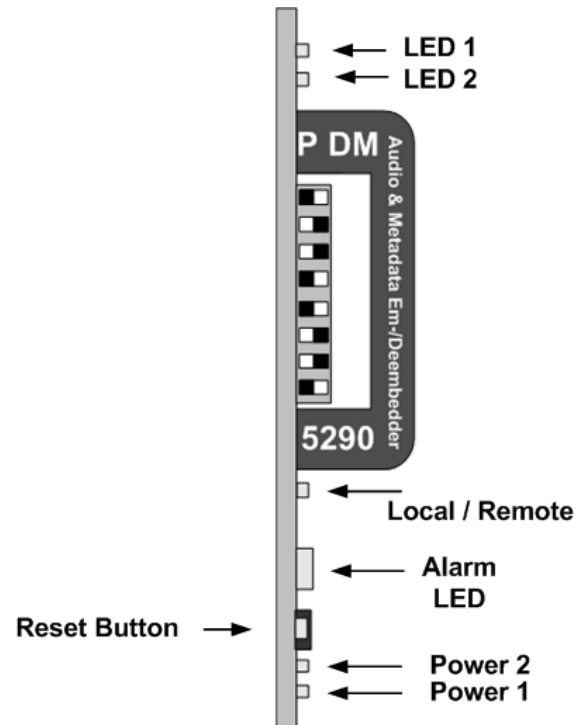
This LED indicates the status of the SDI input signal

LED Color	Indication
Green	SDI present and ok
Yellow	SDI o.k, but unsupported standard, no embedding takes place
Red	No valid SDI standard

LED 2: Audio Status

This LED indicates the status of the audio input signals

LED Color	Indication
Green	All used audio inputs present and o.k.
Yellow	Warning condition. Any of: - At least one embedded group is missing one AES signal and Embedder event enabled. - At least one external Audio Input is missing but routed to be embedded.
Red	Error condition. Any of: - At least one external Audio Input has no signal. - At least one embedded group is missing both AES signals and Embedder event is enabled.



Alarm Indicator

There is also a single alarm LED on the lower edge of the module. This is visible through the card frame front cover and provides a general indication of the module status.

LED Color	Indication
Green	External Audio Output: - All audio output pairs have two audio channels Embedder: - Each selected embedded group has all four possible audio channels.
Yellow	External Audio Output: - At least one of the audio output pairs is missing one audio channel Embedder: - At least one of the selected embedded groups is missing one, two and/or three of the possible four audio channels.
Red	External Audio Output: - At least one audio output pair is missing both possible audio channels. Embedder - At least one embedded group is missing all four possible audio channels

Power Indication

There are two LEDs on the lower edge of the module indicating the presence of the two power supply voltages (main power supply and redundant power supply).

LED 1	Indication
Green	Power from Main PSU ok
off	No power from Main Power Supply

LED 2	Indication
Green	Power from Redundant PSU ok
off	No power from Redundant PSU

Local/remote LED

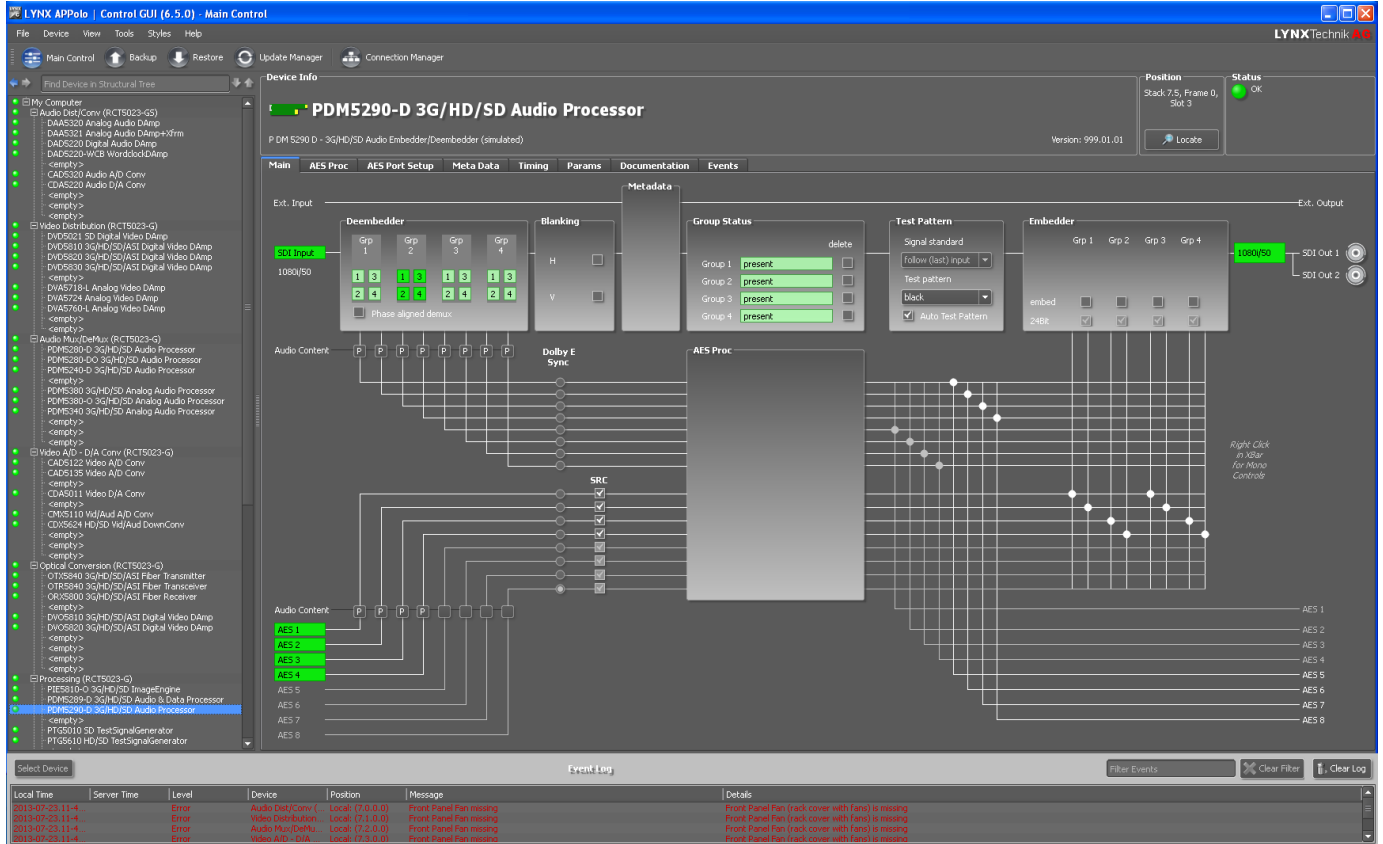
LED Color	Indication
Green	Local control via DIP switches active, all settings according to local DIP switches
off	Current settings may be overwritten through remote control

Control System GUI

All LYNX CardModules support a computer interface which allows setting the modules parameters using a simple GUI interface. Access to all standard features (and in some cases) extended features is possible using this interface.

Access to the GUI requires the use of the optional LYNX control system

Note. Any settings made using the control system overrides any local settings made on the module. All settings are stored in internal flash ram and will survive power cycles and long term storage.



The GUI screenshots below are for the P DM 5290 module. The above screenshot shows the complete module GUI. The Device info area contains information about the module including name and firmware revision. If used as part of a larger system (using the LYNX central control system) the modules position and physical location is displayed above the “locate” button.

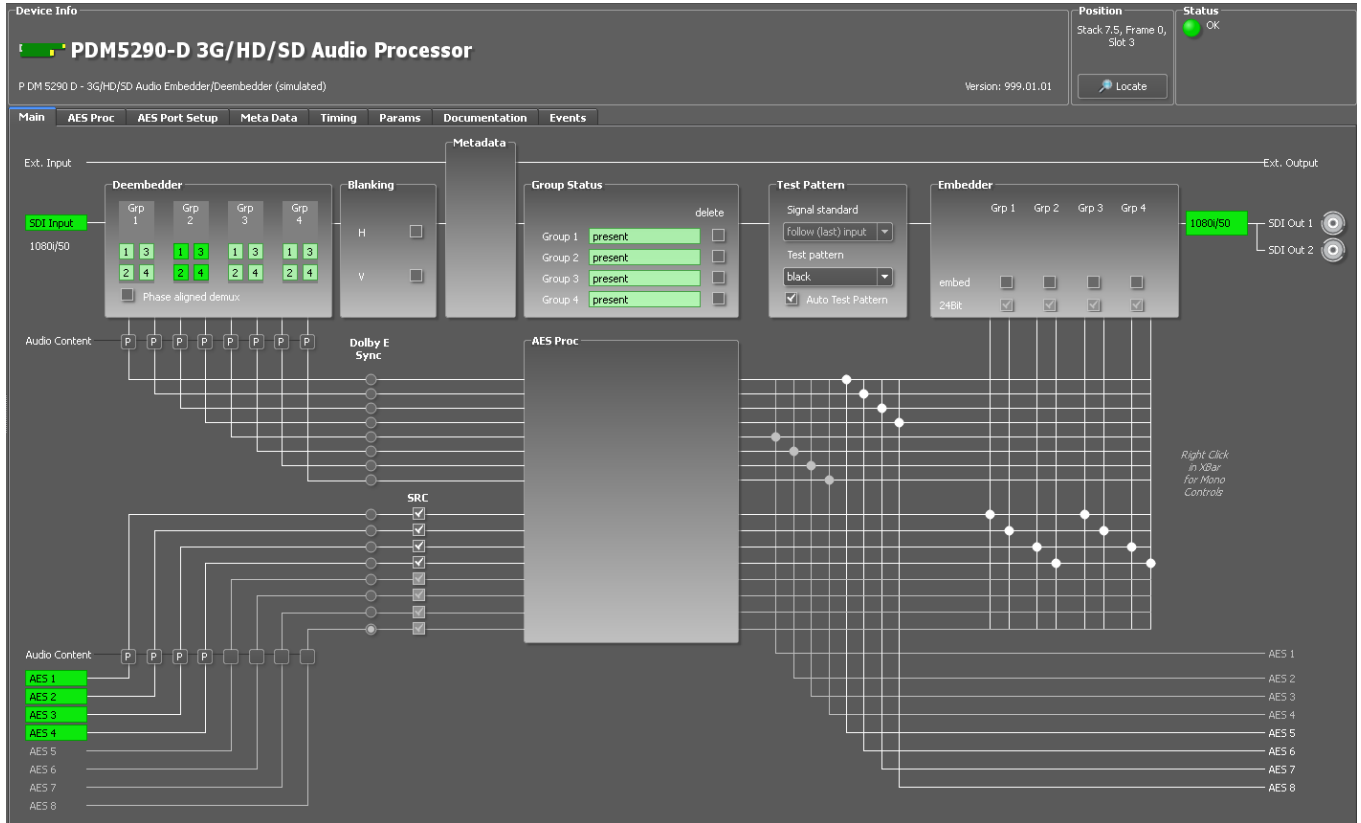
Note. The Locate function is a tool used to quickly identify a module in larger systems. Selecting “locate” will flash the module alarm LED yellow. (does not effect module operation). This function will be automatically stopped (timeout)

The first screen you see when the module is selected is the **Main** tab this is a graphical representation of the modules function and signal flow (left to right). Clicking on processing boxes where shown will link to other GUI screens with controls for these specific functions.

The area at the bottom of the screen is the error log. Any fault condition will be time stamped and entered into the log. There are a number of Tabs associated with each Module which splits up the modules settings into a number of separate screens. The primary GUI screens and functions are described below.

Main Tab

This screen is the main GUI interface and is presented first when the module is displayed in the GUI. The layout replicates module function and the signal flow from left to right. Selections are made using on-screen sliders, radio buttons, drop down selections and checkboxes.



Input Detection

On the left the SDI input and the AES inputs are detected.

The standard / format of the SDI signal is displayed on screen in green (if format is not supported color = Yellow and if input is missing the color = Red).

If a valid and synchronous AES signal is detected the AES input detection turns green, a valid, but asynchronous AES signal is indicated in yellow, a missing AES signal will be indicated in red.

AES ports, which are configured as outputs are greyed out in the input section.

Group Status

Any embedded audio is detected and the status is displayed in the Group Status area. If embedded audio is present it will highlight green. It is possible to delete each incoming audio group individually at this stage using the delete checkbox.

Note. If the audio is not deleted but the group is selected for embedding then the existing audio will be over written.

The color of the signal detection indicates status of the embedded audio:

light green = present, but not used
dark green = present and used
red = not present and used
grey = not present and not used

Test Pattern Signal Standard

This selection is grayed out when a valid input signal is detected. When there is no input (or an invalid input signal) then the selection made in this drop down box will determine the output standard of the “Test Pattern” audio sync frame for the embedder (user can select from a variety of different test patterns, black is default).

Default is “follow last input” which is recommended for most applications. If the video input is removed then the embedder will continue to function (with a minimal interruption to the audio embedding process) by outputting embedded audio in a test pattern “audio sync” frame.

With no input selected it is possible to preset the output format by making a selection from the drop down selections.

Sample Rate Converters

Each AES input has a selectable sample rate converter (SRC ON/OFF). The converter will be **switched off** automatically if any non-PCM audio signal is connected or the encoded audio would be destroyed.

Audio Crossbars

Each AES input as well as each deembedded AES signal passes into a crossbar where each individual left and right channel is split from the AES inputs and made available for mapping into any of the available crossbar outputs for activated AES outputs and the embedder feeds.

Embedder

The crossbar provides 8 AES outputs combined into 4 AES groups which can be embedded into the SDI input stream. Group selection is possible using the group select checkbox.

***Note.** If an existing embedded group has not been deleted but is selected for embedding then the existing audio will be overwritten*

If an HDTV input signal is detected then only signals with 24 Bit audio will be embedded. If an SDTV signal is detected then you can select in between 20 and 24 Bit embedding.

AES Outputs

If AES ports are configured as outputs the selection matrix for the respective cross points will be activated. Also the respective AES outputs will be highlighted.

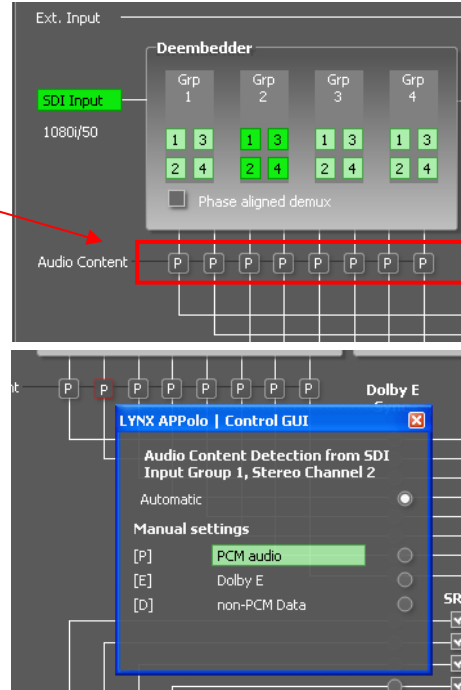
If AES ports are configured as inputs the respective cross points and the AES outputs are greyed out.

Automatic Audio Detection

Audio presence and audio format for the embedded audio on the SDI input and the 8 x external AES inputs is automatically detected and displayed on the module GUI in the LYNX control system.

This can be seen below; the small blocks under the de-embedder indicate the audio status for each AES stream:

- P** = PCM Audio Detected
- E** = Dolby E Audio Detected
- D** = Non-PCM (other than DolbyE)
- Blank** = No Audio Signal Present



Configuring Audio Inputs

Audio inputs can be configured automatically based on the audio detected, or manually configured to be only a particular type. When an input is manually configured the system will indicate when a conflict exists between the configured setting and the detected audio on that channel.

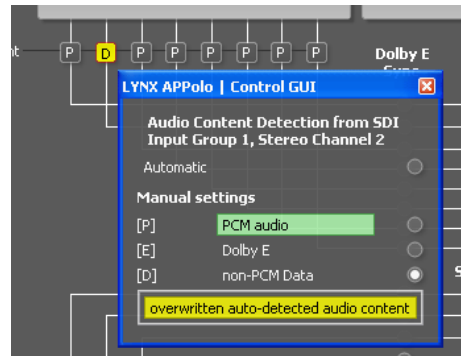
Clicking on one of the audio boxes with the mouse will bring up the audio configuration dialog for that channel.

The default setting is always automatic, as seen above and for this first input you can see it has detected PCM audio.

To manually set this input simply click on the respective selection with the mouse

If we manually force this input to non-PCM Data, this will cause a conflict as PCM audio is present. See below:

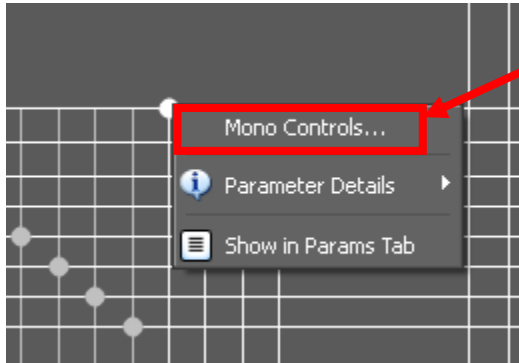
Here you can see the conflict is flagged by turning the box yellow. This is indicating the channel is manually preset for non-PCM Data, but the audio format is in conflict with this setting, in this case PCM audio. **Note.** *Even though there is a conflict the actual audio present is passed through the system – i.e. it is not blocked.*



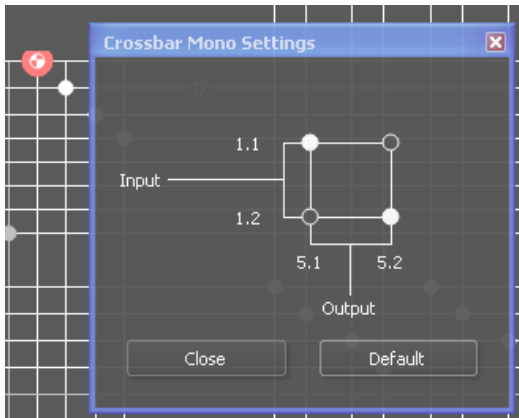
Setting Audio Mono Cross Points

To keep the GUI simplified the default operation of the AES crossbars are AES in nature, meaning selecting a cross point with the mouse will switch both channels (left and right) in the AES pair. Mono selections are possible, instructions below.

With the cursor positioned over the required cross point, click the right button on the mouse to display a submenu:



Select “Mono Controls” from this small submenu and a new mini cross point control box is displayed

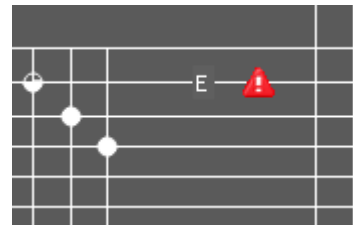


The Mini cross bar looks like shown, and permits full control over the routing of the left and right audio channels within the AES cross point selected.

Simply select the desired routing by clicking the mouse on a cross point and then click “close” to apply the selection and close the dialog.

The default button will return the selection to the standard “default” settings

Note: If a Dolby E signal (or any non-PCM Audio Data) is connected to the cross point, and if a mono control is performed then a warning will be indicated.



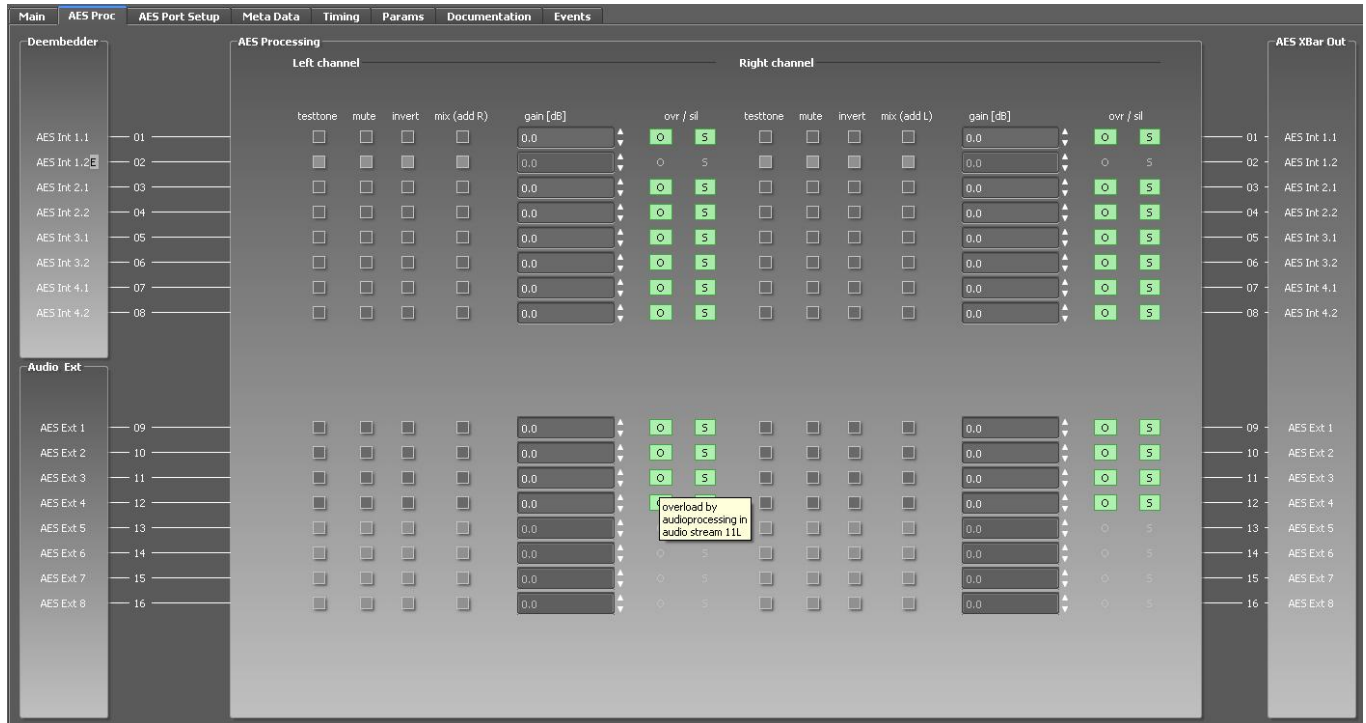
When a cross point has been changed, the graphical cross point selection changes to indicate the underlying configuration. This is shown below:

Status	Cross Point Selection	GUI Indication
Default		
Left input channel into both output channels		
Right input channel into both output channels		
Left and right channel swapped		

If the mouse pointer is positioned on the cross point using the CTRL key and left mouse button click will toggle the settings. Use of this function takes a little practice - as the position of the pointer on the correct cross point quadrant is critical. We recommend you select the mini crossbar as specified above, as this provides the most precise control.

Pressing CTRL+ALT and clicking the left mouse button will result in a channel swap.

AES Processing Tab



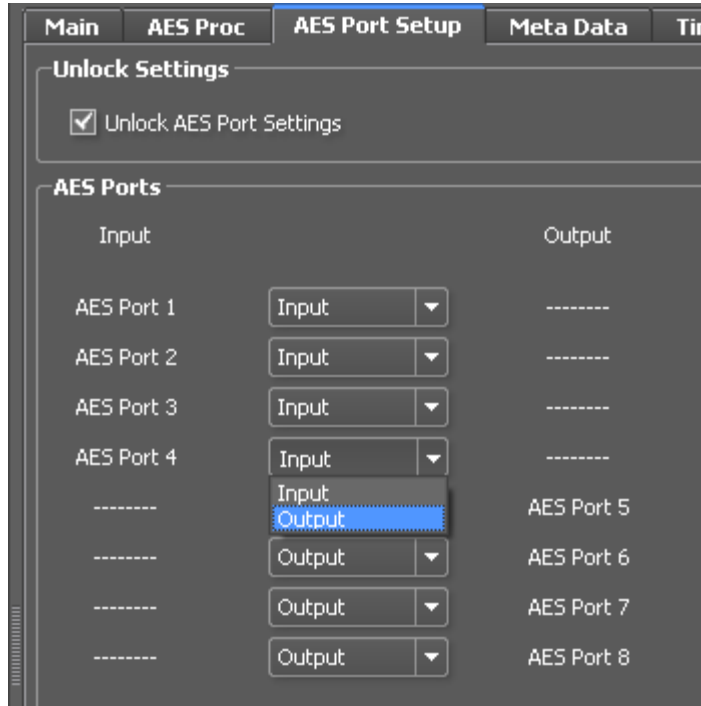
All AES signals (external and deembedded AES) can be processed individually.

The following functions are provided:

- Testtone
- Left and Right MUTE
- Left and Right PHASE INVERT
- Left and right GAIN (18dB .. -66.3dB)
- Overload and Silence detection for Left and Right
- Stereo Mix Down:
 - o Activating the check box in the mono channel enables the mix down signal in this channel only, i.e. this mono channel contains the result of the mix down (L+R) while the other channel will remain unchanged.
 - o If the check box is not activated you maintain the mono signal of this channel.

AES Port Setup

In this tab the AES ports can be configured. The configuration is locked automatically when the tab is closed and the selections to configure the individual ports are greyed out. To change a configuration the check box “Unlock AES-Port Settings” has to be activated.



Note. Note. The P DM 5290 is shipped as a 4 x AES Embedder (AES1..4) and 4 x AES Deembedder (AES5..8) (factory default). To configure audio ports, please use the GUI application (APPolo Control, see page 27).

Note. Please check connected peripheral equipment before using the P DM 5290 to make sure the audio ports of the P DM 5290 is configured correctly, e.g. an output is not connected to an output of another device, this might damage the equipment.

Meta Data Tab

The following screens show the Meta Data Handling. As soon as this tab is selected an additional tab bar will show up enabling the tabs for all the different Meta Data.

Overview Tab

On the left side the presence for Metadata in the SDI input and the external connector (RS 422, LTC Audio Timecode and GPI) is indicated. For the SDI input also the detected line is indicated.

On the right side all selected metadata in the SDI output as well as in the external data port are shown.

The content of the outgoing metadata can be selected in the other tabs for metadata handling or in the selection boxes in between the input and the output display.

The screenshot displays the 'Meta Data' configuration window with the following sections:

- External Input:**

Format	Status
Audio Metadata	
S2020	present
Timecode	
LTC	present
GPI	
GPI signal in external input	
Current values:	GPI 1 on GPI 2 on
- SDI Input:**

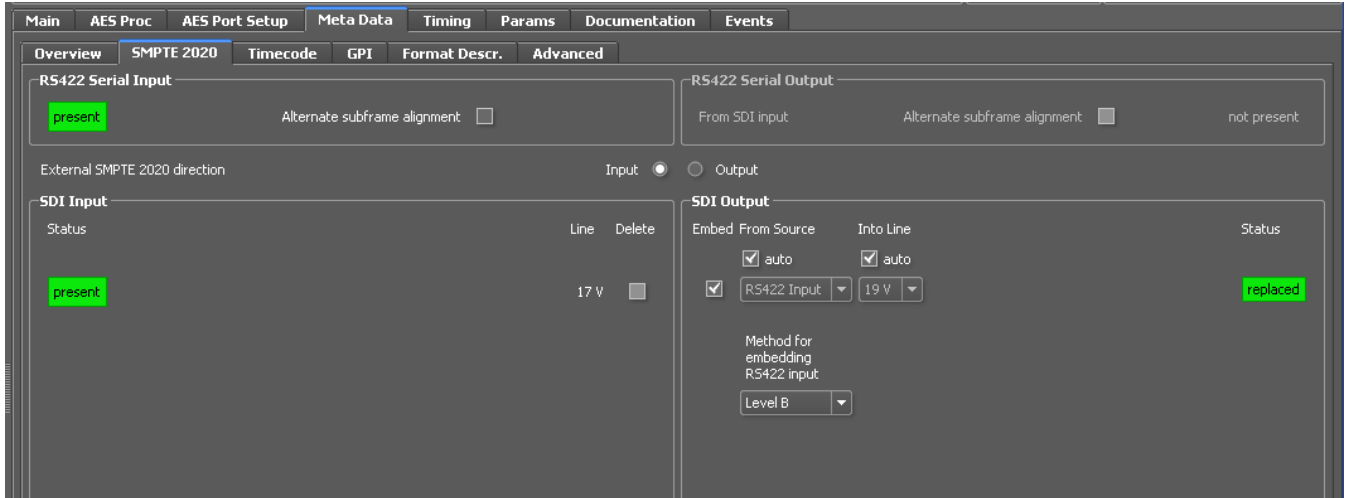
Format	Status	Line
Audio Metadata		
S2020	present	17 V
Timecode		
ATC-LTC	present	contains GPI 18 H
ATC-VITC	present	no GPI 19 H
D-VITC	-	
Format Description		
AFD	present	1110 11 V
WSS	-	
VI	-	
Closed Captioning		
S334 CDP	-	
S334 RAW	-	
Teletext		
S2031 WST	-	
OP47 SDP	-	
Others		
VPID	-	n/a
3D-01	-	
- Metadata Proc:**
 - SMPTE 2020
 - Timecode
 - GPI
 - Format Descr.
 - Advanced
- External Output:**

Format	Status	Source
Audio Metadata		
S2020	not present	SDI Input
Timecode		
LTC	present	ATC-VITC
GPI		
GPI signal	present	ATC-LTC
Current values:	GPI 1 on GPI 2 off	
- SDI Output:**

Format	Status	Line	Source
Audio Metadata			
S2020	replaced	19 V	R5422 Input
Timecode			
ATC-LTC	not embedded (no input)	GPI only	18 H ATC-LTC
ATC-VITC	destination line full		
D-VITC	removed		
Format Description			
AFD	present (passed through)		
WSS	-		
VI	-		
Closed Captioning			
S334 CDP	-		
S334 RAW	-		
Teletext			
S2031 WST	-		
OP47 SDP	-		
Others			
VPID	-		
3D-01	-		

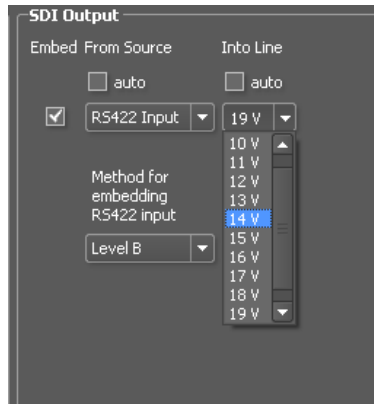
SMPTE 2020 Tab

The external SMPTE 2020 interface can be used either as input or output. Selection can be made with the two radio buttons in the center of this screen.



Settings for the embedding source of the Audio SMPTE 2020 Metadata into the outgoing SDI signal can be set automatically. Data will be taken with priority from the Serial RS422 input. If no data are present there, data from the SDI input will be taken. In manual mode either the Serial RS422 input or the SDI input can be selected as forced source.

Embedding of Audio Metadata can be deactivated with the checkbox in front of the Source selection. In this case the already embedded information (if existing) will be passed through.



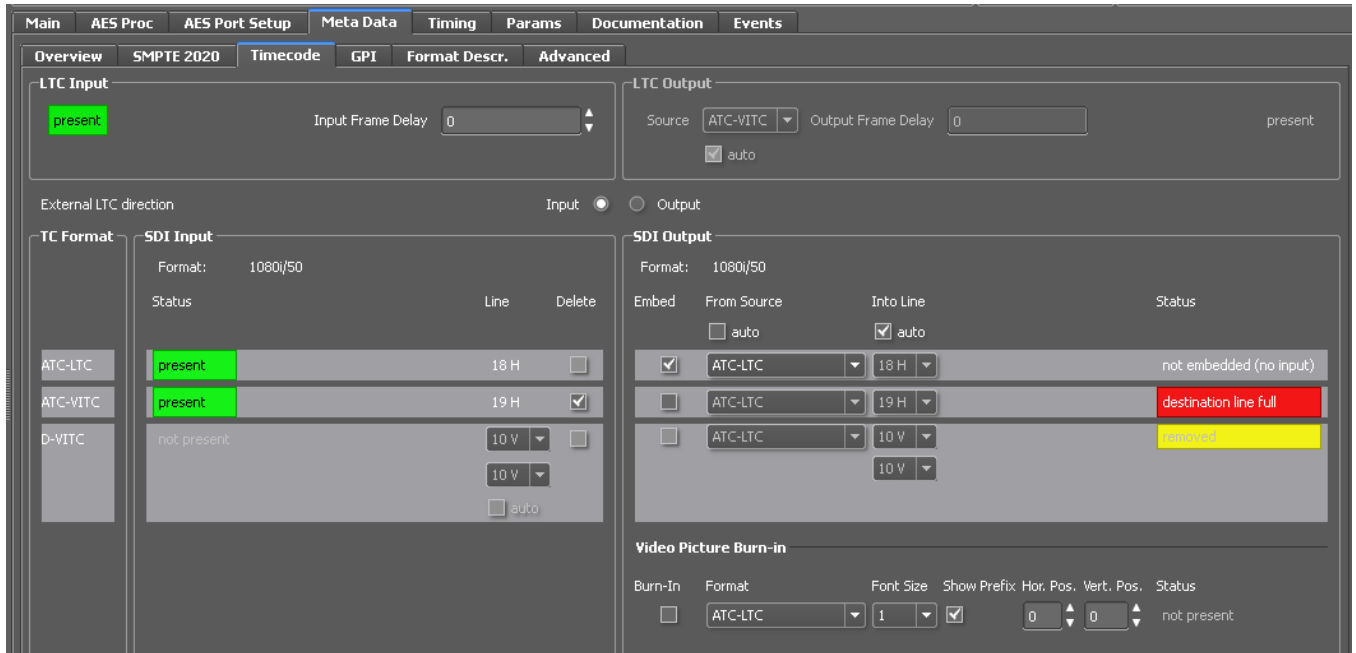
If embedding is activated, the current data will be embedded into a line of the VANC. That is, by default, selected automatically. If the automatic line selection is deactivated the VANC line for insertion of the SMPTE 2020 Audio Metadata can be selected manually. In this case existing data in the selected line can be overwritten.

Two methods for embedding the SMPTE 2020 Metadata can be selected with the drop down list. Method A is described in SMPTE 2020-2 and Method B in SMPTE 2020-3

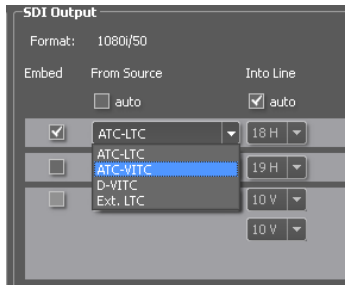
Alternate Subframe Alignment: Dolby Encoders require that the subframes of the SMPTE 2020 metadata are aligned to the reference signal which is applied to the decoder. In case of progressive standards a mismatch of one subframe can occur due to processing delays in a studio. Enabling the checkbox changes the alignment by one subframe.

Timecode Tab

The external Timecode (LTC Audio Timecode) interface can be used either as input or output. Selection can be made with the two radio buttons in the center of this screen



The Timecode information for the external interface (if selected) can be selected automatically (Priority sequence: ATC-LTC; ATC-VITC; D-VITC) or in manual mode from the available internal (embedded) sources as indicated in the SDI input section of this screen.

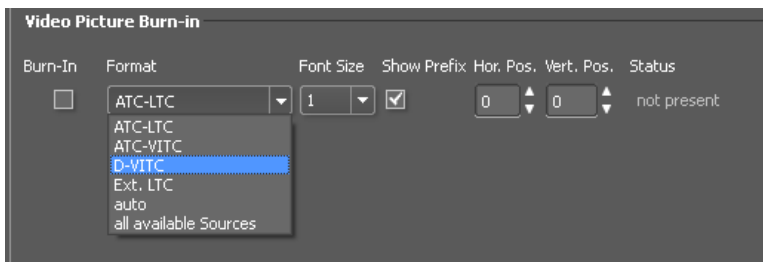


The Timecode information for the internal embedders can be selected in the same way for each type of time code (ATC-LTC; ATC-VITC or D-VITC) . In addition the external Timecode input (if activated) can be selected in manual mode.

If embedding of Timecode data is deactivated the existing data will be passed through. Existing data can also be deleted by activating the checkbox in the SDI input section of this screen.

If D-VITC data is present the respective line where the data is deembedded can be selected manually or automatically.

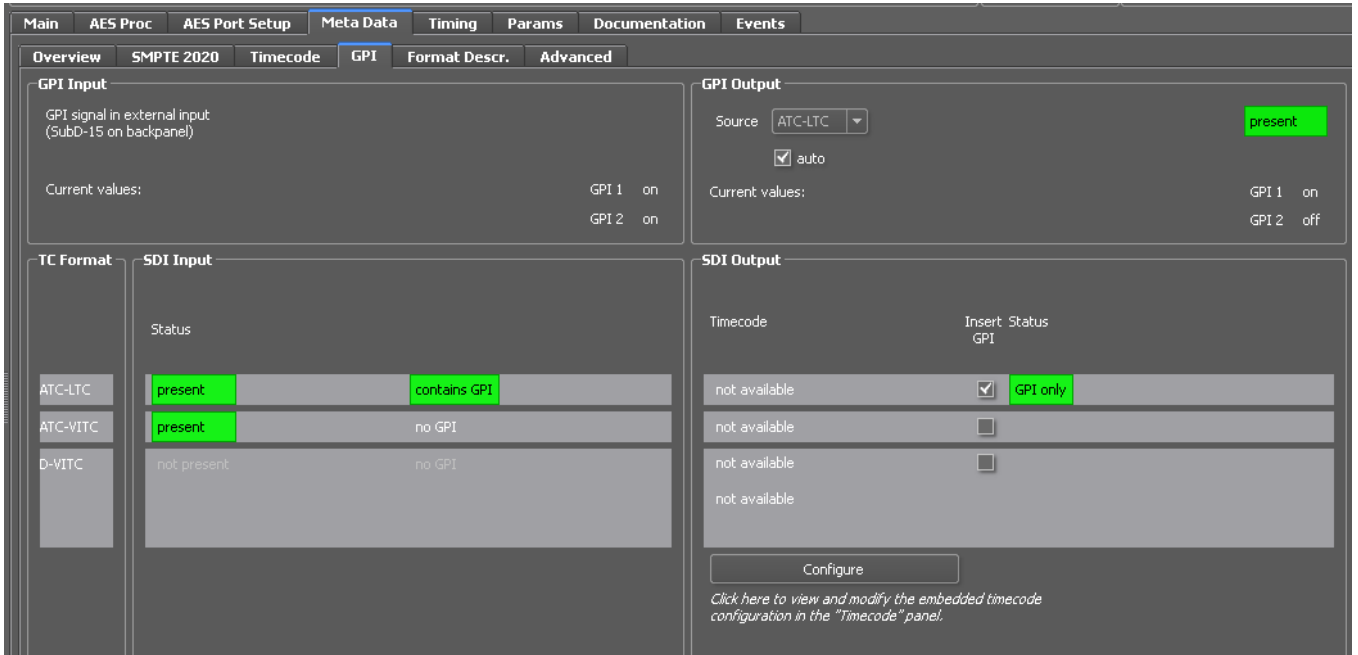
For timing adjustments the external LTC Audio Timecode input resp. LTC Audio Timecode output can be delayed up to 62 frames depending on the video delay, e.g. if the video delay is already 62 frames the Timecode signal can only be advanced to video (negative delays).



The time code can be displayed directly on the screen, if the burn-in check box is selected.

GPI Tab

GPI information (GPI = General Purpose Interface) can be transported as embedded information in the Timecode user bits. If no Timecode source is present (either as external LTC Audio Timecode signal or as embedded Timecode signal (ATC-LTC or ATC-VITC or D-VITC) a “NULL” Timecode signal will be generated for transport of the GPI information.
 2 GPI signals are embedded simultaneously. Management of the GPI data is shown in the screen below.

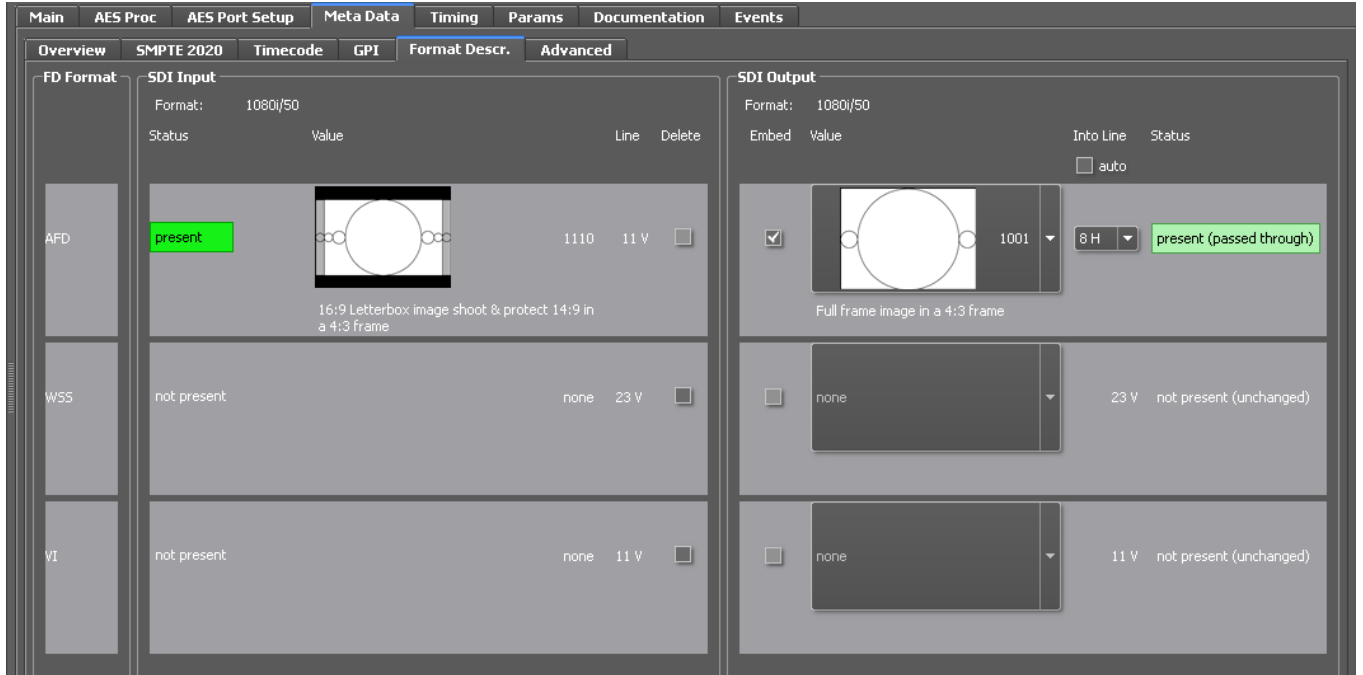


Source for the external GPI outputs can be ATC-LTC or ATC-VITC or D-VITC (if a GPI signal is present in these types of signal).
 If no GPI signal is present in the selected source the GPI outputs are set to “off”

Note: GPI on = Contact closed
 GPI off = Contact open

Format Description Tab

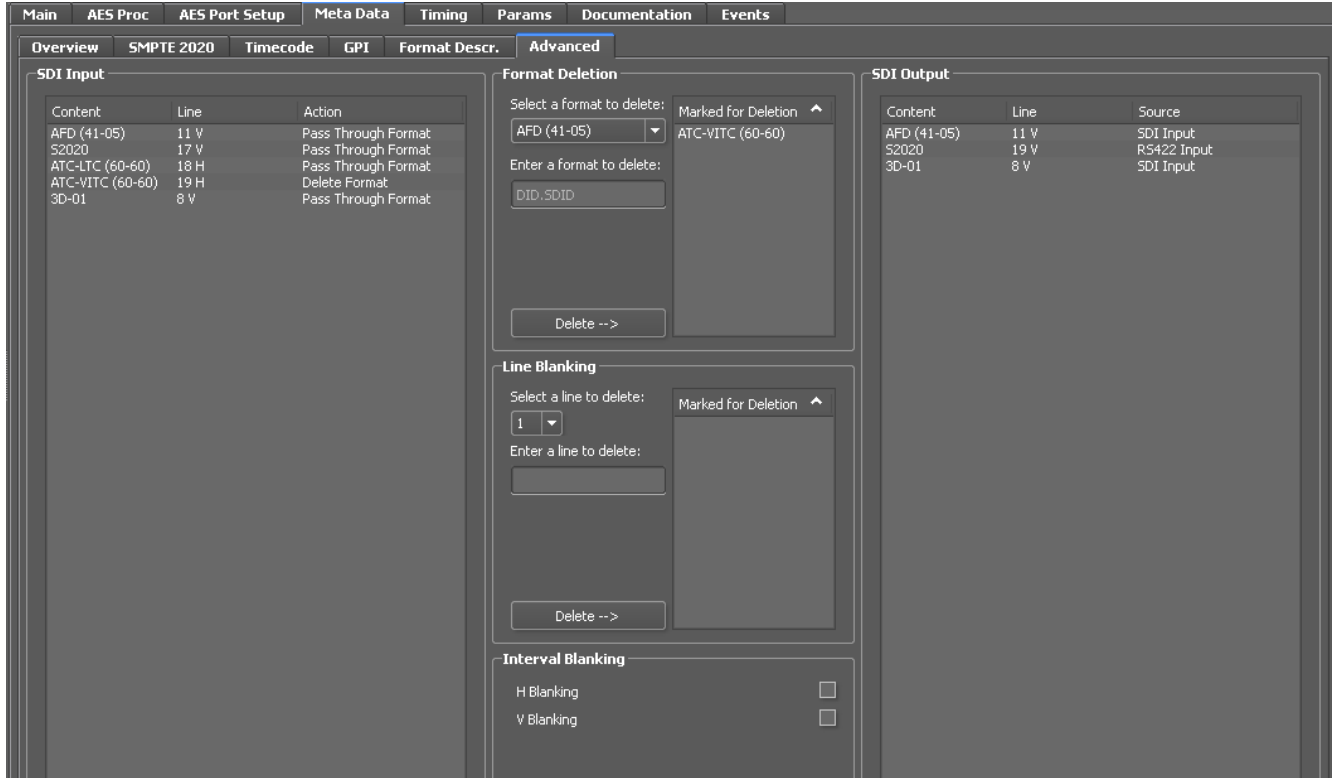
All three video format description data (AFD, WSS and VI) can be modified in P DM 5290 as shown in the screen below.



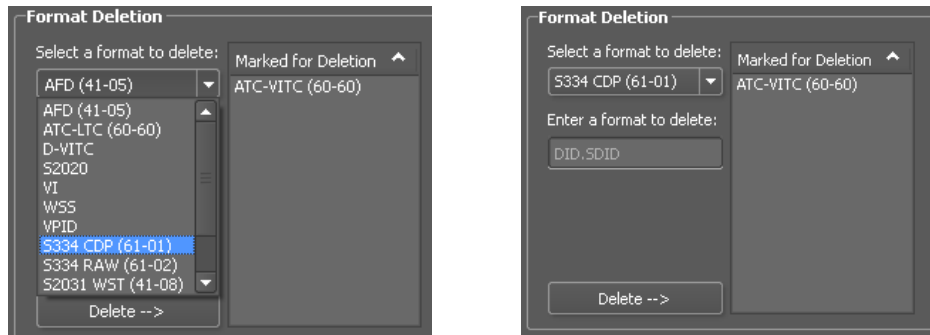
A new value can be embedded if the input video standard allows for it (e.g. WSS is not possible for 525 signals). In case a format description was already embedded for this type this data will be removed.
 In case no new data will be embedded existing data can be deleted with the checkbox on the SDI input section of this screen.

Advanced Tab

For advanced users all existing metadata or individual lines can be deleted separately in this tab.



Simply select a meta data format or a line number and click on the delete button:



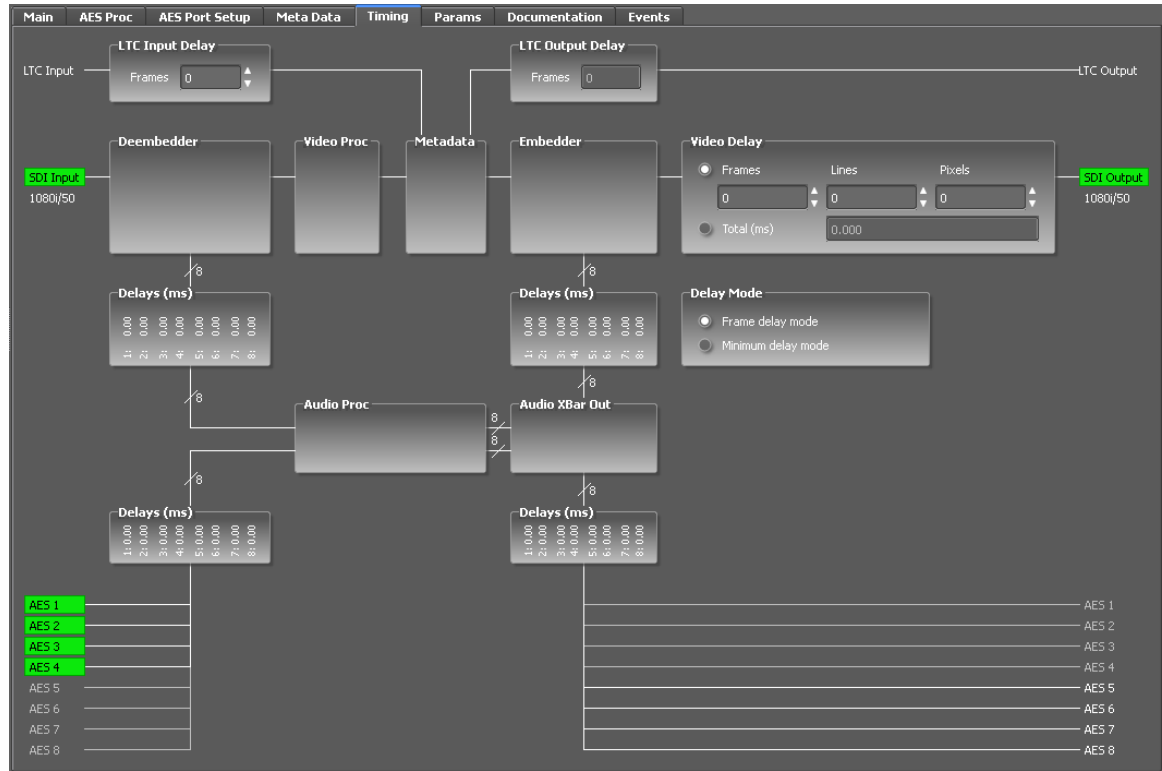
To take a meta data format off the list again just mark this meta data format and the delete button will turn into a pass through button. If you click on the pass through button now the metadata will be taken off the list again.

The same procedure applies for individual lines of the vertical blanking interval.

Note: For interlaced standards: If a line is selected the adjacent line of the second field will also be deleted

Timing Tab

All manually adjustable delays for audio, video and the LTC Audio Timecode can be set in the GUI shown below.



The video delay (up to 62 frames) can be adjusted for the SDI outputs in frames, lines and pixels or in ms.
 The LTC Audio Timecode (input or output depending on the selection) can be delayed up to 62 frames.

The audio delay can be set at various positions as graphically shown in the audio processing chain:

- SDI in:** Delay of the embedded audio after de-embedding
- SDI out:** Delay of audio for re-embedding
- AES in:** Individual delays for the AES inputs
- AES out:** Delay at AES outputs

Setting of the audio delays can be performed in a pop-up window, when clicking on the “Delays” blocks

Note: The module will auto adjust the audio delay to the video processing delay. The adjustments provided here are offsets relative to the internal processing delay.

Clicking the + and – buttons adjusts the setting. Audio Delay Range is 10 seconds total (input to output, set in ms)



Events Tab

The Events Tab is where the module alarming and error notifications are configured for the module.

The GUI has an integrated error log, which is a simple text log file stored in the controller PC. This will record an event and timestamp it. The log can be seen at the bottom of the GUI screen and can be scrolled through using the scrolling bar.

Log in GUI Function

Events are selectable, you can chose if you want to record a particular event in the log (or not) or configure it to only record one side of the event. (*For example you might want to log when a SDI input is removed but do not want to log when it comes back*). The ON/OFF trigger can be configured for each of the available events shown in the list and is setup using the checkboxes provided.

SNMP Support

If the system is using a R CT 5031 or OH_RCT5023_SVR Master Controller and the SNMP option (OC_RSL_CTRL) is installed then the “SNMP Trap” columns become available.

Here you can configure for which events you would like to transmit a “SNMP trap” over the network. (This has no impact or influence over the internal error log maintained by the LYNX control system)

(Internal LYNX error logging and external SNMP traps can be configured independently).

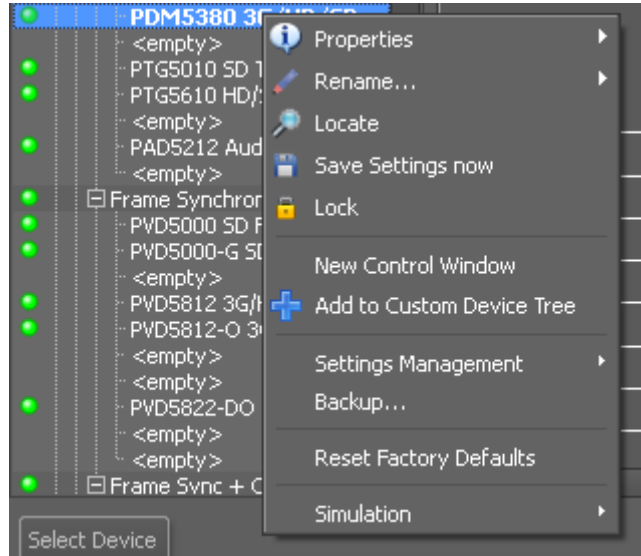
Event Enabled

By default all alarm conditions are activated (checked), by de-selecting a specific alarm condition in this column you are telling the module to ignore this condition completely. It will not color the alarm LED, log and event in the GUI or send a SNMP trap. This is useful if for example you never have anything connected to AES input 4 and want the card to ignore this input condition completely then you would simply de-select “AES 4 Input: No input” and it will be ignored.

Common GUI Controls

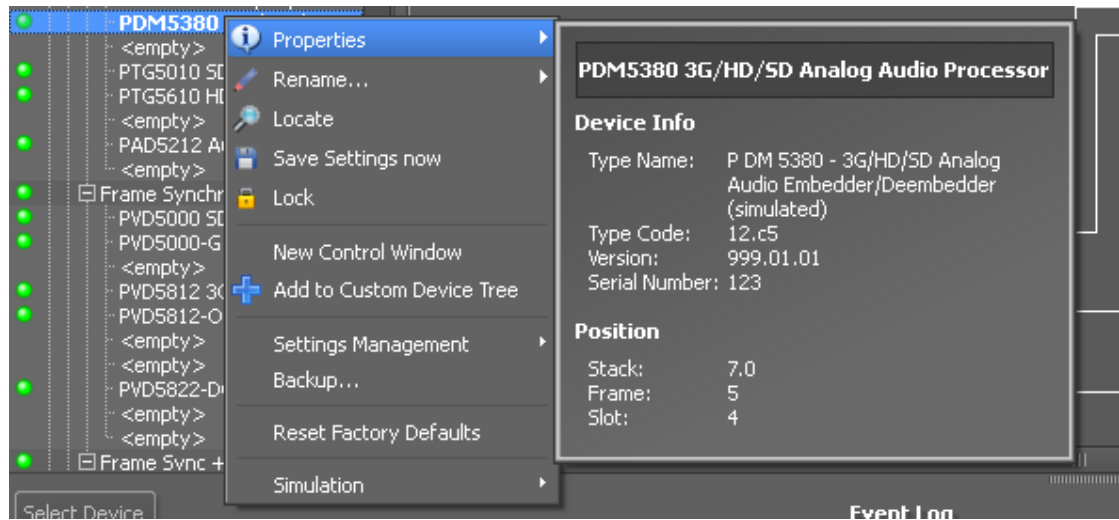
There are a number of GUI controls and commands which are common for all modules in the control system. These are explained below.

Right click on any module in the tree will bring up a sub-menu of available commands (see below). **Note.** This menu can also be selected using the GUI drop down menus by clicking on **“Device”**



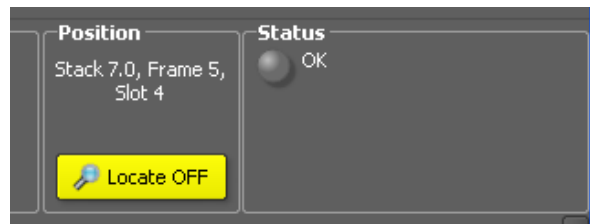
Properties

This will bring up a dialog which shows device specific properties about the module selected.



Locate

This feature is useful if you need to physically locate a module in a larger system quickly (for removal or maintenance purposes) When Locate selected this will flash the module alarm LED yellow. This function does not impact normal module operation and will timeout after a short time period.



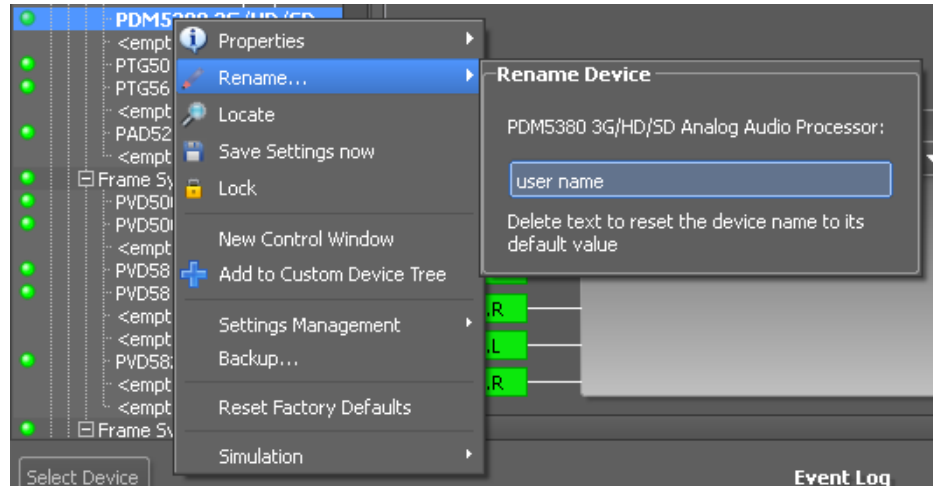
This feature can also be invoked from the main GUI screen using the “locate“ button in the top right hand side of the screen (see below)

New Control Window

Selecting this will open up a new control window with the selected module GUI contained within. This window can be minimized to the taskbar for fast access and is useful if this GUI is something you will need to refer to often.

Rename

It is possible to rename individual items in the control system selection tree, this includes all rack names and the individual module names. The descriptions supplied are default descriptions the system applies. To rename a device simply select the device in the tree, right click and then select “rename”. The dialog below will be displayed



Simply type in the name you wish to assign to this device and press RETURN. If you wish to restore the default name simply delete the content from the text field and press RETURN

Note: The names are stored inside the flash memory of a LYNX server (if installed) or the hard disk of the connected Computer.

Save Settings Now

During normal operation if there is no activity on the module GUI for approx.. ten seconds then any changed settings are automatically written to flash RAM in the module. You can store the settings immediately by using the “save settings now” command. When the settings have been stored you will see the confirmation dialog below.

It is recommended you use the “save settings now” function before removing any module from the rack to ensure the latest settings have been stored prior to module removal (if a module is removed before the normal 10 second timeout then the settings will not be stored)

Lock

Selecting this will lock the device to prevent any accidental changes being made to the modules settings. The module status can be seen but all the controls will be grayed out. To unlock simply deselect the lock control from the menu.

Reset Factory Defaults

If you are unsure of the settings, or have managed to set the module into a strange mode of operation and wish to recover the factory defaults then this can be done by selecting reset factory defaults. You will be asked to confirm this operation with the dialog below



Specifications

Video Input	
Signal Type	Serial Digital Video (SDI) SMPTE 292M, 259M, 424 M with automatic input standard and format detection
Supported Formats	See page 9
Input Impedance	75 Ω BNC
Input Level	0.8V
Return Loss	> 15dB (<1.5 GHz), > 10db (>1.5 GHz)
Digital Video Outputs	
Signal	2 x Serial Digital Video (SDI) SMPTE 292M, 259M, 424M
Output Impedance	75 Ω
Output Level	0.8V pp +/- 10%
Return Loss	> 15dB (<1.5 GHz), > 10db (>1.5 GHz)
Connection	BNC
Jitter	< 0.2 UI (Timing & Alignment Jitter); (270Mbits) < 0.2 UI (Alignment Jitter); < 1.0 UI (Timing Jitter); (1.485Gbits) < 0.3 UI (Alignment Jitter); < 2.0 UI (Timing Jitter); (2.97Gbits)
SDI Performance	
Cable equalization	Up to 250M using Belden 8281 (270Mbit) Up to 140m using Belden 1694A (1.485Gbit) Up to 80m using Belden 1694A (2.97Gbit)
AES Inputs/Outputs	
Signal	P DM 5290 U = AES3 id un-balanced on Mini DIN connectors P DM 5290 D = AES3 balanced on SubD 25 connector
Coupling	Transformer (isolated)
Audio Processing	
Sampling	Each input AES channel has independently selectable sample rate converters (SRC ON / OFF). When ON AES will be re-sampled to 48KHz
DolbyE / AC3 signals	With SRC OFF encoded bit streams can be transparently embedded
Audio Group Deletion	Existing groups pass transparently or they can be deleted and/or replaced with new embedded audio (user selectable)
Embedder / De-embedder	8 x AES channels
Audio Group Selection	Map AES inputs into any of the 4 embedded audio groups
Audio Crossbar	Mono crossbar allows for individual (left and right) channel mapping <i>(Note. Mono crossbar only accessible via control system GUI, local control provides a AES (stereo pair) crossbar functionality)</i>
Audio Sync Frame	With no SDI input the audio is embedded into a black video sync frame (last connected video standard, or a user selected standard).
Video and Audio Delay	
Processing Delay	1 frame with automatic timing compensation 0.5 lines min delay without timing compensation
Video Delay	Up to 62 frames manually adjustable in frames/lines/pixels
Audio Delay	Up to 10s total – individually adjustable
Metadata	
External I/O	15 pin female SubD connector with multiple I/O <ul style="list-style-type: none"> - LTC Audio Timecode input or output (user configurable) - 2 x GPI Input and Output (Transported in Timecode User bits) - SMPTE 2020 audio metadata I/O (RS 422)

Timecode Support	ATC-LTC; ATC-VITC (SMPTE 12M-1/2 2008, SMPTE 291M 2006) DVITC (SMPTE 12M-1/2 2008, SMPTE 266M 2008)
Audio Metadata	SMPTE 2020 (RS422 with internal termination on RX: 120Ohm)
GPI/O Interface	
Transport	2 x GPI/O signals are embedded / decoded from Timecode User bits
Connector	15 pin SubD
GPI inputs	External passive closure between pins (short) to trigger Max input switching frequency 25Hz (50 operations / second) Input insulation 3.75kV
GPI outputs	Internal contact closure (relay) Max switching frequency 25Hz (50 operations / second) Max switching power 220VDC / 0.25A or 250VAC / 0.25A Output insulation 3.75kV
Electrical	
Operating Voltage	+ 12 VDC
Power Consumption	8.5W
Safety	IEC 950 / EN 60950 / VDE 0805
Mechanical	
Size	283mm x 78mm
Weight	CardModule 120g, connector plate 70g
Ambient	
Temperature	5°C – 40°C Maintaining Specifications
Humidity	90% non condensing

Service

Parts List

Due to the very dense design and high level of integration there the module is not user serviceable. Please contact LYNX for repairs or to request an exchange unit.

Technical Support

If you are experiencing problems, or have questions please contact your local distributor for further assistance.

Technical support is also available from our website.

Please do not return products to LYNX without an RMA. Contact your authorized dealer or reseller for more details on our return process.

More detailed product information and product updates may be available on our web site:

www.lynx-technik.com

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

LYNX Technik can be contacted directly using the information below.

Address LYNX Technik AG
 Brunnenweg 3
 D-64331 Weiterstadt
 Germany

Website www.lynx-technik.com

E-Mail info@lynx-technik.com

LYNX Technik manufactures a complete range of high quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

LYNXTechnik **AG**[®]
Broadcast Television Equipment