

Reference Manual

P DA 5280 – D

P DA 5280 – U

**SD / HD / 3G Multi-format Digital Audio Processor
and Dolby Transcoder**

**Revision: 1.0
July 2014**

This Manual Supports Device Revisions:	
P DA 5280 Firmware Revision	623
Control System GUI Release	8.0.0

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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 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, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik 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.

THIS WARRANTY IS GIVEN BY LYNX TECHNIK WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. LYNX TECHNIK AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LYNX TECHNIK'S RESPONSIBILITY TO REPAIR AND REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. LYNX TECHNIK AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER LYNX TECHNIK OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

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 DA 5280 D; P DA 5280 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 DA 5280 is a high quality digital audio (AES) embedder and de-embedder with integrated SDI framesynchronizer, suitable for use with SD-SDI, HD-SDI and 3G-SDI video streams.

A DolbyE encoded audio stream can be trans-coded into a Dolby Digital or Dolby Digital Plus stream. Alternatively, a regular 2.0 PCM audio stream can be encoded into a Dolby Digital or Dolby Digital Plus stream.

The 8 AES ports can be individually configured by the user as audio inputs or outputs. Already embedded audio can be de-embedded internally, processed and routed through an audio mono crossbar in parallel to up to eight external audio inputs.

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 DA 5280 D) and for unbalanced AES audio inputs or outputs on 75Ohm MiniDin connectors (P DA 5280 U).

Note. The P DA 5280 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 APPolo Control GUI (see page 29).

Note. Please check connected peripheral equipment before using the P DA 5280 to make sure the audio ports of the P DA 5280 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, replace or shuffle existing embedded audio
- Mono audio crossbar
- Audio processing (mono gain, test tone, mute, phase invert, mix, overload and silence detection)
- Dolby Digital and Dolby Digital Plus encoding of PCM or DolbyE input signals
- Video delay up to 62 frames in steps of frames, lines and pixels
- Audio delay up to 10s in steps of audio samples
- Embedded audio group selection
- Embedding into test pattern output video frame with no SDI input signal
- Selectable Horizontal and Vertical Video Blanking

Dolby, DD Dolby Digital and DD+ Dolby Digital Plus are registered trademarks of Dolby Laboratories. All other trademarks remain the property of their respective owners.

Input Video 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 Video Formats

The module provides one SDI output on two BNC connectors. Supported output video formats are.

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	

The output SDI frequency (frame rate) is determined by the connected reference signal. The output signal will always be delivered in this framerate, even if the input SDI does NOT match this frequency.

For input signals that do not match the current reference frame rate, the synchronizer will show this as an asynchronous source (indicated by a yellow status indication in the GUI). The output signal derived from this "async" source can show video disturbances (see below "Reference Lock")

Input Reference Signal

The module has a very flexible input reference stage which facilitates the use of either SDTV analog bi-phase sync (i.e. black burst) or HDTV analog tri-level sync. The reference input is “cross lock” compatible so an SDTV reference can be used to frequency lock HDTV signals (and vice versa). The connected reference is auto detected and the synchronizer automatically configures the outputs to the frame rate of the connected reference signal.

Supported reference signals are shown below.

SDTV Analog Bi-Level Sync	HDTV Analog Tri-Level Sync
525 / 59.94Hz	1080i / 50Hz
625 / 50Hz	1080i / 59.94Hz
	1080i / 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

Reference Lock

If the input frame rate and the frame rate of the reference signal are equal, exactly half of each other or double of each other then all modes of the P D 5280 operate with no limitations:

- All 25 Hz and 50 Hz input formats will be synchronized to any 25 Hz or 50 Hz reference signal (from the tables above).
- All 30 Hz and 60 Hz input formats will be synchronized to any 30 Hz or 60 Hz reference signal (from the tables above).
- All 29.97 Hz and 59.94 Hz input format will be synchronized to any 29.97 Hz or 59.94 Hz reference signal (from the tables above).
- All 23.98 Hz input formats will be synchronized to any 23.98 Hz reference signal (from the tables above).
- All 24 Hz input formats will be synchronized to any 24 Hz reference signal (from the tables above).

NOTE: If the frame rate of the reference signal is not equal, double or half of the input/output frame rate, then all functions still are available except the video delay as the frame rate of the output video does not match the frame rate of the reference signal. The video output remains frequency locked to the Reference signal.

Frame Synchronization

The algorithms used for frame synchronization are extremely robust and very tolerant of poor input signals. The Synchronizer uses “Flywheel” functionality. This allows the module to recover from any missing sync pulses on the input signal(s) by predicting where they should be and then re-inserting them.

The Synchronizer can also be switched into a Line Synchronizer Mode (see below)

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 by the same amount.

Audio can be adjusted in various ways (see GUI section of this manual). The audio delay is always specified relative to the video delay, i.e. an audio delay of 0ms will result in an audio delay that is equal to the video delay (no lip-sync adjustment applied). The audio delay can be specified as a negative value. In this case, the audio delay will be LESS than the video delay. This can be used to correct a late-audio error. The maximum possible audio delay is 10 seconds, and can be adjusted in steps of 0.01 milliseconds.

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 APPolo Control GUI.

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 selection provided in the APPolo GUI.

NOTE: The modules are supplied set to “default to the last connected video standard”. This will be 1080i/50 for new modules. This can be cleared by connecting a different video input, or by selecting the required video format in the APPolo GUI, 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.

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.

Dolby Transcoding

The Dolby Transcoder Module that is part of the P DA 5280 can be used to transcode an incoming DolbyE encoded audio-program into a Dolby Digital (DD or AC-3) or Dolby Digital Plus (DD+ or E-AC-3) encoded audio program. The resulting encoded audio program can then be embedded into the SDI output or delivered on the external AES output connectors. Instead of an incoming DolbyE bitstream, a regular PCM stereo stream input can be used as an alternative audio source for the DD or DD+ encoder

Audio Mono Crossbar

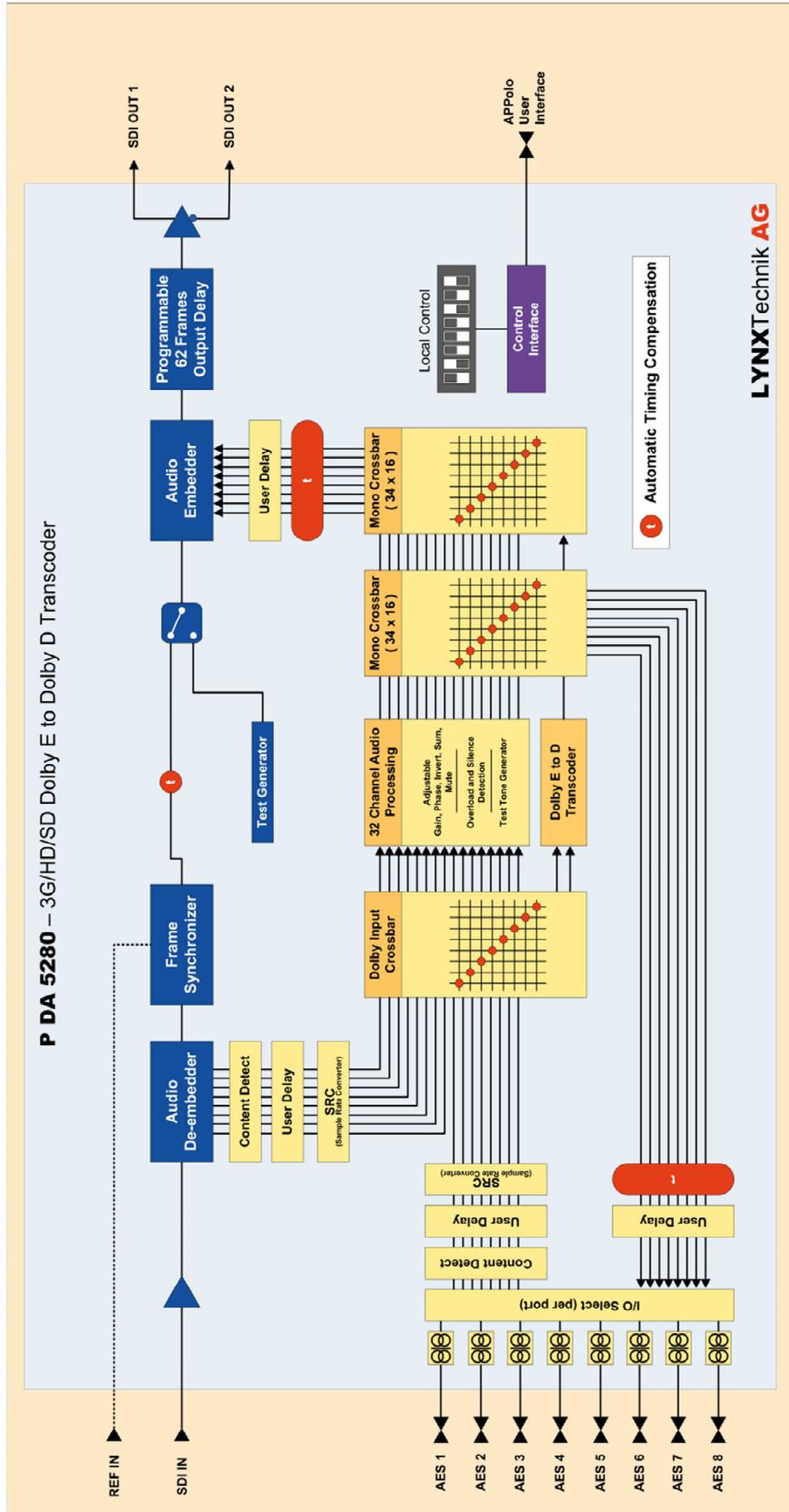
After the processing stages (above), all audio signals are available to an integrated audio crossbar. All of the various audio destinations (SDI embedder and external audio outputs) can use any of the available internal audio signals.

While this internal crossbar works on stereo-signals by default, it can also be used to connect the various audio-signals on a mono-basis, so that individual left and right audio channels can be re-assigned or swapped.

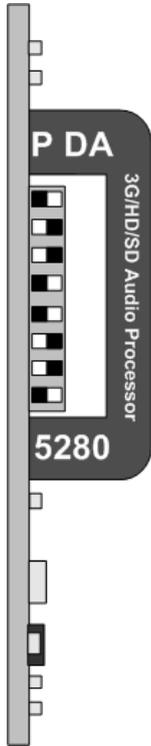
Audio Group Deletion

The P DA 5280 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).

Functional Diagram

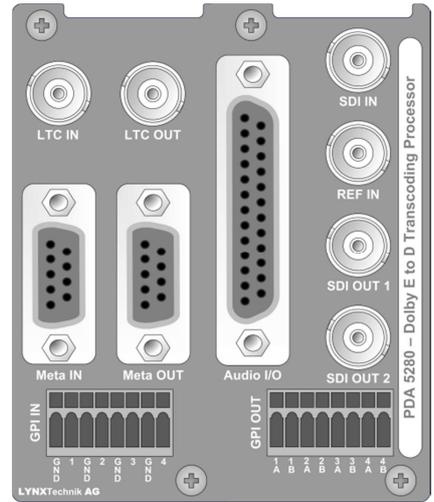


Module Layout

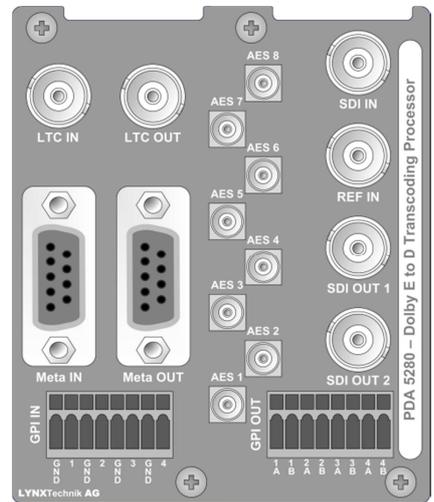


Front Card Edge

Rear Termination Panel
P DA 5280 - D



Rear Termination Panel
P DA 5280 - U



Connections

Video

The P DA 5280 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 the module will support 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.

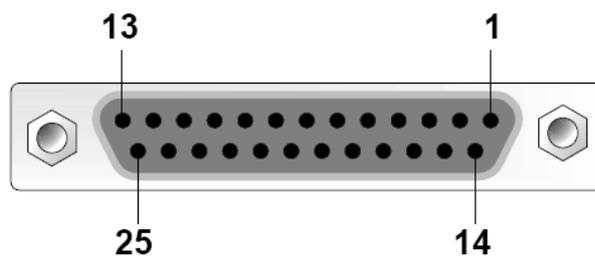
Audio

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

The **P DA 5280 U** version provides MiniDIN (DIN1.0/2.3) connections for unbalanced AES3id

The **P DA 5280 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	AES 4 +	20	AES 4 -
8	AES 4 GND	21	AES 3 +
9	AES 3 -	22	AES 3 GND
10	AES 2 +	23	AES 2 -
11	AES 2 GND	24	AES 1 +
12	AES 1 -	25	AES 1 GND
13	n.c.		



View looking INTO connector as seen on module

It is recommended to use high quality screened (twisted pair) cable for the balanced audio connections. LYNX Technik provides optional audio breakout cables 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**

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.

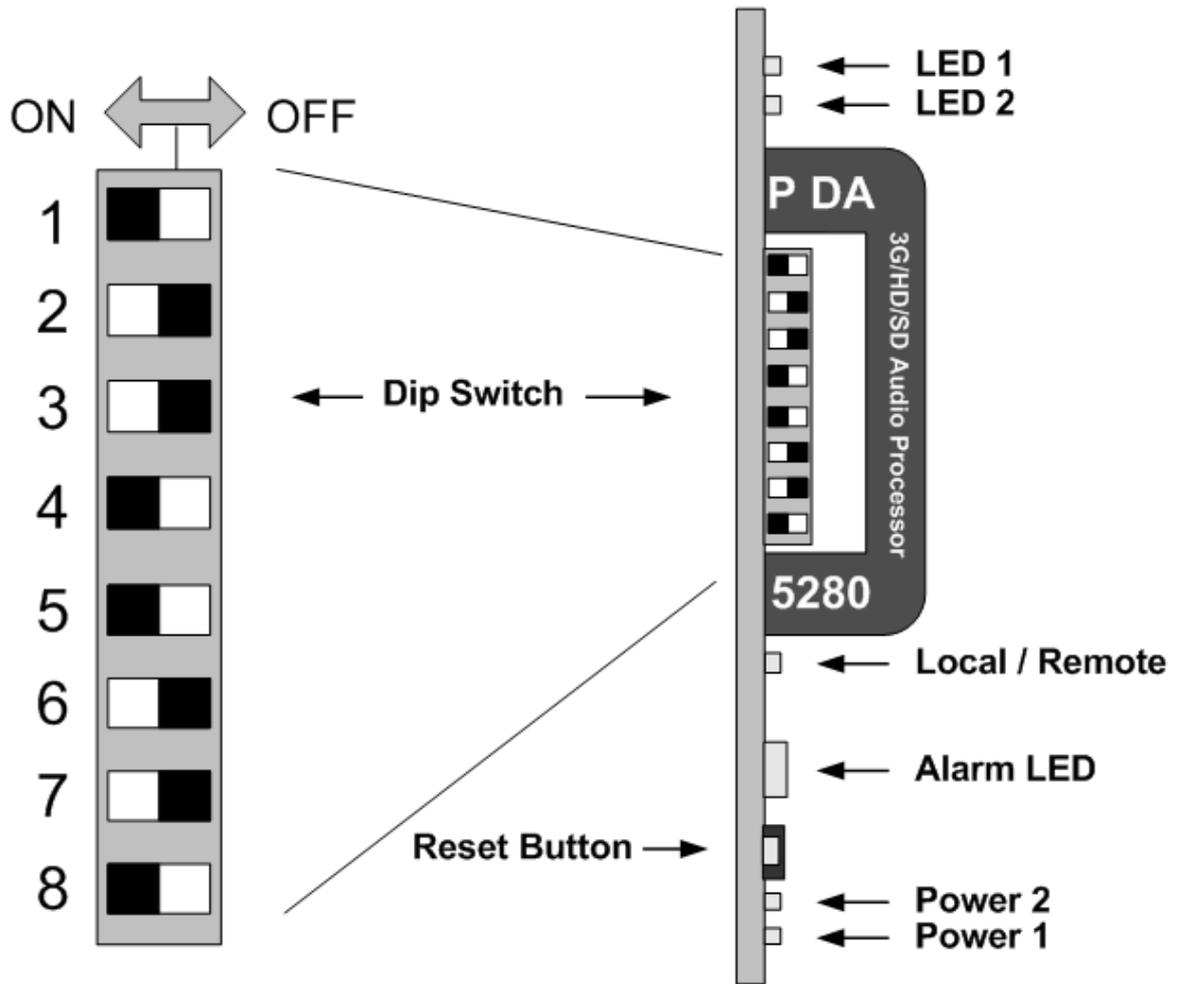
1. Select a slot in the card frame where the CardModule will be located.
2. Remove the blank connection panel from the rear of the rack (if fitted)
3. Install the rear connection panel using the screws supplied. Do not tighten the screws fully
4. Slide the card module into the card frame and carefully 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 DA 5280 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. See section "Save Settings Now" on page 32 for more details.

PCB Front View



Switch and LED locations

DIP Switch Settings

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		n.a.
		n.a.

DIP Switch 1

DIP switch 1 enables local adjustments. Setting it to **ON** enables the setting of the other DIP switches to configure the module. Setting it to **OFF** will prevent any local DIP switch settings from taking effect.

*NOTE: It is recommended to set DIP switch #1 to **OFF** to prevent from accidental changes to the stored module configuration if the switches are moved.*

DIP Switch 2

DIP switch 2 configures the audio embedder for embedded Group 1. Setting it to **ON** enables the embedder: Group 1 will be embedded, replacing the previous content of Group 1 (if any). Setting it to **OFF** disables the embedder for Group 1.

DIP Switch 3

DIP switch 3 configures the audio embedder for embedded Group 2. Setting it to **ON** enables the embedder: Group 2 will be embedded, replacing the previous content of Group 2, if any. Setting it to **OFF** disables the embedder for Group 2.

DIP Switch 4

DIP switch 4 configures the audio embedder for embedded Group 3. Setting it to **ON** enables the embedder: Group 3 will be embedded, replacing the previous content of Group 3, if any. Setting it to **OFF** disables the embedder for Group 3.

DIP Switch 5

DIP switch 5 configures the audio embedder for embedded Group 4. Setting it to **ON** enables the embedder: Group 4 will be embedded, replacing the previous content of Group 4, if any. Setting it to **OFF** disables the embedder for Group 4.

DIP Switch 6

Setting DIP switch 6 to **ON** erases the complete content of the horizontal blanking interval. Setting it to **OFF** will pass the HANC data unmodified from input to output. NOTE that the Audio Embedders (Group 1-4) also modify the HANC.

DIP Switch 7

Setting DIP switch 6 to **ON** erases the complete content of the vertical blanking interval. Setting it to **OFF** will pass the VANC data unmodified from input to output.

Factory Preset Condition

The P DA 5280 is delivered programmed and preset for the following mode of operation:

Switch 1	ON	Local Adjustment Enabled
Switch 2	ON	Embedders for Group 1 enabled
Switch 3	ON	Embedders for Group 2 enabled
Switch 4	ON	Embedders for Group 3 enabled
Switch 5	ON	Embedders for Group 4 enabled
Switch 6	OFF	H-Blanking preserved
Switch 7	OFF	V-Blanking preserved

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.

See section “Save Settings Now” on page 32 for more details.

Reset Button

If this button is pressed for 5 seconds, all internal parameters will be reset to their factory default values. 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 DA 5280 module has integral LED indicators, which serve as alarm and status indication for the module. Function is described below.

LED 1: REF Status

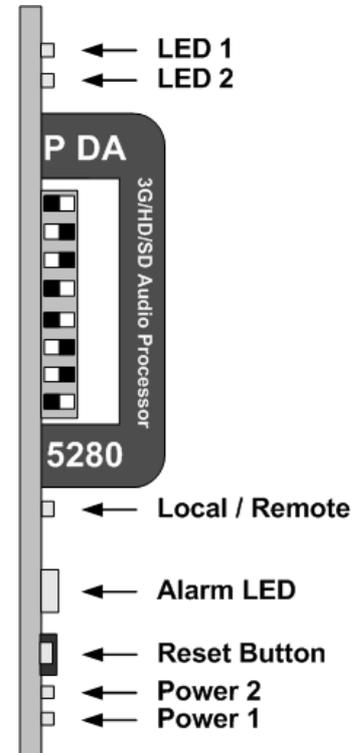
This LED indicates the status of the Reference input signal

LED Color	Indication
Green	REF present and ok
Yellow	REF missing, but not required (self-lock on SDI input) REF ok, but not matching a fixed frequency setting (odd/even)
Red	REF missing

LED 2: SDI Status

This LED indicates the status of the SDI input signal

LED Color	Indication
Green	SDI input ok
Yellow	SDI input not matching a fixed frequency setting (odd/even)
Red	SDi input missing



Alarm LED

There is also a larger Alarm LED on the lower edge of the module. This LED is visible through the RackFrame's 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	frequency mismatch (see LEDs 1 and 2 above) -OR- Some audio input (ext. or embedded) is missing one or more channels
Yellow flashing	Locate device activated from GUI
Black, triple yellow flash	Saving current configuration to local flash-RAM
Red	SDI or REF missing -OR- Some audio input (ext. or embedded) is missing all 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

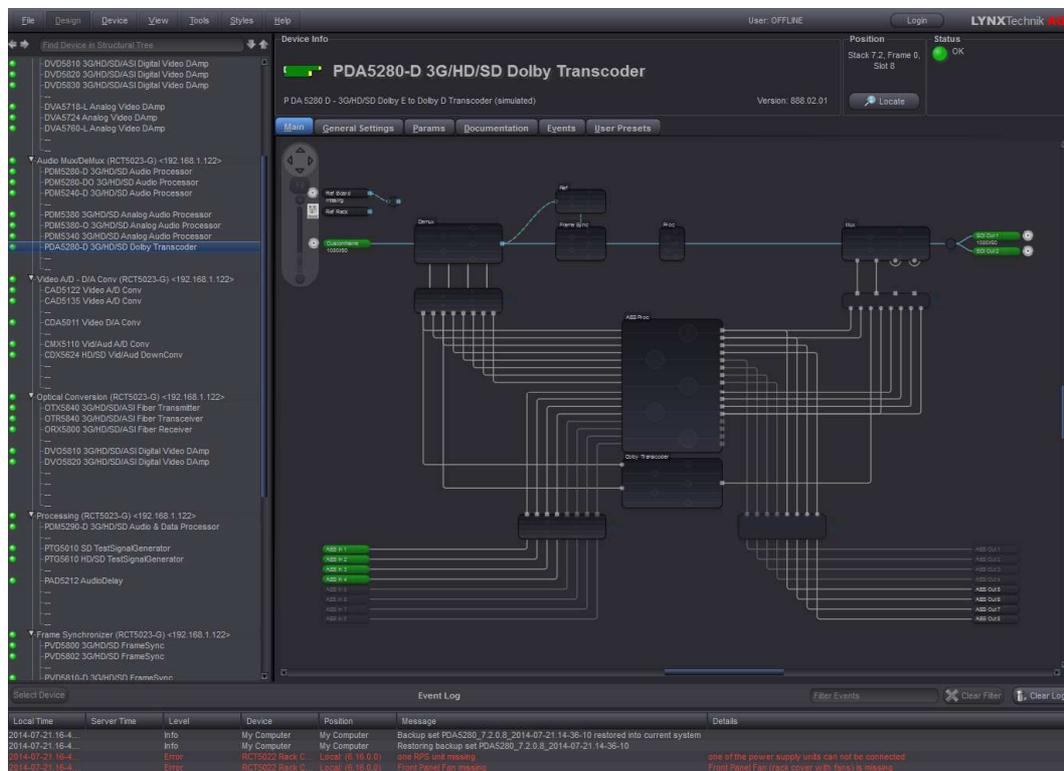
APPolo Control GUI

All LYNX CardModules support a computer interface which allows setting the modules parameters using the LYNX APPolo Control GUI application. This GUI provides read/write access to all functions of the individual product. The current version of the LYNX APPolo Control GUI can be downloaded at any time free of charge from

<http://appolo.lynx-technik.com>

NOTE: Any settings made using the control system override appropriate local settings made on the module. All settings are stored in internal flash ram and will survive power cycles and long term storage.

The following GUI screenshots are for the P DA 5280 module.



The above screenshot shows the complete module GUI. The “Device Info” area across the top contains information about the module including name and firmware revision. The “Position” area displays the modules position and physical location. This is useful if the device is installed as part of a larger installation.

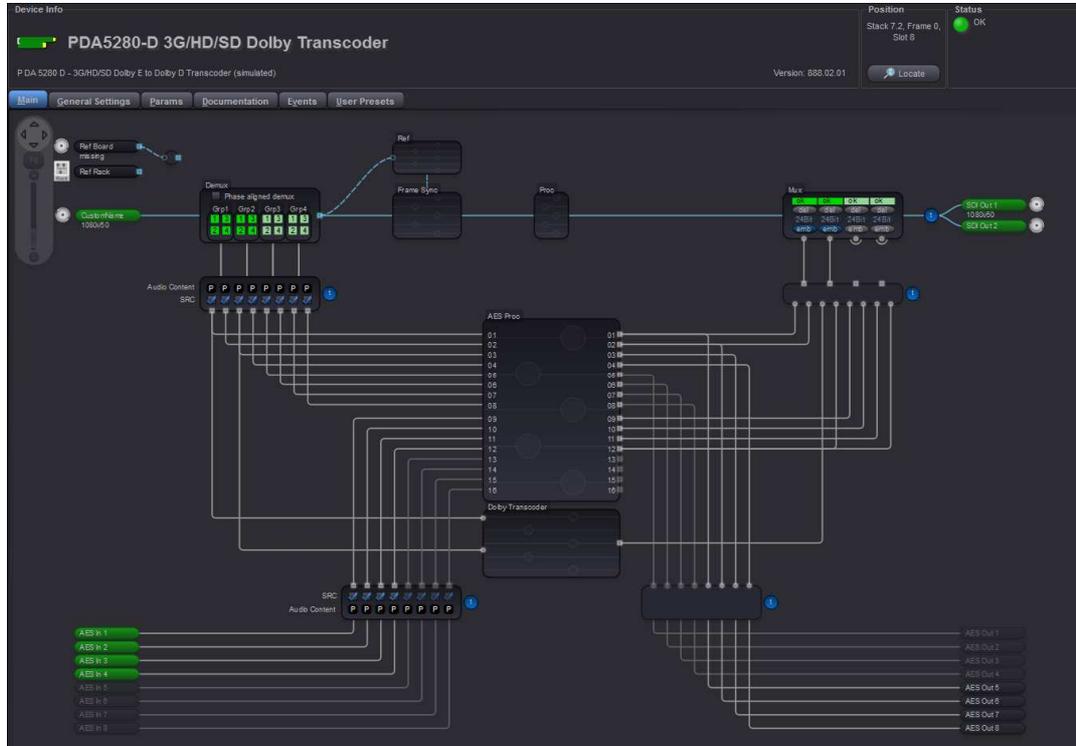
NOTE: The Locate button (in the “Position” area) is a useful tool to quickly identify a module in larger systems. Activating “Locate” will flash the module’s alarm LED in yellow color. (this does not effect the module’s operation in any way). This function will be stopped automatically (timeout).

The “Error Log” at the bottom of the screen displays an individual timestamp’ed message for any error or warning condition in the system. The same information can always be found in the APPolo Control System’s textual logfiles.

The APPolo Control GUI provides several tabbed windows per individual device, splitting up the modules settings into a number of separate screens. The primary GUI screens and functions are described below.

Main Tab

This screen visualizes the module's functionality. The audio and video signals are presented flowing from left to right. Selections are made using onscreen sliders, radio buttons, drop down selections and checkboxes. The screen can be zoomed in/out using the mouse-wheel or the navigation tool in the top left corner of the screen. When zooming closer, the contents of the individual boxes will become visible.

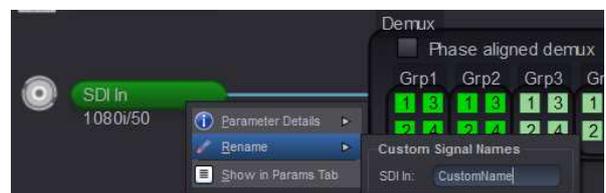


Input Detection

The Audio and Video input connections on the left hand side display the current signal presence status. For the SDI input, the current signal format is displayed on screen in green. If the connected signal cannot be detected, the color will be YELLOW. If no signal is connected at all, the color will be RED.

If a valid AES audio input signal is detected, port symbol in the GUI becomes GREEN. If the input sample rate is not in sync with the internal clock, the input is declared as ASYNCHRONOUS and the port is displayed as YELLOW. If no AES signal can be detected, the input port is displayed in RED. Any audio port that is currently configured as an output is greyed out in the input section.

NOTE: Input and output signals can be renamed. Simply right-click onto the signal name and specify a custom signal name

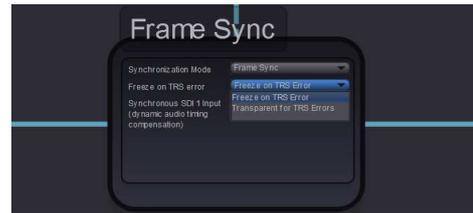


Embedded Audio Presence Detection

The presence of embedded audio is indicated in the Deembedder area. A GREEN color indicates presence of the respective mono audio signal. The color is DARK GREEN if the signal is actually being used in one of the possible outputs. Otherwise (deembedded signal not used), the color is only LIGHT GREEN.

Freeze Mode

This is where the reaction of the synchronizer is defined in the case of excessive video errors (TRS Errors). The output can be configured to freeze (“Freeze on TRS Error”) or pass the input signal transparently when excessive errors are encountered. If configured to pass video transparently (“Transparent”) then all video errors and disturbances are passed from the input to the output.



Synchronization Mode

Three different modes of synchronization can be selected:

Frame Synchronization: The input signal is always buffered for 1 video frame. If TRS errors are detected in the input frame, the last good input frame is delivered (repeatedly) to the output. Differences between the input and REF clocks will be synchronized by repeating or dropping individual video frames on the output. The total video processing time from input to output is 1 video frame minimum plus the timing difference of input signal to Reference



Line Sync (H): In case of clock synchronized signals the Line synchronizer H mode can be activated to achieve minimum delay. The input signal is buffered for 1 line to correct timing differences within 1 line. A minimum delay of approx. ½ line before the start of the next line has to be maintained to compensate for the processing delay of the P DA 5280.

NOTE: this mode can only be used with clock-synchronized signals (i.e. it shall NOT be used with an asynchronous SDI input).

Line Sync (V): In this mode the synchronizer delays the input signal towards the next frame start to achieve horizontally and vertically aligned pictures. The delay is then the timing difference of the input signal to the Frame Pulse of the Reference. This results in frame aligned signals without the additional 1 frame delay of the frame synchronizer mode. A minimum delay of approx. ½ line before the start of the next frame has to be maintained to compensate for the processing delay of the P DA 5280.

NOTE: this mode can only be used with clock-synchronized signals (i.e. it shall NOT be used with an asynchronous SDI input).

Video Processing

Clip CR/Cb Headroom

If activated all Luminance (Y) values below 64 and above 940, and all Chrominance (Cr,CB) values below 64 and above 864 will be clipped.

H and V Blanking

A checkbox selection is provided for H (Horizontal) and V (Vertical) blanking. When selected, the HANC and/or VANC area of the SDI input signal will be blanked (erased) completely, before the signal is delivered to the audio embedding stage.

Output if no input

Specify the content of the SDI output signal to be generated if no SDI input signal can be detected.

NOTE If OFF is selected, the SDI output will be completely (electrically) dead while no input signal is received.

Freeze Mode

Specify the exact content (Field 1, field 2 or Full Frame) that shall be delivered on the output, when the “Freeze” mode becomes active. This selection is applicable for interlaced SDI formats only. The selection options are:

Test Pattern preselect

A wide range of patterns is provided which can be selected using the drop down selection provided. The pre-selected pattern will be used if the freeze mode is set to “test pattern” and will also if the test pattern is enabled manually (see below).

Patterns provided are:

- Full field Black
- Full field White
- Full field Yellow
- Full field Cyan
- Full field Green
- Full field Magenta
- Full field Red
- Full field Blue
- 15% Grey (full field)
- 75% Color bars
- 75% Color bars over Red
- Pathological PLL/EQ

Test Pattern Standard

With no input signal connected the module can be used a standalone test generator using this selection is possible to configure the test pattern into any of the supported standards, or it can be set to follow the last input standard. Settings provided are:

- Follow last input (default)
- Fixed standards (half, same or double or current reference frame rate)

Test Pattern Enable

This checkbox simply switches on the pre-selected test Pattern.

Video Adjustments

Four sliders are provided to allow for the adjustment of individual video parameters. Separate sliders are provided for video Brightness (gain), Saturation, Pedestal (Black level) and Hue.

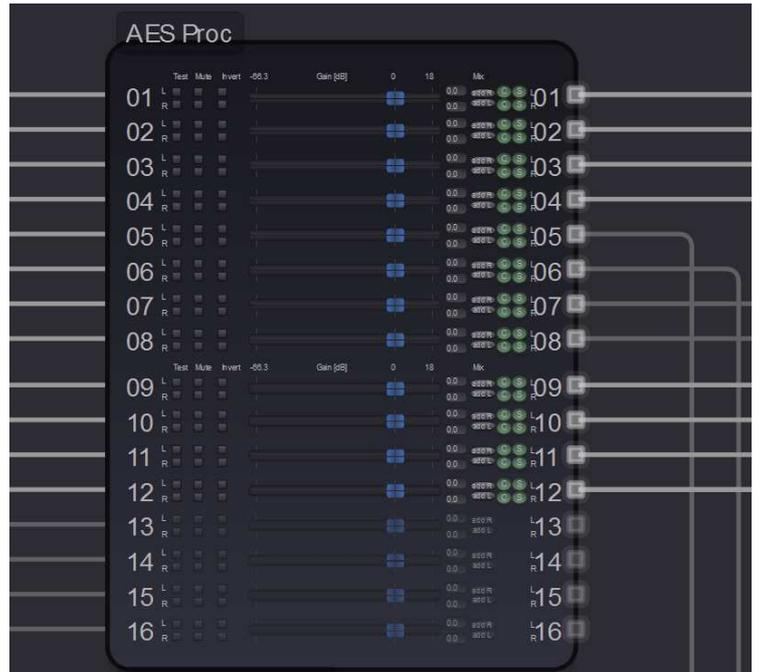


AES Processing

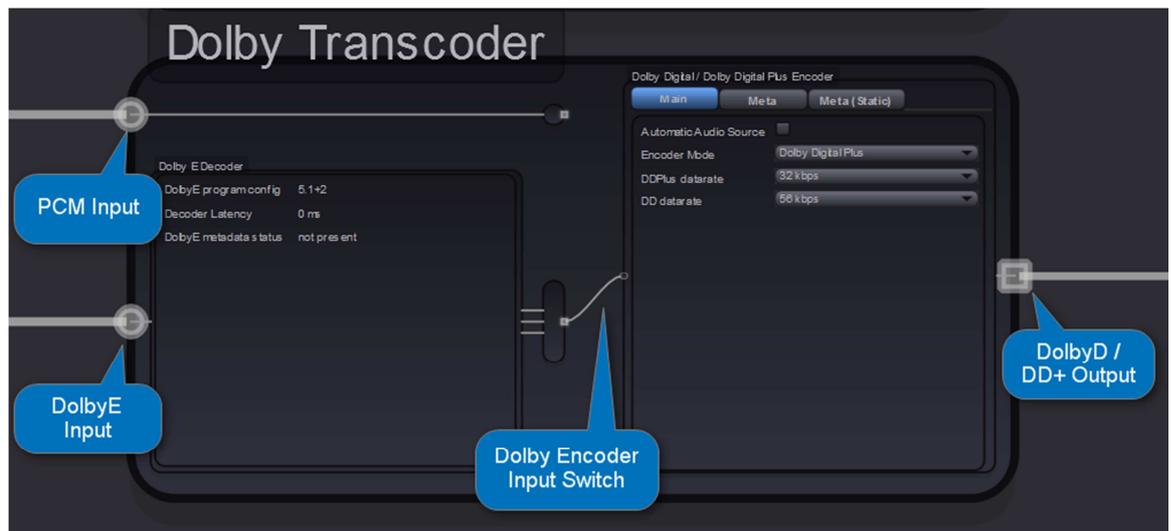
All audio signals (external and deembedded AES) can be processed individually.

The following functions are available here (separately for the Left and Right channel):

- Test Tone (ON/OFF)
- Mute (ON/OFF)
- Phase Inversion (ON/OFF)
- Mono-Downmix (ON/OFF)
- Gain adjustment (+18dB .. -66.3dB)
- Overload detection
- Silence detection



Dolby Transcoding



Overview

The Dolby Transcoder Module can be used to transcode an incoming DolbyE encoded audio-program into a Dolby Digital (DD or AC-3) or Dolby Digital Plus (DD+ or E-AC-3) encoded audio program. The resulting encoded audio program can then be used as one of the sources in the regular audio output crossbar of the PDA5280. Instead of an incoming DolbyE bitstream, a regular transparent PCM stereo stream can be used as an alternative audio source for the DD or DD+ encoder.

DolbyE Input

When a DolbyE bitstream is detected on the DolbyE input of the Transcoder block, the first audio program will automatically be decoded from the incoming DolbyE bitstream. The resulting (multichannel) audio program is delivered to the following DD/DD+ Encoder block, together with the associated (dynamic) Audio Metadata (which has also been decoded from the DolbyE stream). The precise program configuration (multichannel setup) is described as part of the metadata and thus also delivered to the Dolby Encoder.

If the audio signal, that is connected to the DolbyE Decoder is NOT a DolbyE encoded bitstream, but a regular PCM signal instead, then the DolbyE decoder functionality is automatically set to bypass and this PCM signal is delivered as a 2.0 stereo signal (unmodified) to the Dolby Encoder. In this case, no dynamic audio metadata are available with this signal.

PCM Input

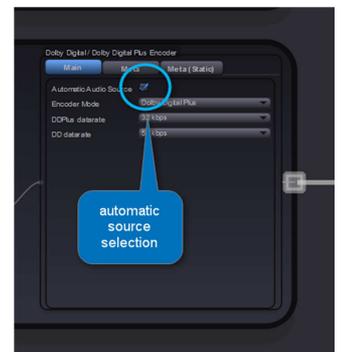
The alternative PCM Input of the Transcoder block can be used to feed a regular PCM-encoded (i.e. NOT Dolby encoded) stereo signal to the Dolby Encoder. The Dolby Encoder can select from one of the available inputs (Decoded DolbyE or PCM), see below.

Dolby Digital / Dolby Digital Plus Encoding

The Dolby Digital / Dolby Digital Plus Encoder function (as part of the Dolby Transcoder block) takes an input audio program and encodes it as either dolby Digital (AC-3) or as Dolby Digital Plus (E-AC-3) bitstream. This encoded bitstream is available at the output of the Dolby Encoder block, as a source to any of the provided audio destinations (Embedder or external Audio outputs, see below).

Input Selection

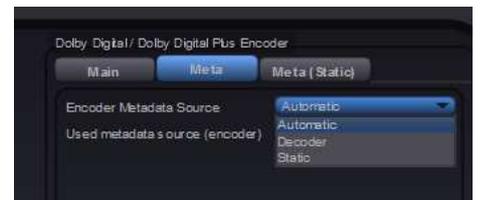
By default, the input signal of the Dolby Encoder is taken from the output of the DolbyE Decoder block. The input can alternatively be taken from the direct PCM input path. The manual source selection is done by clicking onto the connection path in the APPolo GUI, and connecting it to the other source (see screenshot above).



Automatic Source Selection is available as an optional function (see screenshot). If activated, the output of the DolbyE decoder will be selected automatically, as long as a DolbyE input stream is actually present. As soon as no DolbyE stream is detected on the input of the DolbyE Decoder, the input selection will automatically fall back to the direct PCM input signal. NOTE: when “Automatic Source Selection” is activated, the input selection switch cannot be operated manually.

Metadata Source Selection

The DD/DD+ Encoder requires a set of Audio Metadata to encode into the DD/DD+ bitstream. By default, the required metadata is automatically taken from a source that is appropriate to the current audio signal source of the Dolby Encoder. I.e. the Encoder either receives both the audio content as well as the metadata stream from the output of the DolbyE Decoder, or the Encoder receives the audio content from the direct PCM stream and takes the metadata from the internal static set of metadata (see below).



The automatic metadata source selection (default) can be modified and forced to always use one of the two available sources (e.g. always use the static internal set of metadata), independently of the current audio source.

NOTE: the current metadata source connection is only shown as a textual info, not as a graphical line in the GUI.

Static Audio Metadata

The DD/DD+ Encoder provides the ability to specify a complete set of (static) audio metadata. This set of metadata will be used by the Encoder, if the Metadata Source is set to INTERNAL (either by manual choice.



Or automatically, following the input selection of the direct PCM input)

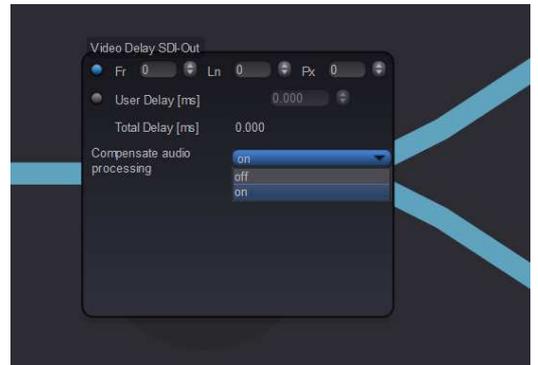
Some additional metadata settings (i.e. such that are not often used) are available from the complete list of parameters on the “Params” tab of the GUI. You can use the filtering function there, to list only those parameters that carry the term “Meta” in their name or description (see screenshot below).



Timing Compensation

The Dolby-Transcoding process (consisting of the two steps DolbyE-Decoding and DD/DD+ Encoding) requires a relatively large total processing time of above 300ms. By default, the video path will be delayed by an appropriate (large) number of video frames, to achieve a correct lip-sync-in to lip-sync-out behavior.

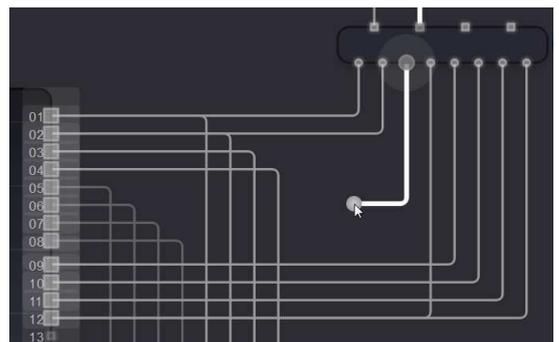
This default behavior (long video delay to compensate for potential high audio processing times) can be disabled by disabling the “Compensate Audio Processing” function in the context of the video output, see screenshot.



NOTE: if this compensation is enabled (default), then the remaining available video output delay will be reduced to 55 frames.

Audio Crossbars

After going through the audio processing stage, each audio input as well as each deembedded AES signal is delivered to the output audio crossbar, where each of the possible audio destinations (embedder and external outputs) can select from all of the available signals. An output can be connected to a new source by simply clicking onto an existing connection and dragging and connecting the white handle to the new source signal.



One single white line in this diagram represents a stereo-connection (containing a left and a right channel). If required, the left and right signals can be connected independently. This can be achieved by waiting a few seconds before actually clicking onto the white handle. This will produce an additional black (L) and red (R) handle to select and drag the Left and Right channel separately.



Embedder

All four embedded audio-groups can be (re-) embedded into the SDI output. An existing embedded group can also be removed from the SDI stream, even without embedding anything. (Re-)embedding a group will implicitly remove this same group from the input SDI stream, if applicable.

An embedded audio-group can only be embedded as a complete group, containing two AES streams. If you want to replace only one out of the two AES streams in the SDI, you need to feed the other AES stream from the Deembedder (on the left) through the audio-processing block and the output crossbar to the Embedder, and re-embed it together with that other (new) AES content into the same group. This will, technically, replace the complete embedded group in the SDI stream.

Embedding audio into an HD-SDI and 3G-SDI stream will always be done in 24bit resolution. When embedding into SD-SDI, 24bit embedding is activated by default, but can be de-activated (reducing the embedding to 20bit). This may be required to satisfy some non-standard-compliant SDI deembedder.

Audio Outputs

All audio ports that are currently configured as OUTPUTS are available as destinations in the audio output crossbar. Any audio port that is currently configured as an INPUT cannot be selected as a destination in the audio output crossbar.

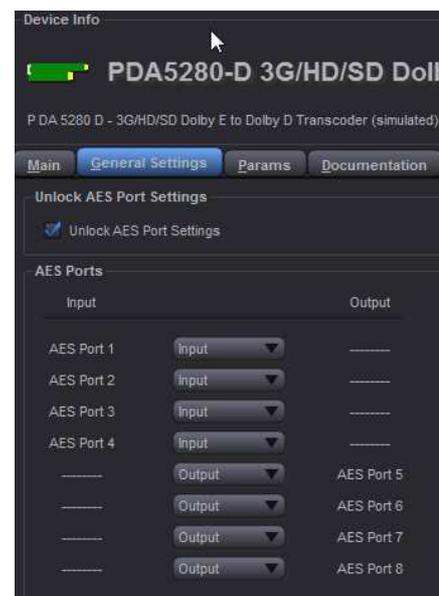
See next section for configuration of audio ports.

Audio Port Setup

Each of the eight external audio ports can be configured to be an INPUT or an OUTPUT port.

To adapt this configuration to your local needs, the settings need to be UNLOCKED first. This is to prevent from accidental changes. NOTE that an OUTPUT port will actively drive the electrical signal on the connected cable. Such a signal should only be connected to an audio INPUT port of another device. Connecting such a signal to an audio OUTOUT port instead, may potentially cause permanent damage to such other devices.

Note. Please check connected peripheral equipment before using the P DA 5280 to make sure the audio ports of the P DA 5280 are configured correctly. Connecting an output port of the P DA 5280 to a signal output of another device might cause permanent damage to the other device.



Timing adjustments

All input and output signals can be adjusted in their timing. I.e. additional delay can be applied to compensate for timing differences in the overall system. The APPolo Control GUI provides appropriate controls in the blue circles that are visible in the appropriate contexts (signal input or output).

Video

The SDI output can be delayed by up to a total of 62 full frames of video. This delay can be specified either in units of Frames, Lines and Pixels, or it can be specified in absolute Milliseconds.

NOTE: The specified values and dimensions will be stored persistently, even when the current video standard is changed.

NOTE: Adjusting the video delay will always apply the appropriate amount of delay both both to Video and Audio contents. Consequently, specifying a video delay can NOT be used to modify the relative timing between Video and Audio (lip-sync corrections). See also audio delay adjustments below.

Audio

Audio signals can be adjusted at various positions along the processing chain:

Adjusting the Audio delay in any of these locations is the only way to adjust the relative timing between Video and Audio (i.e. lip-sync corrections). Audio timing controls are offered in the context of the input as well as the output. This helps to eliminate a dependency on the routing crossbars, while you are adjusting audio-timing.

Simply follow these two rules:

- 1) If there is a lip-sync error in the incoming signals (embedded Audio, or discreet Audio relative to Video), this input-related timing problem should be corrected with the INPUT-related timing controls (i.e. before the audio channels are routed in the crossbar).
- 2) If there is, however, an Audio-Video-Timing situation behind the output (to be compensated here), then this output-related timing issue should be corrected with the OUTPUT-related timing controls.

NOTE: for the most part, the video signal processing in the P DA 5280 requires more processing time than the audio signal processing chain (exception: Dolby Transcoding, see above). Accordingly, some amount of audio delay is implicitly applied to all audio channels that are embedded into the SDI output (i.e. when the audio delay is specified as "0 ms"). This implicit audio delay can be reduced by entering a negative value for such audio channels, resulting in a correction of lip-sync situations with late-audio in relation to the video content.

Events

Device Event Tab

The Events Tab is where the module alarming and error notifications are configured for the module. Any of the possible Events that the device can generate can be disabled here, which will declare such Events as irrelevant. Once an Event has been disabled in this Events-Tag, the Event will not be reported to the APPolo control system, it will not be logged in the logfiles, and it will not even influence the local LEDs of the device.

For all Events that are enabled (which is the default): as soon as the monitored condition becomes critical (e.g. input signal lost), the Event becomes ACTIVE. This change of state generates a message in the APPolo Control System. This message is stored in the APPolo Server logfile. Later, when the condition is not critical anymore (e.g. input signal present again), another message is logged in the APPolo Event System, and also saved in the logfile.

Additionally, these messages can be displayed in the APPolo GUI's Event Log (bottom part of the APPolo GUI, enabled from the "View" menu). This can, however be disabled by removing the checkboxes from the "Log in GUI" columns (separately for "Event becomes Active" and "Event not active anymore" messages).

Similarly, an SNMP trap can be generated from the APPolo Server for any message in the APPolo Event System. Refer to the LYNX Remote Control Guide for more information on SNMP (available from <http://appolo.lynx-technik.com>)

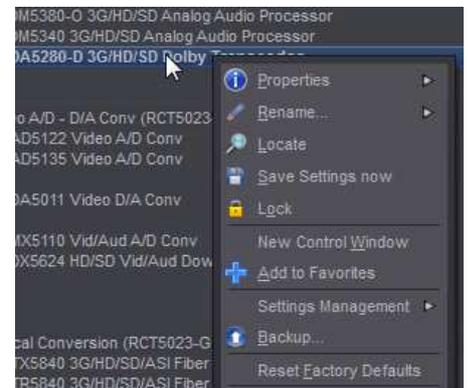
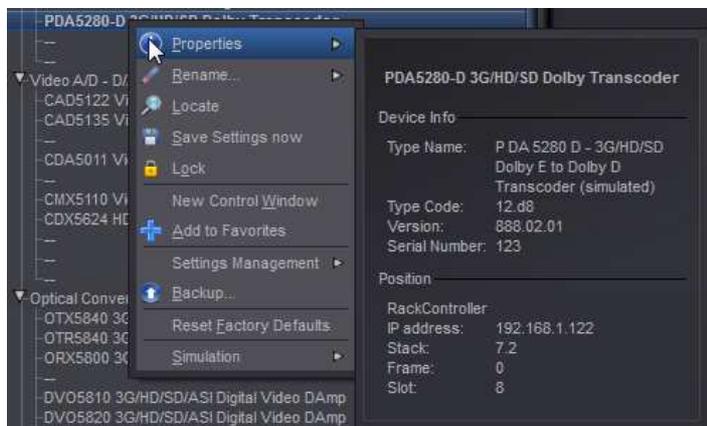
General GUI functions

There are a number of functions and commands of the LYNX APPolo Control System which are common for all LYNX devices.

A click with the Right-Mouse-Button on any module in the DeviceTree will generate the same menu that is available from the "Device" menu. This menu provides the following options:

Properties

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



Locate

This function 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.

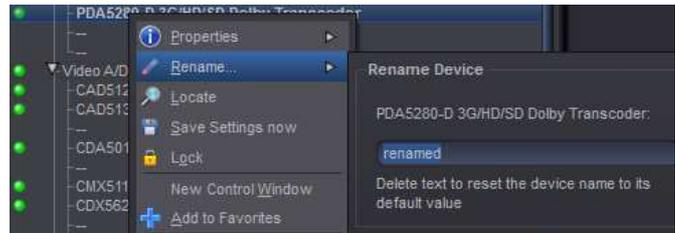
New Control Window

Selecting this option will open up a separate GUI window showing just the controls for the current module. This new window can be used to arrange multiple devices on your desktop or similar.

Rename

It is possible to rename individual items (RackFrames and individual devices) in the APPolo Device Tree. The default name of a device is the LYNX product name. This name can be modified at any time.

The original (default) name can be restored by simply removing the custom name from that renaming-field (save this as an empty name).



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

Save Settings Now

Any modification to any parameter of a device is immediately propagated from the APPolo GUI to the hardware device (card) and made effective. The current settings are saved in a local FlashRAM of the device, so that the device will continue to work in the exact same configuration after a power-cycle. But in order to reduce the number of write-operations on the physical FlashRAM, the actual storage of a modified configuration into the FlashRAM is only executed approximately 10 seconds after the last change to any setting in the whole card. This operation is visualized on the board by all local LEDs flashing three times in yellow color.

Consequently, if you remove a card from a system BEFORE the last changes have been saved to FlashRAM, those last changes will not be available on the next power-up.

The “Save Settings Now” operation in this menu can force the current configuration of this device to be stored to the local FlashRAM now. If in doubt, this function should be executed before a device is physically removed from the system, or before electrical power is shut down.

Lock

Selecting this will lock the device to prevent from 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

Executing this function will reset all the individual settings of all parameters of the device back to the predefined state that has been defined by the manufacturer. All custom adaptations will be lost. This operation cannot be undone.

Settings Management

The complete current configuration of one device can be copied into an internal “clipboard” and pasted onto a different device of the same type. Alternatively, the complete current configuration can be stored to a local file (as a very simple single-device backup).

Specifications

Digital Video Input	
Signal Type	Serial Digital Video (SDI) SMPTE 292M, 259M, 424 M with automatic input standard and format detection
Supported Formats	See page 8
Input Impedance	75 Ω BNC
Input Level	0.8V
Return Loss	>15dB (<1.485Gbit/s); >10dB (>1.485Gbit/s)
Digital Video Outputs	
Signal	Serial Digital Video (SDI) SMPTE 292M, 259M, 424M
Output Impedance	75 Ω
Output Level	0.8V pp +/- 10%
Return Loss	>15dB (<1.485Gbit/s); >10dB (>1.485Gbit/s)
Connection	BNC
Video Delay	Up to 62 frames in steps of pixels, lines, frames
Jitter	< 0.2 UI (270Mbit/s) < 0.2 UI (Alignment Jitter); < 1.0 UI (Timing Jitter); (1.485Gbit/s) < 0.3 UI (Alignment Jitter); < 2.0 UI (Timing Jitter); (2.97Gbit/s)
AES Audio Inputs / outputs	
Signal	P DA 5280 U = AES3 id un-balanced on Mini DIN connectors P DA 5280 D = AES3 balanced on SubD 25 connector
No. of inputs / outputs	8 x AES ports
Coupling	Transformer
Performance	
Audio Group Deletion	Existing groups pass transparently or they can be deleted and/or replaced with new embedded audio (user selectable)
Audio Group Selection	Map AES inputs or deembedded audio into any of the 4 embedded audio groups
Audio Crossbar	Mono crossbar allows for individual (left and right) channel mapping
Audio Sync Frame	With no SDI input the audio is embedded into a test pattern video sync frame (last connected video standard, or a user selected standard).
Audio Delay	Up to 10s
Dolby E	Transcoding of DolbyE to DD/DD+ (one program only)
Dolby Digital	Encoding of 2.0 PCM or decoded Dolby E program into Dolby Digital
Dolby Digital Plus	Encoding of PCM or decoded Dolby E program into Dolby Digital Plus
Electrical	
Operating Voltage	+ 12 VDC
Power Consumption	25W
Safety	IEC 950 / EN 60950 / VDE 0805
Mechanical	
Size	283mm x 78mm
Weight	CardModule 120g, connector plate 70g
Slots	2 slots in the LYNX RackFrame
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.

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Broadcast Television Equipment