



HDB05

HD/SD preset based audio de-embedder

Installation and Operation manual

SynLite

HD
High definition

**MASTER
Card**

COMPATIBLE WITH
 DOLBY. E

Committed.





Synapse

TECHNICAL MANUAL

HDB05



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WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE

- ALWAYS disconnect your entire system from the AC mains before cleaning any component. The product frame (SFR18 or SFR04) must be terminated with three-conductor AC mains power cord that includes an earth ground connection. To prevent shock hazard, all three connections must always be used.
- NEVER use flammable or combustible chemicals for cleaning components.
- NEVER operate this product if any cover is removed.
- NEVER wet the inside of this product with any liquid.
- NEVER pour or spill liquids directly onto this unit.
- NEVER block airflow through ventilation slots.
- NEVER bypass any fuse.
- NEVER replace any fuse with a value or type other than those specified.
- NEVER attempt to repair this product. If a problem occurs, contact your local Axon distributor.
- NEVER expose this product to extremely high or low temperatures.
- NEVER operate this product in an explosive atmosphere.

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This product complies with the requirements of the product family standards for audio, video, audio-visual entertainment lighting control apparatus for professional use as mentioned below.



EN60950	Safety
EN55103-1: 1996	Emission
EN55103-2: 1996	Immunity

Axon Digital Design
HDB05



Tested To Comply
With FCC Standards

FOR HOME OR OFFICE USE

This device complies with part 15 of the FCC Rules
Operation is subject to the following two conditions:
(1) This device may cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

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1 Introduction to Synapse

An Introduction to Synapse

Synapse is a modular system designed for the broadcast industry. High density, intuitive operation and high quality processing are key features of this system. Synapse offers a full range of converters and processing modules. Please visit the AXON Digital Design Website at www.axon.tv to obtain the latest information on our new products and updates.

Local Control Panel

The local control panel gives access to all adjustable parameters and provides status information for any of the cards in the Synapse frame, including the Synapse rack controller. The local control panel is also used to back-up and restore card settings. Please refer to the RRC18, RRC10, RRC04, RRS18 and RRS04 manuals for a detailed description of the local control panel, the way to set-up remote control over IP and for frame related settings and status information.

Remote Control Capabilities

The remote control options are explained in the rack controller (RRC18/RRC10/RRC04/RRS18/RRS04) manual. The method of connection to a computer using Ethernet is described in the RRC/RRS manual.



CHECK-OUT: “AXON CORTEX” SOFTWARE WILL INCREASE SYSTEM FLEXIBILITY OF ONE OR MORE SYNAPSE FRAMES

Although not required to use Cortex with a Synapse frame, you are strongly advised to use a remote personal computer or laptop PC with Axon Cortex installed, as this increases the ease of use and understanding of the modules.

2 Unpacking and Placement

Unpacking

The Axon Synapse card must be unpacked in an anti-static environment. Care must be taken NOT to touch components on the card – always handle the card carefully by the edges. The card must be stored and shipped in anti-static packaging. Ensuring that these precautions are followed will prevent premature failure from components mounted on the board.

Placing the card

The Synapse card can be placed vertically in an SFR18 frame or horizontally in an SFR04 and SFR08 frame. Locate the two guide slots to be used, slide in the mounted circuit board, and push it firmly to locate the connectors.

Correct insertion of card is essential as a card that is not located properly may show valid indicators, but does not function correctly.

NOTE: On power up all LED's will light for a few seconds, this is the time it takes to initialise the card.

3 A Quick Start

When Powering-up

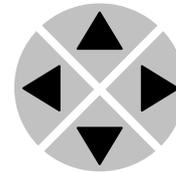
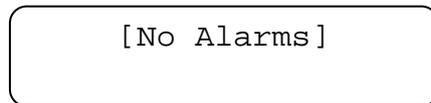
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of the inputs.

Changing settings and parameters

The front panel controls or the Axon Cortex can be used to change settings. An overview of the settings can be found in chapter 5, 6 and 7 of this manual.

Front Panel Control

Front Panel Display and Cursor



Settings are displayed and changed as follows;

Use the cursor 'arrows' on the front panel to select the menu and parameter to be displayed and/or changed.

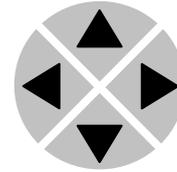
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

NOTE: Whilst editing a setting, pressing ► twice will reset the value to its default.

**Example of
changing
parameters using
front panel control**

With the display as shown below

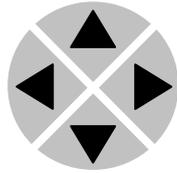
```
RRC18 [Select Card]
>S01=SFS10
```



Pressing the ► selects the SFS10 in frame slot 01.

The display changes to indicate that the SFS10 has been selected. In this example the Settings menu item is indicated.

```
SFS10 [Select Menu]
>Settings
```



Pressing the ► selects the menu item shown, in this example Settings.

(Pressing ▲ or ▼ will change to a different menu eg Status , Events).

The display changes to indicate that the SFS10 Settings menu item SDI-Format has been selected and shows that its current setting is Auto.

```
SFS10 [Settings]
>SDI-Format=Auto
```

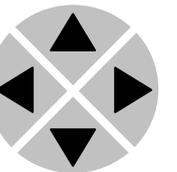


Pressing the ► selects the settings item shown, in this example SDI-Format.

(Pressing ▲ or ▼ will change to a different setting, eg Mode , H-Delay).

The display changes to indicate that the SFS10 Edit Setting menu item SDI-Format has been selected.

```
SFS10 Edit Setting]
SDI-Format>Auto
```



To edit the setting of the menu item press ▲ or ▼.

All menu items can be monitored and/or changed in this way. Changing a setting has an immediate effect.



**Axon Cortex
Software**

Axon Cortex can be used to change the settings of Synapse modules from a PC, either locally or remotely. The software enables communication based on TCP/IP between the Setup PC and Synapse frames/modules.

Each Synapse frame is addressed through its rack controller's unique IP address, giving access to each module, its menus and adjustment items. Axon Cortex has access to data contained within the Synapse module and displays it on a GUI. The software has an intuitive structure following that of the module that it is controlling.

For operation of Axon Cortex, please refer to the Cortex help files.

**Menu Structure
Example**

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲		▲		
S01	SFS10	▶ Set- tings	▶ Standard_dig	▶ Auto
▼		▼	▼	▼
S00	RRC18	Status	Mode	625
		▼	▼	▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	

NOTE: Further information about Front Panel Control and Synapse Cortex can be obtained from the RRC and RRS operational manuals and the Cortex help files.

4 The HDB05 Card

Introduction

The HDB05 is an HD SDI and SD SDI digital audio de-embedder. It is an audio extractor that outputs four AES/EBU streams on the board itself and four ADD-ON audio signals via the local bus to two ADD-ON cards. All chosen settings are stored in presets, these presets (8) can be restored via automation to fire up a salvo with 16 independent audio channels in any combination (even duplicates).

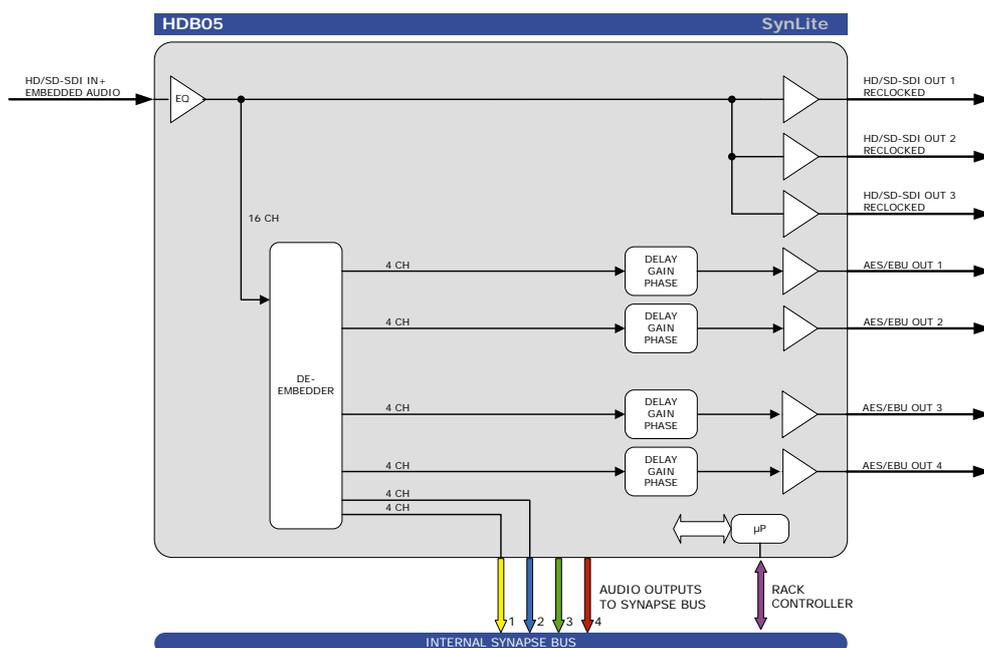
Features

- 16 channel (4 group) de-embedder
- 4 local AES/EBU outputs
- 8 extra outputs through ADD-ON cards
- 3 x reclocked HD SDI output
- 8 presets that configure all 16 output channels at once.
- Audio level and phase control (local outputs only)
- Audio offset delay (local outputs only) up to 2600 ms
- Free selection of all embedded channels
- Peak detection 0, -6, -12 and -18dBFS
- Silence detection with threshold (-100 to -20dBFS) and time control (1 to 255 sec)
- Audio format detection (e.g. AC3, Dolby E and PCM)
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)
- Optional 1 fiber input (replacing 1 SDI input) or 1 fiber output (replacing 1 SDI output) on I/O panel

Applications

- HD and SD preset based 8 channel de-embedding
- HD and SD preset based 16 channel de-embedding with DIO48

Block schematic



5 Settings Menu

Introduction	<p>The settings menu displays the current state of each HDB05 setting and allows you to change or adjust it. Settings can be changed using the front panel of the Synapse frame (SFR18, SFR08 or SFR04) or with Cortex. Also the SCP08 control can be used. Please refer to chapter 3 for information on the Synapse front panel control and Cortex.</p> <p><i>Note:</i> All items preceded with a #-sign are part of the presets.</p>
SDI -Format	<p>The Input format setting allows you to set input format.</p> <p>AUTO: the card is recognizing the input format automatically.</p> <p>The selectable formats are:</p> <ul style="list-style-type: none"> ▪ Auto ▪ 1080i-60 ,1080i-50 ▪ 1080p-24 , 1080p-24, 1080p-24 ▪ 1035i-60 ▪ 720p-60, 720p-50, 720p-30, 720p-25, 720p-24 ▪ 525i ▪ 625i <p>The default setting is AUTO. Please note that the functionality of the card will be affected, if the correct input format is not selected.</p>
Field Freq	<p>1 : 1, 1 : 1 . 001 or AUTO are the values that can be selected</p> <p>1 : 1 is the right field frequency for 1080i-50. Because the actual field frequency of 1080i-60 is 59.97 and not 60 is it necessary when 1080i-60 is selected as input format to adjust the field frequency to 1 : 1 . 001</p> <p>There is also an AUTO mode, the HDB05 will detect the format and switch then to the according field-frequency. Default is AUTO.</p>
Preset	<p>It is possible to define the number of presets with this setting. The possible presets range from 1 to 8. Each setting with the # symbol is part of the preset.</p> <p>The Default setting is set to #1.</p>
#Out_1 ~ #Out_8	<p>The settings Out_1 till Out_8 define which channel of embedded audio, Ch 1 to Ch 16 of the incoming input will be routed to output 1 till 8. Any channel can be selected, even if the channel is selected by another output. The default settings for Out_1 till Out_8 are respectively Ch_1 till Ch_8.</p>

<p>#AddOn-A1 ~ #AddOn-A4</p>	<p>The settings AddOn-A1 till AddOn-A4 define which channel of embedded audio, Ch 1 to Ch 16 of the incoming input will be routed to Add_On output A1 till A4. Any channel can be selected, even if the channel is selected by another output. The default settings of AddOn-A1 till A4 are respectively Ch_9 till Ch_12.</p>
<p>#AddOn-B1 ~ #AddOn-B4</p>	<p>The settings AddOn-B1 till AddOn-B4 define which channel of embedded audio, Ch 1 to Ch 16 of the incoming input will be routed to Add_On output B1 till B4. Any channel can be selected, even if the channel is selected by another output. The default settings of AddOn-B1 till B4 are respectively Ch_13 till Ch_16.</p>
<p>Delay-Ch_1 ~ Delay-Ch_8</p>	<p>Every audio-process-output-channel can be delayed up to 2.6 seconds. The delay can be adjusted with Delay-Ch_1 till Delay-Ch_8. The delay can be adjusted between 0ms and 2600ms in steps of 1ms. The default delay is 0ms.</p>
<p>Gain-Ch_1 ~ Gain-Ch_8</p>	<p>The level of Out_Ch1 till Out_Ch8 is determined by the individual Gain control of each channel (Gain-Ch_1 till Gain-Ch_8). The audio level can be adjusted between +12dB and -60 dB in steps of 0.25dB. Below 60dB the audio is muted and the display shows -999.00dB. Gain-Ch_x adjusts the gain of the audio output of the card and does not change the outputs to the internal Synapse bus. The default setting is 0.00dB.</p>
<p>Phase-Ch_1 ~ Phase-Ch_8</p>	<p>The phase of the audio of Out_Ch1 till Out_Ch8 can be adjusted using Phase-Ch_1 till Phase-Ch_8. The user can choose between 0 degrees and 180 degrees phase shift. Phase-Ch_x adjusts the phase of the audio output of the card and does not change the outputs to the internal Synapse bus. The default setting is 0 degrees.</p>
<p>FrmDet1/2</p>	<p>In the status menu of the HDB05 you can see what the audio format is of Ch_1/2, Ch_3/4, Ch_5/6, Ch_7/8, Ch_9/10, Ch_11/12, Ch_13/14 or Ch15/16. FrmtStat1/2 in the status menu will indicate what the audio format is of the here selected audio channels. Default is Ch_1/2</p>
<p>FrmDet3/4</p>	<p>In the status menu of the HDB05 you can see what the audio format is of Ch_1/2, Ch_3/4, Ch_5/6, Ch_7/8, Ch_9/10, Ch_11/12, Ch_13/14 or Ch15/16. FrmtStat3/4 in the status menu will indicate what the audio format is of the here selected audio channels. Default is Ch_3/4</p>

FrmtMuteSw

This setting is primarily intended to be used in combination with the Synapse ADP24 Audio Description and voice-over processing card. With this setting you can automatically have a mute pulse given on to the synapse bus which controls the ADP24 card, by the audio channels, selected for format detection in settings FrmDet1/2 and FrmDet3/4 (so **NOT** output or input channels 1/2 and 3/4!!). Following settings are possible:

- PCM_1/2 = if detected format (see FrmStat1/2) is PCM, a high mute pulse is put on the synapse bus.

- NON-PCM_1/2 = if detected format (see FrmStat1/2) is not PCM (e.g. Dolby E), a high mute pulse is put on the synapse bus.

- PCM_3/4 = if detected format (see FrmStat3/4) is PCM, a high mute pulse is put on the synapse bus.

- NON-PCM_3/4 = if detected format (see FrmStat3/4) is not PCM (e.g. Dolby E), a high mute pulse is put on the synapse bus.

Default is Off .

Audio-Phase

If this setting is set to *Align*, the card ensures audio-phase alignment between multiple audio channels and audio groups, which is necessary for multi-channel (surround) purposes. If errors in the signal-chain occur the de-embedder blocks reset synchronously to maintain audio-phase-alignment.

If this setting is set to *Off*, the card *eats-all* audio including errors. Even if there are DBN/ANC/ECC or channel-sequence errors, the de-embedder will pass them. Be aware that audio-phase-alignment between multiple audio channels and audio groups can not be maintained if this setting is set to *Off*.

Note: This setting can be helpful to solve problems in the field using equipment which doesn't follow the standards correctly.

Silence-Time

This item allows you to set the amount of seconds before the card is to display a silence status. A variable of 1 up to 255sec can be selected.

The default setting is 10 sec.

Silence-Level

Silence-level determines what the level of silence is. A selectable range from -100 dBFS to -20 dBFS is available.

The default setting is - 60dBFS

HD-AudioLock

HD-SYNC is the default setting that is used under the assumption that all audio present in the video stream is synchronously embedded.

The setting HD-AudioLock can be useful if the audio is asynchronously embedded into the HD video stream. The HDB05 can be locked to embedded Audio-Clk_A or Audio-Clk_B.

HD-AudioLock determines whether the card is locked on to the HD input (HD-SYNC) or to the AUDIO CLOCK as present in embedded audio group_1 (Audio-Clk_A) or embedded audio group_2 (Audio-Clk_B).

The default setting is HD-SYNC.

6 Status Menu

Introduction The status menu indicates the current status of each item listed below.

HDSDI-Input This status item indicates the presence of a valid High Definition serial digital video signal is present at the input. HDSDI-Input indicates if an input signal is NA (not available), Present or the following formats;

- 1080i-60
- 1080i-50
- 1080p-30
- 1080p-25
- 1080p-24
- 1035i-60
- 720p-60
- 720p-50
- 720p-30
- 720p-25
- 720p-24

GrpInUse GrpInUse indicates the audio groups that are already present in the incoming HD SDI signal. The indication of a group, or groups being present is as follows,

Display

```

____
1____
_2___
12___
__3__
1_3__
_23__
123__
____4
1__4
_2_4
12_4
__34
1_34
_234
1234

```

When no groups are present,
GrpInUse indicates ____.

**Audio-Ch_1 ~
Audio-Ch_8**

These items indicate the status of the audio-data of the channel that is assigned to output Out-1 till Out-8.

When this channel does not contain audio, it will indicate NA. If embedded audio is present and not clipped it will indicate Ok.

Due to an adjustment of Gain-Ch_1, the audio signal can be raised above 0dBFS and a distorted audio signal will be the result. In this situation the status of Audio-Ch_1 indicates Clipped and the DATA-ERROR-led will light.

When the signal meets the silence criteria, Silence is displayed and the DATA-ERROR-led lights.

**Audio-A1 ~
Audio-B4**

The status menu items Audio-A1 till Audio-B4 indicate the status of audio data assigned to channel AddOn-A1 till AddOn-B4; the audio channels of ADD_ON ouput A and B.

When this channel does not contain audio, it will indicate NA. If embedded audio is present and not clipped it will indicate Ok.

When the signal is raised above 0 dBFS, a distorted audio signal will be the result. In this situation Audio-Ch_A1 indicates Clipped and the DATA-ERROR-led on the HDB05 will illuminate.

When the signal meets the silence criteria, Silence is displayed and the DATA-ERROR-led lights.

**Audio_Clk_A ~
Audio_Clk_D**

HD-AudioLock determines whether the card is locked to the HD input (HD-Sync) or to the Audio Clock as present in embedded audio group_1 till group_4 (respectively Audio-Clk_A till Audio_Clk-D). The statuses can be Out-of-range, 48KHz-ASync or 48KHz-Sync

FrmtStat1/2

This item displays the audio format of the audio channels selected in menu-setting FrmDet1/2. The following formats can be indicated:

- NA
- PCM
- Null
- AC-3
- TimeStmp
- MPEG-1
- MPEG-2
- SMPTE-KLV
- Dolby E
- Caption
- UserDef
- Rsvd

FrmtStat3/4	This item displays the audio format of the audio channels selected in menu-setting FrmDet3/4. The indicated formats are the same as described in FrmtStat1/2.
ANC-stat	ANC-stat, Ancillary Status, indicates that embedded audio is present and valid. ANC-stat indicates if an input signal is OK, NA (not available) or Error.
CRC-Stat	CRC Stat gives the status of the incoming HD/SDI signal CRC Error. Can report Luma_CRC or Chroma_CRC
FPGA-Stat	FPGA-Stat displays the status of the internal processor of the HDB05. The status is indicated as Ok or Error.

7 Events Menu

Introduction	An event is a special message that is generated on the card asynchronously. This means that it is not the response to a request to the card, but a spontaneous message.
What is the Goal of an event?	The goal of events is to inform the environment about a changing condition on the card. A message may be broadcast to mark the change in status. The message is volatile and cannot be retrieved from the system after it has been broadcast. There are several means by which the message can be filtered.
Events	The events reported by the HDB05 are as follows;
Announcements	Announcements is not an event. This item is only used for switching the announcement of status changes on/off. 0=off, other =on
Input	Input can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
Ref-Status	Reference can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
Lock-Status	If the card is locked can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
CRC-Status	EDH status can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
What information is available in an event?	<p>The message consists of the following items;</p> <ol style="list-style-type: none"> 1) A message string to show what has happened in text, for example: “INP_LOSS”, “REF_LOSS”, “INP_RETURN”. 2) A tag that also shows what happens, but with a predefined number: e.g. 1 (= loss of input), 2 (= loss of reference), 129(= 1+128 = return of input). For a list of these predefined tags see the table on the next page. 3) A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled. 4) A slot number of the source of this event.

The Message String

The message string is defined in the card and is therefore fixed. It may be used in controlling software like Synapse Set-up to show the event.

The Tag

The tag is also defined in the card. The tag has a fixed meaning. When controlling or monitoring software should make decisions based on events, it is easier to use the tag instead of interpreting a string. The first implementation is the tag controlled switch in the GPI16.

In cases where the event marks a change to fault status (e.g. 1 for Loss of Input) the complement is marked by the tag increased by 128 (80_{hex}) (e.g. 129 (81_{hex}) for Return of Input).

Defining Tags

The tags defined for the card are:

Event Menu Item	Tag		Description
Announcements	0 or NA	0 or NA	Announcement of report and control values
Input	01 _{hex} =INP_LOSS	81 _{hex} =INP_RETURN	primary input lost or returned
ANC-Status	04 _{hex} =ANC_ERROR	84 _{hex} =ANC_OK	ANC status error

The Priority

The priority is a user-defined value. The higher the priority of the alarm, the higher this value. Setting the priority to Zero disables the announcement of this alarm. Alarms with priorities equal or higher than the Error Threshold setting of the RRC will cause the error LED on the Synapse rack front panel to light.

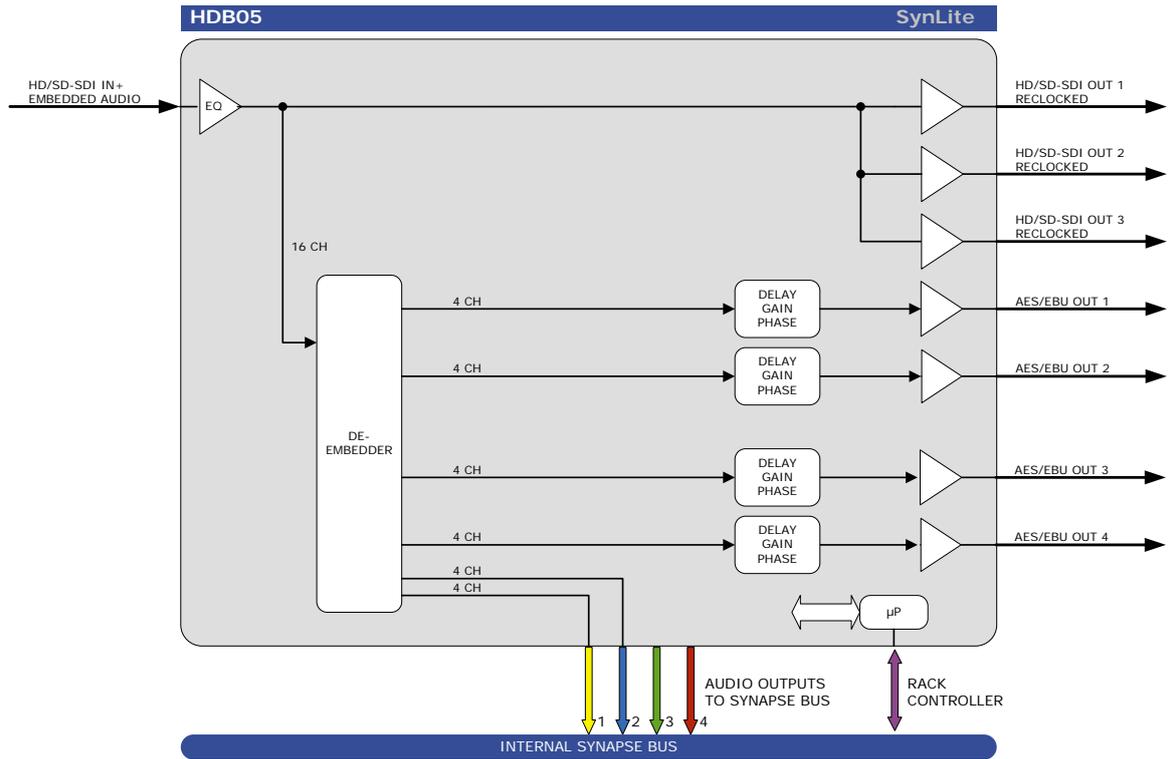
The Address

Together with the message string or the tag, the slot number or address of the card is relevant to be able to assign the event to a certain card.

8 LED Indication

Error LED	The error LED indicates an error if the internal logic of the HDB05 card is not configured correctly or has a hardware failure.
Input LED	This LED indicated the presence of a valid SDI video signal on the input.
ANC Data LED	Indicates the presence of embedded audio within the SDI input signal.
Reference LED	Indicated the presence of a valid reference signal on the selected reference input connector (ref-1 or ref-2).
Data Error LED	This LED indicate two different types of error: <ul style="list-style-type: none">- ANC (embedded audio) checksum error.- EDH error
Connection LED	This LED illuminates after the card has initialised. The LED lights for 0.5 seconds every time a connection is made to the card.

9 Block Schematic



10 Connector Panels

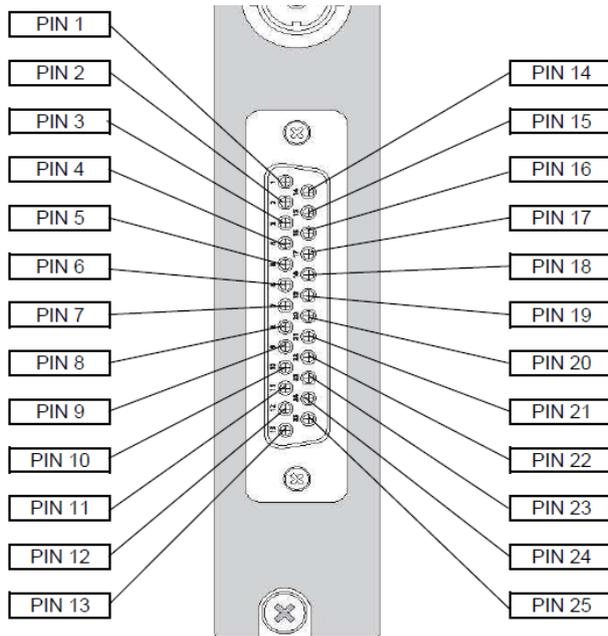
The HDB05 can be used with the BPH01 and BPH02 or BPH02D. The following table displays the pinout of these backpanels.

	BPH01	BPH02	BPH02D
HD/SD SDI INPUT (OPTIONAL FIBER INPUT)			
HD/SD SDI RECLOCKED OUTPUT			
HD/SD SDI PROCESSED OUTPUT 1			
HD/SD SDI PROCESSED OUTPUT 2 (OPTIONAL FIBER OUTPUT)			
AES/EBU OUTPUT 1			
AES/EBU OUTPUT 2			
AES/EBU OUTPUT 3			
AES/EBU OUTPUT 4			

For fiber connectivity see www.axon.tv

Unused inputs and outputs must be terminated with the correct impedance!

BPH02D D-sub pinout:



Pin 1	Not connected
Pin 2	Not connected
Pin 3	Ground
Pin 4	Ground
Pin 5	Ground
Pin 6	Ground
Pin 7	AES1- OUT
Pin 8	AES1+ OUT
Pin 9	Ground
Pin 10	AES3- OUT
Pin 11	AES3+ OUT
Pin 12	Ground
Pin 13	Ground
Pin 14	Ground
Pin 15	Not connected
Pin 16	Not connected
Pin 17	Ground
Pin 18	Ground
Pin 19	Ground
Pin 20	Ground
Pin 21	AES2- OUT
Pin 22	AES2+ OUT
Pin 23	Ground
Pin 24	AES4- OUT
Pin 25	AES4+ OUT

BPH02 pinout:

