Synapse

GXT100/110
HXT100/110

Dual 3Gb/s, HD and SD input, frame synchronizer, up/down/cross converter, embedder and de-embedder

Installation and Operation manual

AFD ready S2016

MASTER Card

Quad speed MASTER

3 TRIPLE RATE GB/s, HD, SD

COMPATIBLE WITH DOLBY E

Powered by LINUX

Upgradable to 3Gb/s

AXON®

Synapse

TECHNICAL MANUAL

GXT100/110
HXT100/110

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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.

Warranty: Axon warrants their products according to the warranty policy as described in the general terms. That means that Axon Digital Design BV can only warrant the products as long as the serial numbers are not removed.

Date created: 25-03-2010
Date last revised: 27-02-2015

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.

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

Axon Digital Design GXT100/110 HXT100/110 FC 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.

Table of Contents

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.

NOTE: Please check appendix 1 before connecting any backpanel!

3 A Quick Start

When Powering-up

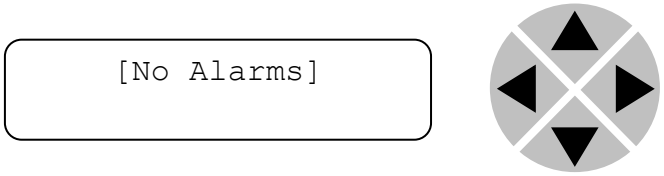
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of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

Changing settings and parameters

The front panel controls or the Synapse 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.

P ess ►	To go forward through the menu structure.
Press ◄	To go back through the menu structure.
Press ▲	To move up within a menu or increase th 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 it 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 GXT100/110 Card

Introduction

The GXT-HXT100/110 are frame synchronizers and 16 channel embedders and de-embedders combined with ultra high-quality up/down/cross converter. The dual input capability can be used as an emergency bypass switch. The optimized scaling and filter algorithms ensure crisp broadcast ready pictures from a native HD source, by use of a 64 tap FIR filters. This card is designed as a transmission output module that enables simultaneous feeding of HD, SD (with embedded audio). Add-on cards can be used as audio in and output cards.
All products can be up- or down graded with a software key.

Features

- 3Gb/s, HD, SD SDI input (auto selecting)
- Low latency conversion process
  - Dual 3Gb/s, HD output
  - Dual SD output (simultaneous anam. widescreen and pan-scan)
- Up-conversion from 720p or 1080i to 1080p (equal frame-rate)
- Down conversion (including 1080p to SD-SDI)
- Cross conversion 720p to 1080i and vice versa
- Dual input backup function
  - Automatic by input carrier detection
  - Manual by direct control (ACP)
  - GPI
- 2 Frame synchronizers for the 3Gb/s, HD and SD domain with individual output timing control
- Color correction in 3Gb/s, HD and SD domain (RGB and total gain, RGB and total black)
- H+V sharpness control in SD domain for crisp down converted picture quality
- 5 GPI inputs for ARC and Shuffle triggers
- Transparent for 16 channels of embedded audio both HD and SD path
- Embedded domain audio shuffling (GXT-HXT110 models only)
- Quad speed audio bus compatible*
- Embedding through synapse bus
- De-embedding to Synapse bus with transparent input to output handling
- Video proc-amp (Y and C control)
- Compatible with:
  - 270 Mbit/s (SMPTE 259M) 50 and 59.94Hz
  - 1485 Mbit/s (SMPTE 292M) 50 and 59.94Hz
  - 2970 Mbit/s (SMPTE 424M) 50 and 59.94Hz (GXT100/110 only)
- AFD insertion in HD domain
- AFD, WSS, WSS-ext and VI insertion in SD domain
- I/O Delay measurement for both output domain
- Reporting of chosen input
- CRC status information for both inputs
- Locks to Bi-level, Tri-level syncs and SDI input
- OP47 to WST cross conversion and vice versa
- Timecode cross conversion
- CC-608 to CC-708 conversion and vice versa
- 6 Line Vertical Ancillary Blanking transparency in transparent mode
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)
- 16 channel embedder in both HD and SD domain
- Optional 2 fiber inputs (replacing 2 SDI inputs) or 2 fiber outputs (replacing 2 SDI outputs) on I/O panel

* = Refer to Appendix 2: Quad speed ADD-ON bus

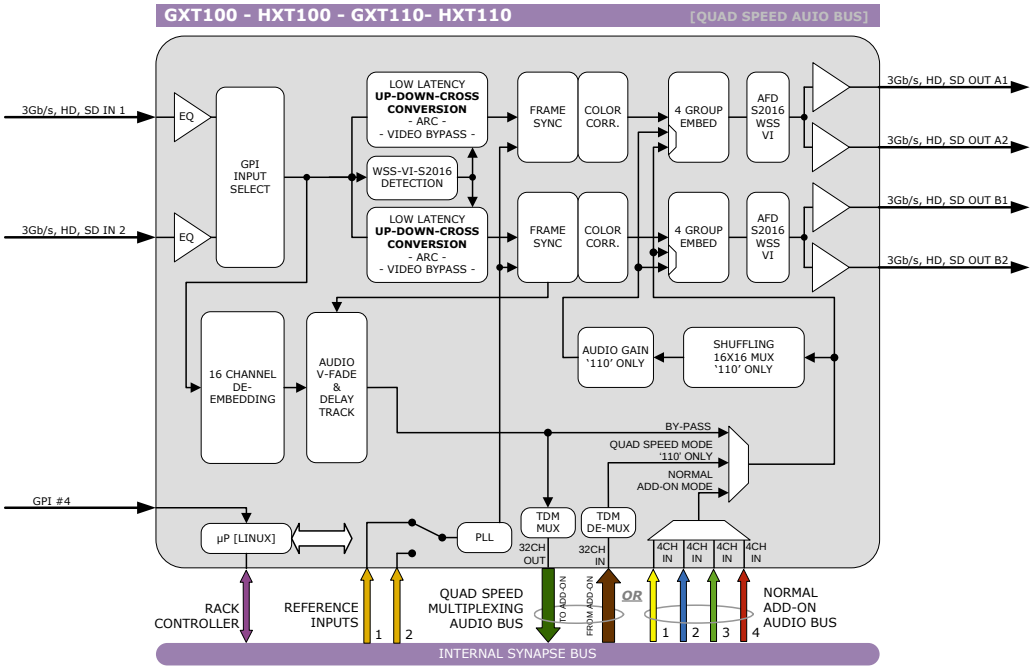
Conversion capabilities

	CONVERSION	Output										
		1080psf23.97	1080p23.97	1080p50*	1080p59.94*	1080i59.94	1080i50	720p59.94	720p50	720p23.98	480i59.94(525)	576i50(625)
SDI Input	1080psf23.97	x	x		x			x		x	x	
	1080p23.97		x		x	x		x		x	x	
	1080p50*			x			x		x			x
	1080p59.94*	x	x		x	x		x		x	x	
	1080i59.94	x	x		x	x		x		x	x	
	1080i50			x			x		x			x
	720p59.94	x	x		x	x		x			x	
	720p50			x			x		x			x
	720p23.98	x	x		x	x		x		x	x	
	480i59.94(525)	x	x			x		x		x	x	
	576i50(625)			x			x		x			x

Applications

- OB van output card with 16 channel embedding (in combination with 2 x DIO48)
- 2x1 HD protection switch with SD monitoring output
- Dual domain (HD & SD) production down converter with individual timing adjustment

Block schematic



Important notice

Historically, closed captions were transmitted in NTSC line 21 according to EIA-608. This allows two caption data bytes per field to be transmitted.With the introduction of HD and DTV a new Closed Caption specification was made, EIA-708. This allows sending more data per field, for extended language, color support, PMT and EIT and timecode data.

The new DTV caption format cannot be translated back to EIA-608. However the EIA-708 may include EIA-608 data as "NTSC closed captions" for compatibility with old decoders.
This card only de-embeds the NTSC closed captions, not the DTV closed captions. It will not function with a DTV-only 708 closed caption source.

5 Settings Menu

Introduction

The settings menu displays the current state of each GXT/HXT100-110 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.

Note: All items preceded with a #-sign are part of the presets.

SYSTEM SETTINGS

IO-Ctrl

This card has separate presets for the input and output settings under the 'SYSTEM SETTINGS' header. With this item you select how the IO presets are controlled: Manually (manual) or via GPI-triggers (GPI, GPI-A, GPI-B or GPI-C). By default it is set to Manual.

IO_Prst_Act

With this item you can manually change the currently active IO settings. Can be any preset between 1 and 8. By default it is set to 1. All menu settings that are preceded with a '# '-prefix under the 'SYSTEM SETTINGS' header are part of the preset.

IO_Prst_Edit

Here you can select which of the 8 selectable IO settings presets you want to edit. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '# '-prefix under the 'SYSTEM SETTINGS' header are part of the preset.

#Inp_Sel

With this item you can select which input you want to use. Can be SDI-1 (SDI input 1) or SDI-2 (SDI input 2). You can also choose a Zoneplate or Colorbar as input. Set to auto will automatically detect which SDI input holds a valid input. If both inputs have a correct input, SDI-1 will be chosen. The default for this setting is SDI-1.

#Out-FrmtA

With `Out-FrmtA` you can set what the output should be for outputs A1 and A2. Possible settings are:

- `1080i60` (default), `1080i50`
- `1080p24`
- `1080psf24`
- `720p60`, `720p50`
- `SD525`, `SD625`
- `1080p60`, `1080p50` (only for GXT)

#Output_Map_A
(GXT only)

With this setting you can select the 3Gb/s mapping in case output A format is 1080p50 or 1080p60. Can be manually set to `Level A` or `Level B`.

#F-delayA

`F-DelayA` sets the amount of delayed Frames for outputs A1 and A2. The available range is from 0 to 250 fields (dependant on the I/O). Default is `0F`.

#V-delayA

`V-DelayA` setting allows adjustment of the vertical phase of the output signal for outputs A1 and A2 with respect to the selected reference input.

The `V-Delay` setting gives a delay in addition to the reference timing. For example: if the `V-Delay` is set to 10 TV HD lines, the output signal will be delayed by reference timing + 10 TV HD lines. The signal is delayed (advanced) with respect to the phase of the reference signal. The available range is from 0 to a maximum of 1125 lines (dependant on I/O format). The default setting is `0ln`.

#H-delayA

The `H-DelayA` setting allows adjustment of the Horizontal phase of the output signal for outputs A1 and A2 with respect to the selected reference input.

The H-Delay setting gives a delay in addition to the reference timing. For example: if the H-Delay is set to 10 pixels, the output signal will be delayed by reference timing + 10 pixels. The signal is delayed (advanced) with respect to the phase of the reference signal. The available range is from 0 to a maximum of 5124 pixels (dependant on I/O format). The default setting is `0px`.

#Out-FrmtB

With `Out-FrmtB` you can set what the output should be for outputs B1 and B2. Possible settings are:

- `1080i60` (default), `1080i50`
- `1080p24`
- `1080psf24`
- `720p60`, `720p50`
- `SD525`, `SD625`
- `1080p60`, `1080p50` (only for GXT)

#Output_Map_B
(GXT only)

With this setting you can select the 3Gb/s mapping in case output B format is 1080p50 or 1080p60. Can be manually set to `Level A` or `Level B`.

#F-delayB

`F-DelayB` sets the amount of delayed Frames for outputs B1 and B2. The available range is from 0 to 250 fields (dependant on the I/O). Default is `0F`.

#V-delayB

`V-DelayB` setting allows adjustment of the vertical phase of the output signal for outputs B1 and B2 with respect to the selected reference input.

The `V-Delay` setting gives a delay in addition to the reference timing. For example: if the `V-Delay` is set to 10 TV HD lines, the output signal will be delayed by reference timing + 10 TV HD lines. The signal is delayed (advanced) with respect to the phase of the reference signal. The available range is from 0 to a maximum of 1125 lines (dependant on I/O format). The default setting is `0ln`.

#H-delayA

The `H-DelayB` setting allows adjustment of the Horizontal phase of the output signal for outputs A1 and A2 with respect to the selected reference input.

The H-Delay setting gives a delay in addition to the reference timing. For example: if the H-Delay is set to 10 pixels, the output signal will be delayed by reference timing + 10 pixels. The signal is delayed (advanced) with respect to the phase of the reference signal. The available range is from 0 to a maximum of 5124 pixels (dependant on I/O format). The default setting is `0px`.

#Audio-PathA

With this setting you can set outputs A1 and A2 to use the `processed` audio path to get audio from, or to use the audio `directly` as it comes from the de-embedder or ADD-ON bus.

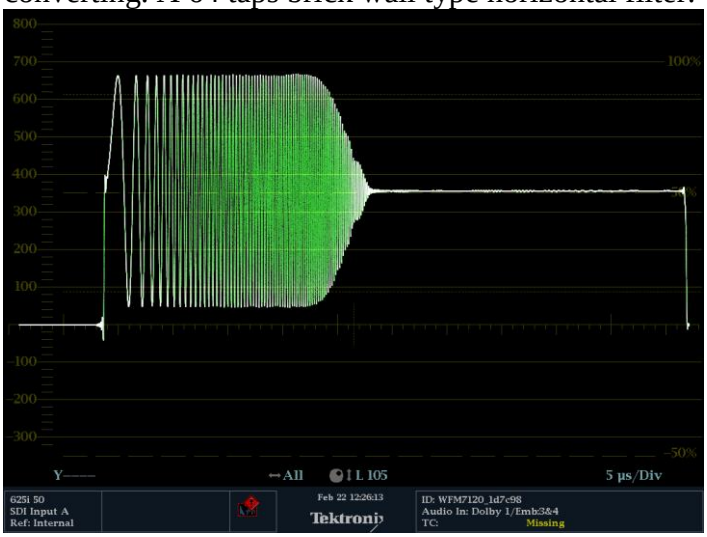
#Audio-PathB

With this setting you can set outputs B1 and B2 to use the `processed` audio path to get audio from, or to use the audio `directly` as it comes from the de-embedder or ADD-ON bus.

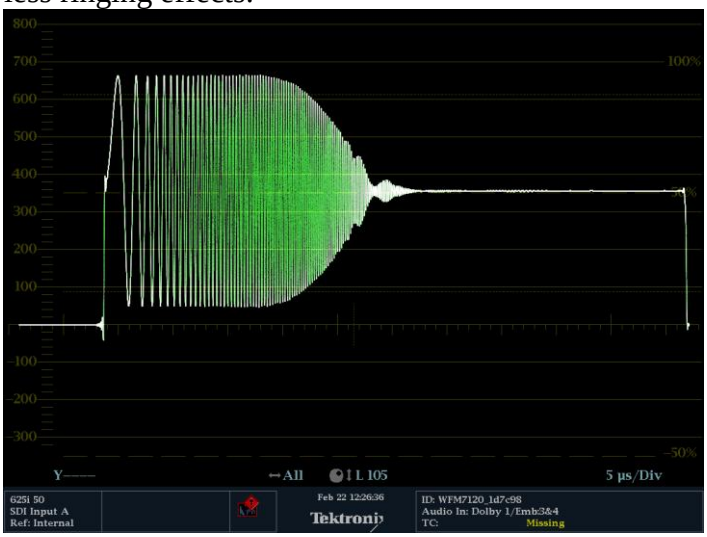
#LowPassFiltA

Here you can set the horizontal and vertical video low-pass filter for channel A. These are the possible settings:

- `Off`: the normal broadband filters will be used when the card is converting. A 64 taps brick wall type horizontal filter:



- `H_only`: a less steep filter with no aliasing Y and soft for C for less ringing effects:



- `V_only`: vertical filters will be active which “soften” the image and prevents “ring”-effects in down converted content.
- `H_And_V`: same horizontal filter as described under `H_Only` will be active, together with the vertical filters described under `V_only`.
- `H2_Only`: less steep filter with aliasing and soft for C for less ringing, more sharpness but with aliasing:

- `H2_And_V`: same horizontal filter as described under `H2_Only` will be active, together with the vertical filters described under `V_only`.

This setting is only for channel A. Default is `off`.

Note: This only works when ***down-converting***.

#LowPassFiltB

This sets the horizontal and vertical low-pass filter for channel B. Refer to `#LowPassFilt_A` for an explanation of the possible settings.

#VANC_Trans

Switches on or off vertical ancillary data transparency. Only the six lines configured with the following settings are passed. VANC transparency is only processed when the input and the output formats are the same.

#VANC_Trans_Ln0

Here you select what the first forwarded line should be. Can be any line between line 7 and line 41. The chosen line will be forwarded to the same output line (for instance: when choosing line 23 here, line 23 on the input will be forwarded to line 23 on the output).

#VANC_Trans_Ln1

Here you select what the second forwarded line should be. Can be any line between line 7 and line 41

#VANC_Trans_Ln2

Here you select what the third forwarded line should be. Can be any line between line 7 and line 41

#VANC_Trans_Ln3

Here you select what the fourth forwarded line should be. Can be any line between line 7 and line 41

#VANC_Trans_Ln4

Here you select what the fifth forwarded line should be. Can be any line between line 7 and line 41

#VANC_Trans_Ln5

Here you select what the sixth forwarded line should be. Can be any line between line 7 and line 41

#OP47-Demb_Ln

With this setting you select the line which the OP47 de-embedder de-embeds. Can be line 7 till line 20. Setting this to `first` will select the first OP47 packet (per field) when it comes by and ignores all following packets. `First` is default for this setting.

Delay-Status

It is possible to display (in the status menu `IODelay`) the processing time of the card in the status menu. This setting allows you to switch this function `ON` or `OFF`.

Default setting is `OFF`

Lock-Mode

`Lock-Mode` determines whether the card is locked to his `input` (input 1), to the reference (`Ref1` or `Ref2`) or `freerun` (not locked). By default it is set to `Ref1`. Can also be set to `RefAuto`.

When set to `RefAuto` the card chooses ref1 as its source. Whenever ref1 fails, it will switch to ref 2 (only for SFR08 and SFR18 frames and only when ref2 offers the same ref format as ref 1). When ref 1 is back up again, it will only automatically switch back to ref 1 when ref 2 fails.

Ref-Type

Sets the type of incoming reference. Can be either Bi-Level or `Tri-Level`. Default is `Bi-Level`.

Add-On-Mode

With this setting you select whether the Synpase add-on bus should work in quad speed mode or in normal mode. Default is normal.

PrstEditView

With this setting set to `Follow Active`, the edit preset settings (like for instance `UP_Prst_editA` and `UP_Prst_editB`) will follow the active preset when the active preset is changed. This to avoid confusion when changing the active. Set to `Independent` the edit preset will not automatically follow active preset changes. By default set to `Follow Active`.

PatternSpeed

Sets the speed of the test-pattern (see settings `Inp_SelA` and `Inp_SelB`) animation between 0 (still) and 15 (fast). Default is 1.

SD-AR-Det

This card can switch between presets on the changes of the aspect ratio. Aspect ratio information can be taken out of the `VI` (video index), `WSS` (widescreen signaling) or `WSS-extended` (extended form of widescreen signaling). With this setting you can select which of the above protocols should be used to detect aspect ratio changes. By default it is set to `VI`.

NoWSS/VI_prstA

With this setting you can set to which preset the card should jump outputs A1 and A2, when no WSS or VI information is found. Can be any preset between `1` and `16` or `Hold` (holds current active preset). By default it is set to `Hold`.

NoWSS/VI_prstB

With this setting you can set to which preset the card should jump outputs B1 and B2, when no WSS or VI information is found. Can be any preset between `1` and `16` or `Hold` (holds current active preset). By default it is set to `Hold`.

Input_Loss_A

With this setting you select what should happen on the output when the input of channel A is lost. Can be one of the following:

- `Freeze`
- `Colorbar`
- `Zoneplate`
- `Black`
- `Grey`
- `Green`

Input_Loss_B

With this setting you select what should happen on the output when the input of channel B is lost. Can be one of the following:

- `Freeze`
- `Colorbar`
- `Zoneplate`
- `Black`
- `Grey`
- `Green`

UP-CONV

Up_CtrlA

With this item you select how the presets for Channel A in up converter mode are controlled: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`) or via changes of the SD Aspect Ratio (`SD-AR`). By default it is set to `Manual`.

Up_Prst_actA

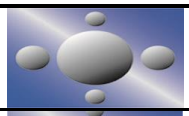
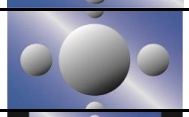
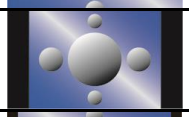
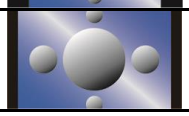
With this item you can manually change the currently active preset of channel A in up converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Up`'-prefix are part of the preset.

UP_Prst_editA

Here you can select which of the 16 selectable presets you want to edit for Channel A in up converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Up`'-prefix are part of the preset.

#Up_ArcA

With this item you set the Aspect Ratio of the output of channel A in up converter mode. Can be `Anamorphic`, `V-Zoom`, `PBox-4:3`, `PBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The following table shows examples of the possible aspect ratios when the input source is 4:3.

Setting:	**Result on 16:9 screens:**
`Anamorphic`	
`V-Zoom`	
`PBox-4:3`	
`PBox-14:9`	
`Variable`	Dependant on `Up_H-scale` and `UP_V-scale` settings.

#Up_H-scaleA

The horizontal scaling of the TV picture of channel A in up converter mode is set using `#Up_H-scaleA`. `#Up_H-scaleA` can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcA` is set to `variable`). Default value is 100%.

#Up_V-scaleA

Sets the vertical scaling of the TV picture of channel A in up converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcA` is set to `variable`). Default value is 100%.

#Up_H-EnhA

With this item you can set the horizontal picture enhancement of channel A in up converter mode between 0 and 100%. By default set to 0%.

#Up_ColorConvA

`ColorConvA` optimizes the color conversion for Channel A in up converter mode. As the color coding of HD (709) and SD(601) are different, it is necessary to convert these when Channel A is up-converting. The best result is generated when the up-converter is active and the `601to709` setting is selected. It is also possible to switch the filter `off`. The default setting is `601to709`.

Up_CtrlB

With this item you select how the presets for Channel B are controlled in up converter mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B`, `GPI-C`) or via changes of the SD Aspect Ratio (`SD-AR`). By default it is set to `Manual`.

Up_Prst_actB

With this item you can manually change the currently active preset of channel B in up converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Up`'-prefix are part of the preset.

UP_Prst_editB

Here you can select which of the 16 selectable presets you want to edit for Channel B in up converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Up`'-prefix are part of the preset.

#Up_ArcB

With this item you set the Aspect Ratio of the output of channel B in up converter mode. Can be `Anamorphic`, `V-Zoom`, `PBox-4:3`, `PBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The table in setting `#Up_ArcA` shows examples of the possible aspect ratios when the input source is 4:3.

#Up_H-scaleB

The horizontal scaling of the TV picture of channel B in up converter mode is set using `#Up_H-scaleB`. `#Up_H-scaleB` can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcB` is set to `variable`). Default value is 100%.

#Up_V-scaleB

Sets the vertical scaling of the TV picture of channel B in up converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcB` is set to `variable`). Default value is 100%.

#Up_H-EnhB

With this item you can set the horizontal picture enhancement of channel B in up converter mode between 0 and 100%. By default set to 0%.

#Up_ColorConvB

`ColorConvB` optimizes the color conversion in up converter mode. As the color coding of HD (709) and SD (601) are different, it is necessary to convert these when Channel B is up-converting. The best result is generated when the up-converter is active and the `601to709` setting is selected. It is also possible to switch the filter `off`. The default setting is `601to709`.

DOWN-CONV

Dn_CtrlA

With this item you select how the presets for Channel A are controlled in down converter mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.

Dn_Prst_actA

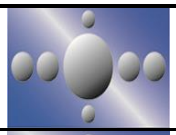
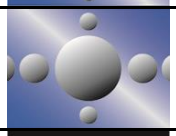
With this item you can manually change the currently active preset of channel A in down converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Dn`'-prefix are part of the preset.

Dn_Prst_editA

Here you can select which of the 16 selectable presets you want to edit for Channel A in down converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Dn`'-prefix are part of the preset.

#Dn_ArcA

With this item you set the ARC of the output of channel A in down converter mode. Can be `Anamorphic`, `CenterCut`, `LBox-16:9`, `LBox-14:9` or `Variable`. The following table shows examples of the possible aspect ratios when the input source is 16:9.

Setting:	Result on 4:3 screens:
`Anamorphic`	
`CenterCut`	
`LBox-16:9`	
`LBox-14:9`	
`Variable`	Dependant on `Dn_H-scale` and `Dn_V-scale` settings.

#Dn_H-scaleA

The horizontal scaling of the TV picture of channel A in down converter mode is set using `#Dn_H-scaleA`. `#Dn_H-scaleA` can be set within the range of 50% to 200% of the input signal (only used when `#Dn_ArcA` is set to `variable`). Default value is 100%.

#Dn_V-scaleA

Sets the vertical scaling of the TV picture of channel A in down converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Dn_ArcA` is set to `variable`). Default value is 100%.

#Dn_H-EnhA

With this item you can set the horizontal picture enhancement of channel A in down converter mode between 0 and 100%. By default set to 0%.

#Dn_ColorConvA

`ColorConvA` optimizes the color conversion of channel A in down converter mode. As the color coding of HD (709) and SD (601) are different, it is necessary to convert these when Channel A is up-converting. The best result is generated when the up-converter is active and the `709to601` setting is selected. It is also possible to switch the filter `off`. The default setting is `Off`.

Dn_CtrlB

With this item you select how the presets for Channel B are controlled in down converter mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.

Dn_Prst_actB

With this item you can manually change the currently active preset of channel B in down converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Dn`'-prefix are part of the preset.

Dn_Prst_editB

Here you can select which of the 16 selectable presets you want to edit for Channel B in down converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Dn`'-prefix are part of the preset.

#Dn_ArcB

With this item you set the Aspect Ratio of the output of channel B in down converter mode. Can be `Anamorphic`, `CenterCut`, `LBox-16:9`, `LBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The table in `#Dn_ArcA` shows examples of the possible aspect ratios when the input source is 16:9.

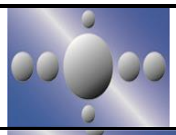
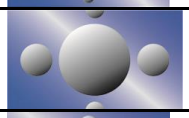
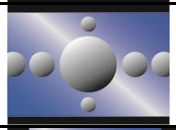
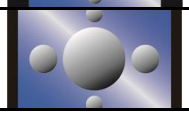
#Dn_H-scaleB

The horizontal scaling of the TV picture of channel B in down converter mode is set using `#Dn_H-scaleB`. `#Dn_H-scaleB` can be set within the range of 50% to 200% of the input signal (only used when `#Dn_ArcA` is set to `variable`). Default value is 100%.

#Dn_V-scaleB	Sets the vertical scaling of the TV picture of channel B in down converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Dn_ArcB` is set to `variable`). Default value is 100%.
#Dn_H-EnhB	With this item you can set the horizontal picture enhancement of channel B in down converter mode between 0 and 100%. By default set to 0%.
#Dn_ColorConvB	`ColorConvB` optimizes the color conversion of channel B in down converter mode. As the color coding of HD (709) and SD (601) are different, it is necessary to convert these when Channel B is up-converting. The best result is generated when the up-converter is active and the `709to601` setting is selected. It is also possible to switch the filter `off`. The default setting is `Off`.
	CROSS-CONV
Cr_CtrlA	With this item you select how the presets for Channel A are controlled in cross converter mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`), the SD aspect ratio (`SD-AR`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.
Cr_Prst_actA	With this item you can manually change the currently active preset of channel A in cross converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Cr`'-prefix are part of the preset.
Cr_Prst_editA	Here you can select which of the 16 selectable presets you want to edit for Channel A in cross converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Cr`'-prefix are part of the preset.

#Cr_ArcA

With this item you set the Aspect Ratio of the output of channel A in cross converter mode. Can be `Anamorphic`, `V-Zoom`, `CenterCut`, `LBox-16:9`, `LBox-14:9`, `PBox-4:3`, `PBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The following table shows examples of the aspect ratios.

Setting:	**Result:**	
`Anamorphic`		With 16:9 source on 4:3 screens
`V-Zoom`		With 4:3 source on 16:9 screens
`CenterCut`		With 16:9 source on 4:3 screens
`LBox-16:9`		With 16:9 source on 4:3 screens
`LBox-14:9`		With 16:9 source on 4:3 screens
`PBox-4:3`		With 4:3 source on 16:9 screens
`PBox-14:9`		With 4:3 source on 16:9 screens
`Variable`	Dependant on `Cr_H-scale` and `Cr_V-scale` settings.	

#Cr_H-scaleA

The horizontal scaling of the TV picture of channel A in cross converter mode is set using `#Cr_H-scaleA`. `#Cr_H-scaleA` can be set within the range of 50% to 200% of the input signal (only used when `#Cr_ArcA` is set to `variable`). Default value is 100%.

#Cr_V-scaleA

Sets the vertical scaling of the TV picture of channel A in cross converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcA` is set to `variable`). Default value is 100%.

#Cr_H-EnhA

With this item you can set the horizontal picture enhancement of channel A in cross converter mode between 0 and 100%. By default set to 0%.

Cr_CtrlB

With this item you select how the presets for Channel B are controlled in cross converter mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`), the SD aspect ratio (`SD-AR`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.

Cr_Prst_actB

With this item you can manually change the currently active preset of channel B in cross converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Cr`'-prefix are part of the preset.

Cr_Prst_editB

Here you can select which of the 16 selectable presets you want to edit for Channel B in cross converter mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Cr`'-prefix are part of the preset.

#Cr_ArcB

With this item you set the Aspect Ratio of the output of channel B in cross converter mode. Can be `Anamorphic`, `V-Zoom`, `CenterCut`, `LBox-16:9`, `LBox-14:9`, `PBox-4:3`, `PBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The table under `#Cr_ArcA` shows examples of the possible aspect ratios.

#Cr_H-scaleB

The horizontal scaling of the TV picture of channel B in cross converter mode is set using `#Cr_H-scaleB`. `#Cr_H-scaleB` can be set within the range of 50% to 200% of the input signal (only used when `#Cr_ArcB` is set to `variable`). Default value is 100%.

#Cr_V-scaleB

Sets the vertical scaling of the TV picture of channel B in cross converter mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcB` is set to `variable`). Default value is 100%.

#Cr_H-EnhB

With this item you can set the horizontal picture enhancement of channel B in cross converter mode between 0 and 100%. By default set to 0%.

TRANSPARENT

In transparent mode (no conversion) the card is not transparent for horizontal and vertical blanking, except for audio.

Tr_CtrlA

With this item you select how the presets for Channel A are controlled in Transparent mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.

Tr_Prst_ActA

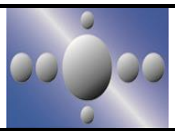
With this item you can manually change the currently active preset of channel A in Transparent mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Tr`'-prefix are part of the preset.

Tr_Prst_EditA

Here you can select which of the 16 selectable presets you want to edit for Channel A in Transparent mode. Changing this will not change the active preset, unless the currently active preset is the same as the one you are going to edit. All menu settings that are preceded with a '`#Tr`'-prefix are part of the preset.

#Tr_ArcA

With this item you set the Aspect Ratio of the output of channel A in Transparent mode. Can be `Anamorphic` or `Variable` (custom set AR, set by H-scale and V-scale settings). The following table shows examples of the possible aspect ratios.

Setting:	Result:	
`Anamorphic`		With 16:9 source on 4:3 screens
`Variable`	Dependant on `Tr_H-scale` and `Tr_V-scale` settings.	

#Tr_H-scaleA

The horizontal scaling of the TV picture of channel A in Transparent mode is set using `#Tr_H-scaleA`. `#Tr_H-scaleA` can be set within the range of 50% to 200% of the input signal (only used when `#Tr_ArcA` is set to `variable`). Default value is 100%.

#Tr_V-scaleA

Sets the vertical scaling of the TV picture of channel A in Transparent mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcA` is set to `variable`). Default value is 100%.

#Tr_H-EnhA

With this item you can set the horizontal picture enhancement of channel A in Transparent mode between 0 and 100%. By default set to 0%.

Tr_CtrlB

With this item you select how the presets for Channel B are controlled in Transparent mode: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`) or via changes of the HD Aspect Ratio (`S2016`). By default it is set to `Manual`.

Tr_Prst_ActB

With this item you can manually change the currently active preset of channel B in Transparent mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Tr`'-prefix are part of the preset.

Tr_Prst_EditB

Here you can select which of the 16 selectable presets you want to edit for Channel B in Transparent mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Tr`'-prefix are part of the preset.

#Tr_ArcB

With this item you set the Aspect Ratio of the output of channel B in Transparent mode. Can be `Anamorphic`, `V-Zoom`, `PBox-4:3`, `PBox-14:9` or `Variable` (custom set AR, set by H-scale and V-scale settings). The table under `#Tr_ArcA` shows examples of the possible aspect ratios.

#Tr_H-scaleB

The horizontal scaling of the TV picture of channel B in Transparent mode is set using `#Tr_H-scaleB`. `#Tr_H-scaleB` can be set within the range of 50% to 200% of the input signal (only used when `#Tr_ArcB` is set to `variable`). Default value is 100%.

#Tr_V-scaleB

Sets the vertical scaling of the TV picture of channel B in Transparent mode. Can be set within the range of 50% to 200% of the input signal (only used when `#Up_ArcB` is set to `variable`). Default value is 100%.

#Tr_H-EnhB

With this item you can set the horizontal picture enhancement of channel B in Transparent mode between 0 and 100%. By default set to 0%.

	INSERTER This card can insert several data values in the VBI of the outputs. With the following settings you can choose what you want to insert.
S2016-Line	With this setting you select a line in the VBI to where the AFD (SMPTE 2016) data should be written. Lines 0 till 31 are selectable. By default it is set to line 17.
Timecode-ins	Set to `on` will enable the following VITC settings to copy the time code information from the input to the output. Set to `off` will disable all embedded time code data on the output.
VITC_Ln_In	With this setting you can select what line of the input you want to copy the VITC data from (only when input is SD). Can be any line between line 7 and line 22. Default is line 19.
VITC_Ln_Ctrl	Here you can choose whether you want to select the line, to where you want to copy the timecode data to, manually (`manual`) or use the information in the `ATC_DBB` package to select the lines (ATC_DBB package contains information about the line duplication as well). Default is `Manual`.
VITC_Ln_625	When `VITC_Ln_Ctrl` is set to `Manual`, with this setting you can select a line between 7 and 22 when the output is SD625. Default is line 19.
VITC_Ln_525	When `VITC_Ln_Ctrl` is set to `Manual`, with this setting you can select a line between 7 and 22 when the output is SD525. Default is line 10.
VITC_Ln_Dup	When set to `On`, the VITC line is duplicated to the above selected line + 2 lines.
Ins_CtrlA	With this item you select how the inserter presets for Channel A are controlled: Manually (`manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`), via changes of the SD Aspect Ratio (`SD_AR`) or the HD aspect ratio (`S2016)` (AFD)). Default is `Manual`.
Ins_Prst_ActA	With this item you can manually change the currently active preset of channel A when in transparent mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Ins`'-prefix are part of the preset.

Ins_Prst_EditA	Here you can select which of the 16 selectable presets you want to edit for Channel A when in a transparent mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Ins`'-prefix are part of the preset.
#VI-InsertA	You can turn VI insertion `on` or `off` for channel A. Default is `Off`.
#VI-DataA	With the `#VI-InsertA` setting set to `on`, you can select VI values with this setting, which you want to insert in Channel A. possible are all VI values between `4:3_0` and `4:3_7` and the settings between `16:9_0` and `16:9_7`. Default is `4:3_0`.
#WSS-InsertA	You can choose which type of WSS data you want to insert in Channel A with this setting, or switch WSS insertion entirely `off` (default value). You can set it to `Standard` or `Extended`.
#WSS-StndA	With the `#WSS-InsertA` setting set to `Standard`, you can select WSS standard values with this setting, which you want to insert in Channel A. possible are all WSS values between `1_vid` and `8_vid` and the settings between `1_flm` and `8_flm`. Default is `1_vid`.
#WSS-ExtndA	With the `#WSS-InsertA` setting set to `Extended`, you can select WSS extended values with this setting, which you want to insert in Channel A. possible are all WSS values between `4:3_0` and `4:3_7` and the settings between `16:9_0` and `16:9_7`. Default is `4:3_0`.
#S2016-InsertA	You can turn S2016 (AFD) insertion `on` or `off` for channel A. Default is `Off`.
#S2016-DataA	With the `#S2016-InsertA` setting set to `on`, you can select AFD values with this setting, which you want to be inserted in Channel A. possible are all AFD values between `AFD0` and `AFD15`.
#OP47-SDP-Emb_A	With this setting you set in which line the OP47 data should be inserted in channel A. Can be any line between line 8 and line 16. Can also be switched off (causing the OP47 data to not be inserted at all).
#CC_Ena_A	This setting sets the Closed Captioning transparency for channel A On or Off. Default is Off.

Ins_CtrlB

With this item you select how the inserter presets for Channel A are controlled: Manually (manual), via GPI-triggers (GPI), via changes of the HD Aspect Ratio (VI, WSS, WSS-ext or S2016 (AFD)). Default is Manual.

Ins_Prst_ActB

With this item you can manually change the currently active preset of Channel B when in transparent mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a #Ins-prefix are part of the preset.

Ins_Prst_EditB

Here you can select which of the 16 selectable presets you want to edit for Channel B when in a transparent mode. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a #Ins-prefix are part of the preset.

#VI-InsertB

You can turn VI insertion on or off for channel B. Default is Off.

#VI-DataB

With the #VI-InsertB setting set to on, you can select VI values with this setting, which you want to insert in Channel B. possible are all VI values between 4:3_0 and 4:3_7 and the settings between 16:9_0 and 16:9_7. Default is 4:3_0.

#WSS-InsertB

You can choose which type of WSS data you want to insert in Channel B with this setting, or switch WSS insertion entirely off (default value). You can set it to Standard or Extended.

#WSS-StndB

With the #WSS-InsertB setting set to Standard, you can select WSS standard values with this setting, which you want to insert in Channel B. possible are all WSS values between 1_vid and 8_vid and the settings between 1_flm and 8_flm. Default is 1_vid.

#WSS-ExtndB

With the #WSS-InsertB setting set to Extended, you can select WSS extended values with this setting, which you want to insert in Channel B. possible are all WSS values between 4:3_0 and 4:3_7 and the settings between 16:9_0 and 16:9_7. Default is 4:3_0.

#S2016-InsertB

You can turn S2016 (AFD) insertion on or off for Channel B. Default is Off.

#S2016-DataB	With the `#S2016-InsertB` setting set to `on`, you can select AFD values with this setting, which you want to be inserted in Channel B. possible are all AFD values between `AFD0` and `AFD15`.
#OP47-SDP-Emb_B	With this setting you set in which line the OP47 data should be inserted in channel B. Can be any line between line 8 and line 16. Can also be switched off (causing the OP47 data to not be inserted at all).
#CC_Ena_B	This setting sets the Closed Captioning transparency for channel B On or Off. Default is Off.
	VIDEO PROC
GainA	With this setting you control the overall gain of the video of channel A between 50 and 150%. Default is 100%.
R-GainA	`R-GainA` controls the Red gain of channel A. The control range is between 50% and 150%. The default setting is 100%.
G-GainA	`G-GainA` controls the Green gain of channel A. The control range is between 50% and 150%. The default setting is 100%.
B-GainA	`B-GainA` controls the Blue gain of channel A. The control range is between 50% and 150%. The default setting is 100%.
GainB	With this setting you control the overall gain of the video of channel B between 50 and 150%. Default is 100%.
R-GainB	`R-GainB` controls the Red gain of channel B. The control range is between 50% and 150%. The default setting is 100%.
G-GainB	`G-GainB` controls the Green gain of channel B. The control range is between 50% and 150%. The default setting is 100%.
B-GainB	`B-GainB` controls the Blue gain of channel B The control range is between 50% and 150%. The default setting is 100%.
BlackA	`BlackA` controls the total R-G-B Black gain of channel A. The control range is between –128bit and 127bit. The default setting is 0bit.

R-BlackA	`R-BlackA` controls the Red-Black of channel A. The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
G-BlackA	`G-BlackA` controls the Green-Black of channel A. The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
B-BlackA	`B-BlackA` controls the Blue-Black of channel A. The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
BlackB	`BlackB` ontrols the total R-G-B Black gain of channel B The control range is between –128bit and 127bit. The default setting is 0bit.
R-BlackB	`R-BlackB`controls the Red-Black of channel B The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
G-BlackB	`G-BlackB` ontrols the Green-Black of channel B The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
B-BlackB	`B-BlackB` controls the Blue-Black of channel B. The control range is between –128bits and 127 bits in steps of 1 bit The default setting is 0 bit.
	AUDIO PROC AMP
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.

Audio_Ctrl	With this setting you select how the audio presets should be controlled. Can be either Manually (`Manual`), via GPI-triggers (`GPI`, `GPI-A`, `GPI-B` or `GPI-C`), via the SD aspect ratio (`SD-AR`) or via the HD aspect ratio (`S2016`).
Audio_Prst_act	With this item you can manually change the currently active audio preset. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '`#Emb`'-prefix are part of the preset.
Audio_Prst_Edit	Here you can select which of the 16 selectable audio presets you want to edit. Changing this will not change the active preset, unless the currently active preset is the same you are going to edit. All menu settings that are preceded with a '`#Emb`'-prefix are part of the preset.
#Direct-Audio	With this setting you choose whether the audio should come from the de-embedder (`Demb-Input`) or from the `ADD-ON` bus. Default is `Demb-Input`.
#Audio_Delay	With this item you can delay all audio between -10000ms and 10000ms with 0.01ms increments, allowing for precise control (2 sample accuracy in practice). Default is 0ms. This item is part of the audio presets. This audio delay is calculated on top of the tracked video delay.
	EMBEDDER
#EmbA_Grp	With this setting you select in to which audio group (= 4 audio channels) of the outputs you want to embed the **first** 4 forwarded audio channels coming from the de-embedder/add-on bus. Can be `group1`, `group2`, `group3` or `group4`. You can also choose to not use these 4 audio channels for anything by setting this item to `off`. By default it is set to `Group1`.
#EmbA1_Inp ~ #EmbA4_Inp	With these settings you can select where the corresponding audio channels (channel A1 till channel A4) of the outputs are coming from. In this card you can choose to get the audio from the de-embedder (`Demb-Input`), from the `ADD-ON` bus groups, or to mute the corresponding channel (set to `off`). Defaults here are `Off`.

#EmbA1_Inp_Ch ~ #EmbA4_Inp_Ch	With these settings you can select which Channel of the selected input should be embedded to the corresponding output channel. Can be any channel between `Ch_1` and `Ch_16`. Defaults for A1 till A4 are respectively `Ch_1` till `Ch_4`.
#EmbB_Grp	With this setting you select in to which audio group (= 4 audio channels) of the outputs you want to embed the **second** 4 forwarded audio channels coming from the de-embedders/add-on bus. Can be `group1`, `group2`, `group3` or `group4`. You can also choose to not use these 4 audio channels for anything by setting this item to `off`. By default it is set to `Group2`.
#EmbB1_Inp ~ #EmbB4_Inp	With these settings you can select where the corresponding audio channels (channel B1 till channel B4) of the outputs are coming from. In this card you can choose to get the audio from the de-embedder (`Demb-Input`), from the `ADD-ON` bus groups, or to mute the corresponding channel (set to `off`). Defaults here are `Off`.
#EmbB1_Inp_Ch ~ #EmbB4_Inp_Ch	With these settings you can select which Channel of the selected input should be embedded to the corresponding output channel. Can be any channel between `Ch_1` and `Ch_16`. Defaults for B1 till B4 are respectively `Ch_5` till `Ch_8`.
#EmbC_Grp	With this setting you select in to which audio group (= 4 audio channels) of the outputs you want to embed the **third** group of 4 forwarded audio channels coming from the de-embedders/add-on bus. Can be `group1`, `group2`, `group3` or `group4`. You can also choose to not use these 4 audio channels for anything by setting this item to `off`. By default it is set to `Group3`.
#EmbC1_Inp ~ #EmbC4_Inp	With these settings you can select where the corresponding audio channels (channel C1 till channel C4) of the outputs are coming from. In this card you can choose to get the audio from the de-embedder (`Demb-Input`), from the `ADD-ON` bus groups, or to mute the corresponding channel (set to `off`). Defaults here are `Off`.
#EmbC1_Inp_Ch ~ #EmbC4_Inp_Ch	With these settings you can select which Channel of the selected input should be embedded to the corresponding output channel. Can be any channel between `Ch_1` and `Ch_16`. Defaults for C1 till C4 are respectively `Ch_9` till `Ch_12`.

#EmbD_Grp	With this setting you select in to which audio group (= 4 audio channels) of the outputs you want to embed the last 4 forwarded audio channels coming from the de-embedders/add-on bus. Can be `group1`, `group2`, `group3` or `group4`. You can also choose to not use these 4 audio channels for anything by setting this item to `off`. By default it is set to `Group4`.
#EmbD1_Inp ~ #EmbD4_Inp	With these settings you can select where the corresponding audio channels (channel D1 till channel D4) of the outputs are coming from. In this card you can choose to get the audio from the de-embedder (`Demb-Input`), from the `ADD-ON` bus groups, or to mute the corresponding channel (set to `off`). Defaults here are `Off`.
#EmbD1_Inp_Ch ~ #EmbD4_Inp_Ch	With these settings you can select which Channel of the selected input should be embedded to the corresponding output channel. Can be any channel between `Ch_1` and `Ch_16`. Defaults for D1 till D4 are respectively `Ch_13` till `Ch_16`.
#EmbA1_Gain ~ #EmbD4_Gain	Adjusts the gain for the corresponding audio channel between -60 and 12dB. Everything below -999 dB means the audio will be muted.
#EmbA1_Phase ~ #EmbD4_Phase	Adjusts the audio phase of the corresponding to 0 deg or 180 deg.

	GPI-CTRL
GPI-Ctrl	You can set the GPI to be triggered in a `latching` manner or in a `nonLatching` manner. Default for this is `Latch`.
GPI_1 ~ GPI_5	In this card it is possible to make the 5 available GPI triggers part of a GPI pool that can control the various functions in the card separately (all `Xx_Ctrl` items of the menu). With these item you can select which pool the corresponding GPI is part of and in what way it should trigger. You can also choose to not use the corresponding GPI at all by setting it to `Off`. Possible settings are: ▪ `GPI A`: part of GPI-A pool, triggered once Take A is closed. ▪ `GPI B`: part of GPI-B pool, triggered once Take B is closed. ▪ `Take A`: part of GPI-A pool, used to trigger GPI A. ▪ `Take B`: part of GPI-B pool, used to trigger GPI B. ▪ `GPI Prio A`: part of GPI-A pool, working in a priority manner (highest closed GPI of the pool is activated) ▪ `GPI Prio B`: : part of GPI-B pool, working in a priority manner (highest closed GPI of the pool is activated) ▪ `GPI Prio C`: part of GPI-C pool, working in a priority manner (highest closed GPI of the pool is activated) Please refer to 'Appendix 1: GPI's explained' for a more elaborate explanation of the GPI settings.
	NETWORK
IP_Conf0	With this setting you can let the card obtain an IP address automatically via `DHCP`, or appoint a `manual` set IP address. By default this setting is set to `Manual`.
mIP0	When `IP_Conf0` is set to `manual`, you can type in the preferred IP address here. By default it is set to 172.16.1.2
mNM0	With `IP_Conf0` set to `manual`, with this setting you can set a Netmask. Default is 255.255.0.0
mGW0	With `IP_Conf0` set to `manual`, this setting let you set a Standard Gateway. Default is set to 172.16.0.1
NetwPrefix0	Here you can set the proper network prefix if required.

6 Status Menu

Introduction

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

Active

This status item indicates which input is active on the outputs, `SDI-1` or `SDI-2`.

sInp1

This status item indicates the presence and format of a valid signal in input 1. This is displayed as:

- `1080P60`
- `1080p50`
- `1080i60`
- `1080i50`
- `1080p30`
- `1080p25`
- `1080p24`
- `1035i60`
- `720p60`
- `720p50`
- `720p30`
- `720p25`
- `720p24`
- `SD525`
- `SD625`
- `NA`

sInp1_VI

Displays the detected VI value found in input1. This is displayed as follows:

- `4:3_0`
- `4:3_1`
- `4:3_2`
- `4:3_3`
- `4:3_4`
- `4:3_5`
- `4:3_6`
- `4:3_7`
- `16:9_0`
- `16:9_1`
- `16:9_2`
- `16:9_3`
- `16:9_4`
- `16:9_5`
- `16:9_6`
- `16:9_7`
- `NA` (no VI detected)

sInp1_WSS-Stnd

This status item displays the detected standard WSS value of input 1. this is displayed as follows:

- 1_vid
- 2_vid
- 3_vid
- 4_vid
- 5_vid
- 6_vid
- 7_vid
- 8_vid
- 1_flm
- 2_flm
- 3_flm
- 4_flm
- 5_flm
- 6_flm
- 7_flm
- 8_flm
- NA (no standard WSS detected)

sInp1_WSS-Extd

This item displays the detected extended WSS value of input 1. This is displayed as follows:

- 4:3_0
- 4:3_1
- 4:3_2
- 4:3_3
- 4:3_4
- 4:3_5
- 4:3_6
- 4:3_7
- 16:9_0
- 16:9_1
- 16:9_2
- 16:9_3
- 16:9_4
- 16:9_5
- 16:9_6
- 16:9_7
- NA (no WSS extended detected)

sInp1_S2016

This item displays the detected SMPTE 2016 (AFD) values of input 1. This is displayed as follows:

- `AFD0`
- `AFD1`
- `AFD2`
- `AFD3`
- `AFD4`
- `AFD5`
- `AFD6`
- `AFD7`
- `AFD8`
- `AFD9`
- `AFD10`
- `AFD11`
- `AFD12`
- `AFD13`
- `AFD14`
- `AFD15`
- `NA` (no S2016 detected)

sInp1_CRC_EDH

This item indicates if there are EDH or CRC errors on input 1. Can be OK, Error or NA (no input).

sInp1-Map

This item displays the 3Gb/s format (mapping) when the input format is 1080p50 or 1080p60. Can be Level A or Level B. If the input is not 3Gb/s or if there's no input at all, NA is indicated.

sInp2

This status item indicates the presence and format of a valid signal in input 2. This is displayed as listed under `sInp1`.

sInp2_VI

Displays the detected VI value found in input2. This is displayed as listed under `sInp1_VI`.

sInp2_WSS-Stnd

Displays the detected WSS-standard value found in input2. This is displayed as listed under `sInp1_WSS-Stnd`.

sInp2_WSS-Extnd

Displays the detected WSS-extended value found in input2. This is displayed as listed under `sInp1_WSS-ext`.

sInp2_S2016

Displays the detected S2016 value found in input2. This is displayed as listed under `sInp1_S2016`.

sInp2_CRC_EDH

This item indicates if there are EDH or CRC errors on input 2. Can be OK, Error or NA (no input).

sInp2-Map	This item displays the 3Gb/s format (mapping) when the input format is 1080p50 or 1080p60 on input 2. Can be Level A or Level B. If the input is not 3Gb/s or if there's no input at all, NA is indicated.
IODelayA	Displays the total delay in ms of outputs A1 and A2. can be a value between `0ms` and `5000ms`.
IODelayB	Displays the total delay in ms of outputs B1 and B2. can be a value between `0ms` and `5000ms`.
FunctionA	Displays the current function outputs A1 and A2. For the card it can only be `Up`, `Down`, `Cross`, `Trans`, `TestPattern` or `NA`.
FunctionB	Displays the current function outputs B1 and B2. For the card it can only be `Up`, `Down`, `Cross`, `Trans`, `TestPattern` or `NA`.
Ref	Displays whether a correct reference is found (`Present`) or not (`NA`)
GPI	Displays the currently closed GPI contacts. This is displayed as for instance 1_3_ when contacts 1 and 3 are closed and for instance _234 when contacts 2, 3 and 4 are closed.
GPIA	Displays the current value of GPI pool A
GPIB	Displays the current value of GPI pool B
GPIC	Displays the current value of GPI pool C
OP47-Det-A	Indicates if OP47 has been detected on input A.
OP47-Det-B	Indicates if OP47 has been detected on the input B.
WST-Det-A	Indicates if teletext/closed captions has been detected on input A.
WST-Det-B	Indicates if teletext/closed captions has been detected on input B.

CC_Det_A	Indicates if Closed Captioning is detected on input A
CC_Det_B	Indicates if Closed Captioning is detected on input B
	NET STATUS
IP_Addr0	This item displays the status of the IP address. It can be manual, DHCP asking, DHCP Leased or DHCP Infin.
MAC0	This item displays the MAC address of the card.
IP0	This item displays the current IP address of the card.
NM0	This item displays the current Netmask of the card.
GW0	This item displays the current Standard Gateway of the card.

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 GXG-HXT100/110 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_A

Input_A can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.

Input_B

Input_B 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.

What information is available in an event?

The message consists of the following items;

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_A	01_{hex}=INPA_LOSS	81_{hex}=INPA_RETURN	input A lost or returned
Input_B	02_{hex}=INPB_LOSS	82_{hex}= INPB_RETURN	input B lost or returned
Reference	03_{hex}=REF_LOSS	83_{hex}=REF_RETURN	reference lost or returned

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 card is not configured correctly or has a hardware failure.

Input_A LED

This LED indicated the presence of a valid SDI video signal on input A.

Input_B LED

This LED indicated the presence of a valid SDI video signal on input B.

ANC Data LED

Indicates the presence of embedded audio within the 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 indicates a CRC error.

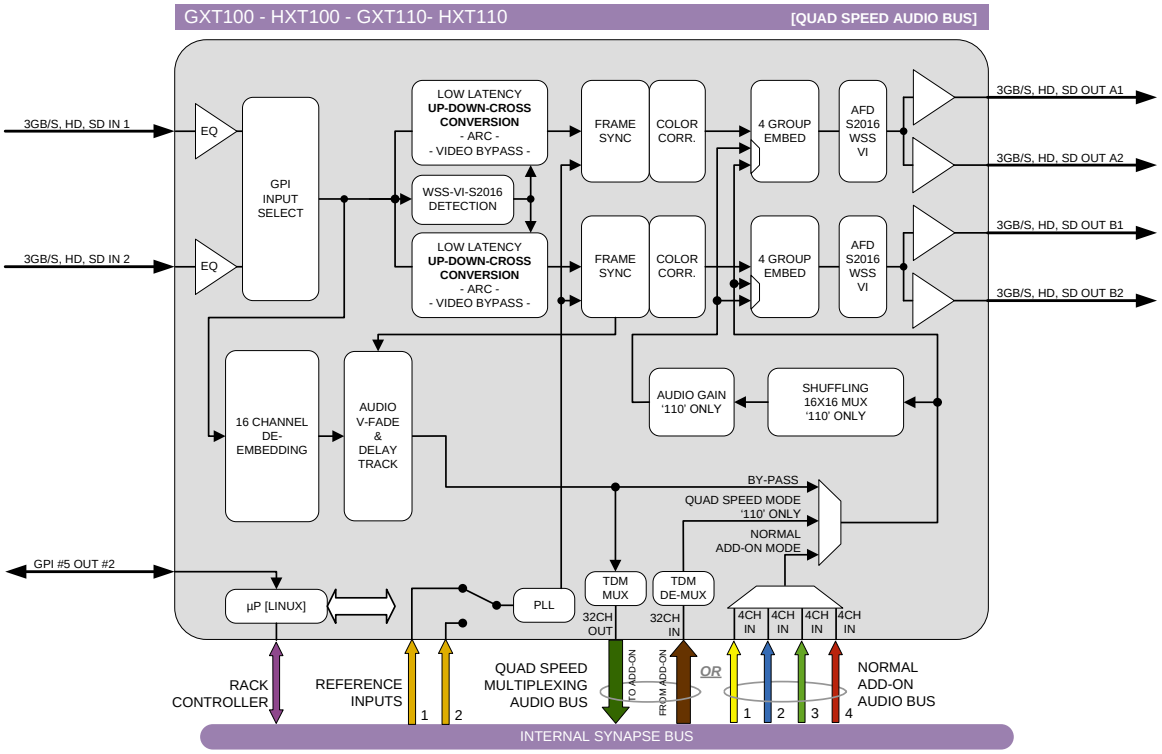
Connection LED

This LED illuminates after the card has initialized. The LED lights for 0.5 seconds every time a connection is made to the card.

Error LED

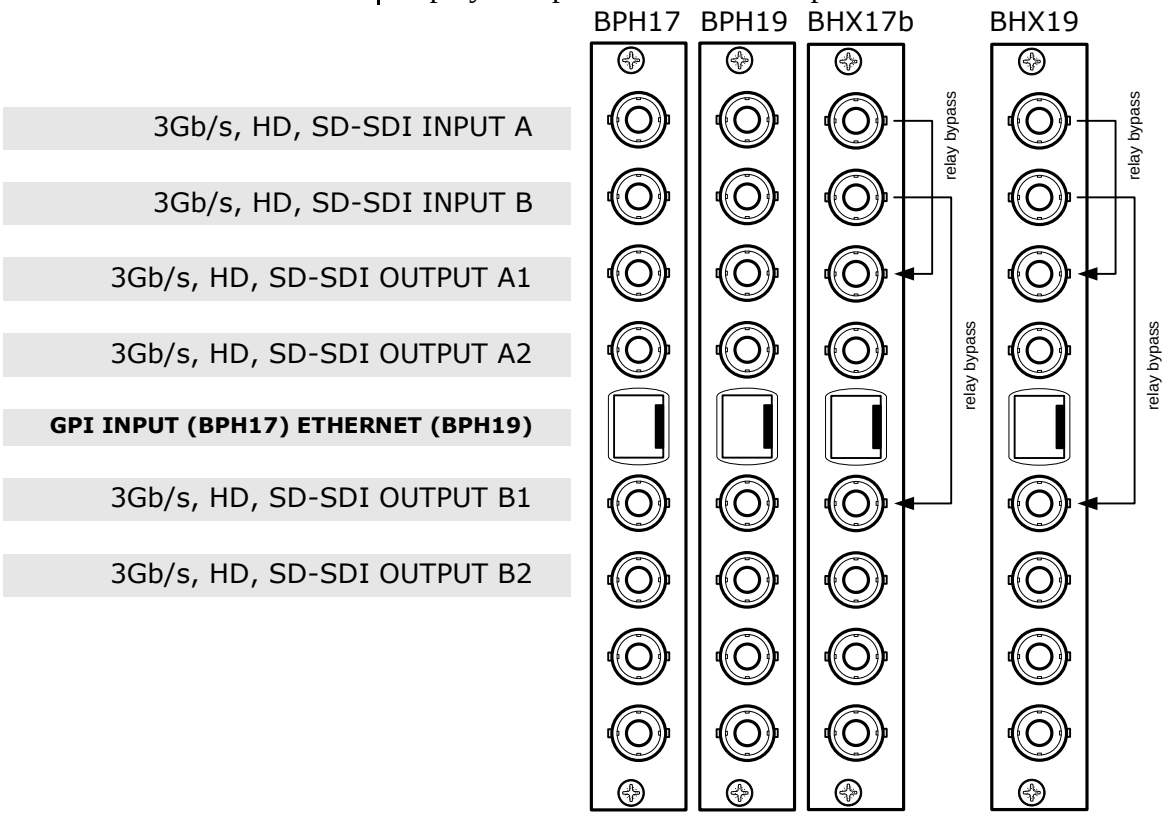
The error LED indicates an error if the internal logic of the card is not configured correctly or has a hardware failure.

9 Block Schematic



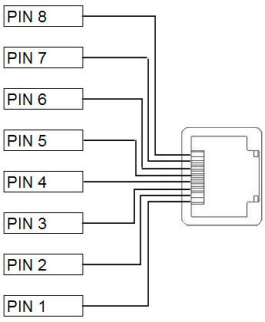
10 Connector Panels

The GXT/HXT100-110 can be used with the BPH17, the BHX17b (with bypass relay), the BPH19 or the BHX19. The following table displays the pinout of these backpanels.



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

GPI pinning



Pin	Function
1	GPI in 1
2	GPI in 2
3	GPI in 3
4	GPI in 4
5	GPI in 5
6	GPI out 1
7	GPI out 2
8	Ground

Appendix 1 GPI's explained

GPI pools

This card has 5 GPI contacts. Since there are several functions you can control by using GPI's (for instance: outmode and up/down/cross-presets and audio presets) you can add each individual GPI contact to certain GPI pools. Each pool can then be assigned to control a specific setting.

binary mode or priority mode

In the `GPI_1` till `GPI_5` settings you can appoint each GPI contact to one of the 3 available pools. The way these contacts act together depends on whether the pool works in binary or in priority mode.

Example 1

If we would like to control the up converter presets using Pool A (`Up_CtrlA` set to `GPI-A`) and the outmode setting using Pool B (`Out-mode-Ctrl` set to `GPI-B`). Both pools working in priority mode. We could do the following:

- Set `GPI_1` to `GPI Prio A`
- Set `GPI_2` to `GPI Prio A`
- Set `GPI_3` to `GPI Prio A`
- Set `GPI_4` to `GPI Prio A`
- Set `GPI_5` to `GPI Prio B`

Pool A now consists of GPI 1, GPI 2, GPI 3 and GPI 4 in a priority mode, controlling the Up converter preset. Pool B consists only of GPI 5 (also in a priority mode), controlling the Output mode setting.

Pool A now works as follows:

GPI_1 status	GPI_2 status	GPI_2 status	GPI_4 status	Set value
0	0	0	0	Up-conv Preset 1
1	0	0	0	Up-conv Preset 2
0	1	0	0	Up-conv Preset 3
0	0	1	0	Up-conv Preset 4
0	0	0	1	Up-conv Preset 5
0	1	1	0	Up-conv Preset **4** (because highest gets priority)
1	1	1	1	Up-conv Preset **5** (because highest gets priority)

Pool B now works as follows:

GPI_5 status	Set value
0	A out only
1	B out only

Example 2

Let's say we would like to control the up-converter presets using Pool A (`Up_CtrlA` set to `GPI-A`) in binary mode and the audio presets using Pool B (`Audio_Ctrl` set to `GPI-B`) in priority mode. We could do the following:

- Set `GPI_1` to `GPI-A`
- Set `GPI_2` to `GPI-A`
- Set `GPI_3` to `Take A`
- Set `GPI_4` to `GPI Prio B`
- Set `GPI_5` to `GPI Prio B`

Pool A now consists of GPI 1, GPI 2 and GPI 3 (as take), in a binary mode, controlling the Up converter preset. Pool B now consists of GPI 4 and GPI 5 in a priority mode, controlling the audio presets.

Pool A now works as follows:

GPI_1 status	GPI_2 status	Set value when GPI_3 (take) is closed
0	0	Up-conv Preset 1
1	0	Up-conv Preset 2
0	1	Up-conv Preset 3
1	1	Up-conv Preset 4

Pool B now works as follows:

GPI_4 status	GPI_5 status	Set value
0	0	Audio Preset 1
1	0	Audio Preset 2
0	1	Audio Preset 3
1	1	Audio Preset **3** (because highest gets priority)

Example 3

Let's say we would like to control the up-converter presets using Pool A (`Up_CtrlA` set to `GPI-A`) in priority mode, the audio presets using Pool B (`Audio_Ctrl` set to `GPI-B`) in priority mode, and Out mode control using Pool C (`Out-mode-Ctrl` set to `GPI-C`) also in prio mode. We could do the following settings:

- Set `GPI_1` to `GPI Prio A`
- Set `GPI_2` to `GPI Prio A`
- Set `GPI_3` to `GPI Prio B`
- Set `GPI_4` to `GPI Prio B`
- Set `GPI_5` to `GPI Prio C`

Pool A now consists of GPI 1 and GPI 2 in a priority mode, controlling the Up converter preset. Pool B now consists of GPI 3 and GPI 4 in a priority mode, controlling the audio presets. Pool C consists only of GPI 5 (also in priority mode)

Pool A now works as follows:

GPI_1 status	GPI_2 status	Set value
0	0	Up-conv Preset 1
1	0	Up-conv Preset 2
0	1	Up-conv Preset 3
1	1	Up-conv Preset **3** (because highest gets priority)

Pool B now works as follows:

GPI_3 status	GPI_4 status	Set value
0	0	Audio Preset 1
1	0	Audio Preset 2
0	1	Audio Preset 3
1	1	Audio Preset **3** (because highest gets priority)

Pool C now works as follows:

GPI_5 status	Set value
0	A out only
1	B out only

Appendix 2 Quad speed ADD-ON bus

Scope

The internal audio ADD-ON bus needs an upgrade. We want more channels (32 per video stream seems possible in the near future). And we want the bus to be bidirectional, so 32 channels in and 32 channels out at the same time.

The new interface needs to be compatible with all existing hardware (frames) and in the implementation of the master card it needs to be backward compatible with the original ADD-ON bus.

The master card will have two modes:

- Normal ADD-ON mode

  or

- Quad Speed audio ADD-ON mode

These modes are selectable on the Master Card. If a mode is selected all ADD-ON cards to that Master need to be in the same mode.
You can mix Master-Cards in one frame using the two different modes, but all cards to the right of the master must be in the same mode as the master.
A new Master breaks the chain and the Master Card ADD-ON mode can be selected again.

Features

The following features and rules will apply:

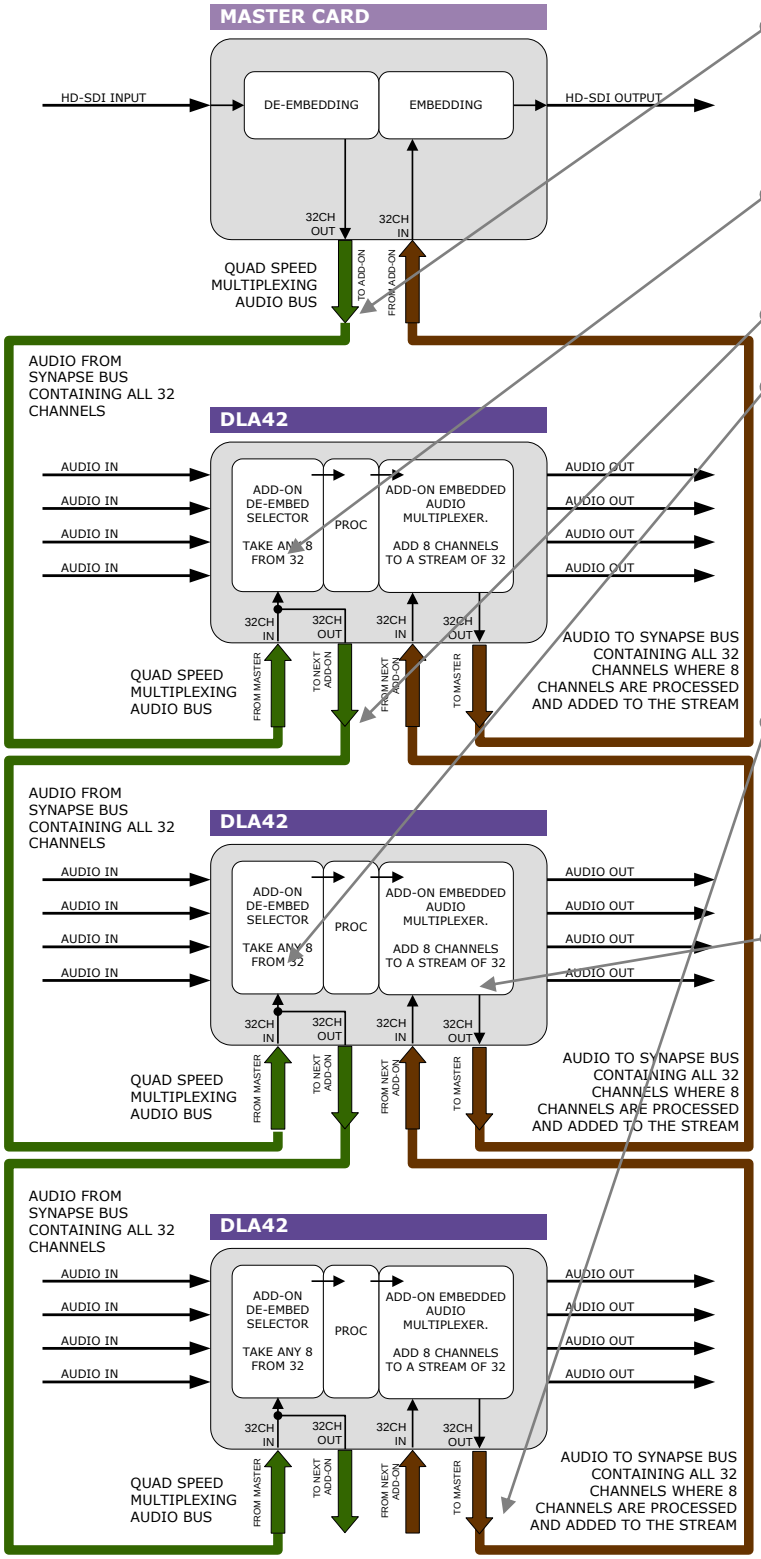
- Up to 32 channels output from the master card with looping to up to 3 ADD-ON cards
  - The ADD-ON card just picks the channels it wants to process
- Up to 32 channels input on the master card
  - If the master card can handle less then 32 channels, the lowest channel numbers will be used, as the ADD-ON card will always generate 32 channels (where some can be zero)
- Channel shuffling is done in the ADD-ON card
  - The Master Card has only one setting to enable the quad speed audio bus
- Every Quad-Speed ADD-ON card takes 32 channels from the ‘right hand ADD-ON card’ and adds (or overwrites) the local processed channels.
  - This can be done for any of the channels that are processed in the ADD-ON card
- Master Cards are switchable between normal and quad-speed bus
- Channel designations on the block schematics:
  - Channel 1-32 (or less) are injected into the dark green large arrow from Master Card to ADD-ON card and looped on to the next ADD-ON card via the dark green arrow
  - The ADD-ON card injects up to 32 channels into the brown large arrow
  - An ADD-ON card will also actively loop extra processed channels into the next ADD-ON card, and finaly into the Master Card
- The cross looping of the original design is now a straight loop
- The quad speed bus can also work in one direction
  - You can use a Quad Speed audio bus to de-embed audio from the master and present on the ADD-ON card as AES/EBU, Bitstream (like Dolby) or analog audio
  - If applicable the ADD-ON card can also be used as in injection point of physical audio streams

Example

The big difference between the new and old bus structure is the fact that it caries 4 times as much audio channels.

It is also bi directional by design. So half of the original physical infrastructure moves audio from the master card to the ADD-ON cards, and the other half is used to put the audio back

The following graphic shows how a typical quad speed bus chain works



The audio coming from the master card (dark green arrow) contains up to 32 channels.

The first ADD-ON card can select any of the 32 channels for internal processing

These channels are looped on to the next ADD-ON card.

This next ADD-ON (sitting in the next n+1 slot) Card can also free select any 8 from 32 channels. *(The DLA42 can also take 3 channels from the ADD-ON bus and 5 channels from its physical input)*

This looping works up to 3 times.

The brown arrow is the return path and sends the (processed) audio back to the master card.
This path is 32 channels wide and is clocked from the master card.

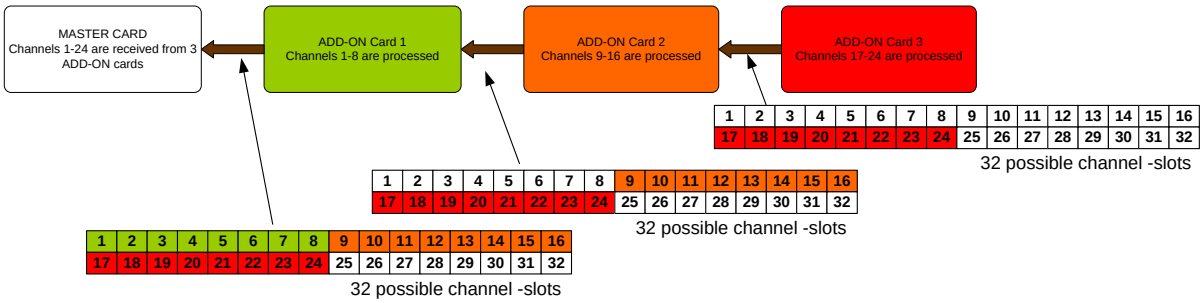
The ADD-ON card can overwrite for instance 8 channels of the 32. These 32 channels are then transported to the next ADD-ON card which overwrites another 8 channels.

Multiplexing

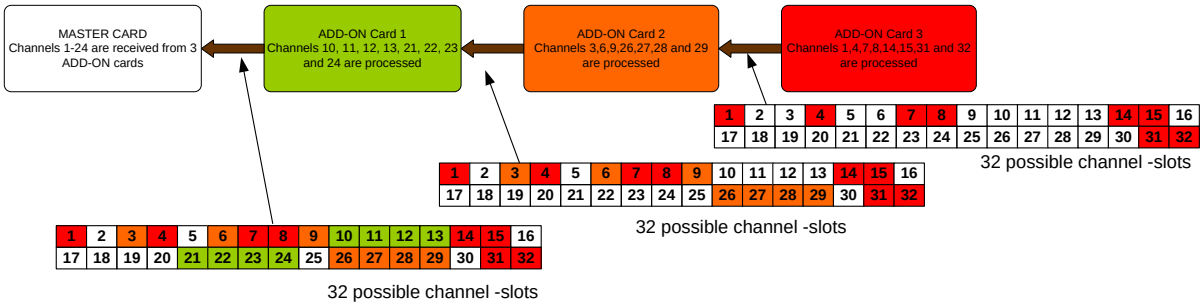
The injection of processed audio into the master card works differently then you were used to with the original audio ADD-ON bus. The brown large arrow will always carry 32 channels from ADD-ON to ADD-ON, or from ADD-ON to Master Card. If the actual channels are used or which channels are used is determined in the ADD-ON card.

In the example below you can see a 4 Card system. One Master Card, and 3 Quad speed ADD-ON cards (the maximum). The last (most right) ADD-ON card processes 8 channels. They are inserted (a menu selection) in slot 17-24 from 32 channel-slots. The second ADD-ON card also processes 8 channels, but they are inserted in slot 9-16 (of 32 slots). The first ADD-ON card inserts channels 1 to 8

This method allows for overwriting slots that come from the right hand Master Card. Channel-slot 25 to 32 are left empty in this example.



Note:
The top example shows a logical way of how the ADD-ON multiplexing could be performed. However; the insertion menu of for instance the DLA42 is much more flexible and allows putting every channel into any of the 32 channel-slots. The example below shows how the flexibility could be used.



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