



# GSU150/160

# HSU150/160

3Gb/s, HD and SD up converter and synchronizer  
with side curtain and optional audio shuffler

## Installation and Operation manual



Committed.



# *Synapse*

## TECHNICAL MANUAL

GSU150/160  
HSU150/160



Lange Wagenstraat 55  
NL-5126 BB Gilze  
The Netherlands  
Phone: +31 161 850 450  
Fax: +31 161 850 499  
E-mail: [Info@axon.tv](mailto:Info@axon.tv)  
Web: [www.axon.tv](http://www.axon.tv)



**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.

**Copyright © 2001 – 2011 AXON Digital Design B.V.**

Date created: 09-07-2009

Date last revised: 28-06-2011

**Axon, the Axon logo and Synapse are trademarks of Axon Digital Design B.V.**

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  
GSU150/160  
HSU150/160



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

<b>Introduction to Synapse</b>	<b>6</b>
An Introduction to Synapse	6
Local Control Panel	6
Remote Control Capabilities	6
<b>Unpacking and Placement</b>	<b>7</b>
Unpacking	7
Placing the card	7
<b>A Quick Start</b>	<b>8</b>
When Powering-up	8
Changing settings and parameters	8
Front Panel Control	8
Example of changing parameters using front panel control	9
Synapse Cortex Software	10
Menu Structure Example	10
<b>The GSU150/160 Card</b>	<b>11</b>
Introduction	11
Features	11
Conversion capabilities	13
Applications	13
Block schematic	14
<b>Settings Menu</b>	<b>15</b>
Introduction	15
IO-Ctrl	15
IO_Prst_Act	15
IO_Prst_Edit	15
#Inp_SelA	15
#Inp_SelB	15
#CVBS-frmt	16
#Out-Frmt	16
#F-delay	16
#V-delay	16
#H-delay	16
#Out-Mode	17
#Out-MixAB	17
#Curt-Start	17
#Curt-End	17
#Curt-Sep	17
#MirrorA	18
#MirrorB	18
Delay-Status	18
Lock-Mode	18
Ref-Type	18
PrstEditView	18
PatternSpeed	18
SD-AR-Det	19
NoWSS/VI_prstA	19
NoWSS/VI_prstB	19
Up_CtrlA	19
Up_Prst_actA	19
UP_Prst_editA	19
#Up_ArcA	20
#Up_H-scaleA	20
#Up_V-scaleA	20
#Up_H-EnhA	20
#Up_ColorConvA	20
Up_CtrlB	21
Up_Prst_actB	21
UP_Prst_editB	21
#Up_ArcB	21
#Up_H-scaleB	21
#Up_V-scaleB	21
#Up_H-EnhB	21
#Up_ColorConvB	21
S2016-Line	22
Timecode_Inp	22

VITC_Ln_In	22
VITC_Ln_Ctrl	22
VITC_Ln_625	22
VITC_Ln_525	22
VITC_Ln_Dup	22
Ins_CtrlA	22
Ins_Prst_ActA	23
Ins_Prst_EditA	23
#VI-InsertA	23
#VI-DataA	23
#WSS-InsertA	23
#WSS-StndA	23
#WSS-ExtndA	23
#VI-DataA	23
#S2016-InsertA	23
#S2016-DataA	24
#OP47-SDP-Emb_A	24
#CC_Ena_A	24
Ins_CtrlB	24
Ins_Prst_ActB	24
Ins_Prst_EditB	24
#VI-InsertB	24
#VI-DataB	24
#WSS-InsertB	24
#WSS-StndB	24
#WSS-ExtndB	25
#VI-DataB	25
#S2016-InsertB	25
#S2016-DataB	25
#OP47-SDP-Emb_B	25
#CC_Ena_B	25
GainA	25
R-GainA	25
G-GainA	25
B-GainA	25
GainB	25
R-GainB	26
G-GainB	26
B-GainB	26
BlackA	26
R-BlackA	26
G-BlackA	26
B-BlackA	26
BlackB	26
R-BlackB	26
G-BlackB	26
B-BlackB	26
CVBS-Hue	26
Audio_Ctrl	27
Audio_Prst_act	27
Audio_Prst_Edit	27
#Audio_Delay	27
Audio-Bus-IO	27
#EmbA_Grp	27
#EmbA1_Inp ~ #EmbA4_Inp	28
#EmbA1_Inp_Ch ~ #EmbA4_Inp_Ch	28
#EmbB_Grp	28
#EmbB1_Inp ~ #EmbB4_Inp	28
#EmbB1_Inp_Ch ~ #EmbB4_Inp_Ch	28
#EmbC_Grp	29
#EmbC1_Inp ~ #EmbC4_Inp	29
#EmbC1_Inp_Ch ~ #EmbC4_Inp_Ch	29
#EmbD_Grp	29
#EmbD1_Inp ~ #EmbD4_Inp	29
#EmbD1_Inp_Ch ~ #EmbD4_Inp_Ch	30
#EmbA1_Gain ~ #EmbD4_Gain	30
#EmbA1_Phase ~ #EmbD4_Phase	30
GPI-Ctrl	30
GPI_1 ~ GPI_5	30
IP_Conf0	31
mIPO	31
mNMO	31
mGWO	31
NetwPrefix0	31

<b>Status Menu</b>	<b>32</b>
Introduction	32
sInp1	32
sInp1_VI	32
sInp1_WSS-Stnd	33
sInp1_WSS-Extnd	33
sInp1_S2016	34
sInp2	34
sInp2_VI	34
sInp2_WSS-Stnd	34
sInp2_WSS-Extnd	34
sInp2_S2016	34
sInp3_WSS-Stnd	34
sInp3_WSS-Extnd	34
sInpCVBS	35
IODelayA	35
IODelayB	35
FunctionA	35
FunctionB	35
Ref	35
GPI	35
GPIA	35
GPIB	35
GPIC	35
OP47-Det-A	35
OP47-Det-B	36
WST-Det-A	36
WST-Det-B	36
CC_Det_A	36
CC_Det_B	36
IP_Addr0	36
MAC0	36
IPO	36
NMO	36
GW0	36
<b>Events Menu</b>	<b>37</b>
Introduction	37
What is the Goal of an event?	37
Events	37
Announcements	37
Input_A	37
Input_B	37
Ref-Status	37
What information is available in an event?	37
The Message String	37
The Tag	38
Defining Tags	38
The Priority	38
The Address	38
<b>LED Indication</b>	<b>39</b>
Error LED	39
Input_A LED	39
Input_B LED	39
ANC Data LED	39
Reference LED	39
Data Error LED	39
Connection LED	39
Error LED	39
<b>Block Schematic</b>	<b>40</b>
<b>Connector Panels</b>	<b>41</b>
GPI pinning	41
<b>Card dip-switches for BHX/BPH configuration</b>	<b>42</b>
Using BHX17b	42
Using BPH17 with fiber I/O	42
<b>Output configuration explained</b>	<b>43</b>
<b>GPI's explained</b>	<b>44</b>
GPI pools	44

binary mode or priority mode	44
Example 1	44
Example 2	45
Example 3	45
<b>GNU Public License version 2</b>	<b>47</b>

# 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](http://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: “SYNAPSE 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 Synapse 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

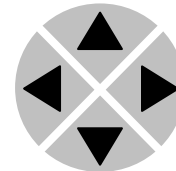
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of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

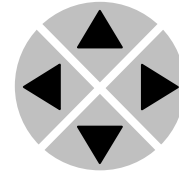
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

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

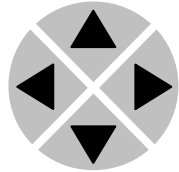
RRC18 [Select Card]  
>S01=SFS10



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

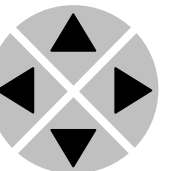


Pressing the ► selects the settings item shown, in this example SDI-Format.

(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.



## Synapse Cortex Software

Synapse 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. Synapse 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 Synapse Cortex, please refer to the Cortex manual.

### 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 GSU150/160 Card

### Introduction

The GSU150/160 and HSU150/160 are *low latency* up, down, cross converters with 16 channel audio transparency. The powerful audio matrix multiplexer can transport audio from the embedded domain to the Synapse bus and vice versa.

The GSU160 or HSU160 add a full audio shuffler and audio proc-amp with gain and phase control.

The GSU150/160 is compatible with 270Mb/s, 1.5Gb/s and 3Gb/s for full 1080p/50 or 1080p/59.94 use.

The HSU150/160 are compatible with SD-SDI (270Mb/s) and HD-SDI (1.5Gb/s) and can be future upgraded to 3Gb/s compatibility

### Features

- 3 inputs: 2 SDI and 1 composite.
- Configurable output function
  - Straight (1=1, 2=2)
  - Crossed (2=1, 1=2)
  - A only
  - B only
- Low latency conversion process (as low as 1 field in controlled timing environment)
- Compatible with the following input formats (auto selecting) (1080p only for GSU):
  - 1080p/59.94
  - 1080p/50
  - 1080i/59.94
  - 1080i/50
  - 1080p/29.97
  - 1080p25
  - 1080p24
  - 1035i/59.94
  - 720p/59.94
  - 720p50
  - 720p30
  - 720p25
  - 720p24
  - SD525
  - SD625
- Output standards
  - 1080p/59.94
  - 1080p/50
  - 1080i/59.94
  - 1080i/50
  - 1080p/29.97
  - 1080p25
  - 1080p24
  - 1035i/59.94
  - 720p/59.94
  - 720p50
  - 720p30
  - 720p25
  - 720p24
  - SD525
  - SD625

- Two individual conversion paths. The inputs can be different standards SD or HD and unlocked to the single output format.
- Frame sync with output phase control in Frames, Lines and pixels with respect to reference. Delay setting are stored per output format for a constant latency operation.
  - 60 Frames delay offset (per channel)
    - 1080i60:
    - 1080i50:
    - 1080p30:
    - 1080p25:
    - 1080p24:
    - 1035i60:
    - 1080p60:
    - 1080p50:
  - 120 Frames delay offset (per channel)
    - 720p60
    - 720p50
    - 720p30
    - 720p25
    - 720p24
  - 250 Frames delay offset (per channel)
    - SD525
    - SD625
- All ARC modes contain:
  - Anamorphic
  - Center Cut
  - V-Zoom
  - LBox-16:9
  - LBox-14:9
  - PBox-4:3
  - PBox-14:9
  - Variable H and V (50—200%)
- Free individual programmable presets banks for:
  - Up converter ARC 16-presets
  - Transparent ARC 16-presets
  - S2016 insertion 16-presets
  - Embedder shuffling/Gain/Phase 16-presets (110 only)
- 5 GPI inputs assignable to different preset banks
  - Input selection
  - Output mode
  - Up conversion aspect ratio
  - Transparent aspect ratio (equal in-output)
  - Insertion of AFD (S2016)
  - Audio shuffling, gain and phase (110 only)
- Individual color corrector for video path A and B
- Transparent for 16 channels of embedded audio
- Embedded domain ***cross input*** audio shuffling, gain and phase control (GSU/HSU160 only)
- Embedding and de-embedding through synapse bus
- Video proc-amp (Y and C control)
- Color corrector (RGB and total gain, RGB and total black)
- Hue control for NTSC inputs
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)

## Conversion capabilities

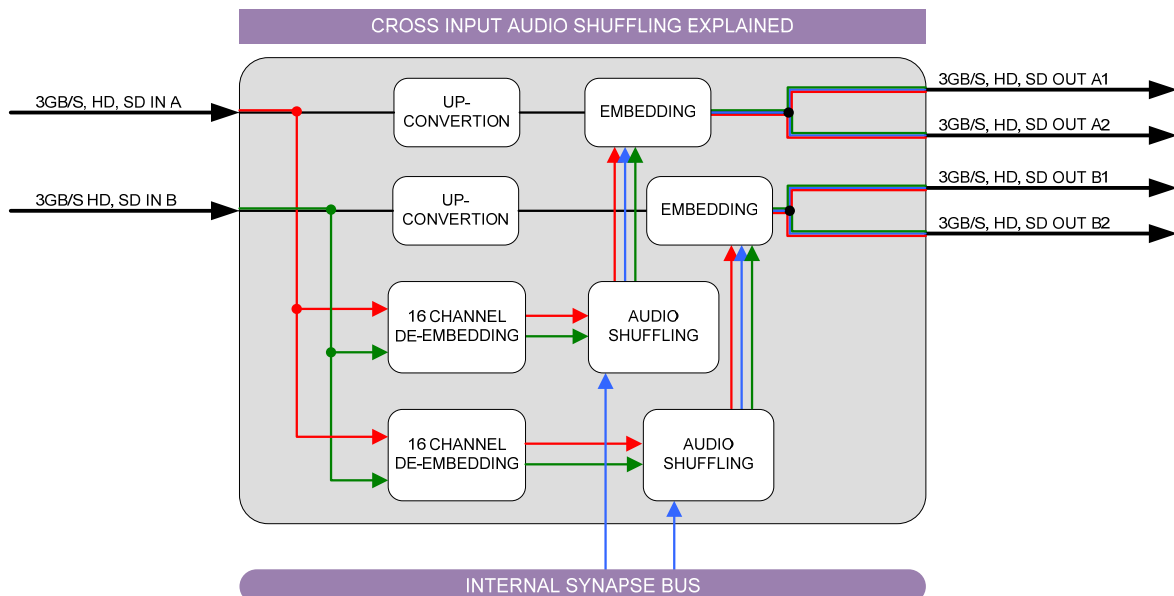
		Output												
CONVERSION		1080p29.97	1080p25	1080p23.97	1035i59.97	1080p50 *	1080p59.94 *	1080i59.94	1080i50	720p59.94	720p50	720p29.97	720p25	720p23.98
Input 1 or 2	1080p29.97	x												
	1080p25		x											
	1080p23.97			x										
	1035i59.97				x									
	1080p50 *					x								
	1080p59.94 *						x							
	1080i59.94							x						
	1080i50								x					
	720p59.94									x				
	720p50										x			
	720p29.97											x		
	720p25												x	
	720p23.98													x
	480i59.94 (525)	x		x	x		x	x		x		x	x	
	576i50 (625)		x			x			x		x		x	
	480i59.94 (NTSC)	x		x	x		x	x		x		x	x	
CVB S	576i50 (PAL)		x			x			x		x		x	

## Applications

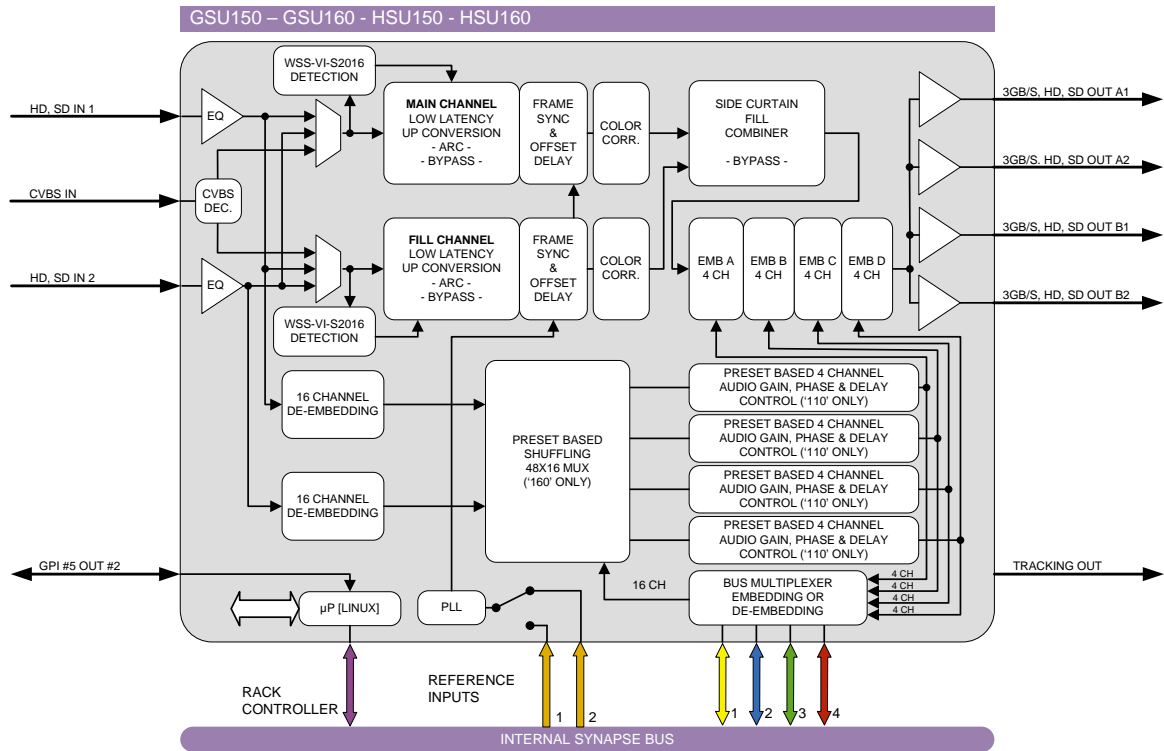
- Truck input up converter/synchronizer
- Infrastructure up conversion
- Up conversion with side-fill/curtain input

### GSU160 and HSU160 only:

- Combining embedded audio channels of 2 inputs into 1 (see image below)



## Block schematic





## 5 Settings Menu

### Introduction

The settings menu displays the current state of each GSU-HSU150/160 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\_SelA

With this item you can select which input you want to use for Channel A. Can be SDI-1 (SDI input 1), SDI-2 (SDI input 2) or Analog (CVBS in). You can also choose a Zoneplate or Colorbar as input. Can also be set to Off to switch off channel A entirely. The default for this setting is SDI-1.

#### #Inp\_SelB

With this item you can select which input you want to use for Channel B. Can be SDI-1 (SDI input 1), SDI-2 (SDI input 2) or Analog (CVBS in). You can also choose a Zoneplate or Colorbar as input. Can also be set to Off to switch off channel B entirely. The default for this setting is SDI-2.

## #CVBS-frmt

With this item you can set the format of the CVBS input. Possible formats to select here are (default is Auto):

- PAL-M
- PAL-N
- NTSC-M
- NTSC-4.43
- NTSC-J
- SECAM
- PAL-60
- PAL-BGHID
- Auto (automatic detection and selection)

## #Out-Frmt

With Out-Frmt you can set what the output should be of channel A as well as channel B. Possible settings are:

- 1080i60 (default), 1080i50
- 1080p30, 1080p25, 1080p24
- 1035i60
- 720p60, 720p50
- 720p30, 720p25, 720p24
- SD525, SD625

## #F-delay

F-Delay sets the amount of delayed Frames. The available range is from 0 to 250 fields (dependant on the I/O). Default is 0F. The preset master for this is Out-Frmt, hence the '#'-prefix.

## #V-delay

V-Delay setting allows adjustment of the vertical phase of the output signal 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. The preset master for this is Out-Frmt, hence the '#'-prefix.

## #H-delay

The H-Delay setting allows adjustment of the Horizontal phase of the output signal 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. The preset master for this is Out-Frmt, hence the '#'-prefix.

## #Out-Mode

With this setting you choose which input should be on which output. There's 4 modes are available:

- Straight (default): Channel A to outputs A1-A2, Channel B to outputs B1-B2
- Crossed: Channel A to outputs B1-B2, Channel B to outputs A1-A2
- A Only: Channel A to all outputs
- B Only: Channel B to all outputs
- Curtain: Lays Channel A over Channel B with adjustable Start and end points for Channel A. Commonly used to have graphical pillarbox bars behind a 4:3 picture.
- Mix: Lays Channel A over Channel B with adjustable mix intensity
- Side by Side: Makes a split screen of both Channels next to each other

See Appendix 2 for a visualised explanation of the possible settings.

**Note:** When in 'A only' or 'B only' modes, you can process 16 channels of audio for the outputs. When in mixed modes you can process only 8 channels of audio per input.

Also take into account that when in 'A only' all the settings that involve video channel B are discarded and when in 'B only' all channel A settings are discarded.

## #Out-MixAB

This setting adjusts the intensity of the mix of channel A over B when Out-mode is set to Mix. Can be set between 0 and 100%. Default is 0%.

## #Curt-Start

With this setting you can adjust the point where Channel A should start over the full screen Channel B when Out-mode is set to Curtain. This can be at any point between 0 and 100%. Default is 12,5%. See 'appendix 1: Side curtains explained' for details.

## #Curt-End

With this setting you can adjust the point where Channel A should start over the full screen Channel B when Out-mode is set to Curtain. This can be at any point between 0 and 100%. Default is 87,5%. See 'appendix 1: Side curtains explained' for details.

## #Curt-Sep

With this setting you can set a separation line between Channel A and Channel B of 0 to 50 pixels. Default is 0 pixels.

<b>#MirrorA</b>	Some 3D applications require a mirrored left or right image when making use of the side by side option. With this setting you can choose to Mirror the A-channel horizontally (H_Only), vertically (V_Only) or both horizontally and vertically (H_And_V). Default is Off (no mirroring).
<b>#MirrorB</b>	Some 3D applications require a mirrored left or right image when making use of the side by side option. With this setting you can choose to Mirror the B-channel horizontally (H_Only), vertically (V_Only) or both horizontally and vertically (H_And_V). Default is Off (no mirroring).
<b>Delay-Status</b>	It is possible to display (in the status menu IODelayA and IODelayB) 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
<b>Lock-Mode</b>	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.
<b>Ref-Type</b>	Sets the type of incoming reference. Can be either Bi-Level or Tri-Level. Default is Bi-Level.
<b>PrstEditView</b>	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.
<b>PatternSpeed</b>	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 channel A, 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 channel B, 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.

## 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	
Anam-702	Anamorphic scaling based on 702 active pixels instead of 720 pixels
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.

<b>Up_CtrlB</b>	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.
<b>Up_Prst_actB</b>	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.
<b>UP_Prst_editB</b>	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.
<b>#Up_ArcB</b>	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, Anam-702 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.
<b>#Up_H-scaleB</b>	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%.
<b>#Up_V-scaleB</b>	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%.
<b>#Up_H-EnhB</b>	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%.
<b>#Up_ColorConvB</b>	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.

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.	
<b>S2016-Line</b>	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.
<b>Timecode_Inp</b>	With this card it is possible to copy the embedded timecode information of either input SDI-1 or input SDI-2 to the output. With this setting you select which input you want to use, or switch the timecode inserting Off (default).
<b>VITC_Ln_In</b>	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.
<b>VITC_Ln_Ctrl</b>	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.
<b>VITC_Ln_625</b>	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.
<b>VITC_Ln_525</b>	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.
<b>VITC_Ln_Dup</b>	When set to On, the VITC line is duplicated to the above selected line + 2 lines.
<b>Ins_CtrlA</b>	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.



<b>Ins_Prst_ActA</b>	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.
<b>Ins_Prst_EditA</b>	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.
<b>#VI-InsertA</b>	You can turn VI insertion on or off for channel A. Default is Off.
<b>#VI-DataA</b>	With the #VI-InsertA setting set to on, you can select VI values with this setting, which you want to be inserted 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.
<b>#WSS-InsertA</b>	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.
<b>#WSS-StndA</b>	With the #WSS-InsertA setting set to Standard, you can select WSS standard values with this setting, which you want to be inserted 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.
<b>#WSS-ExtndA</b>	With the #WSS-InsertA setting set to extended, you can select WSS extended values with this setting, which you want to be inserted 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.
<b>#VI-DataA</b>	With the #WSS-InsertA setting set to extended, you can select WSS extended values with this setting, which you want to be inserted in Channel A. possible are all VI settings between 4:3_0 and 4:3_7 and the settings between 16:9_0 and 16:9_7. Default is 4:3_0.
<b>#S2016-InsertA</b>	You can turn S2016 (AFD) insertion on or off for channel A. Default is Off.

<b>#S2016-DataA</b>	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.
<b>#OP47-SDP-Emb_A</b>	With this setting you set in which line the OP47 data should be inserted. 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).
<b>#CC_Ena_A</b>	This setting sets the Closed Captioning transparency for channel A On or Off. Default is Off.
<b>Ins_CtrlB</b>	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.
<b>Ins_Prst_ActB</b>	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.
<b>Ins_Prst_EditB</b>	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.
<b>#VI-InsertB</b>	You can turn VI insertion on or off for channel B. Default is Off.
<b>#VI-DataB</b>	With the #VI-InsertB setting set to on, you can select VI values with this setting, which you want to be inserted 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.
<b>#WSS-InsertB</b>	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.
<b>#WSS-StndB</b>	With the #WSS-InsertB setting set to Standard, you can select WSS standard values with this setting, which you want to be inserted 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 #VI-InsertB setting set to on, you can select VI values with this setting, which you want to be inserted 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.

## #VI-DataB

With the #WSS-InsertB setting set to extended, you can select WSS extended values with this setting, which you want to be inserted in Channel B. possible are all VI settings 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. 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%.

<b>R-GainB</b>	R-GainB controls the Red gain of channel B. The control range is between 50% and 150%. The default setting is 100%.
<b>G-GainB</b>	G-GainB controls the Green gain of channel B. The control range is between 50% and 150%. The default setting is 100%.
<b>B-GainB</b>	B-GainB controls the Blue gain of channel B. The control range is between 50% and 150%. The default setting is 100%.
<b>BlackA</b>	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.
<b>R-BlackA</b>	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.
<b>G-BlackA</b>	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>B-BlackA</b>	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.
<b>BlackB</b>	BlackB controls the total R-G-B Black gain of channel B. The range is between -128bit and 127bit. The default setting is 0bit.
<b>R-BlackB</b>	R-BlackB controls the Red-Black of channel B. The range is between -128bits and 127 bits. The default setting is 0 bit.
<b>G-BlackB</b>	G-BlackB controls the Green-Black of channel B. The range is between -128bits and 127 bits. The default setting is 0 bit.
<b>B-BlackB</b>	B-BlackB controls the Blue-Black of channel B. The range is between -128bits and 127 bits. The default setting is 0 bit.
<b>CVBS-Hue</b>	This item adjusts the HUE of the CVBS input. Can be set between -90 and +90 degrees. Default is 0 degrees.

AUDIO PROC AMP	
<b>Audio_Ctrl</b>	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).
<b>Audio_Prst_act</b>	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.
<b>Audio_Prst_Edit</b>	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.
<b>#Audio_Delay</b>	With this item you can delay all audio between 0ms and 1000ms. Default is 0ms. This item is part of the audio presets.
<b>Audio-Bus-IO</b>	This setting can change the Audio bus order from the normal 1 2 3 4 (=default) to 1 3 2 4. The 1324 order is of use to route the 1 <sup>st</sup> group of audio from the 2 <sup>nd</sup> input to the 2 <sup>nd</sup> channel of a slave card (like the DIO48).
EMBEDDER	
<b>#EmbA_Grp</b>	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-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 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 of SDI input 1 (Demb-SDI1) or SDI input 2 (Demb-SDI2), the embedder of the active input (Demb-Input, dependant on the current active input), from the ADD-ON bus groups, or to mute the corresponding channel (set to off). Defaults here are Off.

**Note:** With this card the ADD-ON bus can only be used to either embed audio or de-embed audio. When one of the EmbXx\_Inp settings is set to embed from the ADD-ON bus, no audio will be de-embedded towards the bus anymore, not for any of the channels.

**#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 of SDI input 1 (Demb-SDI1) or SDI input 2 (Demb-SDI2), the embedder of the active input (Demb-Input, dependant on the current active input), from the ADD-ON bus groups, or to mute the corresponding channel (set to off). Defaults here are Off.

**Note:** With this card the ADD-ON bus can only be used to either embed audio or de-embed audio. When one of the EmbXx\_Inp settings is set to embed from the ADD-ON bus, no audio will be de-embedded towards the bus anymore, not for any of the channels.

**#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	<p>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 Group2.</p>
#EmbC1_Inp ~ #EmbC4_Inp	<p>With these settings you can select where the corresponding audio channels of the outputs are coming from. In this card you can choose to get the audio from the de-embedder of SDI input 1 (Demb-SDI1) or SDI input 2 (Demb-SDI2), the embedder of the active input (Demb-Input, dependant on the current active input), from the ADD-ON bus groups, or to mute the corresponding channel (set to off). Defaults here are Off.</p> <p><b>Note:</b> With this card the ADD-ON bus can only be used to either embed audio or de-embed audio. When one of the EmbXx_Inp settings is set to embed from the ADD-ON bus, no audio will be de-embedded towards the bus anymore, not for any of the channels.</p>
#EmbC1_Inp_Ch ~ #EmbC4_Inp_Ch	<p>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.</p>
#EmbD_Grp	<p>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 Group2.</p>
#EmbD1_Inp ~ #EmbD4_Inp	<p>With these settings you can select where the corresponding audio channels of outputs B are coming from. In this card you can choose to get the audio from the de-embedder of SDI input 1 (Demb-SDI1) or SDI input 2 (Demb-SDI2), the embedder of the active input (Demb-Input, dependant on the current active input), from the ADD-ON bus groups, or to mute the corresponding channel (set to off). Defaults here are Off.</p> <p><b>Note:</b> With this card the ADD-ON bus can only be used to either embed audio or de-embed audio. When one of the EmbXx_Inp settings is set to embed from the ADD-ON bus, no audio will be de-embedded towards the bus anymore, not for any of the channels.</p>

**#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 C1 till C4 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 3: GPI's explained' for a more elaborate explanation of the GPI settings.



NETWORK	
<b>IP_Conf0</b>	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.
<b>mIPO</b>	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
<b>mNMO</b>	With IP_Conf0 set to manual, with this setting you can set a Netmask. Default is 255.255.0.0
<b>mGWO</b>	With IP_Conf0 set to manual, this setting let you set a Standard Gateway. Default is set to 172.16.0.1
<b>NetwPrefix0</b>	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.

### 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)

<b>sInp1_S2016</b>	<p>This item displays the detected SMPTE 2016 (AFD) values of input 1. This is displayed as follows:</p> <ul style="list-style-type: none"> <li>▪ AFD0</li> <li>▪ AFD1</li> <li>▪ AFD2</li> <li>▪ AFD3</li> <li>▪ AFD4</li> <li>▪ AFD5</li> <li>▪ AFD6</li> <li>▪ AFD7</li> <li>▪ AFD8</li> <li>▪ AFD9</li> <li>▪ AFD10</li> <li>▪ AFD11</li> <li>▪ AFD12</li> <li>▪ AFD13</li> <li>▪ AFD14</li> <li>▪ AFD15</li> <li>▪ NA (no S2016 detected)</li> </ul>
<b>sInp2</b>	<p>This status item indicates the presence and format of a valid signal in input 2. This is displayed as listed under sInp1.</p>
<b>sInp2_VI</b>	<p>Displays the detected VI value found in input2. This is displayed as listed under sInp1_VI.</p>
<b>sInp2_WSS-Stnd</b>	<p>Displays the detected WSS-standard value found in input2. This is displayed as listed under sInp1_WSS-Stnd.</p>
<b>sInp2_WSS-Extnd</b>	<p>Displays the detected WSS-extended value found in input2. This is displayed as listed under sInp1_WSS-ext.</p>
<b>sInp2_S2016</b>	<p>Displays the detected S2016 value found in input2. This is displayed as listed under sInp1_S2016.</p>
<b>sInp3_WSS-Stnd</b>	<p>Displays the detected WSS-standard value found in input3 (CVBS input). This is displayed as listed under sInp1_WSS-Stnd.</p>
<b>sInp3_WSS-Extnd</b>	<p>Displays the detected WSS-extended value found in input3 (CVBS input). This is displayed as listed under sInp1_WSS-ext.</p>

<b>sInpCVBS</b>	<p>This status item indicates the detected input format on the CVBS input. This is displayed as one of the following values:</p> <ul style="list-style-type: none"> <li>▪ NTSC-J</li> <li>▪ NTSC-M</li> <li>▪ NTSC-4.43</li> <li>▪ PAL-BGHID</li> <li>▪ PAL-N</li> <li>▪ PAL-M</li> <li>▪ PAL-60</li> <li>▪ SECAM</li> <li>▪ SECAM-525</li> <li>▪ NA (no input detected)</li> </ul>
<b>IODelayA</b>	Displays the total delay in ms of outputs A1 and A2. can be a value between 0ms and 5000ms.
<b>IODelayB</b>	Displays the total delay in ms of outputs B1 and B2. can be a value between 0ms and 5000ms.
<b>FunctionA</b>	Displays the current function outputs A1 and A2. For the card it can only be Up, Trans, TestPattern or NA.
<b>FunctionB</b>	Displays the current function outputs B1 and B2. For the card it can only be Up, Trans, TestPattern or NA.
<b>Ref</b>	Displays whether a correct reference is found (Present) or not (NA)
<b>GPI</b>	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.
<b>GPIA</b>	Displays the current value of GPI pool A
<b>GPIB</b>	Displays the current value of GPI pool B
<b>GPI C</b>	Displays the current value of GPI pool C
<b>OP47-Det-A</b>	Displays whether or not there's OP47 detected on channel A

<b>OP47-Det-B</b>	Displays whether or not there's OP47 detected on channel B
<b>WST-Det-A</b>	Displays whether or not there's WST (teletext) detected on channel A
<b>WST-Det-B</b>	Displays whether or not there's WST (teletext) detected on channel B
<b>CC_Det_A</b>	Displays whether or not there's Closed Captioning detected on channel A
<b>CC_Det_B</b>	Displays whether or not there's Closed Captioning detected on channel B

## NET STATUS

<b>IP_Addr0</b>	This item displays the status of the IP address. It can be manual, DHCP asking, DHCP Leased or DHCP Infin.
<b>MAC0</b>	This item displays the MAC address of the card.
<b>IPO</b>	This item displays the current IP address of the card.
<b>NMO</b>	This item displays the current Netmask of the card.
<b>GWO</b>	This item displays the current Standard Gateway of the card.

## 7 Events Menu

<b>Introduction</b>	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.
<b>What is the Goal of an event?</b>	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.
<b>Events</b>	The events reported by the card are as follows;
<b>Announcements</b>	Announcements is not an event. This item is only used for switching the announcement of status changes on/off. 0=off, other =on
<b>Input_A</b>	Input_A can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
<b>Input_B</b>	Input_B can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
<b>Ref-Status</b>	Reference can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
<b>What information is available in an event?</b>	<p>The message consists of the following items;</p> <ol style="list-style-type: none"> <li>1) A message string to show what has happened in text, for example: "INP_LOSS", "REF_LOSS", "INP_RETURN".</li> <li>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.</li> <li>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.</li> <li>4) A slot number of the source of this event.</li> </ol>
<b>The Message String</b>	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<sub>hex</sub>) (e.g. 129 (81<sub>hex</sub>) 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 <sub>hex</sub> =INPA_LOSS	81 <sub>hex</sub> =INPA_RETURN	input A lost or returned
Input_B	02 <sub>hex</sub> =INPB_LOSS	82 <sub>hex</sub> =INPB_RETURN	input B lost or returned
Reference	03 <sub>hex</sub> =REF_LOSS	83 <sub>hex</sub> =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

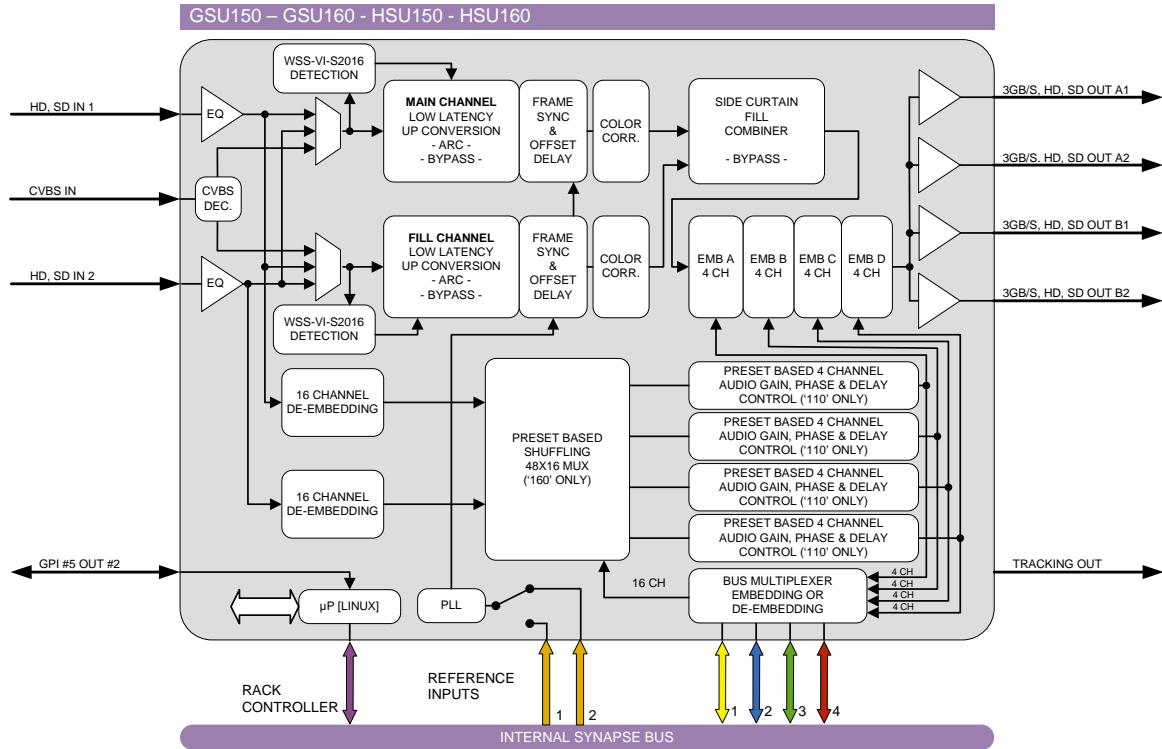
Together with the message string or the tag, the slot number or address of the card is relevant to be able to assign the event to a certain card.



## 8 LED Indication

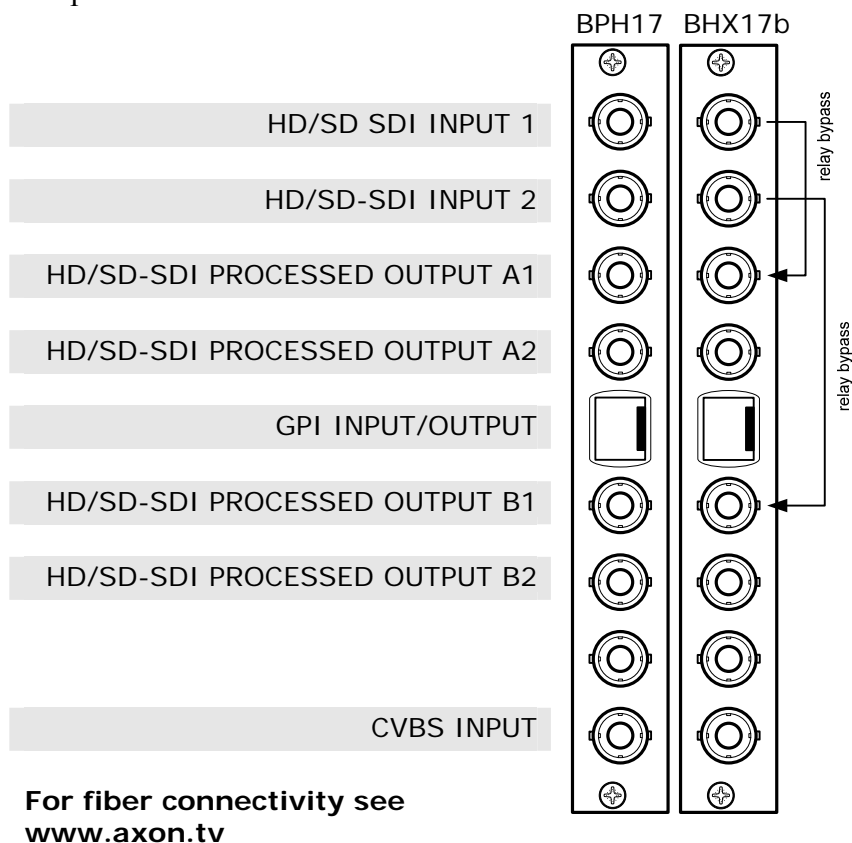
<b>Error LED</b>	The error LED indicates an error if the internal logic of the card is not configured correctly or has a hardware failure.
<b>Input_A LED</b>	This LED indicated the presence of a valid SDI video signal on input A.
<b>Input_B LED</b>	This LED indicated the presence of a valid SDI video signal on input B.
<b>ANC Data LED</b>	Indicates the presence of embedded audio within the input signal.
<b>Reference LED</b>	Indicated the presence of a valid reference signal on the selected reference input connector (ref-1 or ref-2).
<b>Data Error LED</b>	This LED indicates a CRC error.
<b>Connection LED</b>	This LED illuminates after the card has initialized. The LED lights for 0.5 seconds every time a connection is made to the card.
<b>Error LED</b>	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



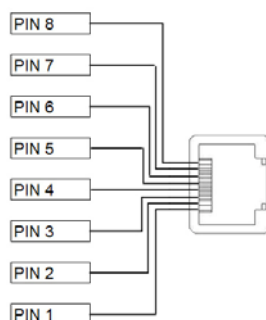
## 10 Connector Panels

The GSU-HSU150/160 can be used with the BPH17 or the BHX17b. The following table displays the pinout of these backpanels in combination with the card.



**!Unused inputs and outputs must be terminated**

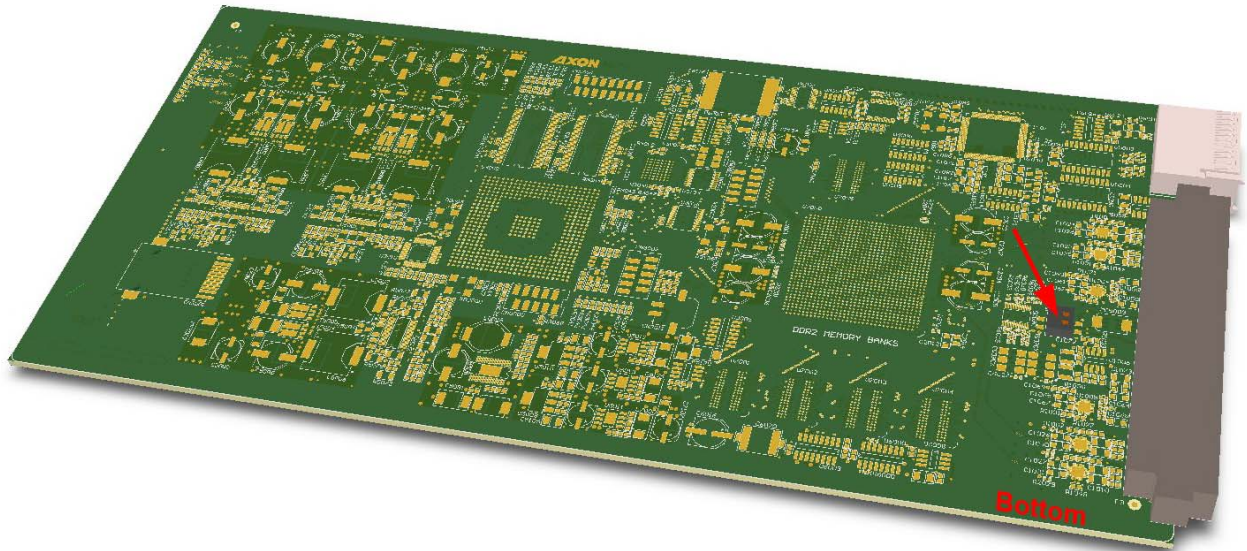
### GPI pinning



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 Card dip-switches for BHX/BPH configuration

There are dip-switches on the circuit board of the card itself. With these dip-switches you can change the power-voltages that is put on the backpanel. By default the switches are set to off, putting no power on the backpanel. The picture below displays where the switch is positioned on the card.



### Using BHX17b

When using the backpanel with bypass relay (BHX17b), you must first set the **bottom-side** dip-switch to 'on'. This will pass 5 volt to the backpanel. If this is not done, the relays won't work at all.

### Using BPH17 with fiber I/O

When using the backpanel with fiber I/O, you must first set the **top-side** dip-switch to 'on'. This will pass 30 volt to the backpanel. If this is not done, the relays won't work at all.

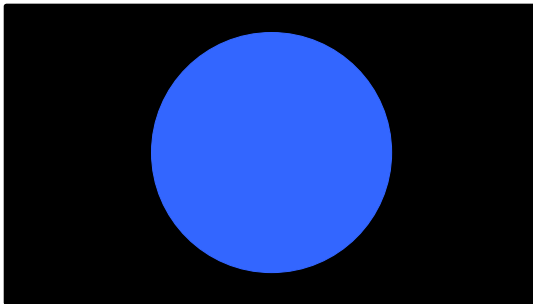
## Appendix 2 Output configuration explained

The output stage of the GSU-HSU150/160 can be configured in multiple ways.

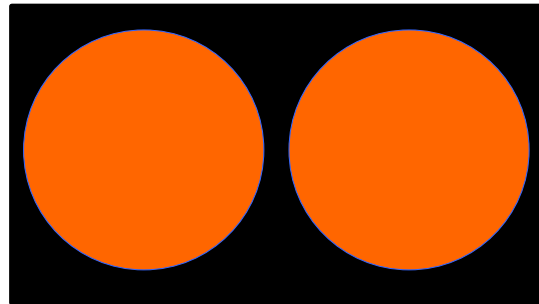
In the straight and mode the card acts as a dual channel device. The audio transparency is then reduced to 8 channels (2 groups) per video output. In A or B only the card is full 16 channel transparent.

The additional side curtain, mix and side by side mode are explained below.

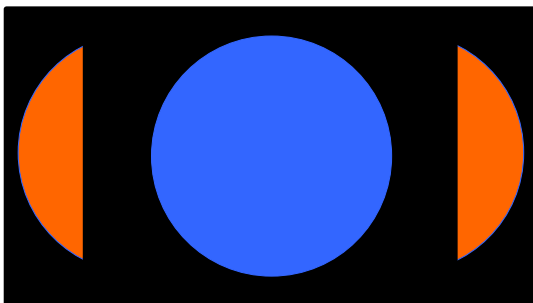
*INPUT 1*



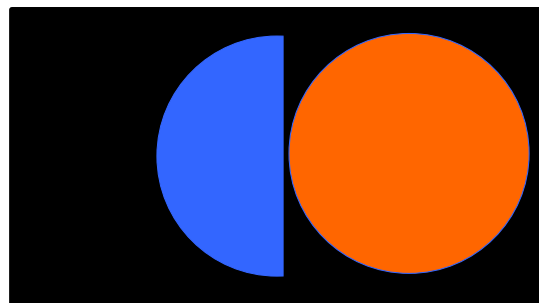
*INPUT 2*



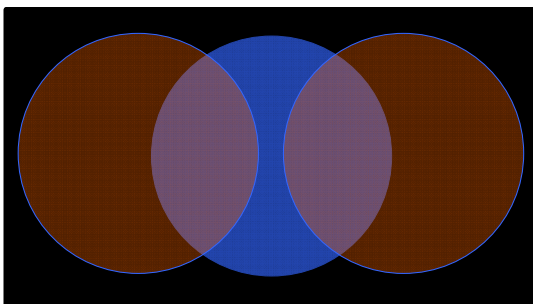
*SIDE CURTAIN 1*



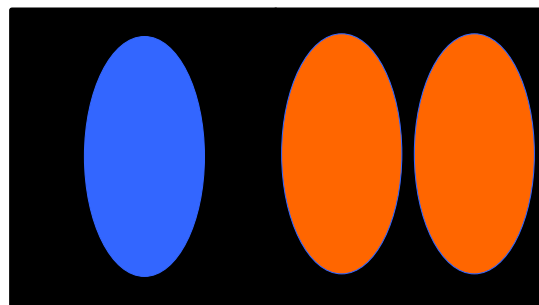
*SIDE CURTAIN 2*



*MIX*



*SIDE BY SIDE (3D)*



## Appendix 3 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 <u>4</u> (because highest gets priority)
1	1	1	1	Up-conv Preset <u>5</u> (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 <u>3</u> (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 <u>3</u> (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 <u>3</u> (because highest gets priority)

Pool C now works as follows:

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





## This product contains open-source software

This product contains open-source software licensed under the GNU Public License (GPL). A copy of the GNU Public License is included below. Under this license you are eligible to receive a copy of the source code of this software including any changes.

Axon Digital Design shall provide the source code on request either through physical distribution or electronic communication. For physical distribution you may be charged a fee that covers distribution costs. This offer is valid up to three years after date of purchase. Please direct your request to the support department of Axon Digital Design.

Axon Digital Design supports open-source software by participating in the development of open-source projects or submitting improvements to these projects. For more information see <http://opensource.axon.tv/>

## GNU Public License version 2

### TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

- a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,



- c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.



#### **NO WARRANTY**

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.