



2XG100/110

2XH100/110

Dual channel 3Gb/s, HD and SD up/down/cross converter and synchronizer with optional audio shuffler

Installation and Operation manual



Committed.

AXON



Synapse

TECHNICAL MANUAL

2XG100/110

2XH100/110



Lange Wagenstraat 55

NL-5126 BB Gilze

The Netherlands

Phone: +31 161 850 450

Fax: +31 161 850 499

E-mail: Info@axon.tv

Web: 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
 2XG100/110
 2XH100/110



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

Introduction to Synapse	6
An Introduction to Synapse	6
Local Control Panel	6
Remote Control Capabilities	6
Unpacking and Placement	7
Unpacking	7
Placing the card	7
A Quick Start	8
When Powering-up	8
Changing settings and parameters	8
Front Panel Control	8
Example of changing parameters using front panel control	9
Axon Cortex Software	10
Menu Structure Example	10
The 2XG100/110 Card	11
Introduction	11
Features	11
Conversion capabilities	13
Applications	13
Block schematic	14
Settings Menu	15
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
Delay-Status	17
Lock-Mode	17
Ref-Type	17
PrstEditView	17
PatternSpeed	17
SD-AR-Det	18
NoWSS/VI_prstA	18
NoWSS/VI_prstB	18
Up_CtrlA	18
Up_Prst_actA	18
UP_Prst_editA	18
#Up_ArcA	19
#Up_H-scaleA	19
#Up_V-scaleA	19
#Up_H-EnhA	19
#Up_ColorConvA	19
Up_CtrlB	20
Up_Prst_actB	20
UP_Prst_editB	20
#Up_ArcB	20
#Up_H-scaleB	20
#Up_V-scaleB	20
#Up_H-EnhB	20
#Up_ColorConvB	20
Dn_CtrlA	21
Dn_Prst_actA	21
Dn_Prst_editA	21
#Dn_ArcA	21
# Dn_H-scaleA	21
# Dn_V-scaleA	22
# Dn_H-EnhA	22
# Dn_ColorConvA	22

Dn_CtrlB	22
Dn_Prst_actB	22
Dn_Prst_editB	22
#Dn_ArcB	22
#Dn_H-scaleB	22
#Dn_V-scaleB	23
#Dn_H-EnhB	23
#Dn_ColorConvB	23
Cr_CtrlA	23
Cr_Prst_actA	23
Cr_Prst_editA	23
#Cr_ArcA	24
#Cr_H-scaleA	24
#Cr_V-scaleA	24
#Cr_H-EnhA	24
Cr_CtrlB	25
Cr_Prst_actB	25
Cr_Prst_editB	25
#Cr_ArcB	25
#Cr_H-scaleB	25
#Cr_V-scaleB	25
#Cr_H-EnhB	25
Tr_CtrlA	25
Tr_Prst_ActA	26
Tr_Prst_EditA	26
#Tr_ArcA	26
#Tr_H-scaleA	26
#Tr_V-scaleA	26
#Tr_H-EnhA	26
Tr_CtrlB	26
Tr_Prst_ActB	27
Tr_Prst_EditB	27
#Tr_ArcB	27
#Tr_H-scaleB	27
#Tr_V-scaleB	27
#Tr_H-EnhB	27
S2016-Line	27
Timecode_Inp	28
VITC_Ln_In	28
VITC_Ln_Ctrl	28
VITC_Ln_625	28
VITC_Ln_525	28
VITC_Ln_Dup	28
Ins_CtrlA	28
Ins_Prst_ActA	28
Ins_Prst_EditA	28
#VI-InsertA	29
#VI-DataA	29
#WSS-InsertA	29
#WSS-StndA	29
#WSS-ExtndA	29
#VI-DataA	29
#S2016-InsertA	29
#S2016-DataA	29
#OP47-SDP-Emb_A	29
#CC_Ena_A	29
Ins_CtrlB	30
Ins_Prst_ActB	30
Ins_Prst_EditB	30
#VI-InsertB	30
#VI-DataB	30
#WSS-InsertB	30
#WSS-StndB	30
#WSS-ExtndB	30
#VI-DataB	30
#S2016-InsertB	31
#S2016-DataB	31
#OP47-SDP-Emb_B	31
#CC_Ena_B	31
GainA	31
R-GainA	31
G-GainA	31
B-GainA	31
GainB	31

R-GainB	31
G-GainB	31
B-GainB	31
BlackA	32
R-BlackA	32
G-BlackA	32
B-BlackA	32
BlackB	32
R-BlackB	32
G-BlackB	32
B-BlackB	32
CVBS-Hue	32
Audio_Ctrl	32
Audio_Prst_act	33
Audio_Prst_Edit	33
#Audio_Delay	33
Audio-Bus-IO	33
#EmbA_Grp	33
#EmbA1_Inp ~ #EmbA4_Inp	33
#EmbA1_Inp_Ch ~ #EmbA4_Inp_Ch	34
#EmbB_Grp	34
#EmbB1_Inp ~ #EmbB4_Inp	34
#EmbB1_Inp_Ch ~ #EmbB4_Inp_Ch	34
#EmbC_Grp	34
#EmbC1_Inp ~ #EmbC4_Inp	34
#EmbC1_Inp_Ch ~ #EmbC4_Inp_Ch	35
#EmbD_Grp	35
#EmbD1_Inp ~ #EmbD4_Inp	35
#EmbD1_Inp_Ch ~ #EmbD4_Inp_Ch	35
#EmbA1_Gain ~ #EmbD4_Gain	35
#EmbA1_Phase ~ #EmbD4_Phase	35
GPI-Ctrl	36
GPI_1 ~ GPI_5	36
IP_Conf0	36
mIPO	36
mNMO	36
mGWO	36
NetwPrefix0	36
Status Menu	37
Introduction	37
sInp1	37
sInp1_VI	37
sInp1_WSS-Stnd	38
sInp1_WSS-Extd	38
sInp1_S2016	39
sInp2	39
sInp2_VI	39
sInp2_WSS-Stnd	39
sInp2_WSS-Extd	39
sInp2_S2016	39
sInp3_WSS-Stnd	39
sInp3_WSS-Extd	39
sInpCVBS	40
IODelayA	40
IODelayB	40
FunctionA	40
FunctionB	40
Ref	40
GPI	40
GPIA	40
GPIB	40
GPIC	40
OP47-Det-A	40
OP47-Det-B	41
WST-Det-A	41
WST-Det-B	41
CC_Det_A	41
CC_Det_B	41
IP_Addr0	41
MAC0	41
IPO	41
NMO	41
GWO	41

Events Menu	42
Introduction	42
What is the Goal of an event?	42
Events	42
Announcements	42
Input_A	42
Input_B	42
Ref-Status	42
What information is available in an event?	42
The Message String	42
The Tag	43
Defining Tags	43
The Priority	43
The Address	43
LED Indication	44
Error LED	44
Input_A LED	44
Input_B LED	44
ANC Data LED	44
Reference LED	44
Data Error LED	44
Connection LED	44
Error LED	44
Block Schematic	45
Connector Panels	46
GPI pinning	46
Card dip-switches for BHX/BPH configuration	47
Using BHX17b	47
Using BPH17 with fiber I/O	47
GPI's explained	48
GPI pools	48
binary mode or priority mode	48
Example 1	48
Example 2	49
Example 3	49
GNU Public License version 2	51

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

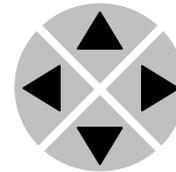
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of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

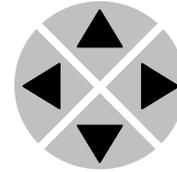
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

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

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

With the display as shown below

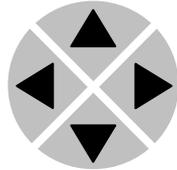
RRC18 [Select Card]
>S01=SFS10



Pressing the ► selects the SFS10 in frame slot 01.

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

SFS10 [Select Menu]
>Settings



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

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

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

SFS10 [Settings]
>SDI-Format=Auto

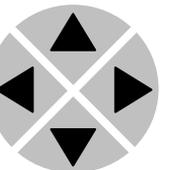


Pressing the ► selects the settings item shown, in this example SDI-Format.

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

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

SFS10 Edit Setting]
SDI-Format>Auto



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

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



**Axon Cortex
Software**

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

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

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

**Menu Structure
Example**

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

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

4 The 2XG100/110 Card

Introduction

The 2XG100/110 and 2XH100/110 are dual channel high-quality up converters. The optimized scaling and filter algorithms ensure crisp broadcast ready pictures from a native SD or HD source, by use of a 64 tap FIR filters. The cards allow you to simulcast 2 HD or 3Gb/s (2XG models only) signals from 2 native HD, SD or 1 CVBS and an SD infrastructure. The embedded audio is carried over to the HD or 3Gb/s domain. The appropriate aspect ratio can be applied by control of VI, WSS and GPI inputs by use of 8 presets per output that can store the aspect ratio conversions.

Beside a high quality up converter, the 2XH110 and 2XG110 are also very powerful cross-input audio shufflers and proc-amps. With the 110 models you can de-embed 2x 8 channels out of any of the 16 embedded audio channels of both HD/SD inputs and shuffle these channels. This means you can combine embedded audio channels from input 1 and embedded audio channels from input 2 in your 3Gb/s (2XG), HD, SD outputs. The embedded audio is carried over to the HD or 3Gb/s domain.

The **2XG**100/110 is compatible with 270Mb/s, 1.5Gb/s and **3Gb/s** for full 1080p/50 or 1080p/59.94 use. The 2XH100/110 is 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 2XG100/110):
 - 1080p/59.94/50/29.97/25/24
 - 1080i/59.94/50
 - 1035i/59.94
 - 720p/59.94/50/30/25/24
 - SD625/525
- Output standards (only one standard can be chosen for both outputs simultaneously):
 - 1080p/59.94/50/29.97/25/24
 - 1080i/59.94/50
 - 1035i/59.94
 - 720p/59.94/50/30/25/24
 - SD625/525
- 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.
 - 30 Frames delay offset (per channel)
 - 1080i60
 - 1080i50
 - 1080p30
 - 1080p25
 - 1080p24
 - 1035i60
 - 1080p60
 - 1080p50

- 60 Frames delay offset (per channel)
 - 720p60
 - 720p50
 - 720p30
 - 720p25
 - 720p24
 - 125 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 A and B 16-presets each
 - Down converter ARC A and B 16-presets each
 - Cross converter ARC A and B 16-presets each
 - Transparent ARC A and B 16-presets each
 - VI insertion A and B 16-presets each
 - WSS insertion A and B 16-presets each
 - S2016 insertion A and B 16-presets each
 - Embedder shuffling/Gain/Phase 16-presets (GXG/HXH160 only)
 - 5 GPI inputs assignable to different preset banks
 - Input selection
 - Output mode
 - Up conversion aspect ratio for channel A and B
 - Down conversion aspect ratio for channel A and B
 - Cross conversion aspect ratio for channel A and B
 - Transparent aspect ratio (equal in-output) for channel A and B
 - Insertion of VI, WSS, AFD (S2016) for channel A and B
 - Audio shuffling, gain and phase (160 only)
 - ARC triggers by VI, WSS, WSSext and S2016 (AFD)
 - 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 (2XG-2XH110 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

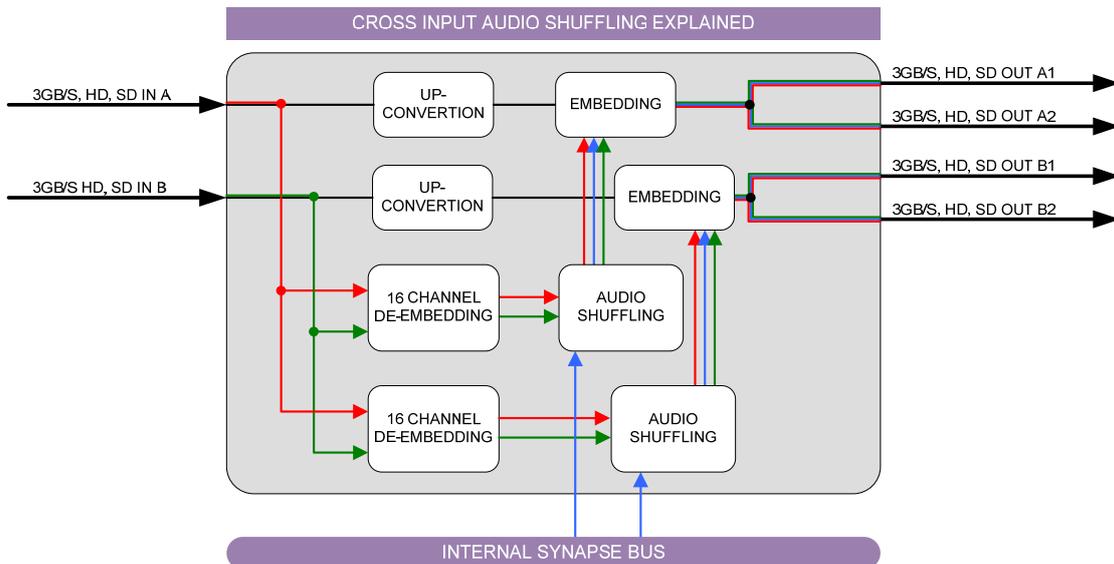
CONVERSION		Output														
		1080p29.97	1080p25	1080p23.97	1035i59.97	1080p50*	1080p59.94*	1080i59.94	1080i50	720p59.94	720p50	720p29.97	720p25	720p23.98	480i59.94(525)	576i50(625)
Input 1 or 2	1080p29.97	x		x	x			x				x		x	x	
	1080p25		x			x			x			x				x
	1080p23.97	x		x	x						x				x	
	1035i59.97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

Applications

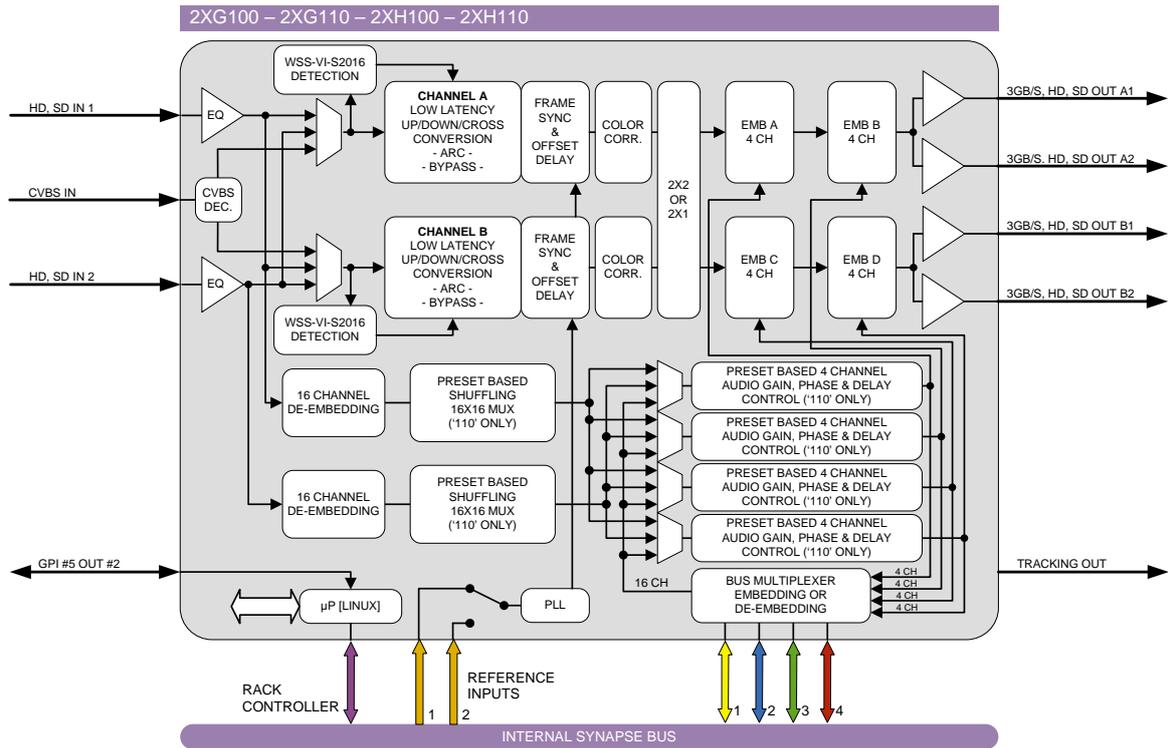
- Truck input synchronizer converter
- Infrastructure up/down/cross conversion
- Up-conversion with side-fill/curtain input

2XG110 and 2XH110 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 2XG/2XH100-110 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_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.

<p>#Out-Mode</p>	<p>With this setting you choose which input should be on which output. There's 4 modes are available:</p> <ul style="list-style-type: none"> ▪ 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 ▪ SUM: All outputs contain a mix (sum) of Channel A and Channel B ▪ A Only: Channel A to all outputs ▪ B Only: Channel B to all outputs <p><i>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.</i></p> <p><i>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.</i></p>
<p>Delay-Status</p>	<p>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.</p> <p>Default setting is OFF</p>
<p>Lock-Mode</p>	<p>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.</p> <p>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.</p>
<p>Ref-Type</p>	<p>Sets the type of incoming reference. Can be either Bi-Level or Tri-Level. Default is Bi-Level.</p>
<p>PrstEditView</p>	<p>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.</p>
<p>PatternSpeed</p>	<p>Sets the speed of the test-pattern (see settings Inp_SelA and Inp_SelB) animation between 0 (still) and 15 (fast). Default is 1.</p>

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_CtrIA

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.

Up_CtrIB	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, 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.
#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

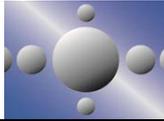
With this item you can manually change the currently active preset of channel A in down converter mode. Can be any preset between 1 and 16. By default it is set to 1. All menu settings that are preceded with a '#Dn'-prefix are part of the preset.

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	
Anam-702	Anamorphic scaling based on 702 active pixels instead of 720 pixels
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_CtrIB	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, Anam-702 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_CtrIA 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_CtrIB 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

Tr_CtrIA 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_CtrIB 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_Inp	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).
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 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.
#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 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.
#WSS-ExtndA	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 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-DataA	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.
#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. 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_CtrIB	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 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.
#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 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%.

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 controls 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-BlackBcontrols 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 controls 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.
CVBS-Hue	This item adjusts the HUE of the CVBS input. Can be set between -90 and +90 degrees. Default is 0 degrees.

AUDIO PROC AMP

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.
#Audio_Delay	With this item you can delay all audio between 0ms and 1000ms. Default is 0ms. This item is part of the audio presets.
Audio-Bus-IO	This setting can change the Audio bus order from the normal 1234 (=default) to 1324. The 1324 order is of use to route the 1 st group of audio from the 2 nd input to the 2 nd channel of a slave card (like the DIO48).

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-embedders/add-on bus. Can be <code>group1</code> , <code>group2</code> , <code>group3</code> or <code>group4</code> . You can also choose to not use these 4 audio channels for anything by setting this item to <code>off</code> . By default it is set to <code>Group1</code> .
#EmbA1_Inp ~ #EmbA4_Inp	<p>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 (<code>Demb-SDI1</code>) or SDI input 2 (<code>Demb-SDI2</code>), the embedder of the active input (<code>Demb-Input</code>, dependant on the current active input), from the ADD-ON bus groups, or to mute the corresponding channel (set to <code>off</code>). Defaults here are <code>Off</code>.</p> <p>Note: With this card the ADD-ON bus can only be used to either embed audio or de-embed audio. When one of the <code>EmbXx_Inp</code> 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>

#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

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.

#EmbC1_Inp ~
#EmbC4_Inp

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. **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.

#EmbC1_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.

~

#EmbC4_Inp_Ch

#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 Group2.

#EmbD1_Inp ~

#EmbD4_Inp

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. **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.

#EmbD1_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.

~

#EmbD4_Inp_Ch

#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 <code>latching</code> manner or in a <code>nonLatching</code> manner. Default for this is <code>Latch</code> .
GPI_1 ~ GPI_5	<p>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 <code>Xx_Ctrl</code> 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 <code>Off</code>. Possible settings are:</p> <ul style="list-style-type: none"> ▪ <code>GPI A</code>: part of GPI-A pool, triggered once <code>Take A</code> is closed. ▪ <code>GPI B</code>: part of GPI-B pool, triggered once <code>Take B</code> is closed. ▪ <code>Take A</code>: part of GPI-A pool, used to trigger GPI A. ▪ <code>Take B</code>: part of GPI-B pool, used to trigger GPI B. ▪ <code>GPI Prio A</code>: part of GPI-A pool, working in a priority manner (highest closed GPI of the pool is activated) ▪ <code>GPI Prio B</code>: : part of GPI-B pool, working in a priority manner (highest closed GPI of the pool is activated) ▪ <code>GPI Prio C</code>: part of GPI-C pool, working in a priority manner (highest closed GPI of the pool is activated) <p>Please refer to ‘Appendix 2: GPI’s explained’ for a more elaborate explanation of the GPI settings.</p>
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 <code>Manual</code> .
mIPO	When <code>IP_Conf0</code> is set to manual, you can type in the preferred IP address here. By default it is set to <code>172.16.1.2</code>
mNMO	With <code>IP_Conf0</code> set to manual, with this setting you can set a Netmask. Default is <code>255.255.0.0</code>
mGWO	With <code>IP_Conf0</code> set to manual, this setting let you set a Standard Gateway. Default is set to <code>172.16.0.1</code>
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.

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)	
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.
sInp3_WSS-Stnd	Displays the detected WSS-standard value found in input3 (CVBS input). This is displayed as listed under sInp1_WSS-Stnd.
sInp3_WSS-Extnd	Displays the detected WSS-extended value found in input3 (CVBS input). This is displayed as listed under sInp1_WSS-ext.

sInpCVBS	<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"> ▪ NTSC-J ▪ NTSC-M ▪ NTSC-4.43 ▪ PAL-BGHID ▪ PAL-N ▪ PAL-M ▪ PAL-60 ▪ SECAM ▪ SECAM-525 ▪ NA (no input detected)
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, Trans, TestPattern or NA.
FunctionB	Displays the current function outputs B1 and B2. For the card it can only be Up, 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
GPI C	Displays the current value of GPI pool C
OP47-Det-A	Displays whether or not there's OP47 detected on channel A

OP47-Det-B	Displays whether or not there's OP47 detected on channel B
WST-Det-A	Displays whether or not there's WST (teletext) detected on channel A
WST-Det-B	Displays whether or not there's WST (teletext) detected on channel B
CC_Det_A	Displays whether or not there's Closed Captioning detected on channel A
CC_Det_B	Displays whether or not there's Closed Captioning detected on channel 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.
IPO	This item displays the current IP address of the card.
NMO	This item displays the current Netmask of the card.
GWO	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 card 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?	<p>The message consists of the following items;</p> <ol style="list-style-type: none"> 1) A message string to show what has happened in text, for example: "INP_LOSS", "REF_LOSS", "INP_RETURN". 2) A tag that also shows what happens, but with a predefined number: e.g. 1 (= loss of input), 2 (= loss of reference), 129(= 1+128 = return of input). For a list of these predefined tags see the table on the next page. 3) A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled. 4) A slot number of the source of this event.
The Message String	The message string is defined in the card and is therefore fixed. It may be used in controlling software like Synapse Set-up to show the event.

The Tag

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

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

Defining Tags

The tags defined for the card are:

Event Menu Item	Tag		Description
Announcements	0 or NA	0 or NA	Announcement of report and control values
Input_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.

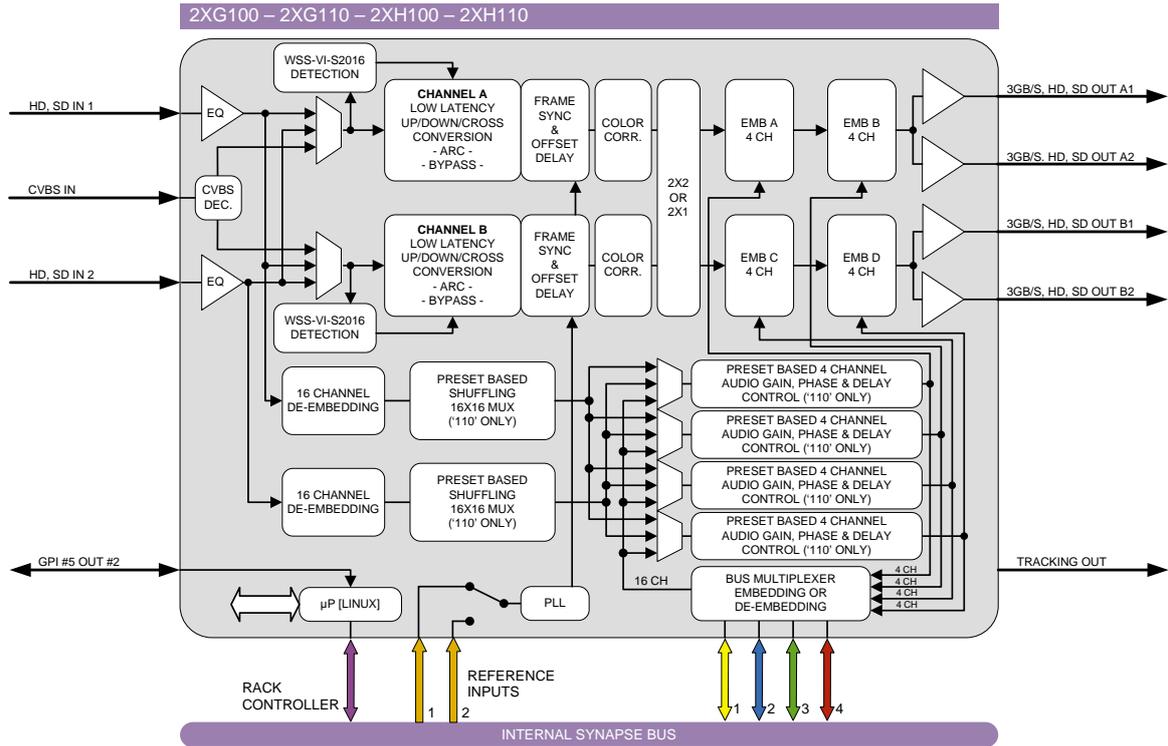
The Address

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

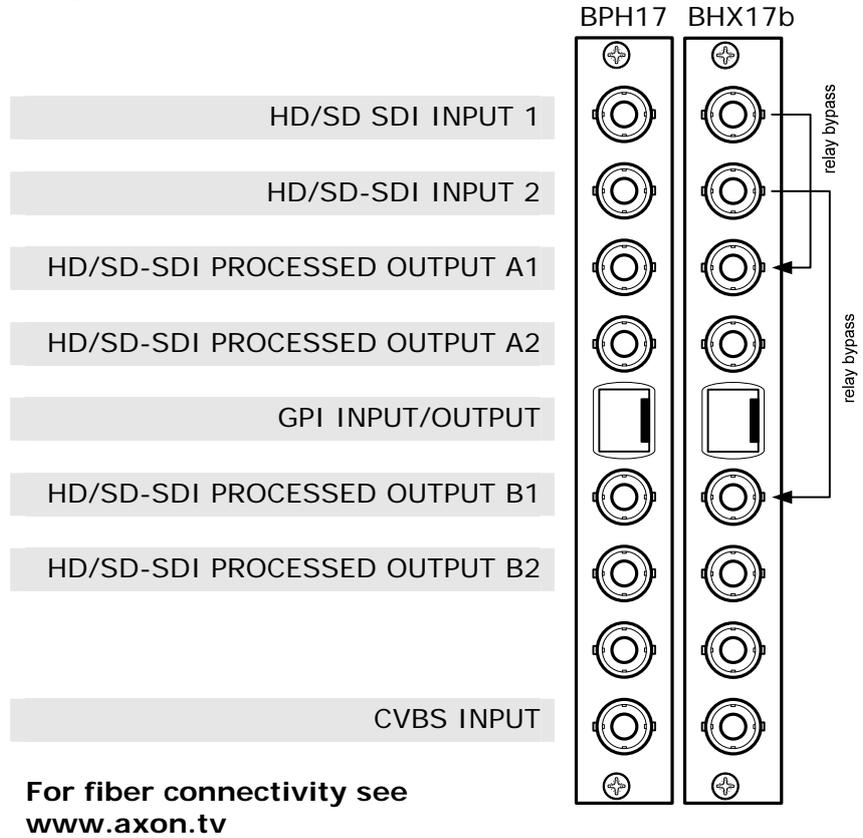
Error LED	The error LED indicates an error if the internal logic of the card is not configured correctly or has a hardware failure.
Input_A LED	This LED indicated the presence of a valid SDI video signal on input A.
Input_B LED	This LED indicated the presence of a valid SDI video signal on input B.
ANC 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

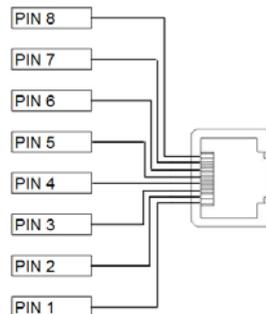
The 2XG/2XH100-110 can be used with the BPH17 or the BHX17b. The following table displays the pinout of these backpanels in combination with the card.



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

!Please read Appendix 1 before connecting any

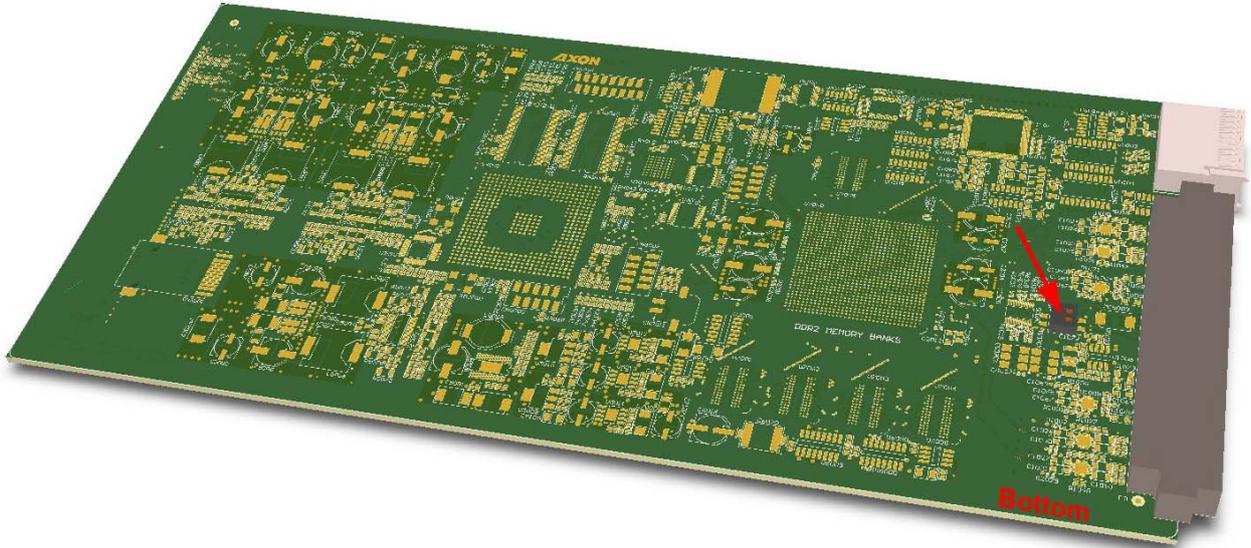
GPI pinning



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 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_3 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 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



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.