



# HNS400

VBI/VANC line inserter/swapper (data bridge) for  
composite, HD and SD SDI inputs

**Installation and Operation manual**

Committed.



*Synapse*

## TECHNICAL MANUAL

HNS400



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

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

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



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

Axon Digital Design  
HNS400



Tested To Comply  
With FCC Standards

FOR HOME OR OFFICE USE

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

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# 1 Introduction to Synapse

## An Introduction to Synapse

Synapse is a modular system designed for the broadcast industry. High density, intuitive operation and high quality processing are key features of this system. Synapse offers a full range of converters and processing modules. Please visit the AXON Digital Design Website at [www.axon.tv](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 manual. The method of connection to a computer using Ethernet is also 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 the Synapse Cortex software 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.

### Locating the card

The Synapse card can be placed vertically in an SFR18 frame or horizontally in an SFR04 or 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.

**REMARK:** On power up all LEDs will light for a few seconds, this is the time it takes to initialise the card.



### 3 A Quick Start

#### When Powering-up

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

#### Default settings

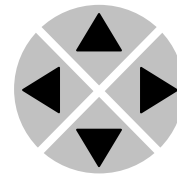
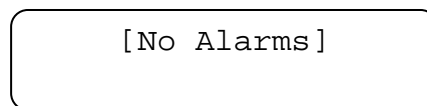
In its default condition, the HNS400 will act as a VBI inserter, inserting data that is placed in the VBI of a analog or SDI video source into an SDI signal. For example this data could be Teletext.

#### Changing settings and parameters

The front panel controls or 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.

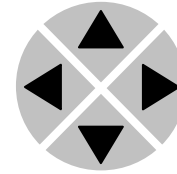
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

**REMARK:** 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

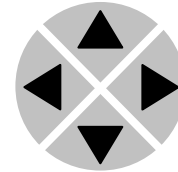
RRC18 [Select Card]  
>S01=SFS10



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

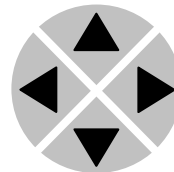


Pressing the ► selects the menu item shown, in this example Settings.

(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

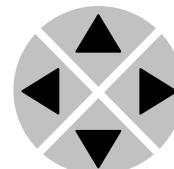


Pressing the ► selects the settings item shown, in this example SDI-Format.

(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]



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**

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 Cortex 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. 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 Cortex, please refer to the Cortex help files.

**Menu Structure Example**

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲				
S01	SFS10	Settings	SDI-Format	Auto
▼		▼	▼	▼
S00	RRC18	Status	Mode	625
		▼	▼	▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	

REMARK: Further information about Front Panel Control and Cortex can be obtained from the rack controller manuals and Cortex help files.

**Quick start for data-bridge use**

To reset the card into bridging all lines from either the SDI or CVBS input, use these two simple steps.

1. Set 'All\_Lines' to 'On'. This resets all #Src-Ins-Ln to the corresponding Ins-Ln.
2. Set either 'All\_Clone\_Ana' or 'All\_Clone\_SDI2' to 'On'. This selects either the SDI or CVBS input to be the source of all of these lines.

This is needed because the factory default settings for the #Ins-Ln, #Src-Ins-Ln items are not optimal for the most common data-bridge use.

If you don't follow this procedure, you would have to manually select a source and line for each line to insert.

## 4 The HNS400 Card

### Introduction

The HNS400 is a HD and SD SDI VBI/VANC inserter with composite and SDI inputs and an HD, SD SDI outputs. VBI (for example Teletext) or VANC (OP47, S2031) information present in the composite or SDI signal can be transcoded and inserted into the main HD or SD SDI signal. The HNS400 can insert lines from both composite and SDI domain into lines in the SDI domain. For example, line 7 of the CVBS input can be inserted into line 335 of the SDI signal.

This line exchange is transparent to embedded audio that might be present in the SDI domain. The complete insertion table is placed below.

### Features

- WST-B translation into OP47 or S2031
- Lines can be swapped, blanked or set transparent
- Built-in proc-amp
- 2 processed outputs
- Locks to SDI input
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)
- Optional 1 fiber input (replacing 1 SDI input) or 1 fiber output (replacing 1 SDI output) on I/O panel
- Optional 1 CVBS output (replacing 1 SDI output) on I/O panel

### Applications

Generic data bridge application where composite domain vertical blanking lines are inserted in the SDI domain

### Conversion abilities

The HNS400 card is able to switch the following lines:

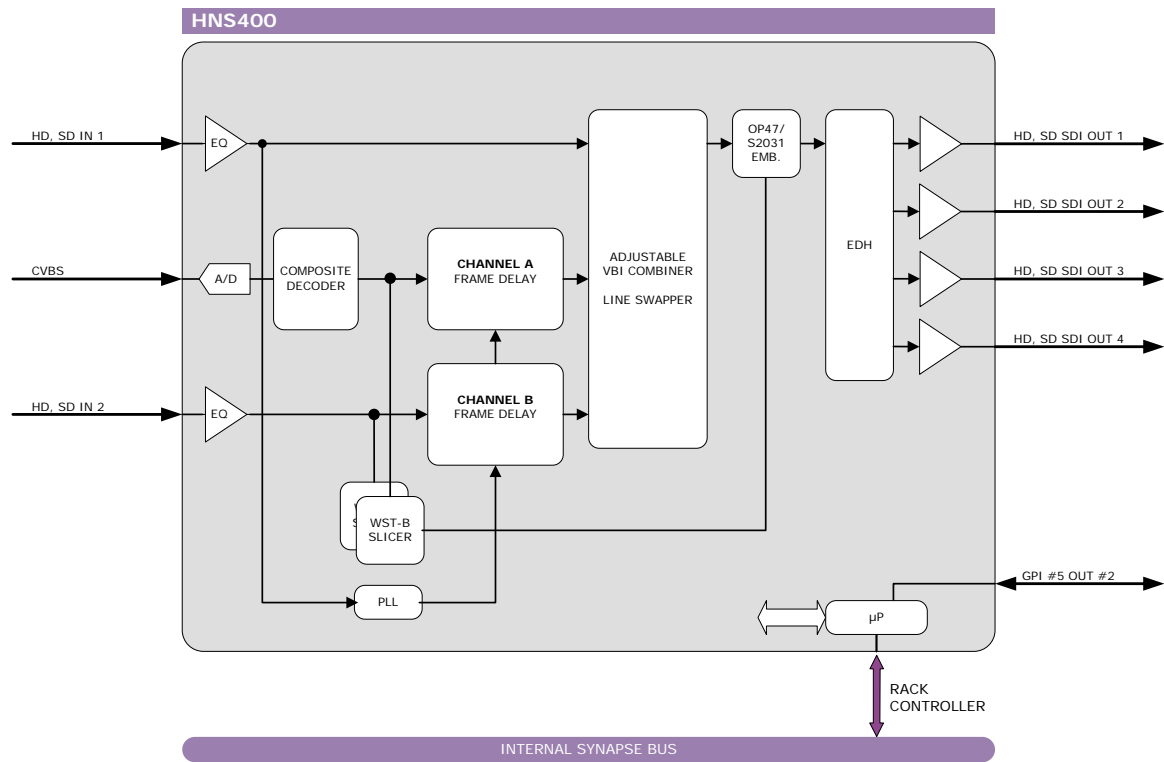
FUNCTIONS		Output					
		576i50(625)	480i59.94(525)	720p50	720p59.94	1080i50	1080i59.94
Input	576i50(625)	Bridge VBI		WST-B to OP47*/S2031		WST-B to OP47*/S2031	
	480i59.94(525)		Bridge VBI				
	720p50			Bridge VANC			
	720p59.94				Bridge VANC		
	1080i50					Bridge VANC	
	1080i59.94						Bridge VANC

\* = OP47-SDP

Note: - Input format = HD,SD SDI 2 input format or CVBS input  
 - Output format = HD, SD SDI 1 input format  
 - Different field-rates on inputs cannot be mixed, empty squares are No Operation

Effective on lines	Field 1	Field 2
576i50(625)	7..22	320..335
480i59.94(525)	11..21	274..284
720p50	8..25	
720p59.94	8..25	
1080i50	8..20	571..583
1080i59.94	8..20	571..583

Block Schematic



## 5 Settings Menu

<b>Introduction</b>	<p>The settings menu displays the current state of each setting within the HNS400 and enables the item to be changed or adjusted.</p> <p>Settings can be changed using the front panel of the Synapse frame (SFR18, SFR08 or SFR04) or Cortex.</p> <p>Please refer to chapter 3 for information on the Synapse front panel control and Cortex.</p>
<b>SDI_Format</b>	<p>This item lets you select the SDI input format of the card. This can be one of the following:</p> <ul style="list-style-type: none"><li>▪ 1080i60</li><li>▪ 1080i50</li><li>▪ 720p60</li><li>▪ 720p50</li><li>▪ SD625</li><li>▪ SD525</li><li>▪ Auto (automatic detection)</li></ul> <p>By default it is set to Auto.</p>
<b>SDI2_Inp_Mod</b>	<p>This item allows you to process the teletext or VBI signal present on the SDI input 2 synchronous or asynchronous with respect to SDI input 1.</p> <ul style="list-style-type: none"><li>▪ sync</li><li>▪ async</li></ul> <p>By default it is set to sync</p>
<b>CVBS_Inp_Mod</b>	<p>This item allows you to process the teletext or VBI signal present on the CVBS input synchronous or asynchronous with respect to SDI input 1.</p> <ul style="list-style-type: none"><li>▪ sync</li><li>▪ async</li></ul> <p>By default it is set to sync</p>
<b>Ins_Ln-625-F1</b>	<p>In this menu item you select which output line of field 1 you want to edit. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #Ins-Fn-625-F1, and which source line should be used in the menu item #Src-Ln-625-F1 for SD625 formats.</p> <p>You can choose line 7 till line 22 to edit.</p>

<b>#Ins-Fn-625-F1</b>	<p>This item you can select what the action the HNS400 perform on the with Ins-Ln-625-F1 selected line of the first field for SD625 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone Analog (copy the data from the lines as they are in the analog input)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#Src-Ln-625-F1</b>	<p>With this item you can select which source line of the chosen input (analog or SDI2, done with #Ins-Fn-625-F1 setting) should be copied to the Ins-Ln-625-F1 selected line for SD625 formats.</p>
<b>Ins_Ln-525-F1</b>	<p>In this menu item you select which output line of field 1 you want to edit in SD525 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #Ins-Fn-525-F1, and which source line should be used in the menu item #Src-Ln-525-F1 for SD525 formats.</p> <p>You can choose line 11 till line 21 to edit.</p>
<b>#Ins-Fn-525-F1</b>	<p>This item you can select what the action the HNS400 perform on the with Ins-Ln-525-F1 selected line of the first field in SD525 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone Analog (copy the data from the lines as they are in the analog input)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#Src-Ln-525-F1</b>	<p>With this item you can select which source line of the chosen input (analog or SDI2, done with #Ins-Fn-525-F1 setting) should be copied to the Ins-Ln-525-F1 selected line for SD525 formats..</p>
<b>End_VBI_F1</b>	<p>With this setting you can set where the end of the VBI lines is of field 1 of the CVBS input. You can set it to the normal position, or to -1 line.</p>
<b>Ins-Fn-625-23</b>	<p>WSS data may be present in line 23. You can clear this line, make it transparent or copy line 23 out of the Analog or SDI2 input.</p>
<b>Ins_Ln-625-F2</b>	<p>In this menu item you select which output line of field 2 you want to</p>

	<p>edit for SD625 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #Ins-Fn-625-F2, and which source line should be used in the menu item #Src-Ln-625-F2.</p> <p>You can choose line 320 till line 335 to edit.</p>
<b>#Ins-Fn-625-F2</b>	<p>This item you can select what the action the HNS400 perform on the with Ins-Ln-625-F2 selected line of the second field for SD625 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone Analog (copy the data from the lines as they are in the analog input)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#Src-Ln-625-F2</b>	<p>With this item you can select which source line of the chosen input (analog or SDI2, done with #Ins-Fn-625-F2 setting) should be copied to the Ins-Ln-625-F2 selected line for SD625 formats.</p>
<b>Ins_Ln-525-F2</b>	<p>In this menu item you select which output line of field 2 you want to edit for SD525 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #Ins-Fn-525-F2, and which source line should be used in the menu item #Src-Ln-525-F2.</p> <p>You can choose line 274 till line 284 to edit.</p>
<b>#Ins-Fn-525-F2</b>	<p>This item you can select what the action the HNS400 perform on the with Ins-Ln-525-F2 selected line of the second field for SD525 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone Analog (copy the data from the lines as they are in the analog input)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#Src-Ln-525-F2</b>	<p>With this item you can select which source line of the chosen input (analog or SDI2, done with #Ins-Fn-525-F2 setting) should be copied to the Ins-Ln-525-F2 selected line for SD525 formats.</p>
<b>End_VBI_F2</b>	<p>With this setting you can set where the end of the VBI lines is of</p>



	field 2 of the CVBS input. You can set it to the normal position, or to -1 line.
<b>WST-EC-status</b>	<p>Enables or disables various error counters in the status menu, namely the following:</p> <ul style="list-style-type: none"> <li>▪ Pkt0-Par-EC</li> <li>▪ Pkt31-CRC-EC</li> <li>▪ WST-MagRow-EC</li> </ul> <p>Can be set to On or Off. By default set to Off.</p>
<b>Chroma-Pass</b>	If this setting is set to 'On' the chrominance at the VBI lines of the SDI input is passed through to the output. The settings are On or Off. The default setting is Off.
<b>VI-Pass</b>	If this setting is set to 'On' the chroma information on line 11 (like VI information) of the SDI input is passed through to the output. This is independent of settings: chroma_blank, and F1 line 11 settings. Default is Off.

## VIDEO PROC

<b>Y-Black</b>	This item controls the Luminance black level adjustment between -128.....+127bits The black level can be aligned by +/- 100mV(analog video). The default setting is 0 bit.
<b>Cr-Black</b>	This item controls the Colour Difference (Cr) black level adjustment. The default setting is 0 bit
<b>Cb-Black</b>	This item controls the Colour Difference (Cb) black level adjustment. The default setting is 0 bit
<b>Y-Gain</b>	Y-Gain controls the Luminance gain of the built-in processing amplifier. The control range is between 0% and 150%. The default setting is 100%.
<b>Cr-Gain</b>	Cr-Gain controls the Colour Difference gain of the built-in processing amplifier. The control range is between 0% and 150%. The default setting is 100%.
<b>Cb-Gain</b>	Cb-Gain controls the Colour Difference gain of the built-in processing amplifier. The control range is between 0% and 150%. The

default setting is 100%.

## MISC

**All\_Clone\_Ana** When set to on: #Ins-Fn-625-F1, #Ins-Fn-625-F2, #Ins-Fn-525-F1 and #Ins-Fn-525-F2 are all set to Clone Analog.

**All\_Clone\_SDI2** When set to on: #Ins-Fn-625-F1, #Ins-Fn-625-F2, #Ins-Fn-525-F1, #Ins-Fn-525-F2, #InsFn720p50, #InsFn720p60, #InsFn1080i60-F1, #InsFn1080i50-F1, #InsFn1080i60-F2 and #InsFn1080i50-F2 are all set to SDI2.

**All\_Transparent** When set to on: #Ins-Fn-625-F1, #Ins-Fn-625-F2, #Ins-Fn-525-F1, #Ins-Fn-525-F2, #InsFn720p50, #InsFn720p60, #InsFn1080i60-F1, #InsFn1080i50-F1, #InsFn1080i60-F2 and #InsFn1080i50-F2 are all set to Transparent.

**All\_Clear** When set to on: #Ins-Fn-625-F1, #Ins-Fn-625-F2, #Ins-Fn-525-F1, #Ins-Fn-525-F2, #InsFn720p50, #InsFn720p60, #InsFn1080i60-F1, #InsFn1080i50-F1, #InsFn1080i60-F2 and #InsFn1080i50-F2 are all set to Clear.

**All\_Lines** When set to on: All linked line settings (for instance #Ins-Ln-625-F1 and #Src-Ln-625-F1) are set to match each other. This is done for *all presets*!

## INSERTER

### Control

The Control menu item determines how the VI and WSS inserter of the HNS400 is controlled. The settings of Control are:

- Manual
- VI1, VI2 or VI3: Video index of input 1, 2 or 3.
- WSS-std1, WSS-std2 or WSS-std3: standard widescreen signalling of input 1, 2 or 3.
- WSS-ext1, WSS-ext2 or WSS-ext3: extended widescreen signalling of input 1, 2 or 3
- GPI-priori: when the local GPI input is used, GPI contact\_1 is routed to Preset\_1, GPI contact\_2 is routed to Preset\_2, up to GPI contact\_4+5 routed to Preset\_8. See GPI-priority table.
- GPI-prio-lvl: when the local GPI input is used, GPI contact\_1 is routed to Preset\_1, GPI contact\_2 is routed to Preset\_2, up to GPI contact\_4+5 routed to Preset\_8. See GPI-priority table. When no contacts are closed the 'no-control' preset is selected.
- GPI-binary: sets the presets by using the local GPI-contacts in a binary way (See table below).
- GPI-take: Sets the presets by using the local GPI-contacts in a binary way (See table below), not triggered until a take-pulse (GPI 5) is given. The take pulse should last at least 101 us. After the GPI take pin has been low for at least 101 us, a take event is generated and the AFD encoded on GPI 1 to 4 is copied. The AFD should be kept on the GPI's for at least 1 ms after the take pulse to let the software handle it correctly.
- GPI-Slave: if used in combination with GPI16 card

The following table gives the preset selection when Control is set to Video Index or WSS-ext:

Incoming Format	Preset Selection
4:3_0	1
4:3_1	2
4:3_2	3
4:3_3	4
4:3_4	5
4:3_5	6
4:3_6	7
4:3_7	8
16:9_0	9
16:9_1	10
16:9_2	11
16:9_3	12
16:9_4	13
16:9_5	14
16:9_6	15
16:9_7	16

The following table gives the preset selection when Control is set to WSS-std:

Incoming Standard	Preset Selection
1_vid	1
2_vid	2
3_vid	3
4_vid	4
5_vid	5
6_vid	6
7_vid	7
8_vid	8
1_flm	9
2_flm	10
3_flm	11
4_flm	12
5_flm	13
6_flm	14
7_flm	15
8_flm	16

GPI\_binary table

Select Preset	Gpi_1 contact	Gpi_2 contact	Gpi_3 contact	Gpi_4 contact
Preset_1	open	open	open	open
Preset_2	closed	open	open	open
Preset_3	open	closed	open	open
Preset_4	closed	closed	open	open
Preset_5	open	open	closed	open
Preset_6	closed	open	closed	open
Preset_7	open	closed	closed	open
Preset_8	closed	closed	closed	open
Preset_9	open	open	open	closed
Preset_10	closed	open	open	closed
Preset_11	open	closed	open	closed
Preset_12	closed	closed	open	closed
Preset_13	open	open	closed	closed
Preset_14	closed	open	closed	closed
Preset_15	open	closed	closed	closed
Preset_16	closed	closed	closed	closed

GPI\_priority/GPI-prio-lvl table:

(0 = open, 1 = closed, X = don't care)

Contact number (GPI#)

5	4	3	2	1	
0	0	0	0	0	Hold previous / set "no-control"
0	0	0	0	1	Preset 1
0	0	0	1	X	Preset 2
0	0	1	X	X	Preset 3
0	1	X	X	X	Preset 4
1	0	0	0	1	Preset 5
1	0	0	1	X	Preset 6
1	0	1	X	X	Preset 7
1	1	X	X	X	Preset 8

<b>No-Control</b>	The No-Control item allows you, when no VI or WSS data is present, to switch back to a selectable preset value. Any of the 16 presets can be selected. Can also be set to Hold, in which case the last active preset is held active. Hold is default.
<b>No-Control-cnt</b>	This sets the threshold of when the card detects a 'No-control' situation (the amount of time of no VI or WSS values, until the No-Control preset is activated). Can be any duration between 0 and 255 frames.
<b>Active-Preset</b>	Here you can manually change the active preset. Any of 16 presets can be selected. Can only be used when Control is set to manual! All setting preceded with a "#" prefix are part of the preset.
<b>#Preset-Name</b>	This field only functions as a mnemonic of the active preset. You can name it with a length of 16 characters.
<b>#VI-Insert</b>	This setting switches On or Off Video Index insertion. Can also be set to Blank in which case the original VI data is blanked and nothing is inserted. Off is default.
<b>#VI-Data</b>	When the above setting is set to On, this setting decides which VI data is inserted. Can be 4:3_0 till 4:3_7 or 16:9_0 till 16:9_7. 4:3_0 is default.
<b>#WSS-Insert</b>	This setting switches on or off WSS insertion. You can select whether you want to insert standard WSS or extended WSS. Can also be set to blank in which case the original WSS data is blanked and nothing is inserted. Default is off.
<b>#WSS-Stnd</b>	When the #WSS-Insert setting is set to Standard. This setting sets which WSS value should be inserted. Can be 1_vid till 8_vid or 1_flm till 8_flm. Default is 1_vid.
<b>#ColourCoding</b>	This WSS bit is only for PALplus. It can be set to Standard or MotionAdapt.
<b>#Helper</b>	Sets the WSS helper bit to No-Helper or Modulated. Should only be set when the aspect ratio is either 16:9_LC or GT16:9_LC and the number of lines is $\leq 430$ lines. This bit is for PALplus only.
<b>#Teletext</b>	Sets the WSS Teletext bit. Can be set to No-Subtitles (subtitles within Teletext) or Subtitles (subtitles within Teletext).

<b>#Open-Titles</b>	This sets the Open-Titles bit in the WSS signal. The bit is used to indicate whether or not subtitles should be displayed in the black bars of a letterboxed image or not. Can be set to <code>In-Active-Img</code> (subtitles are on the active image, not on the black bars), <code>Out-Active-Img</code> (subtitles are displayed on the black bars) or to <code>No-Subtitles</code> (subtitles won't be displayed).
<b>#Surround</b>	Sets the Surround bit in the WSS signal, indicating whether or not there's surround sound.
<b>#CopyRght-Assert</b>	Sets the Copyright information bit in the WSS signal. Can be switched on or off.
<b>#CopyRght-Rstrct</b>	Sets the copy restriction bit in the WSS signal. Can be switched on or off.
<b>#WSS-Extnd</b>	When the <code>#WSS-Insert</code> setting is set to <code>Extended</code> this setting sets which WSS value should be inserted. Can be <code>4:3_0</code> till <code>4:3_7</code> or <code>16:9_0</code> till <code>16:9_7</code> . <code>4:3_0</code> is default.
<b>#WSS-GPI-Ins</b>	<code>#WSS-GPI-Ins</code> is activated if <code>Extended</code> is selected in the setting menu item <code>#WSS-Insert</code> . The <code>#WSS-GPI-Ins</code> setting sets the programmable GPIs that are supported by WSS. selection of 4 GPI can be made: _____, ____4, 1____4. 12__4 etc to 1234. The default setting is _____.
<b>#GPI-Out-Slv</b>	The menu item <code>#GPI-Out-Slv</code> selects which GPI outputs of the slave GPI16 card are used. The available GPI outputs can be set between #1 to #16. The default setting is #1.

<b>GPI_Out1_Lcl</b>	<p>This setting controls the local GPI outputs. The user is able to relay several signals to the outputs:</p> <ul style="list-style-type: none"> <li>▪ <b>Off</b>: No information is passed to the GPI outputs.</li> <li>▪ <b>AFD_b0 to AFD_b3</b>: Either of the AFD Bits 0 to 3 of the incoming WSS standard or WSS extended signal may be set to GPI output 1.</li> <li>▪ <b>WSSGPI_b0 to WSSGPI_b3</b>: Either of the WSS GPI bits 0 to 3 of the incoming WSS extended signal may be set to GPI output 1.</li> <li>▪ <b>1hotGPI</b>: Bits 0 through 3 of the WSS extended GPI information are encoded to 2 outputs. When the user sets either <i>GPI output-local-1</i> or <i>GPI output-local-2</i> to 1hotGPI, the other <i>GPI output-local-1</i> or <i>GPI output-local-2</i> setting jumps to <b>1hotGPI</b> as well. When the GPI information bits 0 through 3 are one-hot encoded (i.e. "0001", "0010", "0100" or "1000"), this information may be encoded to 2 bits ("00", "01", "10" or "11") on the GPI output. When GPI bits are not one-hot encoded (i.e. "0011"), "00" will be set on the GPI output's.</li> <li>▪ <b>CpySlave</b>: Bit 0 of the slave input on the Axon Synapse bus is set to the GPI output.</li> <li>▪ <b>CpyLocal</b>: Input 1 of the local GPI contacts is set to the GPI output.</li> <li>▪ <b>CpySlvOut</b>: The GPI output follows the general purpose output bit 0 to the Axon Synapse bus (Default).</li> </ul>
<b>GPI_Out2_Lcl</b>	<p>Same as GPI_Out1_Lcl, but in CpySlave bit 1 is set to the GPI output. Hence CpyLocal outputs input 2 of the local GPI contacts. In CpySlvOut the GPI output follows the general purpose output bit 1 to the Axon Synapse bus.</p>

## OP47-INSERTER

<b>OP47-Source</b>	<p>The HNS400 can convert available WST-B data into OP47. With this setting you select which input will be the WST-B source for the OP47 inserter. Can be either SDI-2 or CVBS. Default is SDI-2.</p>
<b>OP47-SDP-Emb</b>	<p>Here you select into which line you want to embed OP47. Can be any line between line 8 and line 16. Can also be set to Off in which case no OP47 will be embedded (default).</p>

## HD LINES

<b>InsLn720p50</b>	<p>In this menu item you select which output line you want to edit for 720p50 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn720p50, and which source line should be used in the menu item #SrcLn720p50.</p> <p>You can choose line 8 till line 25 to edit.</p>
<b>#InsFn720p50</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn720p50 selected line for 720p50 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn720p50</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn720p50 setting) should be copied to the InsLn720p50 selected line for 720p50 formats.</p>
<b>InsLn720p60</b>	<p>In this menu item you select which output line you want to edit for 720p60 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn720p60, and which source line should be used in the menu item #SrcLn720p60.</p> <p>You can choose line 8 till line 25 to edit.</p>
<b>#InsFn720p60</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn720p60 selected line for 720p60 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn720p60</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn720p60 setting) should be copied to the InsLn720p60 selected line for 720p60 formats.</p>



<b>InsLn1080i50-F1</b>	<p>In this menu item you select which output line of the first field you want to edit for 1080i50 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn1080i50-F1, and which source line should be used in the menu item #SrcLn1080i50-F1.</p> <p>You can choose line 8 till line 20 to edit.</p>
<b>#InsFn1080i50-F1</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn1080i50-F1 selected line of the first field for 1080i50 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn1080i50-F1</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn1080i50-F1 setting) should be copied to the InsLn1080i50-F1 selected line for 1080i50 formats.</p>
<b>InsLn1080i60-F1</b>	<p>In this menu item you select which output line of the first field you want to edit for 1080i60 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn1080i60-F1, and which source line should be used in the menu item #SrcLn1080i60-F1.</p> <p>You can choose line 8 till line 20 to edit.</p>
<b>#InsFn1080i60-F1</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn1080i60-F1 selected line of the first field for 1080i60 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn1080i60-F1</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn1080i60-F1 setting) should be copied to the InsLn1080i60-F1 selected line for 1080i60 formats.</p>

<b>InsLn1080i50-F2</b>	<p>In this menu item you select which output line of the second field you want to edit for 1080i50 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn1080i50-F2, and which source line should be used in the menu item #SrcLn1080i50-F2.</p> <p>You can choose line 8 till line 20 to edit.</p>
<b>#InsFn1080i50-F2</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn1080i50-F2 selected line of the second field for 1080i50 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn1080i50-F2</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn1080i50-F2 setting) should be copied to the InsLn1080i50-F2 selected line for 1080i50 formats.</p>
<b>InsLn1080i60-F2</b>	<p>In this menu item you select which output line of the second field you want to edit for 1080i60 formats. This works in a preset way. When you select an output line using this item you will see what functions will be performed on that line in the menu-item #InsFn1080i60-F2, and which source line should be used in the menu item #SrcLn1080i60-F2.</p> <p>You can choose line 8 till line 20 to edit.</p>
<b>#InsFn1080i60-F2</b>	<p>This item you can select what the action the HNS400 performs on the with InsLn1080i60-F2 selected line of the second field for 1080i60 formats. Choose between:</p> <ul style="list-style-type: none"> <li>▪ Transparent (copy the data from SDI input 1)</li> <li>▪ Clear (delete the data)</li> <li>▪ Clone SDI2 (copy the data from the lines as they are in the second SDI input)</li> </ul>
<b>#SrcLn1080i60-F2</b>	<p>With this item you can select which source line of the chosen input (done with #InsFn1080i60-F2 setting) should be copied to the InsLn1080i60-F2 selected line for 1080i60 formats.</p>

## S2031-INSERTER

<b>S2031-Source</b>	The HNS400 can convert available WST-B data into S2031 (HD subtitles standard). With this setting you select which input will contain the WST-B data for the S2031 inserter. Can be either SDI-2 or CVBS. Default is SDI-2.
<b>S2031-Emb</b>	Here you select into which line you want to embed S2031. Can be any line between line 8 and line 16. Can also be set to Off in which case no S2031 will be embedded. Off is default.
<b>WST-Insert</b>	When set to On, incoming WST data from S2031 is converted into plain WST for insertion in SD signals. The lines on which the WST data is inserted are determined by the S2031 packet and are therefore not configurable.

## BYPASS

<b>Bypass-Input</b>	When set to SDI-1, the SDI-1 embedded WST or OP47 pass when the WST on Bridge_Inputs fail. When set to Bridge_Inputs, the Bridge_Inputs will be used as source if the SDI-1 embedded WST or OP47 fails. Default is Bridge_Inputs.
<b>Bypass-Timeout</b>	This sets a delay time before the Bypass (set with Bypass-Input) is enabled. If the fail is shorter than the here set time, the Bypass will not be enabled. Can be set between 1 and 120 seconds. Default is 1 second. This setting will only be used when Bypass-timer is set to On.
<b>Bypass-timer</b>	Set to off, the WST or OP47 will be processed normally, without bypass. When set to on, it will use the timeout setting, set with Bypass-Timeout. Default is off.

## 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>	This item sets the network prefix with IP_conf0 set to manual. Can be set between 0 and 30 bit. By default it is set to 0 bit

## 6 Status Menu

<b>Introduction</b>	The status menu indicates the current status of each item listed below.
<b>sInp1</b>	<p>This status item indicates the presence and format of a valid signal in input 1. This is displayed as:</p> <ul style="list-style-type: none"> <li>▪ 1080i60</li> <li>▪ 1080i50</li> <li>▪ 1080p30</li> <li>▪ 1080p25</li> <li>▪ 1080p24</li> <li>▪ 1035i60</li> <li>▪ 720p60</li> <li>▪ 720p50</li> <li>▪ 720p30</li> <li>▪ 720p25</li> <li>▪ 720p24</li> <li>▪ SD525</li> <li>▪ SD625</li> <li>▪ NA</li> </ul>
<b>sInp2</b>	This status item indicates the presence and format of a valid signal in input 2. This is displayed as listed under sInp1.
<b>sInp3</b>	This status item indicates the presence and format of a valid signal in input 3 (the analog input). This is displayed as listed under sInp1.
<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> </ul> <p>NA (no input detected)</p>
<b>EDH-Stat</b>	EDH-Stat gives the status of the incoming SDI signal EDH. Can be EDH-Error (EDH-errors detected) or OK (no EDH-errors are detected).

<b>WST-det</b>	Displays the WST status that has been detected. Can be NA (if no WST found), OK, Level-Low (WST detected, but with a low peak level) or Level-High (WST detected but with a high peak level).
<b>WST-MagRow-EC</b>	This item displays the error count of WST Magazine row errors. Can become a maximum of 255 errors.
<b>Pkt31-CRC-EC</b>	This item displays the error count of packet-31 CRC errors. Can become a maximum of 255 errors.
<b>S2031-WST-Det</b>	Displays whether S2031-WST has been detected. Can be NA or OK.
<b>Pkt0-Par-EC</b>	This item displays the error count of packet-0 parity errors. Can Become and maximum of 255 errors after which it will reset to 0.
<b>Preset-A</b>	This status item displays the current active preset.
<b>sInp1_VI ~ sInp3_VI</b>	Displays the current Video index in input 1 till input 3. Can be 4:3_0 till 4:3_7 or 16:9_0 till 16:9_7. When no VI is detected, this is indicated by NA.
<b>sInp1_WSS-Stnd ~ sInp3_WSS-Stnd</b>	Displays the current standard WSS value in input 1 till input 3. Can be 1_vid till 7_vid or 1_flm till 7_flm. When no standard WSS is detected, this is indicated by NA.
<b>sInp1_WSS-Extd ~ sInp3_WSS-Extd</b>	Displays the current extended WSS value in input 1 till input 3. Can be 4:3_0 till 4:3_7 or 16:9_0 till 16:9_7. When no extended WSS is detected, this is indicated by NA.
<b>sInp1_WSS-GPI ~ sInp3_WSS-GPI</b>	Displays the detected programmable GPIs that are supported by WSS, in inputs 1 till 3. Selection of 4 GPI can be displayed: ____, __4, 1__4. 12_4 etc to 1234.
<b>GPI_In_Local</b>	Displays the current local GPI value.
<b>GPI_In_Slave</b>	Displays the current GPI value coming from the GPI16 card.

<b>sInp2_WST-Det</b>	This status item indicates the status of the WST-B data on SDI input 2. Can be NA (no WST detected), OK (WST detected and OK), Level-Low (WST detected, but with a low peak level) or Level-High (WST detected but with a high peak level).
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<b>sInp3_WST-Det</b>	This status item indicates the status of the WST-B data on the analog input. Can be NA (no WST detected), OK (WST detected and OK), Level-Low (WST detected, but with a low peak level) or Level-High (WST detected but with a high peak level).
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## Network

<b>IP_Addr0</b>	This item displays the status of the IP address. It can be manual, DHCP asking, DHCP Leased or DHCP Infin.
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<b>IPO</b>	This item displays the current IP address of the card.
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<b>MAC0</b>	This item displays the MAC address of the card.
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<b>NMO</b>	This item displays the current Netmask of the card.
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<b>GWO</b>	This item displays the current Standard Gateway of the card.
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## 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 HNS400 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</b>	Input can be selected between 0 .. 255. 0= no event, 1..255 are the priority setting. If set to 0 no events will be generated. If the input is lost an Event will be generated at the priority.
<b>EDH-Status</b>	EDH status 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 HNS400 are:

Event Item	Menu	Tag		Description
Announcements	0 or NA		0 or NA	Announcing of report and control values
Input1		01 <sub>hex</sub> =INP1_LOSS	81 <sub>hex</sub> =INP1_RETURN	Input1 lost or returned
Input2		12 <sub>hex</sub> =INP2_LOSS	92 <sub>hex</sub> =INP2_RETURN	Input2 lost or returned
Input3		13 <sub>hex</sub> =INP3_LOSS	93 <sub>hex</sub> =INP3_RETURN	Input3 lost or returned
EDH-Status		03 <sub>hex</sub> =EDH_ERROR	83 <sub>hex</sub> =EDH_OK	EDH error occurred

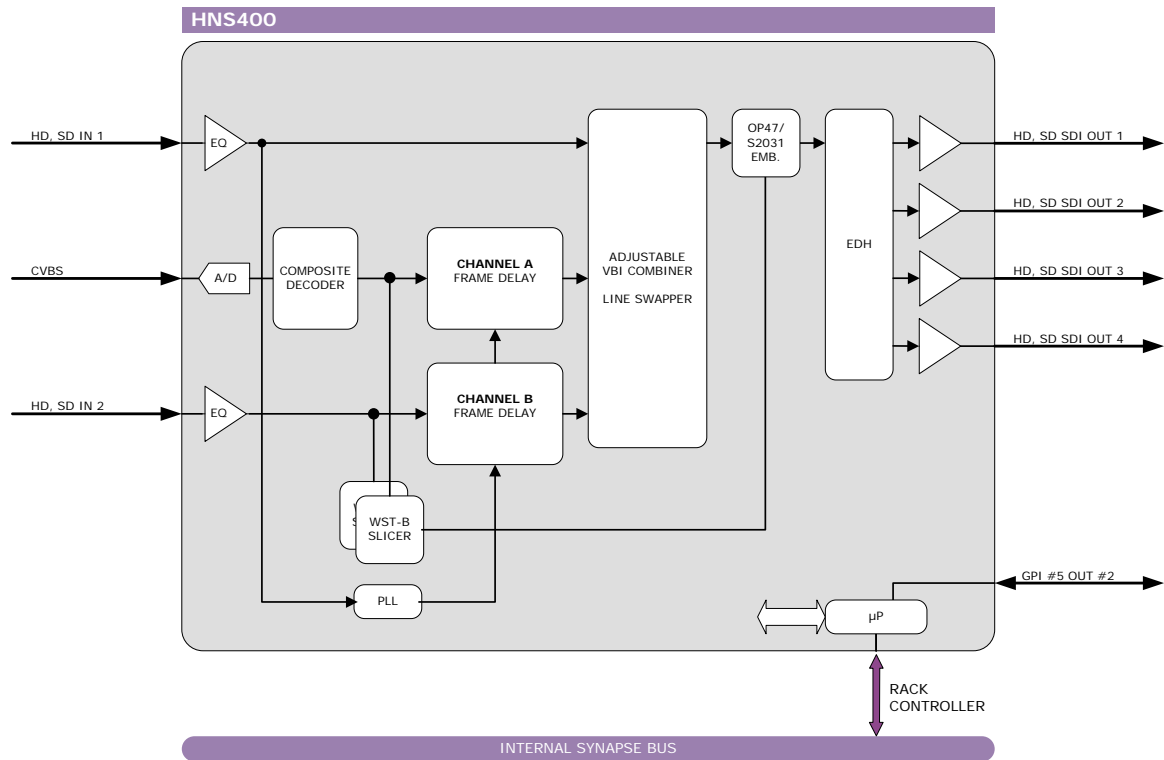
**The Priority** The priority is a user-defined value. The higher the priority of the alarm, the higher this value. Setting the priority to Zero disables the announcement of this alarm. Alarms with priorities equal or higher than the Error Threshold setting of the RRC will cause the error LED on the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

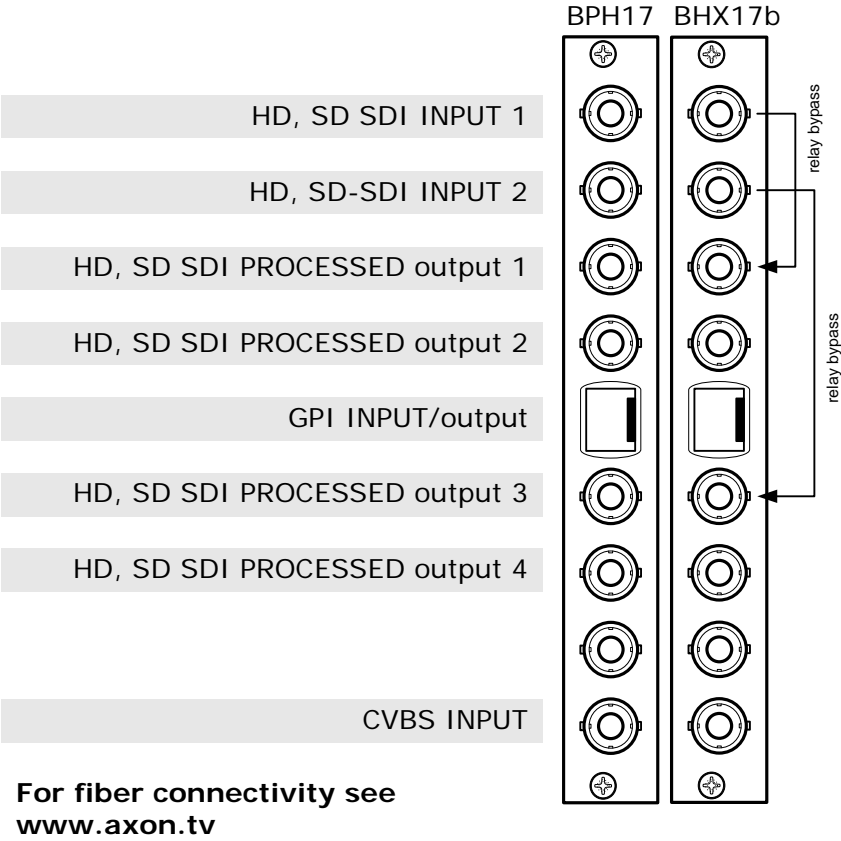
<b>Error LED</b>	The error LED indicates an error if the internal logic of the HNS400 card is not configured correctly or has a hardware failure.
<b>Input_1 LED</b>	This LED indicated the presence of a valid SDI video signal on input 1.
<b>Input_2 LED</b>	This LED indicated the presence of a valid SDI video signal on input 2.
<b>ANC Data LED</b>	Indicates the presence of ancillary data within the input signal.
<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 HNS400 card is not configured correctly or has a hardware failure.

## 9 Block Schematic



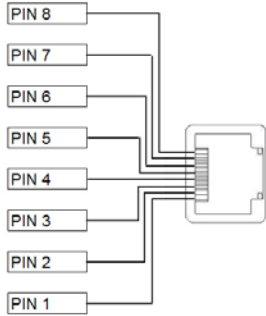
# 10 Connector Panels

The HNS400 can be used with the BPH17 or the BHX17b. The following table displays the pinout of these backpanels in combination with the HNS400.



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

## GPI pinning

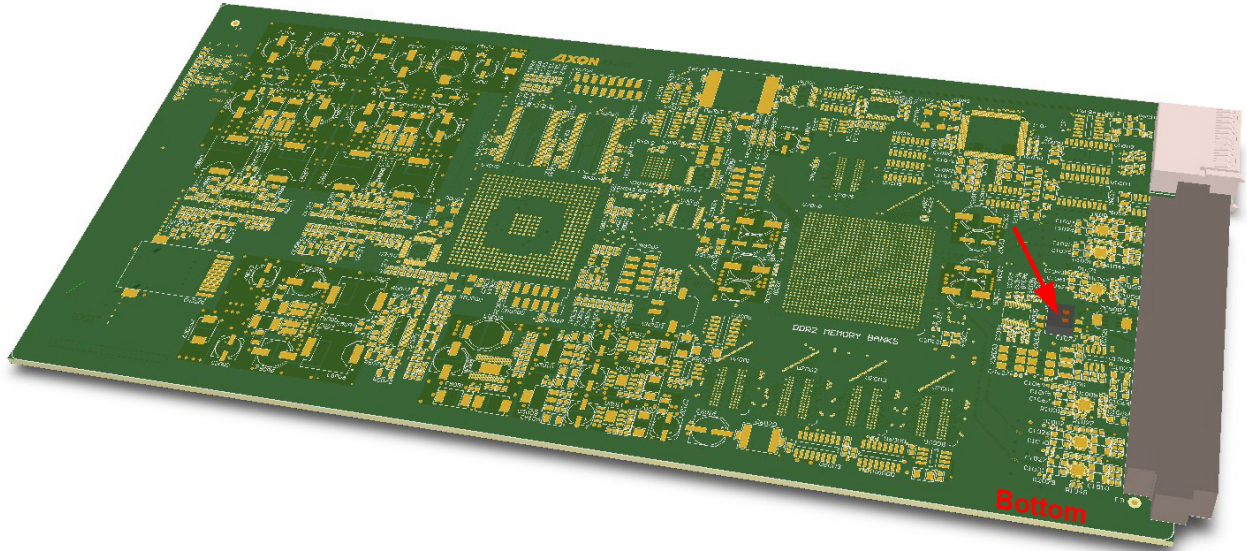


Pin	Function
1	GPI in 0
2	GPI in 1
3	GPI in 2
4	GPI in 3
5	GPI in 4
6	GPI out 1
7	GPI out 2
8	Ground

## 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.

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