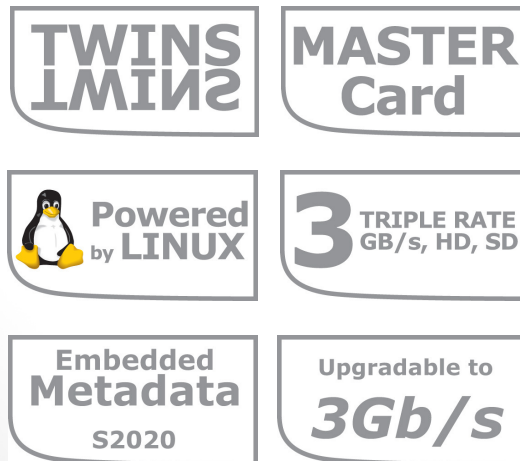




GRB550/590/950/990 **HRB550/590/950/990**

3Gb/s, HD, SD audio de-embedder, re-embedder,
embedded domain shuffler with S2020 metadata
insertion

Installation and Operation manual



Committed.





Synapse

TECHNICAL MANUAL

GRB550/590/950/990

HRB550/590/950/990



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

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

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

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Date created: 03-12-2009
 Date last revised: 01-04-2015

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

| | |
|---|--|
| Axon Digital Design GRB550/590/950/990 HRB550/590/950/990 Tested To Comply With FCC Standards FOR HOME OR OFFICE USE | This device complies with part 15 of the FCC Rules Operation is subject to the following two conditions: (1) This device may cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. |
|---|--|

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1 Introduction to Synapse

An Introduction to Synapse

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

Local Control Panel

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

Remote Control Capabilities

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



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

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

2 Unpacking and Placement

Unpacking

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

Placing the card

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

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

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

3 A Quick Start

When Powering-up

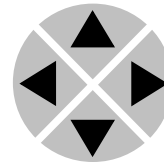
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of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

Changing settings and parameters

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

Front Panel Control

Front Panel Display and Cursor



Settings are displayed and changed as follows;

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

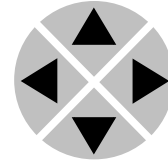
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

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

Example of changing parameters using front panel control

With the display as shown below

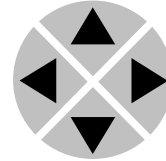
```
RRC18 [Select Card]
>S01=SFS10
```



Pressing the **▶** selects the SFS10 in frame slot 01.

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

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

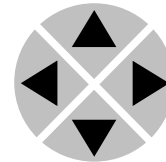


Pressing the **▶** selects the menu item shown, in this example `Settings`.

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

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

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



Pressing the **▶** selects the settings item shown, in this example `SDI-Format`.

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

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

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



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

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



Axon Cortex Software

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

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

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

Menu Structure Example

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

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

4 The GRB990 Card

Introduction

The G/HRB990-950-550 is a 48x32 channel re-embedder, with a 16 channel embedder (2x 8 channels in 2 individual SDI streams), 4 AES/EBU or analog outputs, and 4 AES channels to the Synapse ADD-ON bus.

The source audio channels can be derived from 2 x 16 channel embedded domain streams, 4 AES/EBU or analog physical audio inputs and 8 channels from the Synapse bus

The HRBxx0 can be future upgraded to GRBxx0. This allows for staged implementation of HD infrastructures and spread the cost over multiple budget years.

Features

- 2 SDI inputs (with auto switch on carrier loss, and switch back function)
- 2 SDI outputs (2x1 or 2x2 function)
- Compatible with the following input formats (auto selecting) (1080p only for GXX):

| | |
|--------------|--------------|
| ▪ 1080p59.94 | ▪ 1080p23.98 |
| ▪ 1080p50 | ▪ 720p59.94 |
| ▪ 1080i59.94 | ▪ 720p50 |
| ▪ 1080i50 | ▪ SD525 |
| ▪ 1080p29.97 | ▪ SD625 |
| ▪ 1080p25 | |
- Dual offset VIDEO delay adjustable between 0 and 500ms
- Dual (TWINS) or single channel SDI mode when sources are clock locked (not phase locked*)
- 4 AES/EBU inputs with sample rate converter (available with 110 Ohm and 75 Ohm inputs), or 4 analog inputs (available with balanced or unbalanced connectors).
- 4 AES/EBU outputs or 4 analog outputs.
- AES/EBU inputs accept synchronous streams like Dolby E and asynchronous up to 192kHz sampling via the built in Sample Rate Converters.
- Auto SRC-off for bitstream sources like Dolby E
- 4 extra AES/EBU inputs through the Synapse bus
- 7 presets that configure all I/O channels. controlled by GPI or ACP (Cortex)
- S2020 metadata insertion from an external source
- Append and overwrite modes
- Audio level and phase control
- Audio offset delay up to 5000 ms
- Transparent for ATC time code RP188, RP196, RP215
- Locks to Tri-level, Bi-level syncs or SDI input
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)
- Optional 1 or 2 fiber inputs, 1 or 2 fiber outputs or a fiber in and output (replacing 1 SDI in and output) on the I/O panel
- Optional relay bypass (BHX18 or BHX18D)

* (In dual mode, or 2-SDI mode the sources need to be running on the same clock, the phase is not critical)

Applications

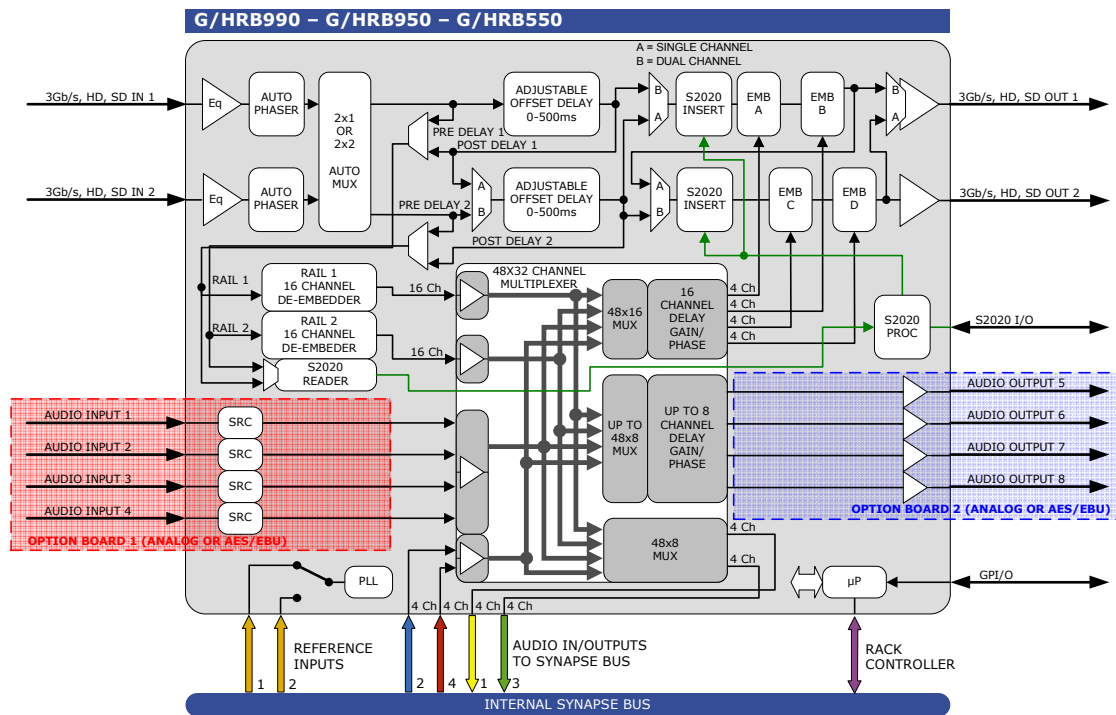
- Embedded domain shuffling with external (manipulated from internal) domain AES/EBU channels
- 3rd party audio processing from an embedded domain source

Input/Output options

This platform has 2 option boards which define the inputs of the card. Refer to the block schematic for the position of the option boards. These are the options:

| Card model | Option board 1 | Option board 2 |
|------------|-------------------------------|--------------------------------|
| GRB990 | 4 AES/EBU inputs (8 channels) | 4 AES/EBU outputs (8 channels) |
| HRB990 | 4 AES/EBU inputs (8 channels) | 4 AES/EBU outputs (8 channels) |
| GRB950 | 4 AES/EBU inputs (8 channels) | 4 analog outputs (4 channels) |
| HRB950 | 4 AES/EBU inputs (8 channels) | 4 analog outputs (4 channels) |
| GRB550 | 4 analog inputs (4 channels) | 4 analog outputs (4 channels) |
| HRB550 | 4 analog inputs (4 channels) | 4 analog outputs (4 channels) |

Block schematic



5 Settings Menu

Introduction

The settings menu displays the current state of each GRB-HRB 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

Inp_Select

With this item you can decide which of the 2 inputs is used and how the card will switch between the 2 inputs. Choices are:

- Auto: The card chooses input 1 if there is a source. If there is no input 1, the card will automatically switch to input 2.
- TWINS: The card will process both input 1 as well as input 2 as separate processed circuits. Be aware that these sources need to be running on the same clock, the phase is not critical
- SDI-1: only input 1 is used (disables detection of input 2)
- SDI-2: only input 2 is used (disables detection of input 1)

Switch-Back

With `Inp_Select` set to `Auto`, the card will automatically switch to the other input when the first input was lost. With `Switch-Back` set to `On`, the card will switch back to the first input if this it is back up again. Set to `Off` the card will keep using the other input even if the first input is back up again.

Lock-Mode

`Lock-Mode` determines whether the card is locked to input 1 (SDI1), input 2 (SDI2) or to the reference (Ref1 or Ref2). Can also be set to `Auto-SDI`, automatically selecting the currently active SDI input to lock to. By default it is set to `SDI1`.

Phaser1-Offset

Sets the offset of the auto phaser of input 1 (see block schematic) between 0 and 4124px. Default is 0px.

Phaser2-Offset

Sets the offset of the auto phaser of input 2 (see block schematic) between 0 and 4124px. Default is 0px.

F-delay_1

`F-Delay_1` sets the amount of delayed Frames of input 1. The available range is from 0 to 125 fields (dependant on the I/O). Default is 0F.

| | |
|------------------|--|
| V-delay_1 | <p>V-Delay_1 setting allows adjustment of the vertical phase of the output signal of input 1 with respect to the selected reference input.</p> <p>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 1124 lines (dependent on I/O format). The default setting is 0ln.</p> |
| H-delay_1 | <p>The H-Delay_1 setting allows adjustment of the Horizontal phase of the output signal of input 1 with respect to the selected reference input.</p> <p>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 4124 pixels (dependent on I/O format). The default setting is 0px.</p> |
| F-delay_2 | <p>F-Delay_2 sets the amount of delayed Frames of input 1 when Delay-mode_1 is set to Fr-Ln-Px. The available range is from 0 to 30 fields (dependent on the I/O). Default is 0F.</p> |
| V-delay_2 | <p>V-Delay_2 setting allows adjustment of the vertical phase of the output signal of input 1 with respect to the selected reference input, when Delay-mode_1 is set to Fr-Ln-Px.</p> <p>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 1124 lines (dependant on I/O format). The default setting is 0ln.</p> |
| H-delay_2 | <p>The H-Delay_2 setting allows adjustment of the Horizontal phase of the output signal of input 1 with respect to the selected reference input, when Delay-mode_1 is set to Fr-Ln-Px.</p> <p>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 4124 pixels (dependant on I/O format). The default setting is 0px.</p> |

| | |
|----------------------|--|
| Delay-Status | With this setting you switch <code>on</code> or <code>off</code> the delay status detection in the status menu. Default is <code>Off</code> . |
| PRESET | |
| Control | With this setting you decide whether the presets are controlled manually (using cortex of the front controls of the frame), or by use of the GPI inputs. |
| GPI-Ctrl | <p>The GRB/HRB/550/590/950/990 has several physical GPI contacts to control the card's presets (if presets are set to be GPI controlled)</p> <p><code>Latch</code>: Latching GPI mode. When a contact is closed momentarily (edge triggered).</p> <p><code>Non-Latch</code>: Non-latching GPI mode. When a contact is closed all the time (level triggered).</p> |
| ExtMode | With this item you set the purpose of pins 5 till 8 of the RJ45 connector on the backpanel. The pupose can be either additional GPIO contacts (resulting in 7 GPI contacts instead of 3) or to use those pins for a dolby metadata input. Default is <code>GPIO</code> . |
| Active-Preset | With this item you can manually change the currently active preset . Can be any preset between 1 and 7. By default it is set to 1. All menu settings that are preceded with a '#'-prefix are part of the preset. |
| Edit-Preset | Here you can select which of the 7 selectable 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 are part of the preset. |
| PrstEditView | With this setting set to <code>Follow Active</code> , the edit preset settings will follow the active preset when the active preset is changed. This to avoid confusion when changing the active. Set to <code>Independent</code> the edit preset will not automatically follow active preset changes. By default set to <code>Follow Active</code> . |
| #Preset_Name | Sets/displays the name of the currently displayed preset. |

| DE-EMBEDDING | |
|------------------------------------|--|
| #Rail1 | The audio on rail 1 (see block schematic) can be forwarded to the (de)embedding blocks before (pre-delay) or after (post-delay) the video-delay processing blocks. Default is pre-delay. |
| #Rail2 | The audio on rail 2 (see block schematic) can also be forwarded to the (de)embedding blocks before (pre-delay) or after (post-delay) the video-delay processing blocks. Default is pre-delay. |
| EMBEDDING | |
| #Emb-AB-Mode | With Emb-AB-Mode you select how the audio in groups A and B should be embedded into the video: <code>overwrite</code> the existing audio, or <code>Append</code> . Can also be set to <code>off</code> (switching off embedding for groups A and B entirely). Default is <code>overwrite</code> . |
| #Emb-CD-Mode | With Emb-CD-Mode you select how the audio in groups C and D should be embedded into the video: <code>overwrite</code> the existing audio, or <code>Append</code> . Can also be set to <code>off</code> (switching off embedding for groups C and D entirely). Default is <code>overwrite</code> . <i>Note:</i> When the card is operating in single-mode, this setting is automatically set to <code>append</code> . |
| #Emb_A_Sel ~ #Emb_D_Sel | With these setting you select in to which audio group (= 4 audio channels) of the outputs you want embedders A to D to embed the forwarded audio channels coming from the audio inputs/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 the forwarded audio channels for anything by setting this item to <code>off</code> . By default it is set to <code>Group1</code> . |

EMB AUDIO OUT

#SourceEmb-A1 ~ #SourceEmb-A4

With these settings you can select where the corresponding audio channels (channel A1 till channel A4) of embedder A are coming from:

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B
- AddOnD: Audio comes from addon bus group D
- Rail1: Audio comes from rail 1 (see blockschematic)
- Rail2: Audio comes from rail 2 (see blockschematic)

#Emb-A1 ~ #EmbA4

With this setting you decide which audio channel of the above selected source is used for embedder A, respectively channel 1 till 4. Can be any of the available 16 or 4 (dependent on the source setting) channels or set to `off`.

#SourceEmb-B1 ~ #SourceEmb-B4

With these settings you can select where the corresponding audio channels (channel B1 till channel B4) of embedder B are coming from:

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B (4 channels)
- AddOnD: Audio comes from addon bus group D (4 channels)
- Rail1: Audio comes from rail 1 (16 channels) (see block schematic)
- Rail2: Audio comes from rail 2 (16 channels) (see block schematic)

#Emb-B1 ~ #EmbB4

With this setting you decide which audio channel of the above selected source is used for embedder B, respectively channel 1 till 4. Can be any of the available 16 or 4 (dependent on the source setting) channels or set to `off`.

#SourceEmb-C1 ~ #SourceEmb-C4

With these settings you can select where the corresponding audio channels (channel C1 till channel C4) of embedder C are coming from:

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B (4 channels)
- AddOnD: Audio comes from addon bus group D (4 channels)
- Rail1: Audio comes from rail 1 (16 channels) (see block schematic)
- Rail2: Audio comes from rail 2 (16 channels) (see block schematic)

| | |
|--|--|
| #Emb-C1 ~ #EmbC4 | <p>With this setting you decide which audio channel of the above selected source is used for embedder C, respectively channel 1 till 4. Can be any of the available 16 or 4 (dependent on the source setting) channels or set to <code>off</code>.</p> |
| #SourceEmb-D1 ~ #SourceEmb-D4 | <p>With these settings you can select where the corresponding audio channels (channel D1 till channel D4) of embedder D are coming from:</p> <ul style="list-style-type: none"> ■ <code>LocalA</code>: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model) ■ <code>AddOnB</code>: Audio comes from addon bus group B (4 channels) ■ <code>AddOnD</code>: Audio comes from addon bus group D (4 channels) ■ <code>Rail1</code>: Audio comes from rail 1 (16 channels) (see block schematic) ■ <code>Rail2</code>: Audio comes from rail 2 (16 channels) (see block schematic) |
| #Emb-D1 ~ #EmbD4 | <p>With this setting you decide which audio channel of the above selected source is used for embedder D, respectively channel 1 till 4. Can be any of the available 16 or 4 (dependent on the source setting) channels or set to <code>off</code>.</p> |
| EmbA1_Gain ~ EmbD4_Gain | <p>Adjusts the gain for the corresponding incoming audio channel between -144 and 12dB. -144dB means the audio will be muted.</p> |
| EmbA1_Phase ~ EmbD4_Phase | <p>Adjusts the audio phase of the corresponding individual audio channel to 0 deg or 180 deg.</p> |
| #EmbA1_Delay ~ #EmbD4_Delay | <p>Adjusts the delay of the corresponding audio channel between 0 and 5000ms. These settings are part of the main preset.</p> |
| LOCAL AUDIO OUT | |
| #SourceLocB1 ~ #SourceLocB4 | <p>These settings let you decide what the source should be for audio of outputs B1 till B4 (AES/EBU outputs 1 and 2 in case of the 990/590 models and analog outputs 1 till 4 in case of the 550/950 models).</p> <ul style="list-style-type: none"> ■ <code>AddOnB</code>: Audio comes from addon bus group B (4 channels) ■ <code>AddOnD</code>: Audio comes from addon bus group D (4 channels) ■ <code>Rail1</code>: Audio comes from rail 1 (16 channels) (see block schematic) ■ <code>Rail2</code>: Audio comes from rail 2 (16 channels) (see block schematic) |

**#SourceLocB5 ~
#SourceLocB8**

These settings are only available in the 590/990 models. They let you decide what the source should be for audio of outputs B5 till B8 (AES/EBU outputs 3 and 4).

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B (4 channels)
- AddOnD: Audio comes from addon bus group D (4 channels)
- Rail1: Audio comes from rail 1 (16 channels) (see block schematic)
- Rail2: Audio comes from rail 2 (16 channels) (see block schematic)

**#LocOutB1 ~
#LocOutB4**

With these settings you can select one of the available embedded 16 channels of the above chosen rail input which should de-embedded to the corresponding output channel. B1 till B4 indicate AES/EBU outputs 1 and 2 in case of the 590/990 models and analog outputs 1 till 4 in case of the 550/950 models

**#LocOutB5 ~
#LocOutB8**

Only available in the 990/590 models. With these settings you can select one of the available embedded 16 channels of the above chosen rail input which should de-embedded to the corresponding output channel. B5 till B8 indicate AES/EBU outputs 3 and 4.

**#LocGainOutB1 ~
#LocGainOutB4**

Adjusts the gain for the corresponding audio output (Analog outputs 1 till 4 in case of the 550/950 models; AES/EBU outputs 1 and 2 in case of the 590/990 models) between -144 and 12dB. -144dB means the audio will be muted.

**#LocGainOutB5 ~
#LocGainOutB8**

Only available in 590/990 models. Adjusts the gain for the corresponding audio output (AES/EBU outputs 3 and 4) between -144 and 12dB. -144dB means the audio will be muted.

**LocPhaseOutB1 ~
LocPhaseOutB4**

Adjusts the audio phase of the corresponding individual output (Analog outputs 1 till 4 in case of the 550/950 models, AES/EBU outputs 1 and 2 in case of the 590/990 models) to 0 deg or 180 deg.

**LocPhaseOutB5 ~
LocPhaseOutB8**

Only available in the 590/990 models. Adjusts the audio phase of the corresponding individual output (AES/EBU outputs 3 and 4) to 0 deg or 180 deg.

**#LocDelayOutB1 ~
#LocDelayOutB4**

Adjusts the delay of the corresponding audio channel (Analog outputs 1 till 4 in case of the 550/950 models, AES/EBU outputs 1 and 2 in case of the 590/990 models) between 0 and 5000ms. These settings are part of the main preset.

#LocDelayOutB5
~
#LocDelayOutB8

Only available in the 590/990 models. Adjusts the delay of the corresponding audio channel (AES/EBU outputs 3 and) between 0 and 5000ms. These settings are part of the main preset.

ADDON AUDIO OUT

SourceAddonA1 ~
SourceAddonA4

These settings let you decide what the source should be for audio of outputs A1 till A4 to the add-on bus

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B
- AddOnD: Audio comes from addon bus group D
- Rail1: Audio comes from rail 1 (see blockschematic)
- Rail2: Audio comes from rail 2 (see blockschematic)

SourceAddonC1 ~
SourceAddonC4

These settings let you decide what the source should be for audio of outputs C1 till C4 to the add-on bus

- LocalA: Audio comes from audio inputs 1 till 4 (AES or analog inputs, depending on the card model)
- AddOnB: Audio comes from addon bus group B
- AddOnD: Audio comes from addon bus group D
- Rail1: Audio comes from rail 1 (see blockschematic)
- Rail2: Audio comes from rail 2 (see blockschematic)

AddonOutA1 ~
AddonOutA4

With these settings you can select one of the available embedded 16 channels of the above chosen input which should de-embedded to the corresponding add-on bus output channel. Can also be set to off, resulting in no audio on the corresponding output channel.

AddonOutC1 ~
AddonOutC4

With these settings you can select one of the available embedded 16 channels of the above chosen input which should de-embedded to the corresponding add-on bus output channel. Can also be set to off, resulting in no audio on the corresponding output channel.

MISC

SRC_AES-A1/2 ~
SRC_AES-A7/8

Only available in the 990/950 models. These settings adjust the sample rate converter of AES/EBU inputs 1 till 4. Can be set to *Transparent* (no sample rate conversion), *On* (always converting) or *Auto* (automatically switch to transparent in case dolby is detected).

0dBFS-IN

The setting 0dBFS-In sets the analog audio level that gives a full-scale digital input. The available settings are +12 dBu, +15dBu, +18dBu and 24dBu.

0dBFS-OUT

The setting 0dBFS-Out sets the analog audio output level for a digital full-scale output signal. The available settings are +12 dBu, +15dBu, +18dBu and 24dBu.

Addon-IO-Mode

With this setting you change the input/output order on the add-on bus. Possible are the following settings:



| Setting: | O-I-O-I | I-I-O-O | O-O-I-I |
|----------------|---------|---------|---------|
| Add-on Slot 1: | A | B | A |
| Add-on Slot 2: | B | D | C |
| Add-on Slot 3: | C | A | B |
| Add-on Slot 4: | D | C | D |

The menu items stay the same though:

- AddonB and AddonD in the menus are always *outputs*
- AddonA and AddonC in the menus are always *inputs*

NonPCM-Bypass

With this setting you can switch to bypass audio processing for all non-PCM audio *on* or *off*.

Fade-Time

Fade/time is locked to 2 parameters: channel-switch and gain-change. It is used as the fade-in/out time of the channel-switch of audio channels. The old channel will be fade-out and the new channel will be fade in according to the time chosen with fade-time. Fade-Time is also used for smooth transitions when gain-values are changed. These smooth transitions are triggered by a change in Gain settings or a Preset change. With this setting you can manually set this fade time between 100ms and 10.000ms. The default is 500ms.

Audio-Phase

If this setting is set to *Align*, the card ensures audio-phase alignment between multiple audio channels and audio groups, which is necessary for multi-channel (surround) purposes. If errors in the signal-chain occur the de-embedder blocks reset synchronously to maintain audio-phase-alignment. If this setting is set to *Off*, the card *eats-all* audio including errors. Even if there are DBN/ANC/ECC or channel-sequence errors, the de-embedder will pass them. Be aware that audio-phase-alignment between multiple audio channels and audio groups can not be maintained if this setting is set to *Off*.

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

**AudioStatusBits**

With this setting you select whether the audio status bits should be `Transparent` (same status bit on the outputs as on the inputs) or to `overwrite` them with new status bits.

Silence-Time

If the audio contains silence, it can be reported (in Cortex and SNMP). This setting allows you to determine how many seconds it takes before the card reports the silence by the audio status items. This setting can be set in a range from 1 sec to 60 sec. The default setting is 10sec.

Silence-Level

`Silence-level` determines the value that triggers a silence alarm. The silence threshold can be set between `-100` and `-20` dBFS. Default is `-60` dBFS .

METADATA**S2020-Source**

With this setting you select whether metadata should come from input 1 (`Rai11`) input 2 (`Rai12`) or if it is coming from the Local RJ45 input (requires the setting `ExtMode` to be set to `Metadata`). Default is `Rai11`.

Extract_Line

With this item you set a line between line 0 and line 1125 from where you want to extract the metadata from the input when `S2020-Soucre` is set to `Rai11` or `Rai12`. By default set too line 0.

Extract_Ass_Ch

One attribute of the S2020 metadata is the association channel. The association channel is the channel to which the metadata is connected. You can select the S2020 metadata to be extracted from one of the possible associated channel pairs ranging from `Ch01/02` to `Ch15/16`. Can also be set to `None` (in case there is no association set in the S2020 source or to `Auto` (in which case the S2020 is extracted from the first available associated channel).

S2020-Emb-AB

With this setting you decide whether you want to `overwrite` or to `switch off` metadata (S2020) inserting for embedders A and B.

S2020-Emb-CD

With this setting you decide whether you want to `overwrite` or to `switch off` metadata (S2020) inserting for embedders C and D

Insert_Line

With this setting you set a line to which the S2020 data should be inserted. Can be set between line 1 and line 1125. Default is line 9.



Insert_Method

There's 2 methods to insert S2020 (refer to the S2020 SMTPE document). Can be set to Method A or Method B. Default is B.

Insert_Ass_Ch

With this setting you select one of the 8 channel pairs (Ch1/2 till Ch15/16) to which the metadata should be associated. Can also be set to None (which is also a valid value of the metadata item).

6 Status Menu

| | |
|---------------------|--|
| Introduction | The status menu indicates the current status of each item listed below. |
| SDI-Input_1 | <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"> ▪ 1080P60 ▪ 1080p50 ▪ 1080i60 ▪ 1080i50 ▪ 1080p30 ▪ 1080p25 ▪ 1080p24 ▪ 1035i60 ▪ 720p60 ▪ 720p50 ▪ SD525 ▪ SD625 ▪ NA |
| SDI-Input_2 | This status item indicates the presence and format of a valid signal in input 2. This is displayed as listed under SDI-Input 1. |
| SDI-Freq_1 | Indicates the frequency of SDI input 1. Can be 1:1, 1:1.001 or NA. |
| SDI-Freq_2 | Indicates the frequency of SDI input 2. Can be 1:1, 1:1.001 or NA. |
| CRC-Stat_1 | Displays if there are CRC errors on input 1. |
| CRC-Stat_2 | Displays if there are CRC errors on input 2. |

| | |
|------------------------|--|
| Ref-Format | <p>Displays the reference format. Can be one of the following:</p> <ul style="list-style-type: none"> ■ NA ■ NTSC/480i ■ PAL/576i ■ 480p ■ 576p ■ 720p ■ 1080i ■ 1080p |
| Locked-To | <p>Displays to what the card is locked: Ref, SDI1, SDI2 or Not Locked.</p> |
| Active-Out1 | <p>Indicates what the current source is of output 1, can be SDI1 or SDI2.</p> |
| Active-Out2 | <p>Indicates what the current source is of output 2, can be SDI1 or SDI2.</p> |
| SDI1-Ref_Offset | <p>This status item shows the offset of SDI1 compared to the reference. Displayed in μs.</p> |
| SDI2-Ref_Offset | <p>This status item shows the offset of SDI2 compared to the reference. Displayed in μs.</p> |
| IO-Delay_1 | <p>This indicates the delay of input 1 compared to the output. Displayed in ms.</p> |
| IO-Delay_2 | <p>This indicates the delay of input 2 compared to the output. Displayed in ms.</p> |
| GPI | <p>Indicates the current GPI value</p> |
| ATC-Stat_AB | <p>Indicates any ATC errors in embedders A and B. can be NA (not available), Present or Error.</p> |
| ATC-Stat_CD | <p>Indicates any ATC errors in audio embedders C and D. can be NA (not available), Present or Error.</p> |

| | |
|--------------------------------------|---|
| ANC_RI1 | Shows the status of the ancillary data in rail 1. Can be NA, OK or error. |
| ANC_RI2 | Shows the status of the ancillary data in rail 2. Can be NA, OK or error. |
| GrpInUse_AB | Displays which groups are in use of embedders A and B combined. Displayed as for instance 1_3_ when groups 1 and 3 contain audio and for instance _234 when groups 2, 3 and 4 contain audio. |
| GrpInUse_CD | Displays which groups are in use of embedders C and D combined. Displayed as for instance 1_3_ when groups 1 and 3 contain audio and for instance _234 when groups 2, 3 and 4 contain audio. |
| Grp-Ins_AB | Indicates the status of the audio group A and B on the addon bus. Can be Error or OK. |
| Grp-Ins_CD | Indicates the status of the audio group C and D on the addon bus. Can be Error or OK. |
| LocStatInA1 ~ LocStatInD4 | This items indicate the status of each individual local audio channel input. Can be Silence, Clipped, OK or NA (not available) |
| LocFrmtInA1/2 | <p>Displays the format of inputs 1 and 2 in case of a 550 and input 1 in case of a 990. Can be one of the following:</p> <ul style="list-style-type: none"> ■ NA ■ PCM ■ Null ■ AC-3 ■ TimeStmp ■ MPEG-1 ■ MPEG-2 ■ SMPTE-KLV ■ Dolby E ■ Caption data ■ UserDef ■ Rsvd |

| | |
|---|---|
| LocFrmtInA3/4 | Displays the format of inputs 3 and 4 in case of a 550 and input 2 in case of a 990. Can be one of the formats listed under LocFrmtInA1/2. |
| LocFrmtInA5/6 | Displays the format of input 3 in case of a 990. Can be one of the formats listed under LocFrmtInA1/2. |
| LocFrmtInA7/8 | Displays the format of input 4 in case of a 990. Can be one of the formats listed under LocFrmtInA1/2. |
| AddOnFrmtInB1/2 ~ AddOnFrmtInD1/4 | Display the format of each individual add-on buss audio channel input pair. Can be one of the formats listed under LocFrmtInA1/2. |
| EmbStatOutA1 ~ EmbStatOutD4 | This items indicate the status of each individual embedder audio channel output. Can be Silence, Clipped, OK or NA (not available) |
| EmbFrmtOutA1/2 ~ EmbFrmtOutD3/4 | Display the format of each individual the embedder output pairs. Can be one of the formats listed under LocFrmtInA1/2. |
| LocStatOutB1 ~ LocStatOutB8 | Display the status of the individual audio channels. B1 till B4 represent AES/EBU outputs 1 and 2 in case of the 990 and analog outputs 1 till 4 in case of the 550. B5 till B8 represent AES/EBU outputs 3 and 4 in case of the 990. In the 550 B5 till B8 are not available). Can be OK, Silence, Clipped or NA (not available) |
| LocFrmtOutB1/2 ~ LocFrmtOutB7/8 | Display the format of the outputs. B1/2 and B3/4 represent AES/EBU outputs 1 and 2 in case of the 990 and analog outputs 1 till 4 in case of the 550. B5/6 and B7/8 represent AES/EBU outputs 3 and 4 in case of the 990. In the 550 B5/6 and B7/8 are not available).Can be one of the formats listed under EmbFrmtOutA1/2. |
| AddOnFrmtOutA1/2 ~ AddOnFrmtOutC3/4 | Display the format of each add-on buss audio output channel pair. Can be one of the formats listed under LocFrmtInA1/2. |
| Ext_Metadata | Detects whether or not metadata is present on the Metadata input of the backpanel. Can be Present, NA or Error. |

| | |
|---------------------|--|
| Progr_Config | <p>This status indicates the program config as present on the current metadata input. Can be one of the following values:</p> <ul style="list-style-type: none">■ 5.1+2■ 5.1+1+1■ 4+4■ 4x2■ 8x1■ 5.1■ 3x2■ 6x1■ 2+2■ 7.1■ Other■ NA |
| FPGA-Stat | <p>Displays the status of the FPGA chip. Can be error or OK.</p> |
| DM-A_Type | <p>Displays which type of input or output board is currently detected on circuit A. Can be Digital input or output, Analog input or output or NA. For instance: for the GRB/HRB550/990 this should always be an analog or digital input.</p> |
| DM-A_Status | <p>Indicates the status of I/O board A. can be OK, NA or Error.</p> |
| DM-B_Type | <p>Displays which type of input or output board is currently detected on circuit B. Can be Digital input or output, Analog input or output or NA.: for the GRB/HRB990 this should always be Digital output.</p> |
| DM-B_Status | <p>Indicates the status of I/O board B, can be OK, NA or Error.</p> |

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_1 | Input_1 can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting. |
| Input_2 | Input_2 can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting. |
| CRC-Status1 | CRC-Status1 can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting. |
| CRC-Status2 | CRC-Status2 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. |
| Silence_LocInA1 ~ Silence_LocInA8 | Silence_LocInA1 till A8 can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting. |

What information is available in an event?

The message consists of the following items;

- 1) A message string to show what has happened in text, for example: “INP_LOSS”, “REF_LOSS”, “INP_RETURN”.
- 2) A tag that also shows what happens, but with a predefined number: e.g. 1 (= loss of input), 2 (= loss of reference), 129(= 1+128 = return of input). For a list of these predefined tags see the table on the next page.
- 3) A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled.
- 4) A slot number of the source of this event.

The Message String

The message string is defined in the card and is therefore fixed. It may be used in controlling software like Cortex 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 |
| Input1 | 01 _{hex} =INP1_LOSS | 81 _{hex} =INP1_RETURN | input 1 lost or returned |
| Input2 | 12 _{hex} =INP2_LOSS | 92 _{hex} = INP2_RETURN | input 2 lost or returned |
| CRC-Status1 | 03 _{hex} =CRC1_ERROR | 83 _{hex} =CRC1_OK | CRC on input 1 error or OK |
| CRC-Status2 | 43 _{hex} =CRC2_ERROR | C3 _{hex} =CRC2_OK | CRC on input 2 error or OK |
| Reference | 02 _{hex} =REF_LOSS | 82 _{hex} =REF_RETURN | reference lost or returned |
| Silence_LocInA1 | 05 _{hex} =LOC_A1_SILENCE | 85 _{hex} =LOC_A1_OK | Audio channel A1 silence or OK |
| Silence_LocInA2 | 05 _{hex} =LOC_A2_SILENCE | 85 _{hex} =LOC_A2_OK | Audio channel A2 silence or OK |
| Silence_LocInA3 | 05 _{hex} =LOC_A3_SILENCE | 85 _{hex} =LOC_A3_OK | Audio channel A3 silence or OK |
| Silence_LocInA4 | 05 _{hex} =LOC_A4_SILENCE | 85 _{hex} =LOC_A4_OK | Audio channel A4 silence or OK |
| Silence_LocInA5 | 05 _{hex} =LOC_A5_SILENCE | 85 _{hex} =LOC_A5_OK | Audio channel A5 silence or OK |
| Silence_LocInA6 | 05 _{hex} =LOC_A6_SILENCE | 85 _{hex} =LOC_A6_OK | Audio channel A6 silence or OK |
| Silence_LocInA7 | 05 _{hex} =LOC_A7_SILENCE | 85 _{hex} =LOC_A7_OK | Audio channel A7 silence or OK |
| Silence_LocInA8 | 05 _{hex} =LOC_A8_SILENCE | 85 _{hex} =LOC_A8_OK | Audio channel A8 silence or OK |

**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.

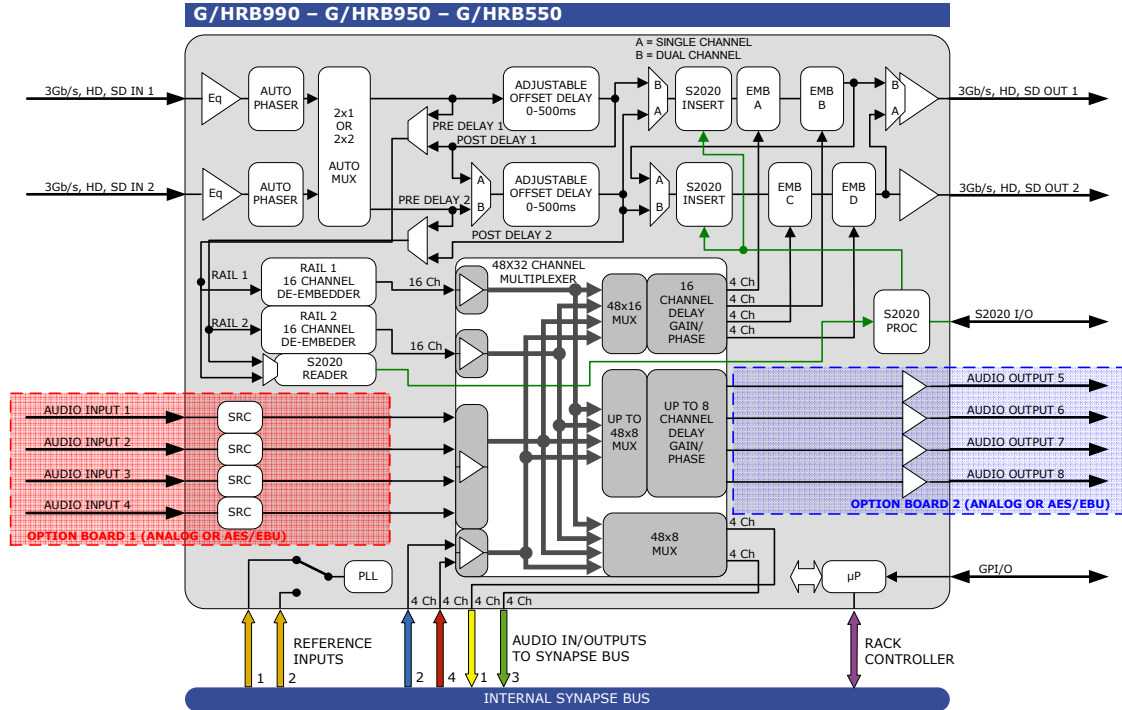
The Address

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 GRB/HRB550/990 card is not configured correctly or has a hardware failure. |
| Input_1 LED | This LED indicated the presence of a valid SDI video signal on input 1. |
| Input_2 LED | This LED indicated the presence of a valid SDI video signal on input 2. |
| ANC Data_1 LED | Indicates the presence of embedded audio within input 1. |
| ANC Data_2 LED | Indicates the presence of embedded audio within input 2. |
| Reference LED | Indicated the presence of a valid reference signal on the selected reference input connector (ref-1 or ref-2). |
| Data Error_1 LED | This LED indicates a CRC error in input 1. |
| Data Error_2 LED | This LED indicates a CRC error in input 2. |
| 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. |
| DM_Pres_A | This LED illuminates when a I/O board is present on position A |
| DM_Pres_B | This LED illuminates when a I/O board is present on position B |
| DM_Error_A | Indicates an error on the I/O board on position A |
| DM_Error_B | Indicates an error on the I/O board on position B |

9 Block Schematic

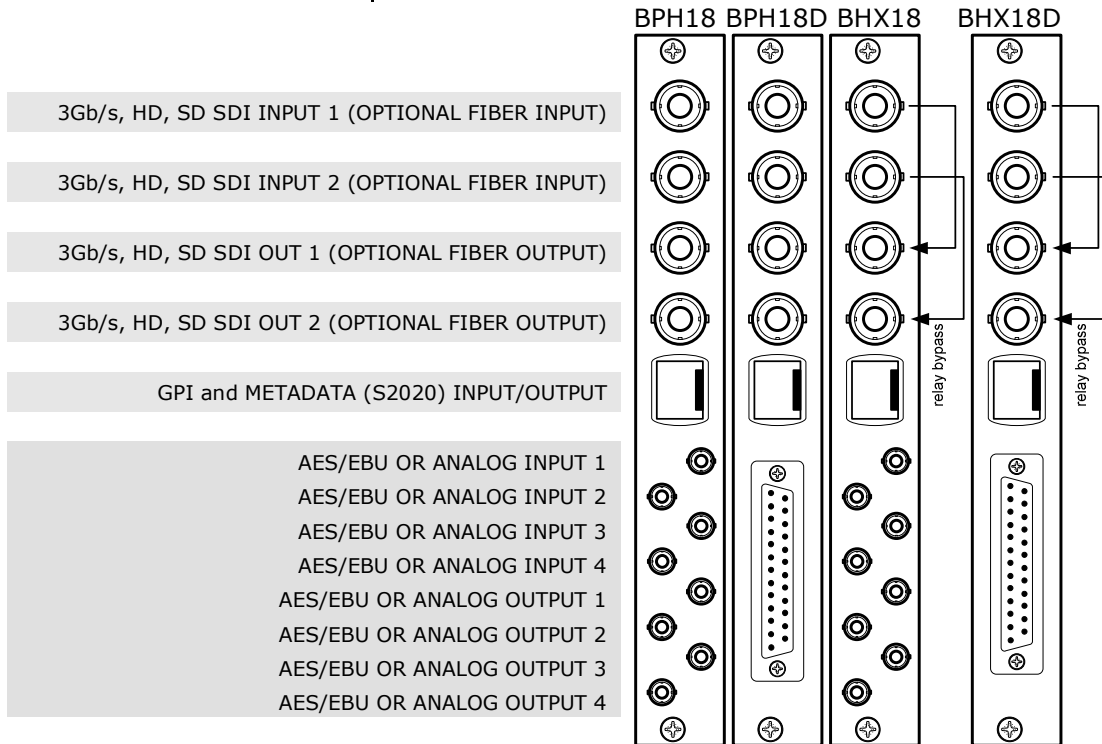


Note:

- The group numbers on the add-on bus are swapped. (2, 4, 1 and 3... instead of 1, 2, 3 and 4).
- Therefore you always need an output add-on card before you can insert audio via the bus.

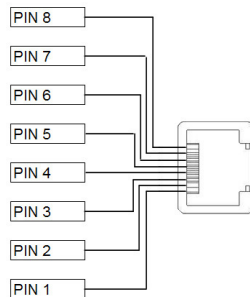
10 Connector Panels

The GRB-HRB550/590/950/990 can be used with the BPH18, the BPH18D or the bypass relay equivalents. The following table displays the pinout of these backpanels in combination with the card.



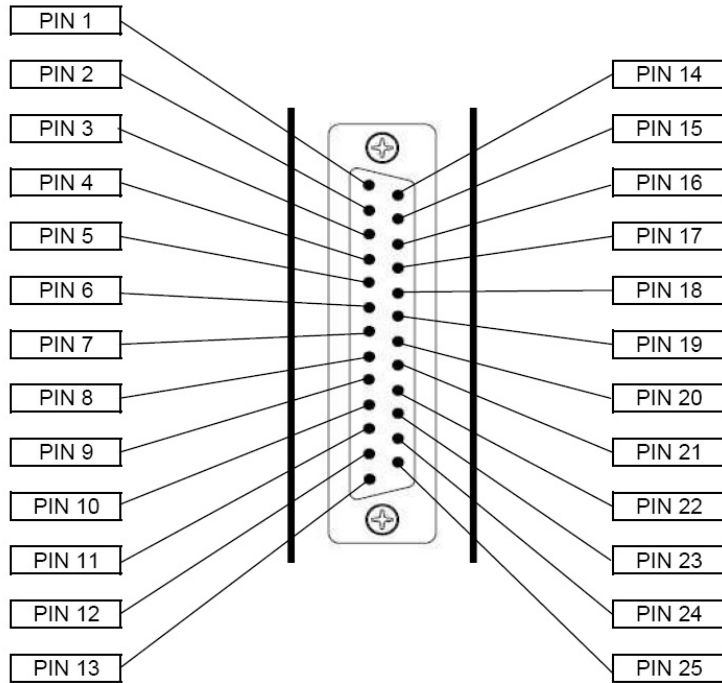
!Unused inputs and outputs must be terminated with the correct impedance!

GPI pinning



| Pin | Function |
|-----|----------------|
| 1 | Ground |
| 2 | GPI 1 |
| 3 | GPI 2 |
| 4 | GPI 3 |
| 5 | GPI 4 / TXA(+) |
| 6 | GPI 5 / TXB(-) |
| 7 | GPI 6 / RXA(+) |
| 8 | GPI 7 / RXB(-) |

D-sub pinning



| Pin | G/HRB550 | G/HRB590 | G/HRB950 | G/HRB990 |
|-----|-----------|-----------|-----------|-----------|
| 1 | A1neg IN | A1neg IN | D1neg IN | D1neg IN |
| 2 | A1pos IN | A1pos IN | D1pos IN | D1pos IN |
| 3 | GND | GND | GND | GND |
| 4 | A3neg IN | A3neg IN | D3neg IN | D3neg IN |
| 5 | A3pos IN | A3pos IN | D3pos IN | D3pos IN |
| 6 | GND | GND | GND | GND |
| 7 | A5neg OUT | A5neg OUT | A5neg OUT | D5neg OUT |
| 8 | A5pos OUT | A5pos OUT | A5pos OUT | D5pos OUT |
| 9 | GND | GND | GND | GND |
| 10 | A7neg OUT | D7neg OUT | A7neg OUT | D7neg OUT |
| 11 | A7pos OUT | D7pos OUT | A7pos OUT | D7pos OUT |
| 12 | GND | GND | GND | GND |
| 13 | Not used | Not used | Not used | Not used |
| 14 | GND | GND | GND | GND |
| 15 | A2neg IN | A2neg IN | D2neg IN | D2neg IN |
| 16 | A2pos IN | A2pos IN | D2pos IN | D2pos IN |
| 17 | GND | GND | GND | GND |
| 18 | A4neg IN | A4neg IN | D4neg IN | D4neg IN |
| 19 | A4pos IN | A4pos IN | D4pos IN | D4pos IN |
| 20 | GND | GND | GND | GND |
| 21 | A6neg OUT | D6neg OUT | A6neg OUT | D6neg OUT |
| 22 | A6pos OUT | D6pos OUT | A6pos OUT | D6pos OUT |
| 23 | GND | GND | GND | GND |
| 24 | A8neg OUT | D8neg OUT | A8neg OUT | D8neg OUT |
| 25 | A8pos OUT | D8pos OUT | A8pos OUT | D8pos OUT |



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