

*Synapse*

HCL10

**HD/SDI Embedded audio compressor / limiter.  
(for two groups of embedded audio)**

**HD**  
High Definition

*Synapse*

## TECHNICAL MANUAL

HCL10

HD/SD embedded audio compressor limiter.  
(for two groups of embedded audio)



**Handelsweg 5**  
**NL-5071 NT Udenhout**  
**The Netherlands**  
**Phone: +31 13 511 6666**  
**Fax: +31 13 511 4151**  
**E-mail: [Info@axon.tv](mailto:Info@axon.tv)**  
**Web: [www.axon.tv](http://www.axon.tv)**



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

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

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

**Copyright © 2001 – 2008 AXON Digital Design B.V.**

Date created: 19-10-06  
Date last revised: 22-04-08

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

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

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

<p>Axon Digital Design HCL10</p> <p> Tested To Comply With FCC Standards</p> <p>FOR HOME OR OFFICE USE</p>	<p>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.</p>
--	---

# Table of Contents

<b>Chapter 1</b>	<b>Introduction to Synapse</b> An introduction to Synapse Local Control Panel Remote Control Capabilities
<b>Chapter 2</b>	<b>Unpacking and Placement</b> Unpacking Placing the card
<b>Chapter 3</b>	<b>A Quick Start</b> When powering-up Default settings Changing settings and parameters Front Panel Control Example of changing parameter using Front Panel control Synapse SetUp Software Menu Structure Example
<b>Chapter 4</b>	<b>The HCL10 card</b> Introduction When do you require a Line-synchroniser/autophaser
<b>Chapter 5</b>	<b>Settings Menu</b>
<b>Chapter 6</b>	<b>Status Menu</b>
<b>Chapter 7</b>	<b>Events</b>
<b>Chapter 8</b>	<b>LED Indication</b>
<b>Chapter 9</b>	<b>Block Schematic</b>
<b>Chapter 10</b>	<b>Connector panel</b>
<b>Chapter 11</b>	<b>Specifications</b>

# 1 Introduction to Synapse

## An Introduction to Synapse

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

## Local Control Panel

The local control panel gives access to all adjustable parameters and provides status information for any of the cards in the Synapse frame, including the Synapse rack controller. The local control panel is also used to back-up and restore card settings. Please refer to the RRC18, RRS18, RRC10 RRC04 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/RRS18/RRC10/RRC04/RRS04) manual. The method of connection to a computer using Ethernet is described in the RRC manual.



**CHECK-OUT: “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 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.

### Placing the card

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

### SDI / HD CARDS

HD or SDI cards can be mixed and matched in the SFR18 and SFR04 frames.

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

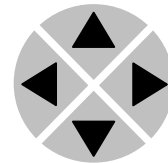
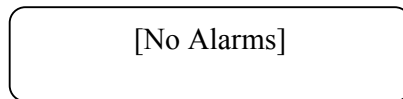
In its default condition, the HCL10 will act as a embedded audio compressor/limiter with the compressor and limiters functioned switched off.

#### Changing settings and parameters

The front panel controls or Cortex Software 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;

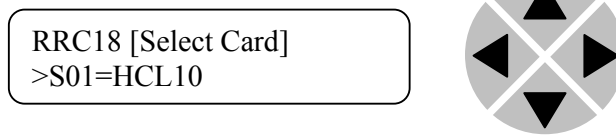
Use the cursor ‘arrows’ on the front panel to select the menu and parameter to be displayed and/or changed.

- 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.

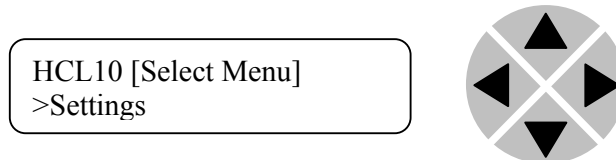
## Example of changing parameters using front panel control

With the display as shown below



Pressing the ► selects the HCL10 in frame slot 01.

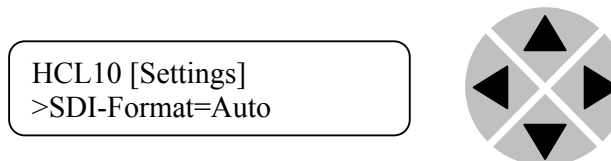
The display changes to indicate that the HCL10 has been selected. In this example the Settings menu item is indicated.



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

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

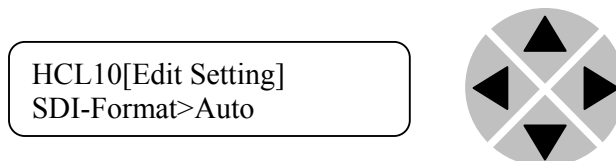
The display changes to indicate that the HCL10 Settings menu item SDI-Format has been selected and shows that its current setting is Auto.



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 HCL10 Edit Setting menu item SDI-Format has been selected.



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.



## Cortex Software

Cortex Software 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. 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 more information about operating Cortex, please refer to the Cortex help files (press F1).

## Menu Structure Example

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲		▲		
S01	HCL10	▶ Settings	▶ SDI-Format	▶ Auto
▼		▼	▼	▼
S00	RRC18	Status	Mode	625
		▼	▼	▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	

## 4 The HCL10 Card

### Introduction

The HCL10 is an HD/SD embedded audio compressor/limiter. The card will be able to compress and limit 2 groups of embedded audio.

### Applications

The HCL10 can be used at output stages of the transmission chain, or on a output of a OB / ENG truck.

The HCL10 can be used for traditional audio compressor/limiting functions within the embedded domain. It is capable processing stereo, surround and multi-channel applications.

### Capability

The HCL10 will take HD/SD SDI with embedded audio of the major standards. SD625, SD525, HD1080i/50/59.94, HD720P/50/59.94. All standards are allowed to carry 16 channels of audio where 8 channels will be processed and put into 2 user defined groups.

- Free selection of any 8 channels out of all 16 channels
- Adjustable Video offset delay for compensation of audio processing delay
- 8 Presets controllable through GPI.
- Threshold, knee adjustment, Compression ratio, Attack, Release, Makeup gain, Input gain and stereo link (multi-link functions)
- Full functioning frame sync.
- Full status information of the video and all embedded audio parameters.

## HD FORMATS

The HD terminology is represented as

- P, which stands for progressive
- I, which stands for interlaced

The frame rate is expressed as 60, 50, 30, 25 and 24 fps.

For progressive content the frame rate indicates *frames* per second.

For interlaced content it indicates *fields* per second.

The frame size is displayed as 1080, 1035 and 720.

The resolution for:

- 1080 is 1920 x 1080
- 1035 is 1920 x 1035
- 720 is 1280 x 720

	Pixels per line	Lines per frame	Frame rate	Active samples per line	Active lines per frame
1080i-60	2200	1125	30	1920	1080
1080i-50	2640	1125	25	1920	1080
1080i-30	2200	1125	30	1920	1080
1080p-25	2640	1125	25	1920	1080
1080p-24	2750	1125	24	1920	1080
1035i-60	2200	1125	30	1920	1035
720p-60	1650	750	60	1280	720
720p-50	1980	750	50	1280	720
720p-30	3300	750	30	1280	720
720p-25	3960	750	25	1280	720
720p-24	4124	750	24	1280	720

The aspect ratio is 16:9

**TRI/BI-Level sync.**

The card is able to lock on to a HD sync 600mV nominal TRI-level. as described in the SMPTE 274M and 296m spec.

A SD sync 300 mV nominal BI-level sync can also be used.

## 5 Settings Menu

<b>Introduction</b>	<p>The settings menu displays the current state of each HCL10 setting and allows you to change these.</p> <p>Settings can be changed by using the front panel of the Synapse frame (SFR18 or SFR04) or Cortex software. The SCP08 control can also be used.</p> <p>Please refer to chapter 3 for information on Synapse front panel control and cortex.</p>
<b>SDI-Format</b>	<p>The format menu item selects the input video standard.</p> <p>AUTO: the unit recognize format is presented at the input and automatically sets that format. It will take more time for the card to lock.</p> <ul style="list-style-type: none"><li>▪ 1080i-60/50</li><li>▪ 1080p-24/25/30</li><li>▪ 1035i-60</li><li>▪ 720p-24/25/30/50/60</li><li>▪ SD525</li><li>▪ SD625</li></ul> <p>SD is standard definition.</p> <p>The default setting is set to AUTO.</p>
<b>Field-Freq</b>	<p>1:1 or 1:1.001 are the values that can be selected</p> <p>1:1 is the right field frequency for 1080i-50. Because the actual field frequency of 1080i-60 is 59.97 and not 60 is it necessary when 1080i-60 is selected as input format to adjust the field frequency to 1:1.001</p> <p>There is also an AUTO mode, the HEB20 will detect the format and switch then to the according field-frequency.</p> <p>Default is AUTO.</p>
<b>AV-delay</b>	<p>This item sets the delay of all audio and video to either exactly 1 frame or to the minimum possible delay.</p> <p>When set to 1 Frame, the delay of the audio-processing path and video-path are aligned to exactly 1 video frame. When it is set to Minimum, both audio and video have the shortest processing delay.</p>

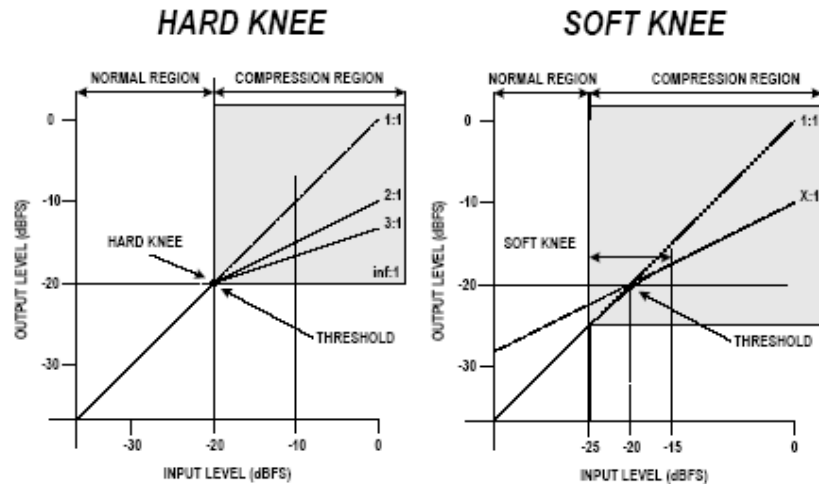
<b>Source-A1</b>	<p>With Source-A1 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the first channel of embedder A.</p> <p>CH1.. CH16</p> <p>Default is CH1</p>
<b>Source-A2</b>	<p>With Source-A2 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the second channel of embedder A.</p> <p>CH1.. CH16</p> <p>Default is CH2</p>
<b>Source-A3</b>	<p>With Source-A3 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the third channel of embedder A.</p> <p>CH1.. CH16</p> <p>Default is CH3</p>
<b>Source-A4</b>	<p>With Source-A4 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the fourth channel of embedder A.</p> <p>CH1.. CH16</p> <p>Default is CH4</p>
<b>Source-B1</b>	<p>With Source-B1 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the first channel of embedder B.</p> <p>CH1.. CH16</p> <p>Default is CH5</p>
<b>Source-B2</b>	<p>With Source-B2 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the second channel of embedder B.</p> <p>CH1.. CH16</p> <p>Default is CH6</p>

<b>Source-B3</b>	<p>With Source-B3 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the third channel of embedder B.</p> <p>CH1.. CH16</p> <p>Default is CH7</p>
<b>Source-B4</b>	<p>With Source-B4 is it possible to select one channel of the 16 incoming embedded channels. This channel is then the fourth channel of embedder B</p> <p>CH1.. CH16. Default is CH8.</p>
<b>Inp-Gain_A1 ~ B4</b>	<p>This setting let's you gain the input level of the audio on corresponding channels A1 till B4. Range from -999dB till 12dB. Default is 0,00dB</p> <p>The Inp-Gain blocks are automatically disabled when NON_PCM (Dolby-E) is detected on these audio channels (stereo-pairs). The Inp-Gain blocks A1~B4 stay enabled when the corresponding setting Proc_A1/2~Proc_B3/4 is in Bypass-mode.</p>
<b>Phase_A1 ~ B4</b>	<p>The phase of the audio of A1 till B4 can be adjusted using Phase_A1 till Phase_B4. The user can choose between 0 degrees and 180 degrees phase shift.</p> <p>The default setting is 0 degrees.</p>
<b>Control</b>	<p>The HCL10 is preset based and the setting <i>Control</i> defines how the presets are controlled. This can be done either manually (Manual) via the Set-Up software and/or front panel or via the local GPI-contact (GPI-Local). The default setting is Manual.</p>
<b>Preset</b>	<p>The card has 6 presets with the item is it possible to select one of the presets.</p> <p>#1 ..#6</p> <p>All the menu items marked with # are making part of a preset. To set a preset select a preset number ( #1 .. #6) then set the values marked with #. To set the next preset just select the next preset number and set the values.</p> <p>Default is #1</p>
<b>#Preset-Label</b>	<p>The user can label all 6 presets with a name, a maximum of 16 characters within the label is possible.</p>

<b>#Proc_A1/2 ~ #Proc_B3/4</b>	<p>With these setting you can set channels A1/2 till B3/4 to be compress (comp), limited (lim), both compressed and limited (Comp+Lim) or to be completely bypassed. Default is Comp+Lim for all channels.</p> <p><i>Note:</i> The compressor and/or Limiter are automatically bypassed when NON_PCM is detected on their corresponding channels (stereo-pairs).</p>
<b>#Proc-Link</b>	<p>This setting defines how the compressor and limiter should react on the audio signals if they are in action. Default is Dual-Stereo.</p> <p>In Multi-Mono mode, both compressor and limiter acts on all channels individually. This setting is usefull when there is no correlation between audio-channels (mono program material).</p> <p>In Dual-Stereo mode, the channels are linked as stereo-pairs. If one of the levels within a stereo-pair reached above threshold, both channels will be reduced equally. This keeps the stereo-image undistorted. If these channels are not linked, a strong signal in the left channel will cause a gain reduction in this channel only. This results in a stereo image which will move to the right for centre panned instruments.</p> <p>For Quad mode the channels (A1 .. A4) are linked and reduced equally when one of the channels (A1 .. A4) is above threshold. This is also the case for audio-channels (B1 .. B4).</p> <p>For All-8 mode all the 8 channels (A1~B4) are linked equally when one of the channels (A1~B4) is above threshold.</p> <p>For 2+6 mode the channels (A1 .. A2) are linked and reduced equally when one of the channels (A1 .. A2) is above threshold. This is also the case for (A3~B4). This mode is useful for surround applications.</p> <p>For 6+2 mode the channels (A1~ B2) are linked and reduced equally when one of the channels (A1~B2) is above threshold. This is also the case for (B3 .. B4). This mode is useful for surround applications.</p>
<b>#Comp-Thrsh</b>	<p>This setting defines the onset of processing. When the signal is above the value, shown in <i>#Comp-Thrsh</i>, the output signal is reduced in a ratio selected by <i>#Comp-Ratio</i>. If the signal stays under this level, the compressor will work as a simple bypass function. The range of <i>#Comp-Thrsh</i> is from -80dBFS to 0dBFS, with a stepsize of 1dB (dBFS = dB Full Scale).</p> <p><i>Note:</i> When <i>#Comp-Knee</i> is set to, <i>Medium</i>, <i>Soft</i> or <i>Tube-Soft</i>, compression will already take place in the region below <i>#Comp-Threshold</i>.</p>



<b>#Comp-Ratio</b>	This setting defines the compression-ratio when the compressor is in action. A ratio of 4:1 means that the output will rise only 1dB for every 4dB of input-signal. A ratio of 1:1 is equivalent to a bypass function. Typically compression ratios range from 2:1 to 4:1. For 10:1 and higher, high compression takes place which is often already close to the border of limiting. Ratio can be set from 1:1 till 15:1 with steps of 0.1.
<b>#Comp-Attack</b>	The attack time, <i>#Comp-Attack</i> , determines how quick the compressor comes into action when the input-signal reaches above <i>#Comp-Threshold</i> . Longer attack times tend to sound more natural and preserve transients, but can allow too many peaks to pass. Shorter attack times catch more peaks, but often sound too lifeless. Finally, it is up to the <i>ears of the user</i> to define what is the best setting for the type of program-material which should be processed. Attack can be set from 1ms to 500ms with steps of 1ms.
<b>#Comp-Release</b>	The release time <i>#Comp-Release</i> , determines how quick the compressor restores to normal gain after it drops below the threshold. Shorter release times often can generate a <i>pumping</i> effect and it can lead to inter modulation distortion (IM-distortion). The release can be set from 10ms to 5000ms in steps of 10ms.
<b>#Comp-Knee</b>	Most compressors on the market have a static curve with an abrupt change between normal to compression-region, what is often described as a <i>hard knee</i> . If the signal passes through <i>#Comp-Threshold</i> the gain reduction will start abruptly. For high values of <i>#Comp-Ratio</i> the abrupt change can be noticeable and sound very unpleasant. The setting <i>#Comp-Knee</i> changes this dynamic effect into a more natural sounding one. It softens the transition between normal and compressionregion. If <i>#Comp-Knee</i> is set to Hard ( $\Delta\text{knee} = 0\text{dB}$ ), the onset of compression will be direct and abrupt, like regular compressors. Also, three different types of soft-knee are implemented: Medium ( $\Delta\text{knee} = 6\text{dB}$ ), Soft ( $\Delta\text{knee} = 12\text{dB}$ ), or Tube-Soft ( $\Delta\text{knee} = 24\text{dB}$ ). For a visual explanation of the hard and soft knee, please refer to the diagrams on the next page.



For example: If `#Comp-Knee` is set to *Soft* ( $\Delta\text{knee} = 12\text{dB}$ ), the ratio will gradually increase from 1:1 to `#Comp-Ratio` over a 12dB interval around the threshold level `#Comp-Threshold`.

Note: The knee, `#Comp-knee`, is always in relation to the threshold `#Comp-Threshold` and ratio `#Comp-Ratio`.

### #Comp-Level-Det

The type of signal detection influences how the compressor will react to the input signal. When it is more important to catch transients and to prevent overloads, peak-detection is preferred. When gentle level correction is required, RMS-detection should be chosen.

### #Comp-MakeUp

A compressor is a gain-reduction device, therefore it has a makeup-gain control (`#Comp-MakeUp`). This setting enables the user to turn-up the output-level of the compressor by the amount of reduction to maintain headroom. This feature is useful when using the HCL10 as level maximizer. `#Comp-MakeUp` is applied post-compressor but pre-limiter, it *drives* the signal into the

limiter. MakeUp can be set from -60dB to +12dB with step of 0.25dB

Note: The `#Comp-MakeUp` setting does not compensate for the time-delay of the level detector and attack-time of the compressor (by its nature). Therefore, it is possible to exceed 0dBFS when `#Comp-MakeUp` is combined with slow attack times set by `#Comp-Attack`, or `#Comp-Level-Det` is in VU-mode (RMS detection). Please use this option carefully. When using `#Comp-MakeUp` it is advisable to activate the limiter to protect output signals exceeding 0dBFS.

### #Lim-Thrsh

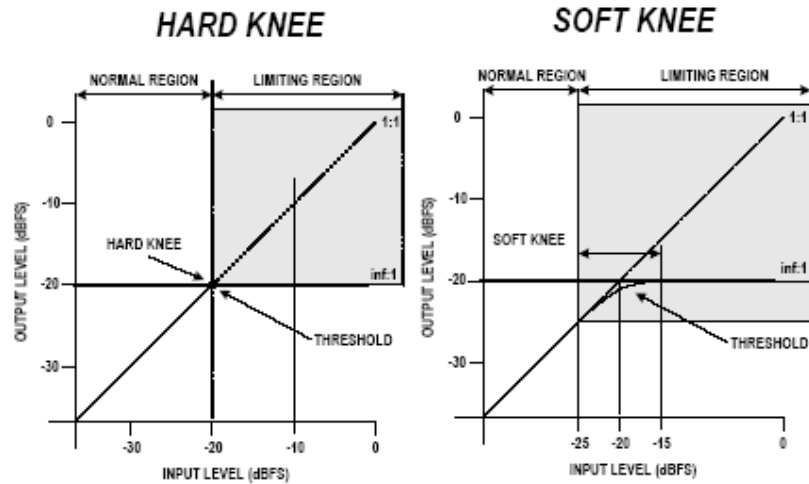
This setting defines the onset of processing. When the signal is above the value shown in *#Lim-Thrsh* the output signal will be kept constant at *#Lim-Thrsh*. If the signal stays under this level, the limiter will work as a simple bypass function. The range of *#Lim-Thrsh* is from -80dBFS to 0dBFS, with a stepsize of 1dB (dBFS = dB Full Scale).

### #Lim-release

The release time *#Lim-Release*, determines how quick the limiter restores to normal gain after it drops below the threshold. The release can be set from 100ms to 5000ms in steps of 10ms.

### #Lim-Knee

Like the compressor-core, the limiter-core is also equipped with an adjustable knee. The setting *#Lim-Knee* changes the dynamic effect of the onset of limiting into a more natural sounding one. It softens the transition between normal and limiting-region. If *#Lim-Knee* is set to Hard ( $\Delta\text{knee} = 0\text{dB}$ ), the onset of limiting will be direct and abrupt. Also, three different types of *soft knee* are implemented: Medium ( $\Delta\text{knee} = 6\text{dB}$ ), Soft ( $\Delta\text{knee} = 12\text{dB}$ ), or Tube-Soft ( $\Delta\text{knee} = 24\text{dB}$ ). For graphics, see below.



### #Lim-Out-Gain

This setting can be used to match the output gain of the limiter. *#Lim-Out-Gain* is applied post-limiter. Can be set from -60dB till +12dB, with steps of 0.25dB.

### #Level-Meters

The level-meters can be switched to read either the input level of the compressor Input-Comp, or the input level of the limiter Input-Lim (output of the compressor) or the Output, which is the level after compression and limiting. The user can also choose to disable the level-meters by setting it to Off, this reduces announcements traffic on the network.

Note: It is advisable to check the input levels before you start adjusting the *#Comp-Threshold*, *#Comp-Ratio* or *#Lim-Threshold*.

<b>#Reduct-Meters</b>	<p>The reduction-meters shows the amount of reduction when the compressor or limiter are in action. It can be switched to Comp to show the amount of reduction at the compression-stage. Lim shows the amount of reduction at the limiter-stage. Comp+Lim shows the total reduction when both compressor and limiter are in action. The user can also choose to disable the reduction-meters by setting it to Off, this reduces announcements traffic on the network.</p>
<b>Emb-Mode</b>	<p>Emb-Mode enables additional audio channels to be appended added to the existing audio-groups in the ancillary data space of the SDI stream Emb-Mode has three settings, Off, Append, and Overwrite. The default setting is Overwrite.</p> <p>In Overwrite mode all existing audio groups will be overwritten and the processes group is inserted.</p> <p>In Append mode additional audio channels are added.</p> <p>In order to blank the ancillary data space of the SDI stream, set Emb-Mode to Overwrite and set Emb-Sel to Off (see below).</p>
<b>Emb-A-Sel</b>	<p>Emb-A-Sel sets in which group the selected channels from source-A1..A4 are set. Group1,2,3 or 4.</p> <p>Default is Group1</p>
<b>Emb-B-Sel</b>	<p>Emb-B-Sel sets in which group the selected channels from source-B1..B4 are set. Group1,2,3 or 4.</p> <p>Default is Group2</p>
<b>ATC-Transp</b>	<p>ATC-Transp: this setting allows to set the time code back in the horizontal interval. The standards that are supported are RP188, RP196 and RP215. Its possible to select one of these standards or Select then ALL. Or switch this functionality OFF in this case the time code is blanked, which is also the default setting.</p>
<b>HD-AudioLock</b>	<p>HD-SYNC is the default setting and assumes that all audio present in the video stream is synchronously embedded. The setting HD-AudioLock can be useful if audio is asynchronously embedded into the HD video stream. The HAS10 can be locked to embedded Audio-Clk_A or Audio-Clk_B.</p> <p>HD-AudioLock determines whether the card locks to the HD input (HD-SYNC) or to the AUDIO CLOCK as is present in embedded audio group_1 (Audio-Clk_A) or embedded audio group_2 (Audio-Clk_B).</p> <p>The default setting is HD-SYNC.</p>

## 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.

## 6 Status Menu

<b>Introduction</b>	The status menu indicates the current status of each item listed below.
<b>SDI-Input</b>	<p>This status item indicates the presence and format of a valid HD/SD serial in input_1.</p> <p>This is displayed as:</p> <ul style="list-style-type: none"><li>▪ 1080i/60/50</li><li>▪ 1080p/30/25/24</li><li>▪ 1035i/60</li><li>▪ 720p/60/50/30/25/24</li><li>▪ SD525</li><li>▪ SD625</li></ul> <p>NA is used when no valid input signal is available or if the selected format doesn't match the input signal.</p>
<b>CRC-Stat</b>	<p>CRC Stat gives the status of the incoming HD/SDI signal:</p> <p>CRC Error</p> <p>Luma_CRC</p> <p>Chroma_CRC</p>
<b>GPI-in-local</b>	This item indicates what preset is active. This is displayed as #1 ... #6.

**GrpInUse** GrpInUse indicates the audio groups that are already present in the incoming SDI signal. The indication of a group, or groups being present is as follows,

**Display**

\_\_\_\_\_  
 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 12 \_\_\_\_\_  
 3 \_\_\_\_\_  
 1 3 \_\_\_\_\_  
 23 \_\_\_\_\_  
 123 \_\_\_\_\_  
 4 \_\_\_\_\_  
 1 4 \_\_\_\_\_  
 2 4 \_\_\_\_\_  
 12 4 \_\_\_\_\_  
 34 \_\_\_\_\_  
 1 34 \_\_\_\_\_  
 234 \_\_\_\_\_  
 1234 \_\_\_\_\_

When no groups are present GrpInUse indicates \_\_\_\_\_.

**Grp-Ins** When the serial digital video signal already contains audio data and Emb-Mode is set to Append and the selection Emb-Sel is set to the same group number as the present audio, this status item will generate an Error. No embedding occurs for the selected group that creates the error. If Emb-Mode is set to Overwrite the present audio data will be lost, and replaced by the new audio data. If Emb-Mode is set to Overwrite, no Grp-Ins error can occur. If an error does not occur Grp-Ins will indicate Ok.

**FrmtStat\_A1/2** Indicates the format of input A1/2. Possible values are:

NA, PCM, Null, AC-3, TimeStmp, MPEG-1, MPEG-2, SMPTEKLV, Dolby-E, Caption, UserDef and Rsvd.

**FrmtStat\_A3/4** Indicates the format of input A3/4.

**FrmtStat\_B1/2** Indicates the format of input B1/2.

**FrmtStat\_B3/4** Indicates the format of input B3/4.

<b>Level_A1 ~ B4</b>	Indicates the audio level of A1 till B4. The level-meters can be switched to read either the input level of the compressor <i>Input-Comp</i> , or the input level of the limiter <i>Input-Lim</i> (output of the compressor) or the <i>Output</i> , which is the level after compression and limiting. What this item displays can be set in the #Level-meters setting
<b>Reduction_A1 ~ B4</b>	Shows the amount of reduction when the compressor or limiter are in action. This is dependant on the #Reduct-meters settings.
<b>Audio-Clk_A</b>	HD-AudioLock determines whether the card is locked to the HD input (HD-SYNC) or to the CARD that is locked to the AUDIO CLOCK as is present in the embedded audio group_1 (Audio-Clk_A)  The status can be Out-of-range, 48KHz-ASync or 48KHz-Sync
<b>Audio-Clk_B</b>	HD-AudioLock determines whether the card is locked to the HD input (HD-SYNC) or to the CARD that is locked to the AUDIO CLOCK as is present in the embedded audio group_1 (Audio-Clk_B)  The status can be Out-of-range, 48KHz-ASync or 48KHz-Sync
<b>ANC-Stat</b>	ANC-stat, Ancillary Status, indicates that embedded audio is present and valid. ANC-stat indicates if an input signal is OK, NA (not available) or Error.
<b>ATC-Det</b>	ATC-Det detects if there is an ATC time code available in the vertical interval. NA or Present are the available options.
<b>ATC-Stat</b>	ATC-Stat determines the status of the ATC time code. The available setting options are Ok or ERROR
<b>FPGA-Stat</b>	FPGA-Stat displays the status of the internal processor of the HAS30. The status is indicated as Ok or Error.



## 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>HCL10 Events</b>	The events reported by the HCL10 are as follows;
<b>Announcements</b>	Announcements are 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 is the priority setting.
<b>CRC-Status</b>	EDH status can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
<b>ANC_Status</b>	ANC status can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
<b>Grp-Insert</b>	Grp-Insert status can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
	This information is only needed when the GPI16 card is used or when software is implemented.
<b>What information is available in an event?</b>	The message consists of the following items; <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</li></ol>

see the table on the next page.

- 3) A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled.
- 4) A slot number of the source of this event.

**The Message String**

The message string is defined in the card and is therefore fixed. It may be used in controlling software like Synapse Set-up to show the event.

**The Tag**

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

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

**Defining Tags**

The tags defined for the HCL10 are:

Event Menu Item	Tag		Description
Announcements	0 or NA	0 or NA	Announcing of report and control values
Input	01 <sub>hex</sub> =INP_LOSS	81 <sub>hex</sub> =INP_RETURN	primary input lost or returned
Reference	02 <sub>hex</sub> =REF_LOSS	82 <sub>hex</sub> =REF_RETURN	reference lost or returned
EDH-Status	03 <sub>hex</sub> =EDH_ERROR	83 <sub>hex</sub> =EDH_OK	EDH error occurred
ANC-Status	04 <sub>hex</sub> =ANC_ERROR	84 <sub>hex</sub> =ANC_OK	ANC status error

**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.

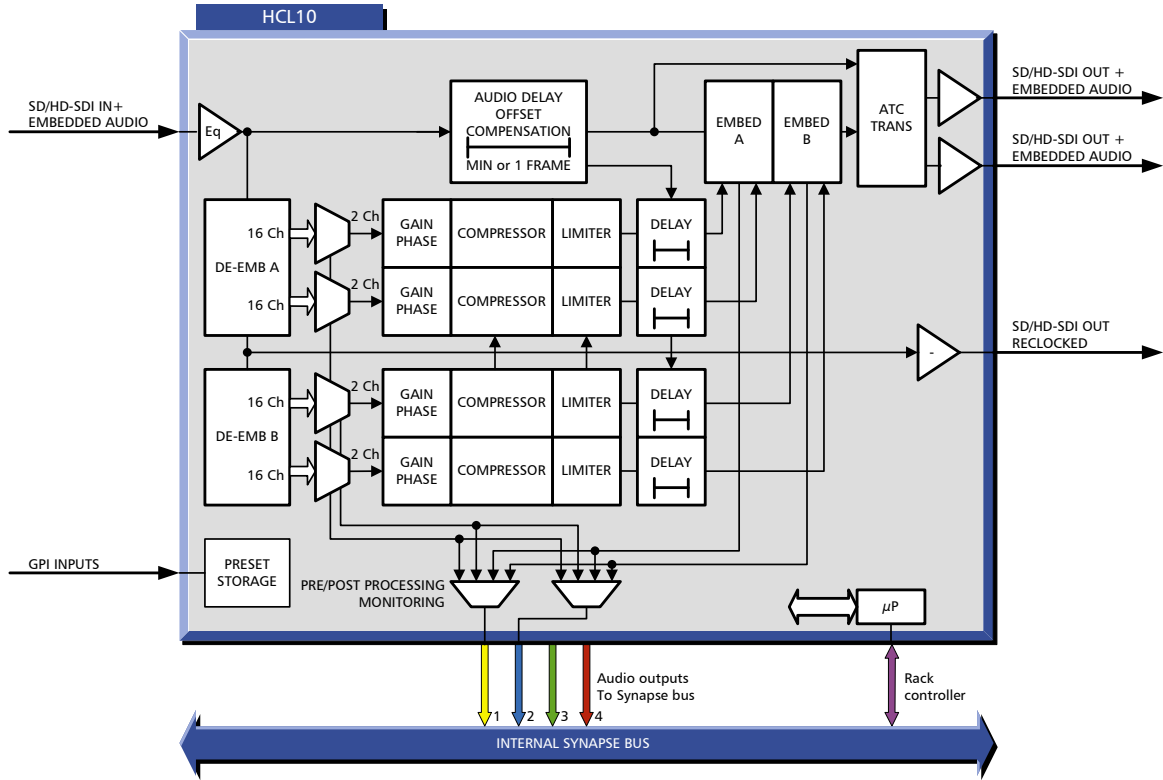
**The Address**

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 SFS10 card is not configured correctly or has a hardware failure.
<b>Input LED</b>	This LED indicated the presence of a valid SDI video signal on the input.
<b>Reference LED</b>	Indicated the presence of a valid reference signal on the selected reference input connector (ref-1 or ref-2).
<b>Data Error LED</b>	This LED indicate two different types of error: <ul style="list-style-type: none"><li>- ANC (embedded audio) checksum error.</li><li>- EDH error</li></ul>
<b>Connection LED</b>	This LED illuminates after the card has initialised. The LED lights for 0.5 seconds every time a connection is made to the card.

# 9 Block Schematic

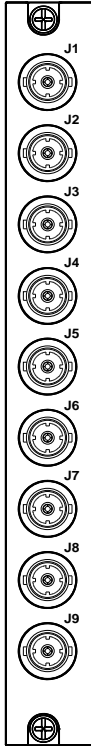


## 10 Connector Panel

The HCL10 can be used with the following backplane

BPH01

Fiber backpanels, BPH01T\_SC, BPH01T\_FC/PC, BPH01R\_SC  
and BPH01R\_FC/PC



J1 = HD/SDI INPUT

J2 = HD/SDI RECLOCKED OUTPUT

J3 = HD/SDI PROCESSED OUTPUT

J4 = HD/SDI PROCESSED OUTPUT

J7 = FREEZE GPI INPUT

J8 = TRACKING TTL OUTPUT

## 11 Specifications

### Serial Digital Video Input

Data format	SMPTE 259M/272M
Data rate	270Mb/s. 1.485Gb/s on 1.485/1.001 Gb/s
Levels	800mV p-p
Return loss	>15dB
Max cable length	250m for SDI , 120m for HD on belden 1694

### Serial Digital Video Outputs – reclocked

Data format	SMPTE 259M/272M
Data rate	270Mb/s. 1.485Gb/s on 1.485/1.001 Gb/s
Levels	800mV p-p
DC offset	<500mV
Jitter	<120ps(HD) <400ps(HD)
Rise & Fall time	<200ps(HD) <520ps (SD)
Return Loss	>18dB

### Serial Digital Video Outputs – processed

Data format	SMPTE 259M/272M
Data rate	270Mb/s. 1.485Gb/s on 1.485/1.001 Gb/s
Levels	800mV p-p
DC offset	<500mV
Jitter	<120ps(HD) <400ps(HD)
Rise & Fall time	<200ps(HD) <520ps (SD)
Return Loss	>18dB

### Processing

Video	Y Cr Cb gain
Embedded Audio	Q3 available
Propagation delay	Max 1 frame +5 H , min 4H
Hysteresis	1H
H-phase adjustment accuracy	6.7ns (HD), 37ns(SD)

### Miscellaneous

Supply Voltage	25 to 32VDC
Power Consumption	8 w
Weight	250g
Operating temperature	0 °C to 50 °C
Dimensions	20 x 137 x 296 mm

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