

Synapse

ADC20

**4 Channel Analog Audio Input Synapse™ Add-On Card
with Delay**

Synapse

TECHNICAL MANUAL

ADC20

**4 Channel Analog Audio Input Synapse™ Add-On Card
with Delay**

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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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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 ADC20</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>
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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/RRS18, RRC10 and RRC04/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.



“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 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.

Locating 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.

Default settings

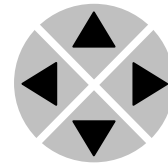
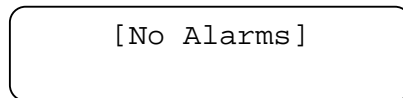
In the default condition, the ADC20 passes analog audio to the Axon bus.

Changing settings and parameters

The front panel controls or 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.

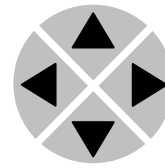
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

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

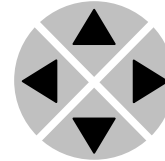
```
RRC18 [Select Card]
>S01=SFS10
```



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
```

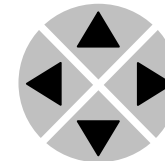


Pressing the ► selects the menu item shown, in this example Settings.

(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
```

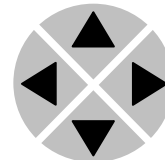


Pressing the ► selects the settings item shown, in this example SDI-Format.

(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]
```



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 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. 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	Settings	SDI-Format	Auto
▼				
S00	RRC18	Status	Mode	625
		▼		▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	

NOTE: Further information about Front Panel Control can be obtained from the Rack controller operational manuals.

4 The ADC20 Card

Introduction	<p>The AXON ADC20 is an analog audio to digital audio converter card with delay. The delay offset ranging from 0ms up to 5200 ms at 48 kHz.</p> <p>This card can only be used as an add-on card. In this mode the card is set to embed audio signals. In this function the card acts as an analog input board that feeds a master card positioned to the left with embedder functionality. The SEB20, for example, can perform an embedder function with the ADC20 as its input card. The ADC20 converts the analog audio into AES/EBU signals and puts it on the bus. These signals can then be embedded into the SDI data stream.</p> <p>Other cards with an embedding function are: ASV08, ASV10, ASV20, ASC10, SFS11/21, SEB10 and ADL24.</p>
Key Features	<p>The Key features of the ADC20 are as follows:</p>
Performance	<p>The ADC20 has high quality 24bit D/A converters that are capable of sampling up to 192kHz.</p>
Levels	<p>To maintain maximum performance and optimum noise levels Axon have given the input section of this card a selectable analog gain stage that ensures the A/D converter chip is working in the ideal range of its input stage.</p> <p>We have implemented reference levels of +24dBu, +18dBu,+15dBu, +12dBu.</p>
Back planes	<p>The ADC20 can be used with the BPL04, BPL05 and BPL05D</p>
Miscellaneous	<p>The ADC20 cards fit into the Axon SFR04, SFR08 & SFR18 rack.</p> <p>LED's on the front of the board indicate the presence of an Audio Input signal, Connection & Processor Errors.</p> <p>The ADC20 can be controlled by Axon Cortex software and the SCP08 control panel.</p>

5 Settings Menu

Introduction	<p>The settings menu displays the current state of each setting within the ADC20 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 Axon Cortex.</p>
Audio Fade	<p>For correct operation the tracking inputs must be connected to a tracking output of a Frame synchronizer, for example the SFS11.</p> <p>The setting <code>AudioFade</code> has 2 modes, they are as follows;</p> <p><code>Fast</code>: Fast tracking and handling of frame drops enabling instantaneous synchronization of audio.</p> <p><code>Smooth</code>: Slow correction of frame drops enabling gradual synchronization of audio.</p> <p>The default setting of <code>Tracking</code> is <code>Fast</code>.</p>
Delay	<p>The <code>Delay</code> menu item sets the amount by which the input audio is delayed.</p> <p><code>Delay</code> can be adjusted within the range 0ms to 5200ms in 1 ms increments</p> <p>The default setting of <code>Delay</code> is 0ms.</p>
Output_Ch1	<p>The <code>Out_Ch_1</code> setting gives the possibility to route input channels to the embedding channels. Default = Ch1.</p>
Output_Ch2	<p>The <code>Out_Ch_2</code> setting gives the possibility to route input channels to the embedding channels. Default = Ch2</p>
Output_Ch3	<p>The <code>Out_Ch_3</code> setting gives the possibility to route input channels to the embedding channels. Default=Ch3</p>
Output_Ch4	<p>The <code>Out_Ch_4</code> setting gives the possibility to route input channels to the embedding channels. Default=Ch4</p>
0dBfs-inp_1	<p>The setting <code>0dBfs-inp_1</code> set the audio level that will give a full-scale input on channel 1. The available settings are +12dBu, +15dBu, +18dBu and +24dBu. The default setting is +24dBu.</p>

0dBFs-inp_2	<p>The setting 0dBFs-inp_2 set the audio level that will give a full-scale input on channel 2. The available settings are +12dBu, +15dBu, +18dBu and +24dBu.</p> <p>The default setting is +24dBu.</p>
0dBFs-inp_3	<p>The setting 0dBFs-inp_3 set the audio level that will give a full-scale input on channel 3. The available settings are +12dBu, +15dBu, +18dBu and +24dBu.</p> <p>The default setting is +24dBu.</p>
0dBFs-inp_4	<p>The setting 0dBFs-inp_4 set the audio level that will give a full-scale input on channel 4. The available settings are +12dBu, +15dBu, +18dBu and +24dBu.</p> <p>The default setting is +24dBu.</p>
Gain-Ch_1	<p>The settings menu item Gain-Ch_1 controls the output gain of channel 1. Gain-Ch_1 has an adjustment range between -60.00dB and +12.00dB. When Gain-Ch_1 is set to 0dB the output level is equal to the input level. Below -60dB, a setting of -999dB is automatically entered and a mute is activated.</p> <p>The default setting of Gain-Ch_1 is 0dB.</p>
Gain-Ch_2	<p>The settings menu item Gain-Ch_2 controls the output gain of channel 2. Gain-Ch_2 has an adjustment range between -60.00dB and +12.00dB. When Gain-Ch_2 is set to 0dB the output level is equal to the input level. Below -60dB, a setting of -999dB is automatically entered and a mute is activated. The default setting of Gain-Ch_2 is 0dB.</p>
Gain-Ch_3	<p>The settings menu item Gain-Ch_3 controls the output gain of channel 3. Gain-Ch_3 has an adjustment range between -60.00dB and +12.00dB. When Gain-Ch_3 is set to 0dB the output level is equal to the input level. Below -60dB, a setting of -999dB is automatically entered and a mute is activated.</p> <p>The default setting of Gain-Ch_3 is 0dB</p>

Gain-Ch_4	<p>The settings menu item <code>Gain-Ch_4</code> controls the output gain of channel 4. <code>Gain-Ch_4</code> has an adjustment range between -60.00dB and $+12.00\text{dB}$. When <code>Gain-Ch_4</code> is set to 0dB the output level is equal to the input level. Below -60dB, a setting of -999dB is automatically entered and a mute is activated.</p> <p>The default setting of <code>Gain-Ch_4</code> is 0dB.</p>
Phase-Ch_1	<p>The phase of channel 1 can be adjusted using the setting menu item <code>Phase-Ch_1</code>. The settings of <code>Phase-Ch_1</code> are 0 deg (degrees) and 180 deg.</p> <p>The default setting of <code>Phase-Ch_1</code> is 0 deg.</p>
Phase-Ch _2	<p>The phase of channel 2 can be adjusted using the setting menu item <code>Phase-Ch_2</code>. The settings of <code>Phase-Ch_2</code> are 0 deg (degrees) and 180 deg.</p> <p>The default setting of <code>Phase-Ch_2</code> is 0 deg.</p>
Phase-Ch _3	<p>The phase of channel 3 can be adjusted using the setting menu item <code>Phase-Ch_3</code>. The settings of <code>Phase-Ch_3</code> are 0 deg (degrees) and 180 deg.</p> <p>The default setting of <code>Phase-Ch_3</code> is 0 deg.</p>
Phase-Ch _4	<p>The phase of channel 4 can be adjusted using the setting menu item <code>Phase-Ch_4</code>. The settings of <code>Phase-Ch_4</code> are 0 deg (degrees) and 180 deg.</p> <p>The default setting of <code>Phase-Ch_4</code> is 0 deg.</p>

6 Status Menu

Introduction	The status menu indicates the current status of each item listed below.
AnalogInp	The status item AnalogInp, indicates if there is analog audio present at the inputs. If there is audio present, the present audio channels are indicated. The default status is NA (not available).
Audio-Ch_1	The status item Audio-Ch_1 indicates the condition of the audio signal at the input of channel 1. Audio-Ch_1 indicates if the input signal is OK, Clipped or NA (not available).
Audio-Ch_2	The status item Audio-Ch_2 indicates the condition of the audio signal at the input of channel 2. Audio-Ch_2 indicates if the input signal is OK, Clipped or NA (not available).
Audio-Ch_3	The status item Audio-Ch_3 indicates the condition of the audio signal at the input of channel 3. Audio-Ch_3 indicates if the input signal is OK, Clipped or NA (not available).
Audio-Ch_4	The status item Audio-Ch_4 indicates the condition of the audio signal at the input of channel 4. Audio-Ch_4 indicates if the input signal is OK, Clipped or NA (not available).
FPGA-Stat	FPGA-Stat displays the status of the internal processor of the ADC20. The status is indicated as Ok or Error.

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.
ADC20 Events	The events reported by the ADC20 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 reports the loss of the audio at the input of channel 1 and can be set between 0 .. 255. 0= no event, 1..255 is the priority setting.
Input_2	Input_2 reports the loss of the audio at the input of channel 2 and can be set between 0 .. 255. 0= no event, 1..255 is the priority setting.
Input_3	Input_3 reports the loss of the audio at the input of channel 3 and can be set between 0 .. 255. 0= no event, 1..255 is the priority setting.
Input_4	Input_2 reports the loss of the audio at the input of channel 2 and can be set 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 Synapse Set-up to show the event.

The Tag

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

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

Defining Tags

The tags defined for the ADC20 are:

Event Menu Item	Tag	Description
Announcements	0 or NA	Announcing of report and control values
Input_1..4	01 _{hex} =INP_.._LOSS 81 _{hex} =INP_.._RETURN	Channel 1-4 input lost or returned
Tracking_1..2	0C _{hex} =TRACK_.._LOSS 8C _{hex} =TRACK_.._RETURN	Tracking pulse 1-2 lost or returned

The Priority

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

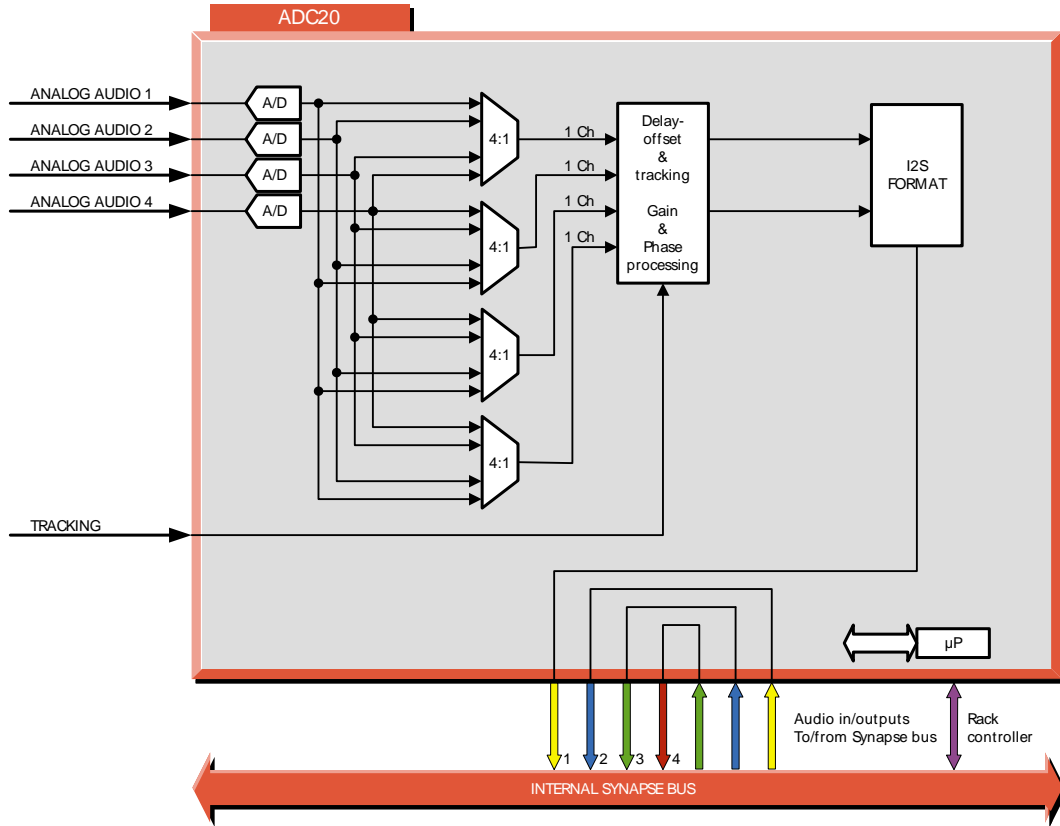
The Address

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

8 LED Indication

Error LED	The error LED indicates an error if the internal logic of the ADC20 card is not configured correctly or has a hardware failure.
Input LED	This LED indicated the presence of a valid input signal.
Reference LED	This LED indicates the presence of a valid reference signal and that the ADC20 is locked to the master card.
Data Error LED	This led indicates if the audio signal 1, 2, 3 or 4 of the local outputs are clipped.
Connection LED	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



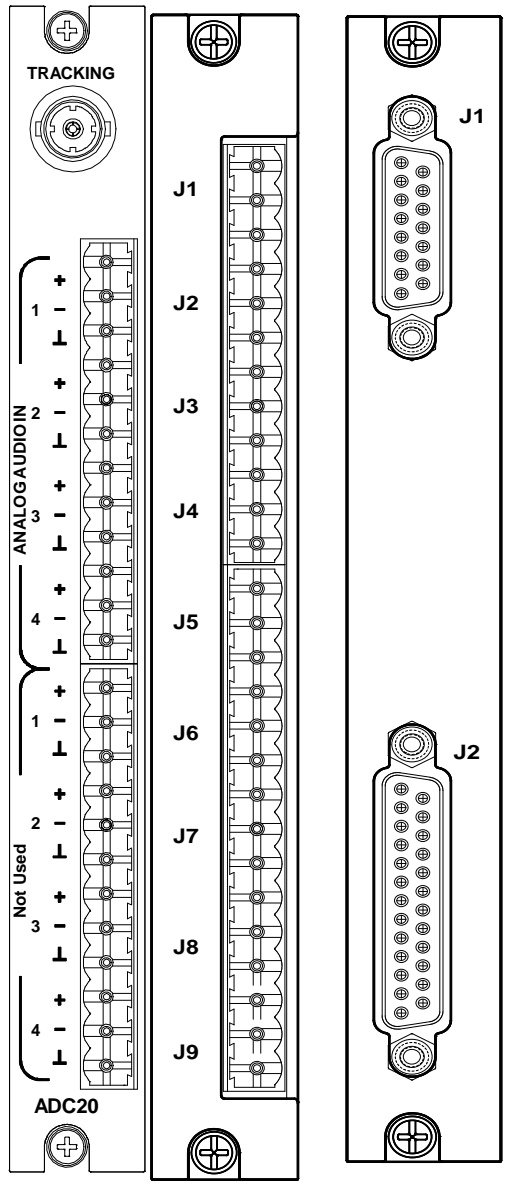
10 Connector Panel

The ADC20 can be used with the following backplanes: BPL04, BPL05 and BPL05D

BPL04

BPL05

BPL05D



SEE LABEL NEXT PAGE
FOR CONNECTIONS

BPL05D -J1 -TRACKING	Pin number on J1
Tracking 1	3
GND	9
BPL05D-J2-ANOLOG INPUTS	Pin number on J2
Analog_input_1 - positive	2
Analog_input_1 - negative	1
GND	14
Analog_input_2 - positive	16
Analog_input_2 - negative	15
GND	3
Analog_input_3 - positive	5
Analog_input_3 - negative	4
GND	17
Analog_input_4 - positive	19
Analog_input_4 - negative	18
GND	6

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