Synapse

ADP24

AUDIO DESCRIPTION AND VOICE OVER CARD

AXON
Digital Design

TECHNICAL MANUAL

ADP24

**AUDIO DESCRIPTION AND
VOICE OVER CARD**

Smarter by Listening

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

FCC ...tal Design ADP24 Tested To Comply With FCC Standards FOR HOME OR OFFICE USE	This device complies with part 15 of the FCC Rules Operation is subject to the following two conditions: (1) This device may cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Table of Contents

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 and RRC04 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) manual. The method of connection to a computer using Ethernet is described in the RRC manual.

! **CHECK-OUT:** "SYNAPSE SET-UP" SOFTWARE WILL INCREASE SYSTEM FLEXIBILITY OF ONE OR MORE SYNAPSE FRAMES

Although not required to Setup a Synapse frame, you are strongly advised to use a remote personal computer or laptop PC with the Synapse Setup 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.

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 default condition, the ADP24 is in audio description mode.

Changing parameters and settings

The front panel controls or the Synapse Set-Up 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

[No Alarms]
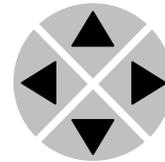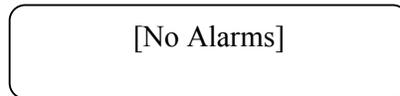
Settings are displayed and changed as follows;

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=ADP24
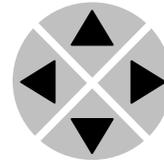
Pressing the ► selects the ADP24 in frame slot 01.

The display changes to indicate that the ADP24 has been selected. In this example the Settings menu item is indicated.

ADP24 [Select Menu]
>Settings
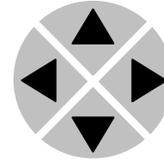
Pressing the ► selects the menu item shown, in this example Settings.

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

The display changes to indicate that the ADP24 Settings menu item SDI-Format has been selected and shows that it current setting is Auto.

ADP24 [Settings]
>SDI-Format=Auto
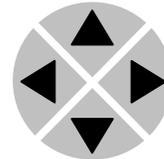
Pressing the ► selects the settings item shown, in this example SDI-Format.

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

The display changes to indicate that the ADP24 Edit Setting menu item SDI-Format has been selected.

ADP24 [Edit Setting]
SDI-Format>Auto
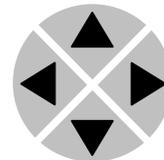
To edit the setting of the menu item press ▲ or ▼.

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

Synapse Setup Software

Synapse Setup 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.

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Each Synapse frame is addressed through its rack controller's unique IP address, giving access to each module, its menus and adjustment items. The Synapse Setup software 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.

Having selected the desired Frame and Module from the GUI Synapse Network View, select the menu item that you wish to open. Opening the menu item gives a complete list of available properties with their associated Value.

For example to change a setting e.g. SDI-Format, select SDI-Format form the list of settings by 'double clicking' to open a dialogue box. The dialogue box allows parameters to be changed or set to default value. On completion close the dialogue box.

Menu Structure Example

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲		▲		
S01	ADP24 ►	Settings ►	SDI-Format ►	Auto
▼		▼	▼	▼
S00	RRC18	Status	Mode	625
		▼	▼	▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	
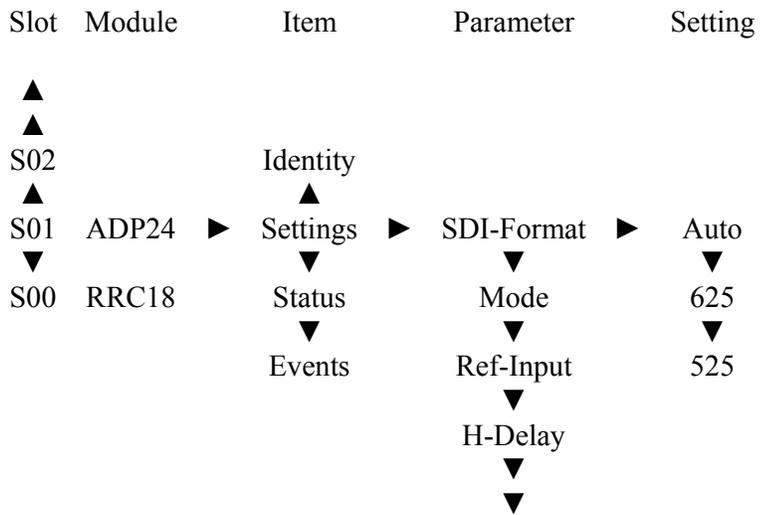
NOTE: Further information about Front Panel Control and Synapse Setup Software can be obtained from the RRC18 and RRC04 operational manuals.

4   The ADP24 Card

Introduction

The ADP24 is an **A**udio **D**escription (**AD**) and **V**oice-**O**ver (**VO**) processing card. The card has two main functions:

1) Audio Description
2) Voice Over

The card also includes some additional features like: delay, gain and phase stages on all inputs. By using these features, the user is capable of adjusting delay and gain differences between one ore more audio channels.

An *Auto*-mode function for audio description solves routing problems to the input of the ADP24 of program-material and audio description information. AD-Fade information detection is done on all input-channels and presented as a status-item. Using the gain-stages the program-material or AD-signal can be adjusted if audio-levels are not satisfactory.

In *VoiceOver*-mode the mixing of program-material and Voice-Over is controlled by a local GPI. The fade-in and fade-out time of the processing can be adjusted from 10ms up to 2600ms for a smooth transition.

The ADP24 has a variety of locking-modes to external references so that it is highly flexible.

Performance

The ADP24 has high quality sample rate converters that are capable of sampling up to 96kHz. The SRC (sample rate conversion) based digital audio inputs can handle sample rates from 32k to 96k.

Back planes

The ADP24 can be used with the BPL02M, BPL04M and BPL05DM backplanes.

Miscellaneous

The ADP24 cards fit into the Axon SFR04 & SFR18 rack.

LED's on the front of the board indicate the presence of an Audio Input signal, Connection & Processor Errors.

The ADP24 can be controlled by Axon Synapse set-up software.

5	# Settings Menu

The settings menu displays the current state of each setting within the ADP24 and enables the item to be changed or adjusted.

Settings can be changed using the front panel of the Synapse frame (SFR18 or SFR04) or Synapse Setup software.

Please refer to chapter 3 for information on the Synapse front panel control and Synapse Setup software.

CARD MODE

The ADP24 has three different modes:

If the ADP24 is in bypass, it routes the AES-input signals directly to the AES-output of the card, without processing.

The AudioDescr setting accepts program-material and Audio-Description signal (AD) on its AES-inputs. The processing of the program-material and AD-signal is controlled by fade-information embedded in the AD-signal.

Using the setting VoiceOver, program-material and Voice-Over signal is presented on the AES-inputs where processing is controlled by a local General-Purpose-Input (GPI).

Program material is presented on 1/2 and processed AD or VO is presented on 3/4 .

The default setting of Card-Mode is AudioDescr.

REF-INPUT

This setting allows the user to determine which reference input is used to lock the ADP24. Input 1 is the uppermost input of the RRC18 rack controller connection panel at the back of the SFR18. The SFR04 has only one reference input. The default setting of Ref-Input is 1.

AUDIO_LOCK

The output frequency of the ADP24 can be free running from a local oscillator or locked to different sources. The settings of Audio_Lock are as follows:

AES_1/2 and AES_3/4 enables the ADP24 to be locked to the appropriate AES-input.

Master enables the ADP24 to be locked to the master card located one position to the left in the SFR18/04 frames.

Wordclk is used when a 48k wordclock is connected to the genlock inputs of the SFR18/04 frames.

Genlock is used when a video Black&Burst is connected to the genlock inputs of the SFR18/04 frames.

StdAlone sets the ADP24 in free running mode.

The default setting of Audio_Lock is AES_1/2.

Delay-Ch1	Each audio input channel can be delayed up to 1.3 seconds. The delay of AES_1 can be adjusted from 0ms to 1300ms in steps of 1ms with Delay-Ch_1.
	The default delay is 0ms.
Delay-Ch2	Each audio input channel can be delayed up to 1.3 seconds. The delay of AES_2 can be adjusted from 0ms to 1300ms in steps of 1ms with Delay-Ch_2.
	The default delay is 0ms.
Delay-Ch3	Each audio input channel can be delayed up to 1.3 seconds. The delay of AES_3 can be adjusted from 0ms to 1300ms in steps of 1ms with Delay-Ch_3.
	The default delay is 0ms.
Delay-Ch4	Each audio input channel can be delayed up to 1.3 seconds. The delay of AES_4 can be adjusted from 0ms to 1300ms in steps of 1ms with Delay-Ch_4.
	The default delay is 0ms.
Gain-Ch_1	The level of AES_1 is determined by the Gain control Gain-Ch_1. The audio level can be adjusted in a range from +12dB to –60 dB in steps of 0.25dB. Below 60dB the audio is muted and the display shows –999.00dB.
	The default setting is 0.00dB.
Gain-Ch_2	The level of AES_2 is determined by the Gain control Gain-Ch_2. The audio level can be adjusted in a range from +12dB to –60 dB in steps of 0.25dB. Below 60dB the audio is muted and the display shows –999.00dB.
	The default setting is 0.00dB.
Gain-Ch_3	The level of AES_3 is determined by the Gain control Gain-Ch_3. The audio level can be adjusted in a range from +12dB to –60 dB in steps of 0.25dB. Below 60dB the audio is muted and the display shows –999.00dB.
	The default setting is 0.00dB.
Gain-Ch_4	The level of AES_4 is determined by the Gain control Gain-Ch_4. The audio level can be adjusted in a range from +12dB to –60 dB in steps of 0.25dB. Below 60dB the audio is muted and the display shows –999.00dB.
	The default setting is 0.00dB.

TIP To set audio levels correctly and avoid distortion, the DATA-ERROR-led can be used as an active peak-detector. By adjusting the level of one of the four local output channels, the DATA-ERROR-led continuously monitors whether a signal is going to overload (Peak) or not. Make sure that the DATA-ERROR-led won't light up because clipping in the digital domain is not desirable.

Phase-Ch_1 The phase of the audio of AES_1 can be adjusted using Phase-Ch_1. The user can select phase shift in a range from 0 degrees to 180 degrees.

The default setting is 0 degrees.

Phase-Ch_2 The phase of the audio of AES_2 can be adjusted using Phase-Ch_2. The user can select phase shift in a range from 0 degrees to 180 degrees.

The default setting is 0 degrees.

Phase-Ch_3 The phase of the audio of AES_3 can be adjusted using Phase-Ch_3. The user can select phase shift in a range from 0 degrees to 180 degrees.

The default setting is 0 degrees.

Phase-Ch_4 The phase of the audio of AES_4 can be adjusted using Phase-Ch_4. The user can select phase shift in a range from 0 degrees to 180 degrees.

The default setting is 0 degrees.

AD-ChnSel The Auto setting of menu-item AD-ChnSel automatically selects the input with a valid AD-signal. The APD24 automatically detects if an appropriate AD-signal is present on one of the AES-inputs, which is indicated by the status-item AD_ChnDet. By using AES_1, AES_2, AES_3 *or* AES_4 the user can manually force the card to check for an AD-signal at the selected input-channel.

The ADP24 includes an auto audio-input router for AudioDescr-mode. By default the program-material should be presented on AES_1/2 and the AD-signal should be presented on AES_3/4. If these inputs are exchanged and AD_ChnSel is set to Auto, if AD-fade information is on AES_2 instead of AES_4 (right channel of AES_3/4). Then internally these inputs will be re-routed to have program-material on Ch_1/2 and audio description on Ch_3/4 again. AD-fade information (by default on the right channel) and the mono audio description (by default on the left channel) of the AD-signal could be exchanged within an AES-signal. This will also be corrected if AD_ChnSel is set to Auto.
In all these situations the user can examine connectivity by checking the status-item AD_ChnDet. This item indicates in which input-channel the AD-fade information of the AD-signal is detected/presented.

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AD-Loss | By default, program material is output to OUT-AES_1/2 and program material processed with audio description is output to OUT-AES_3/4.

If the AD-Loss setting is set to off and the input AES_3/4 loses its AD-signal, the input AES_3/4 is transparently routed to output OUT-AES_3/4.

If the AD-Loss is set to 1/2-TO-3/4 and the input AES_3/4 loses its AD-signal, the program material present on AES_1/2 will also be copied to OUT-AES_3/4.

The default setting is 1/2-TO-3/4.

VO-Fade | Voice-Over signal can be mixed into program-material using a local GPI. When the GPI is closed, the program-material will fade-out by the value of `VO-Duck` (next setting) and the Voice-Over signal will be inserted on top of that. If the contact remains closed, this mix will be preserved. If the contact is re- opened, the program-material will fade-in to its original level and the Voice-Over signal is muted. The fade-time of the fade-out and fade-in can be changed by the setting `VO-Fade`. A graphical presentation of the `VO_Fade` is shown in the next figure under `VO-Duck`. The fade-time can be adjusted in a range from 10ms to 2600ms in steps of 10ms.The default fade-time is 100ms.

VO-Duck | With `VO-Duck` you set the amount of fade-out in dB between -60 and 0 dB. Everything below -60 is entirely muted (shown as `-999 dB`). Below figure shows a graphical representation of both `VO-Fade` and `VO-Duck`.
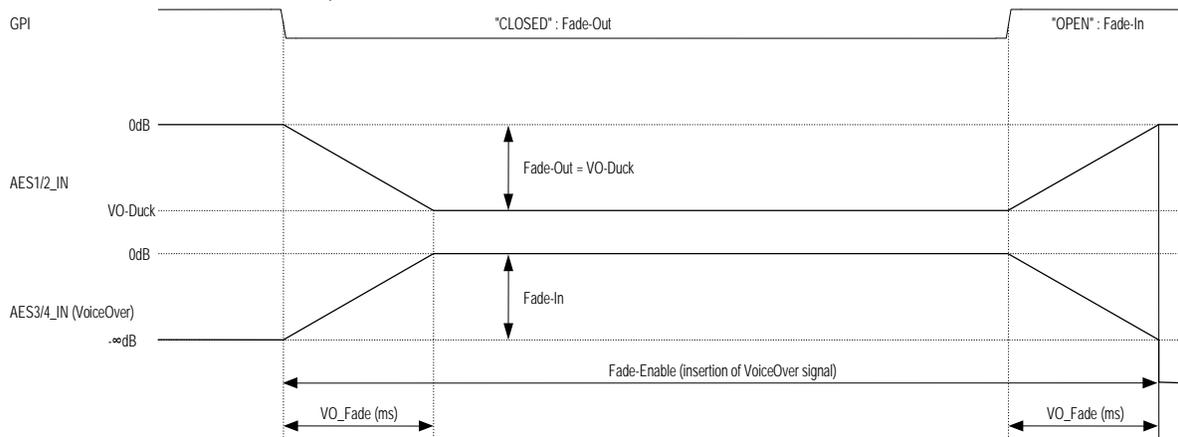
SRC | The AES inputs are connected to a Sample Rate Converter. This enables the input to use audio sample rates that are non- synchronous to video. For Non PCM audio data the SRC can be bypassed and the data is inserted in the card transparently (Transp). The settings of SRC are On and Transp.

The default setting is On.

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6 Status Menu

Introduction The status menu indicates the current status of each item listed below.

Locked-To This status item indicates if the ADP24 is locked to an appropriate reference determined by the setting Audio_Lock. If no locking can be established or the reference is not available the ADP24 will go into free-running mode and Locked-To will indicate Free.

Ref-In This status item recognizes a valid reference input connected to the central genlock input of the SFR18/04. It will indicate WordClk when a 48k Wordclk is attached. When a video Black&Burst is connected it indicates 625 or 525 depending on the format of the video reference. If no reference is attached Ref-In will indicate NA.

GPI-Stat This item shows the status of the GPI-input. If the contact is closed it will indicate Closed otherwise Open is indicated.

Audio-Ch_1 This item indicates the status of the audio-data of AES_1.

When this channel does not contain audio, it will indicate NA.

If audio is present and not clipped it will indicate Ok.

Due to an adjustment of Gain-Ch_1, the audio signal can be raised above 0dBFS and a distorted audio signal will be the result. In this situation the status of Audio-Ch_1 indicates Clipped and the DATA-ERROR-led will light.

Audio-Ch_2 This item indicates the status of the audio-data of AES_2.

When this channel does not contain audio, it will indicate NA.

If audio is present and not clipped it will indicate Ok.

Due to an adjustment of Gain-Ch_2, the audio signal can be raised above 0dBFS and a distorted audio signal will be the result. In this situation the status of Audio-Ch_2 indicates Clipped and the DATA-ERROR-led will light.

Audio-Ch_3 This item indicates the status of the audio-data of AES_3.

When this channel does not contain audio, it will indicate NA.

If audio is present and not clipped it will indicate Ok.

Due to an adjustment of Gain-Ch_3, the audio signal can be raised above 0dBFS and a distorted audio signal will be the result. In this situation the status of Audio-Ch_3 indicates Clipped and the DATA-ERROR-led will light.

If AudioDescr or VoiceOver is selected in Card-Mode a clipped signal on the output AES_3/4 can occur by mixing the program-material and the AD- or VoiceOver-signal. In this situation a Clipped indication will light.

Audio-Ch_4 This item indicates the status of the audio-data of AES_4.

When this channel does not contain audio, this item will indicate NA.

If audio is present and not clipped it will indicate Ok.

Due to an adjustment of Gain-Ch_4, the audio signal can be raised above 0dBFS and a distorted audio signal will be the result. In this situation the status of Audio-Ch_4 indicates Clipped and the DATA-ERROR-led will light.

If AudioDescr or VoiceOver is selected in Card-Mode a clipped signal on the output AES_3/4 can occur by mixing the program-material and the AD- or VoiceOver-signal. In this situation a Clipped indication will light.

AD-ChnDet The ADP24 checks all inputs on present appropriate AD-signals. If the presence of audio description is detected on one of the input channels, the status-item AD_ChnDet will show this channel. If no AD-signal is present on the inputs of the ADP24 this item will indicate NA.

The ADP24 only detects a valid AD-signal if the following AD-headers are available in the data structure:

1) Reserved & Ad_description_length   = F8h
2) AD_text_tag   = 4454474144h

AD-Stat If the AD-signal (presented on the input-channel shown by AD-ChnDet) is available and is without errors it indicates Ok.

If the signal is present but with errors AD-Stat will show Error.

If there is no AD-signal present this item will indicate NA.

FPGA-Stat FPGA-Stat displays the status of the ADP24's internal processor. The status is presented as Ok or Error.

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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.

Announcements

Announcements is not an event. This item is only used for switching the announcement of status changes on/off. 0=off, other =on

AES_1/2

AES_1/2 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.

AES_3/4

AES_3/4 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.

Reference

Reference can be set between 0 .. 255. 0= no event, 1..255 are the priority setting. If the reference is lost an Event will be generated at the priority.

Audio-Data

Audio-Data reports the audio signal being clipped at 0dB 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 ADP24 are:

Event Menu Item	Tag		Description
Announcements	0 or NA	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
Reference	02_{hex}=REF_LOSS	82_{hex}=REF_RETURN	reference lost or returned
Audio-Data	05_{hex}=AUDIO_ERROR	85_{hex}=AUDIO_OK	Audio data 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

Error LED

The error LED indicates an error if the internal logic of the DIO24 card is not configured correctly or has a hardware failure.

Input LED

This LED indicated the presence of a valid AES/EBU signal on the input. The presence of an analogue audio signal is not indicated

Reference LED

This LED indicates the presence of a valid reference signal and that the DIO24 is locked.

Data Error LED

This led indicates two different types of errors:

- 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.

Remark

To set audio levels correctly and avoid distortion, the DATA ERROR LED can be used as an active peak-detector. By adjusting the level of one of the four local output channels, the DATA ERROR LED continuously monitors whether a signal is going to overload (Peak) or not. Clipping in the digital domain is very unpleasant, ensure that the DATA ERROR LED does not illuminate and clipping will be prevented

09 Block Schematic

ADP24

AES/EBU IN 1 → SRC

AES/EBU IN 2 → SRC

Clock select

Delay-offset CH 1/2 → GAIN PHASE CH 1/2

Delay-offset CH 3/4 → GAIN PHASE CH 3/4

AD DETECTION

AUDIO DESCRIPTION & VOICE OVER PROCESSING (FADE & MIX)

AES/EBU FORMAT → AES/EBU OUT1

AES/EBU FORMAT → AES/EBU OUT 2

GPI IN

PLL

µP

Reference inputs 1 2

1 2 3 4 1 2

Rack controller

INTERNAL SYNAPSE BUS
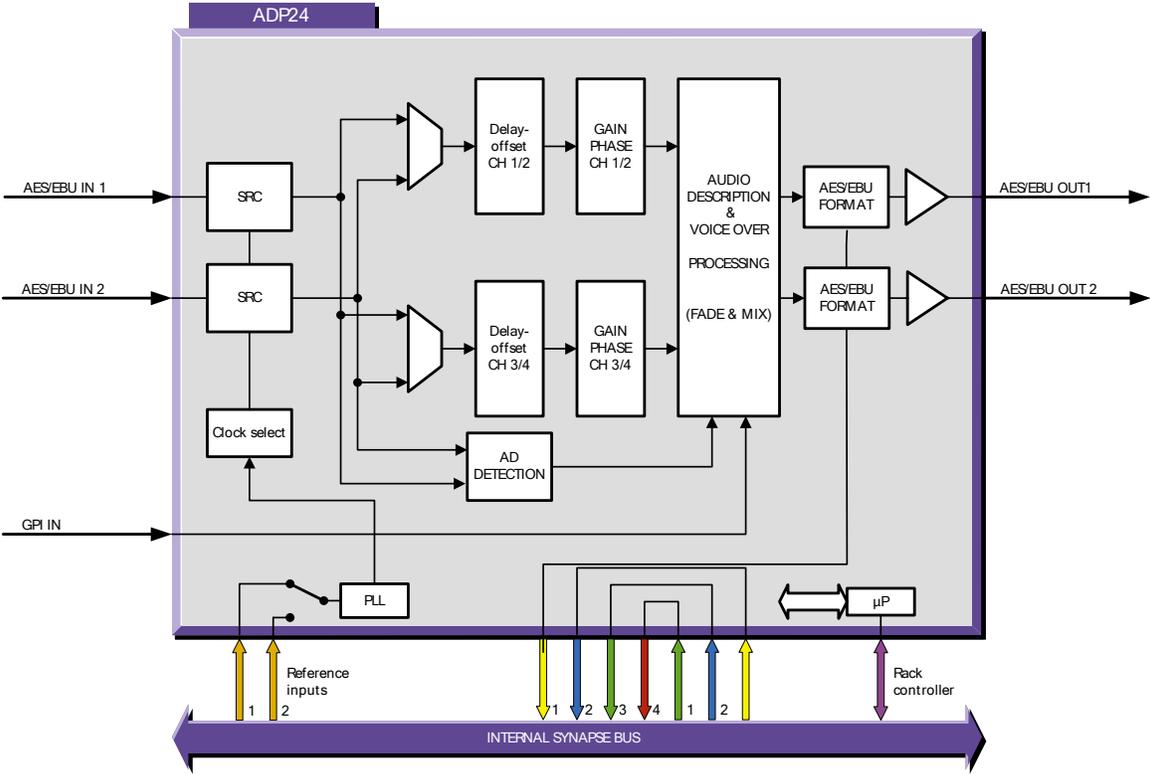
10 Connector Panel

The ADP24 can be used with the following backplanes: BPL02M, BPL04M and BPL05DM:

BPL02M BPL05DM BPL04M
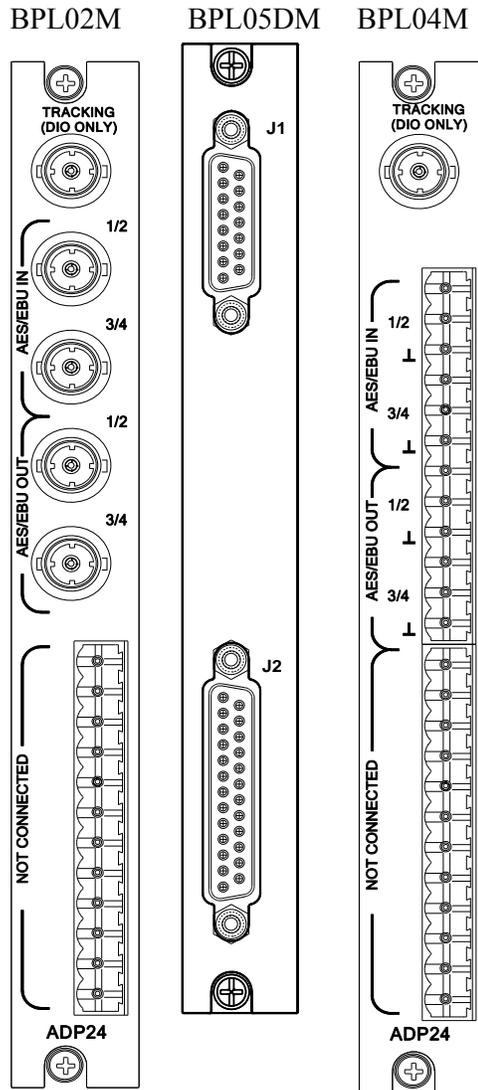
J1	
pin-1	Tracking
pin-9	Ground
J2	
pin-1	AES_input1 neg
pin-2	AES_input1 pos
pin-15	AES_input2 neg
pin-16	AES_input2 pos
pin-4	AES_out1 neg
pin-5	AES_out1 pos
pin-18	AES_out2 neg
pin-19	AES_out2 pos
pin-3,6,12,13 14,17,20, 23	Ground