USER MANUAL

Indigo
SYSTEM

CoolFlow

ADP 310

Audio delay and processor for discrete AES or analogue audio

Crystal Vision

Contents

Revision 1   Moved Statesman info to Appendix. Added VisionWeb.   25/08/14
Revision 2   Added note about removal of card edge control in 2018.   19/06/19

1   Introduction

ADP 310 is a processor for analogue or 24-bit 48 kHz digital audio.

Audio signals are input and output as either two analogue stereo pairs or four AES stereo pairs.

Audio signals can be gain controlled by +/- 18dB, delayed by up to 400mS, inverted, muted, stereo to mono converted and shuffled. Asynchronous AES signals are automatically resampled if not Dolby E encoded.

There are two slots for analogue or digital I/O piggybacks of which there are three types: 3G-AIP2, 3G-AOP2 and DIOP4. The 3G-AIP2 piggyback has four analogue inputs; 3G-AOP2 has four analogue outputs; DIOP4 has four stereo AES pairs.The front slot (nearest handle) is for audio inputs and can be fitted with a 3G-AIP2 or DIOP4 piggyback. The rear slot (nearest edge connector) is for audio outputs and can be fitted with a 3G-AOP2 or DIOP4 piggyback. It is not possible to mix analogue and digital signals, so an ADP 310 will be fitted with either a 3G-AIP2 + 3G-AOP2 combination or two DIOP4.

The main features are as follows:

- **Optimise the audio:** each channel has individual gain control and stereo to mono conversion. The audio level can be increased or decreased to match the rest of the system: each mono audio channel offers individual gain control, adjustable between +18dB and -18dB in 0.1dB steps. Audio channels can be muted and stereo pairs converted to mono. Audio channels can be delayed by up to 400mS. Dolby E signals automatically bypass all audio processing.

- **Audio resampling:** Asynchronous 48 KHz AES signals automatically resampled unless Dolby E encoded.

- **Control** of ADP 310 is by VisionWeb web browser software. Control can additionally be from an active front panel on the frame, a remote panel or via SNMP. Card edge control was also available prior to 2018.

- **GPI control** of configuration set-ups and status alarms.

- **Supports the following rear module connectors:** RM47, RM74.

- **Compatible** with Crystal Vision standard frames available in 2U, 1U and desk top box.

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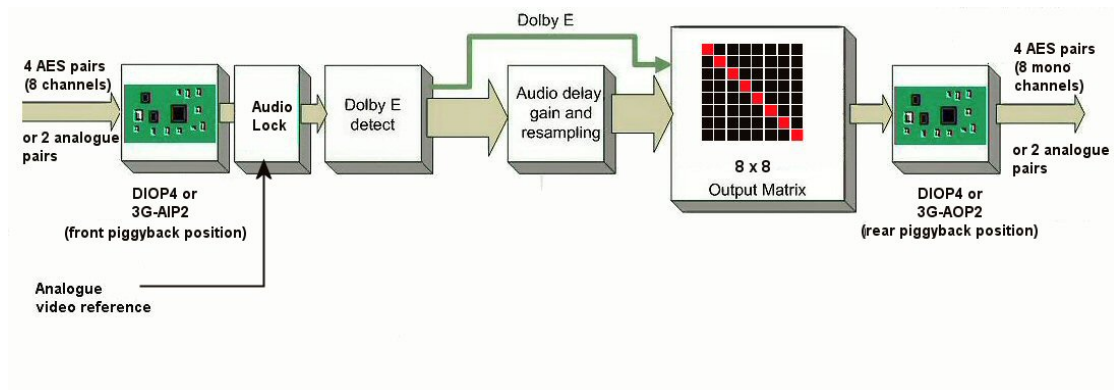
ADP 310 Functional Block Diagram

Block Diagram Description

All analogue or digital audio is passed to audio processing blocks where gain and delay adjustments are made after resampling. Dolby E encoded signals automatically bypass the audio processing stage.

The outputs of the audio processing block are inputs to an 8x8 router which feeds the plug-in output piggyback. In this way any of the eight digital channels or four analogue channels can be routed to any output channel.

An analogue Black and Burst or tri-level syncs reference must be applied to provide a stable clock to lock to the incoming AES and analogue audio.

2 Hardware installation

2.1 Board configuration
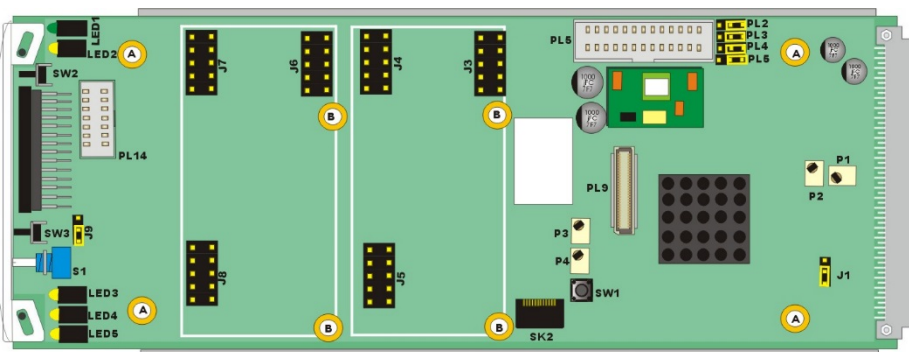
ADP 310 board top-side

Note: *The potentiometers P1, P2, P3 and P4 have been factory set and should NOT be adjusted.*
Holes marked 'B' are for the fitting of the I/O piggybacks.

Link Configuration

There are four user-settable links on the ADP 310. These are PL2-5, all other links should be left in the position shown in the above picture. PL2-5 set whether the board's GPI inputs are used as GPIs or as an extra serial I/O port.

Link	Towards front of board or Up	Towards the rear of board or Down
J1	Sync input unterminated	Sync input terminated by 75 ohm
J9	Debug mode – forces board's IP address to be 10.0.0.201	Normal mode (factory set, do not alter)
PL2	GPI 1 Input = RS422 Rx+	GPI 1 Input = GPI 1
PL3	GPI 2 Input = RS422 Rx-	GPI 2 Input = GPI 2
PL4	GPI 3 Input = RS422 Tx+	GPI 3 Input = GPI 3
PL5	GPI 4 Input = RS422 Tx-	GPI 4 Input = GPI 4

2.2 Input and output piggyback boards

The ADP 310 board has two positions where one of three types of I/O module can be plugged in to enable analogue or digital input and output. The front position is for audio inputs and the rear for outputs.

The three types of piggybacks are 3G-AIP2, 3G-AOP2 and DIOP4. The only valid combinations are shown in the table below:

	AES I/O	Analogue I/O
FRONT	DIOP4	3G-AIP2
REAR	DIOP4	3G-AOP2

3G-AIP2 Analogue Input
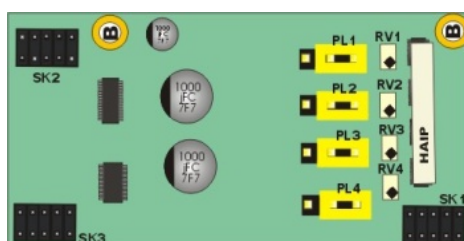
This analogue module has four balanced audio inputs. The links PL1-4 allow 0dBFS to be set to +18dBu (to the right, towards SK1) or +24dBu (to the left, towards SK2/3). The adjacent potentiometers RV1-4 are factory set and should **NOT** be adjusted.

3G-AIP2 Channel number	Link number
CH1	PL1
CH2	PL2
CH3	PL3
CH4	PL4

Table showing links controlling the input gain of the 3G-AIP2 channels

3G-AOP2 Analogue Output
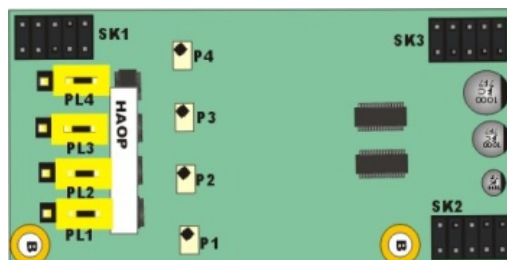
This analogue piggyback has four balanced audio outputs. The links PL1-4 set 0dBFS to +18dBu (to the right, towards SK2/3) or +24dBu (to the left, towards SK1). The four potentiometers P1-P4 are factory set and should **NOT** be adjusted.

3G-AOP2 Channel number	Link number
CH1	PL1
CH2	PL2
CH3	PL3
CH4	PL4

Table showing links controlling the output gain of the 3G-AOP2 channels

DIOP4 AES I/O
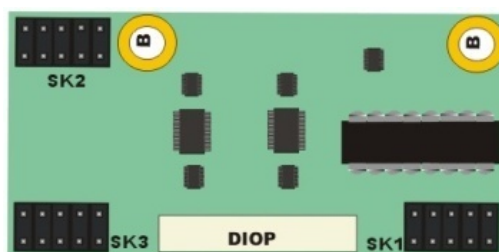
This digital audio piggyback has four AES stereo pairs that are individually configured as inputs or outputs by software. There are no links or user-adjustments on this card.

Fitting the I/O piggybacks onto the main board
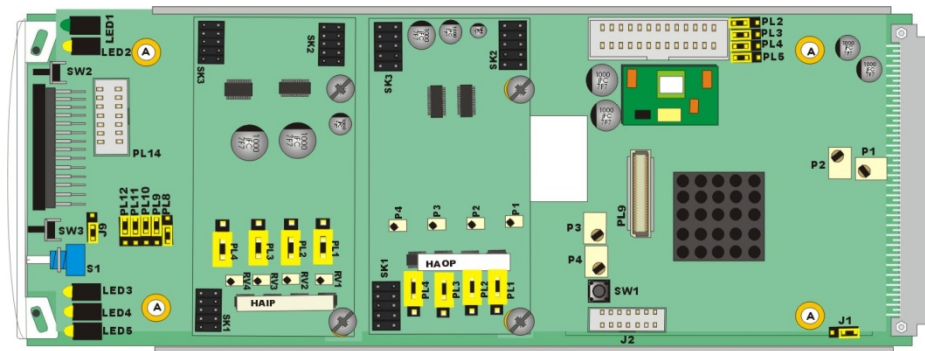
Example showing 3G-AIP2 and 3G-AOP2 piggybacks fitted

The I/O piggybacks plug onto the main board such that main board plugs J3, J4, J5 and J6, J7, J8 align with piggyback sockets SK2, SK3, SK1. With the component side of the module top-most, align the piggyback sockets carefully with the plugs and push firmly. Insert the plastic rivets supplied with the fitting kit through the main board from the underside so they protrude through the piggyback board, then push the rivet peg firmly to splay the end to lock the piggyback board in position.

3   Rear modules and signal I/O

The 2U Indigo 2 frame will house up to 12 single height modules with a single or dual power supply. The 1U Indigo 1 frame will house six single height modules and a single or dual power supply. The Indigo DT desk top boxes have a built-in power supply and will house up to two single height modules. All modules can be plugged in and removed while the frame is powered without damage.

> *Note:* For details of fitting rear connectors please refer to the appropriate frame manual.

ADP 310 can support the following rear modules: RM47, RM74.

Rear module connections with RM47

The RM47 being a single height module will allow maximum packing density with the maximum number of outputs available. Eight channels of audio AES stereo pairs or eight mono analogue channels are presented as balanced I/O on the 26-way high density D-Type connector.

RM47 rear module connector	Description
	RM47 • 12 ADP 310 modules per Indigo 2 frame • Six per Indigo 1 frame • Two per Indigo DT • All frame slots can be used

BNC connections

BNC	I/O assignment
NC	No user connection
SYNC IN	Analogue Black and Burst or tri-level reference video
NC	No user connection
NC	No user connection

26-way D-type Audio Connections

The 26-way audio 'D' connector RM47 module can be used for analogue or digital, inputs or outputs - or a mixture of both depending on the I/O modules fitted. Half of the I/O channels on the rear module are connected to the front I/O (nearest handle) module position and the remainder to the rear module position. The DIOP4 will normally be configured as 110 ohm balanced operation when using this rear module. In the ADP 310 the front piggyback position is always dedicated to inputs and the rear for outputs. Note that analogue output channel numbers are numbered C9-12.

Module position	I/O		Pin-out
	GND		1
Front (Input)	Analogue audio input C1 / AES1	+ -	2 3
	Analogue audio input C2 / AES2	+ -	4 5
	Analogue audio input C3 / AES3	+ -	6 7
	Analogue audio input C4 / AES4	+ -	8 18
	GND		9
Rear (Output)	Analogue audio output C9 / AES5	+ -	14 15
	Analogue audio output C10 / AES6	+ -	10 11
	Analogue audio output C11 / AES7	+ -	16 17
	Analogue audio output C12 / AES8	+ -	12 13
	GND		19, 20, 23, 24
	NC		21, 22, 25, 26

RM47 audio I/O connector wiring

Rear module connections with RM74

The RM74 is a dual height module presenting the eight unbalanced AES stereo pairs on 75 ohm BNC connectors. The DIOP4 I/O piggybacks must be used with this rear module as there is no provision for analogue audio I/O.

RM74 rear module connector	Description
	RM74 • Six ADP 310 modules per Indigo 2 frame • Three per Indigo 1 frame • One per Indigo DT • Alternate frame slots can be used

BNC Connections

BNC	I/O assignment
AES5	AES5 stereo pair 75 ohm output
AES7	AES7 stereo pair 75 ohm output
AES8	AES8 stereo pair 75 ohm output
AES4	AES4 stereo pair 75 ohm input
AES3	AES3 stereo pair 75 ohm input
AES2	AES2 stereo pair 75 ohm input
NC	No user connection
AES6	AES6 stereo pair 75 ohm output
SYNC IN	Analogue Black and Burst or tri-level sync reference
NC	No user connection
NC	No user connection
AES1	AES1 stereo pair 75 ohm input

4   General Purpose Interface

Introduction

Each frame slot has up to six connections 'a-f' for GPI control and monitoring. These connections are available at the rear of the frame on the 26-way D-Type remote connectors.

ADP 310 has four GPI inputs and two GPI outputs.

Each General Purpose Interface (GPI) input is fitted with a 6800Ω resistor connected to the internal +5V and in the following table, this equates to logic 'H', so with no connections to the GPI lines, preset 1 (logic 'HHHH') will be selected.

Each General Purpose Interface (GPI) output has a 270Ω resistor in series with its output. This allows for an external LED to be driven, connected to a DC voltage of +5V.

The GPI inputs can be programmed to automatically recall a previously saved preset configuration. The 16 user preset configurations are selected using binary notation. The two outputs can be programmed to assert themselves for a number of different alarm conditions.

GPI			Low (<1V)	High (+5V)
1	**'a'**	**Recall preset bit 1**		
2	**'b'**	**Recall preset bit 2**		
3	**'c'**	**Recall preset bit 4**	See following table for user preset control	
4	**'d'**	**Recall preset bit 8**		
5	**'e'**	**Alarms** (See alarm table)	Alarm condition	No alarm
6	**'f'**	**Alarms** (See alarm table)	Alarm condition	No alarm

Table showing the six GPI functions

GPI	Bit 8	Bit 4	Bit 2	Bit 1	GPI	Bit 8	Bit 4	Bit 2	Bit 1
Preset					**Preset**				
1	H	H	H	H	**9**	L	H	H	H
2	H	H	H	L	**10**	L	H	H	L
3	H	H	L	H	**11**	L	H	L	H
4	H	H	L	L	**12**	L	H	L	L
5	H	L	H	H	**13**	L	L	H	H
6	H	L	H	L	**14**	L	L	H	L
7	H	L	L	H	**15**	L	L	L	H
8	H	L	L	L	**16**	L	L	L	L

Binary coding of GPI inputs to recall preset configurations

Alarms

GPI Out 5 and 6 (e, f) can be configured to be asserted (logic 'L') for a selection of error conditions.

There are, in total, a maximum of nine separate alarms for AES audio I/O and three for analogue audio I/O. All alarm conditions can be applied to either GPI output. The following table lists the maximum number of alarms available. See Section 6 'Control Descriptions' for more details of alarms.

Reportable error conditions	No. of alarms
Reference video missing	1
AES input channel pair missing	4
AES input channel pair silent	4
Analogue input channel pair silent	2

Alarm Tables

2U frame GPI connections

GPI lines 'a' to 'f' of each card connect to two of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows pin number (remote number)

Note: *Remote 1 and Remote 3 are 26-way high-density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case. Remote 2 and Remote 4 are 26-way high-density D-Type male plugs and frame ground is pin 6 in each case and +5V @500mA is pin 15 on Remote 2.*
Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows pin number (remote number)

Note: *Remote 1: 26-way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.*
Remote 2: 26-way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15.
Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

Indigo DT desk top box GPI connections

GPI lines 'a' to 'f' of each card connect to two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)

Table shows pin number (remote number)

Note: *Remote 1: 26-way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.*
Remote 2: 26-way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15.
*Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.*

5 Control and Status monitoring

ADP 310 controls and status can be accessed by either the card edge control, the rack front panel or by 'VisionWeb' remote control web browser software. ADP 310 is aware of what optional boards are fitted and adjusts the card edge/front panel menu tree accordingly to reflect the options available. For instance, if analogue audio piggybacks are fitted, then no provision is shown for selecting digital audio sources or outputs. Similarly, the VisionWeb GUI also only shows the functionality of the fitted options.

Board edge control was removed from ADP 310 in 2018. Therefore the card edge control information detailed below is only relevant for older versions of the product.

5.1 Card edge controls

ADP 310 board edge
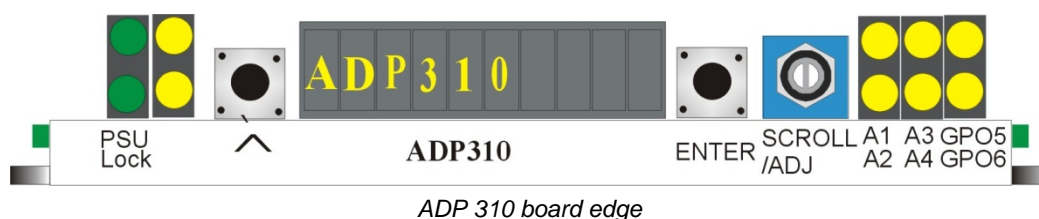
Card edge buttons

The two tactile push button switches allow the operator to navigate within the menu structure.

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Button	Function	Normal state Up, Action Down
∧	Up Menu	Push to jump up a menu level or cancel a selection.
ENTER	Select/Action	Push to select a menu and to action and confirm a change.

Card edge rotary control

The board edge rotary encoder is used to navigate through the menu categories and adjust parameter values.

Control	Function
SCROLL/ ADJ	Rotate SCROLL/ADJ to identify a menu category. In combination with the ENTER button select and ADJUST to change the current level or select a further option.

Note: *The rotary control can access menus and parameter values by clockwise or anti-clockwise rotation.*

Reading card edge LEDs

Card edge LEDs may be used in conjunction with status information from any connected remote status panel display or from VisionWeb if available.

Refer also to the troubleshooting chapter for more help with solving problems and monitoring status information.

The following table summarises the card edge LED functions and colours:

Name	LED Colour	Function when ON	Function when Off
PSU	Green	Good power supply (PSU) rails	One or more of the monitor supplies is out of specification
Lock	Green		
A1	Yellow	AES input 1 present	AES input 1 not present
A2	Yellow	AES input 2 present	AES input 2 not present
A3	Yellow	AES input 3 present	AES input 3 not present
A4	Yellow	AES input 4 present	AES input 4 not present
GPO5	Yellow	GPO 5 active / low	GPO 5 inactive / high
GPO6	Yellow	GPO 6 active / low	GPO 6 inactive / high

Navigating card edge menus

To access the card edge menu system proceed as follows:

- Press the up-arrow [∧] until a top menu category is reached
- Rotate the SCROLL/ADJ control until the desired menu category is found
- Press ENTER to enter the sub-menus of that category
- Rotate SCROLL/ADJ to select a sub-menu
- Press ENTER to select the desired function. Selection will be indicated by the text being displayed in *italic* text
- Rotate ADJUST to make the desired change to the selected parameter. The display changes to *italics* to indicate that a change has been made and requires confirmation
- When required push ENTER to action the change. The display will return to normal non-italic text.
- Use the up-arrow [∧] and SCROLL/ADJ control to navigate to further menus

5.2 Using the front control panel

At power up, the LEDs of all eight control panel keys will illuminate briefly. Once the panel has completed its power up and configuration sequence the panel will enter its status mode and display the current software version and frame IP address.

'Status' menu showing current software version and IP address

Selecting an ADP 310

To continue with control panel operation or configuration, press the 'Device' key once. The control panel will display the name of the card that first responds to the polling request together with its location number. The location number consists of the frame number plus the card position in the frame. Rotate the Shaft control to poll through the available cards. Use the F2 soft key to toggle between the card's serial number and issue number with modification level.

'Device' menu showing ADP 310 in slot 1.01

In the example above, the card displayed is located in the first frame in slot number 1.

When the desired card is selected press the ENTER key to access that card's HOME menu.

The ADP 310 home menu

Rotate the shaft control to scroll through the menu structure and press ENTER to select the sub-menus. Press HOME at any time to return to the home menu.

ADP 310 Reference Status sub-menu

Press ENTER to select the Reference Status menu or SCROLL to display other sub-menus. See description of menu structure below for list of sub-menus.

Control Panel keys overview

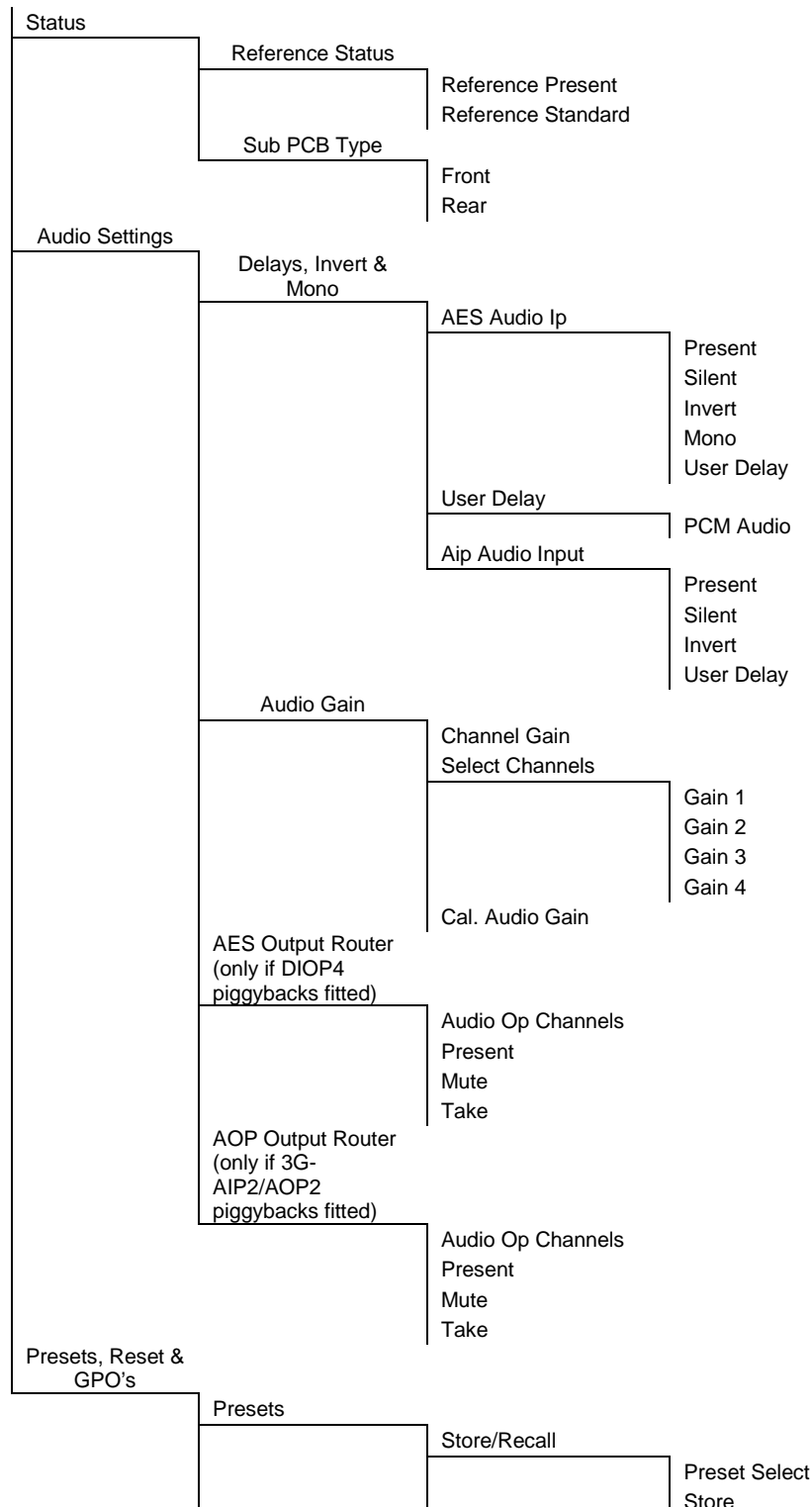The functions assigned to the control panel keys are:

- DEVICE – enters 'device' menu to select a card or show available cards.
- ASTERISK (*) – selects 'network configuration' menu.
- F1 to F4 – soft keys not currently used by ADP 310.
- HOME – returns to top of ADP 310's menu structure.
- ENTER – accept current selection.
- Up arrow – used to move up through the menu structure.
- Rotary control – shaft encoder used to select sub-menus or variable data.
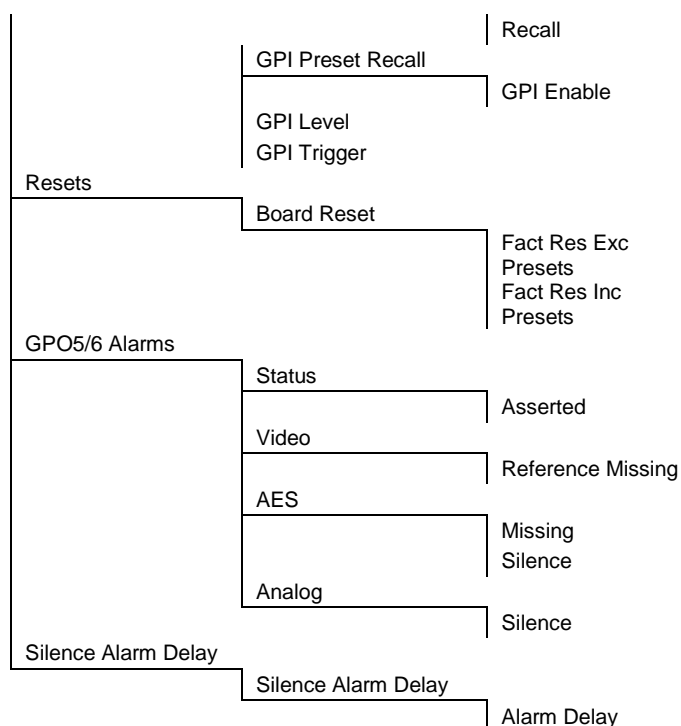
Updating the display

The values displayed on an active front panel are only updated when an adjustment is made and when changing menu level. If changes occur through the use of card edge controls or other remote control, the text displayed on the active front panel will not be updated immediately. If necessary, use the upward arrow to leave and then re-enter a menu to update the display.

Menu Structure

The basic menu structure for card edge, front panel access and VisionWeb is identical and consists of the following groups and sub-groups. *Note that some of these groups and sub-groups will change according to the piggyback boards fitted – for example, references to AES will only appear if DIOP4 piggybacks are fitted:*

Status
    Reference Status
        Reference Present
        Reference Standard
    Sub PCB Type
        Front
        Rear

Audio Settings
    Delays, Invert & Mono
        AES Audio Ip
            Present
            Silent
            Invert
            Mono
            User Delay
        User Delay
            PCM Audio
        Aip Audio Input
            Present
            Silent
            Invert
            User Delay
    Audio Gain
        Channel Gain
        Select Channels
            Gain 1
            Gain 2
            Gain 3
            Gain 4
        Cal. Audio Gain
    AES Output Router (only if DIOP4 piggybacks fitted)
        Audio Op Channels
        Present
        Mute
        Take
    AOP Output Router (only if 3G-AIP2/AOP2 piggybacks fitted)
        Audio Op Channels
        Present
        Mute
        Take

Presets, Reset & GPO's
    Presets
        Store/Recall
            Preset Select
            Store

```
                                                                    ┌── Recall
                                                ┌── GPI Preset Recall ──┤
                                                │                        └── GPI Enable
                                                ├── GPI Level
                                                ├── GPI Trigger
                                    Resets ─────┤
                                                │                        ┌── Fact Res Exc
                                                └── Board Reset ──────────┤   Presets
                                                                         └── Fact Res Inc
                                                                             Presets
                                    GPO5/6 Alarms ──┐
                                                    ├── Status ──────────── Asserted
                                                    ├── Video ─────────────── Reference Missing
                                                    ├── AES ──────────────┬── Missing
                                                    │                     └── Silence
                                                    └── Analog ──────────── Silence
                                    Silence Alarm Delay ──┐
                                                          └── Silence Alarm Delay ── Alarm Delay
```

The above menu structure is the means to access the various ADP 310 controls and status. A more detailed description is in the section 'Control Descriptions'.

Controlling cards via VisionWeb

Crystal Vision cards use an XML file to create a control database that is used by the card's front-edge controller, the Indigo frame front panel controller and VisionWeb software. VisionWeb software offers a full range of controls with slider controls etc. similar to that available with the older Statesman PC software.

Accessing the Indigo Home page with a PC browser via the Ethernet connector of an Ethernet-enabled frame will display a list of the cards fitted. (See appropriate frame manual for more details.)

⚙	Indigo @ 10.0.0.201	
1.01 ADP 310	v1.2 #000409	›
1.13 FrameMon	v1.4 #282827	›
1.14 FramePsu	v1.2 #002743	›

Indigo home page

The example above shows an ADP 310 card fitted in slot one and the frame's power supply and status monitor in slots 13 and 14. Clicking on the ADP 310 card will bring up the card's home page:
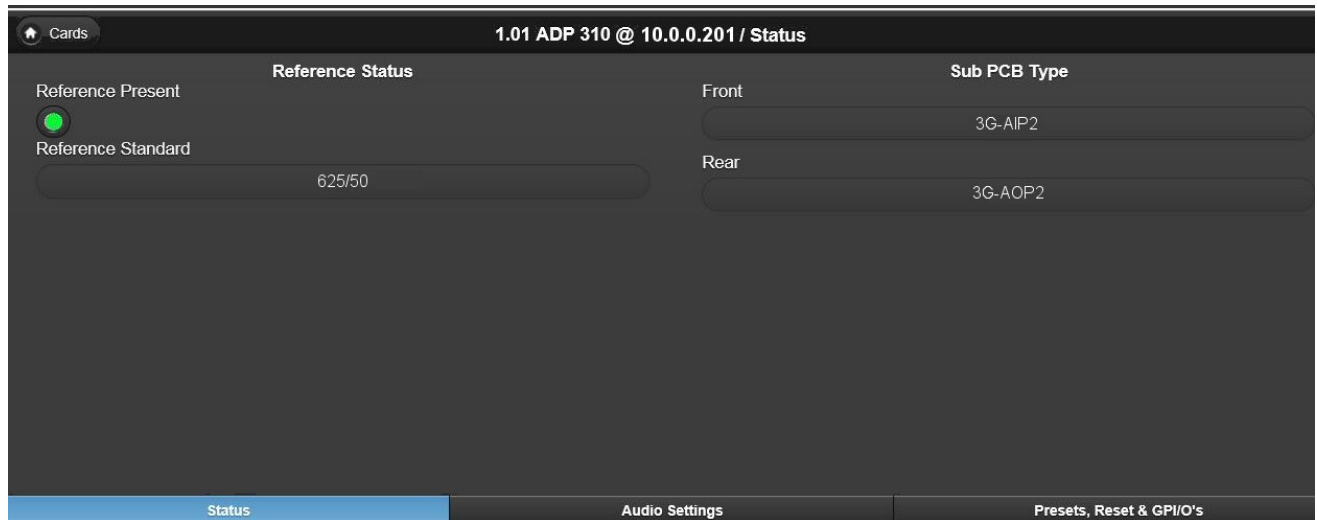
ADP 310 Status Page

6   Control Descriptions

The controls of ADP 310 are accessible from the front panel, the board edge or from Crystal Vision's 'VisionWeb' software. The description of controls used in this manual is based on VisionWeb GUI screen grabs but the path to locate controls via the front panel or board edge follows the same logic. For instance, in the VisionWeb GUI the 'Reference Present' indicator is located in the '**Reference Status'** group of the '**Status'** menu. To find the same control using the card edge or front panel follow the path **Status->Ref Status** to the **Ref Present** control.

VisionWeb GUI controls are accessed by menus at the bottom of the page which, when selected, offer sub-menus containing a number of controls. Some controls are simulated LEDs that are used to show status, others are check boxes, buttons or sliders which change various ADP 310 settings.

The description of the menus are in the order shown in the GUI i.e.

STATUS, DELAY, INVERT & MONO, AUDIO GAIN, AOP OUTPUT ROUTER / AES OUTPUT ROUTER, PRESETS, RESETS, **GPO5 ALARMS, GPO6 ALARMS, SILENCE ALARM DELAY.**

*(Note that the **AOP OUTPUT ROUTER** tab is only available whenever a 3G-AOP2 piggyback is fitted. If a DIOP4 piggyback is fitted instead, the tab displayed becomes **AES OUTPUT ROUTER**.)*

Each menu is shown with a screen grab and description of each control's function. Some menus and some controls are specific to the type of piggyback option boards fitted. Screen grabs from both configurations are used to show menus and controls specific to each.

Status Menu

Status
Display presence, standard and status of reference video signal.

Reference Present	On when valid Black and Burst or tri-level video input present.
Reference Standard	Shows reference video standard e.g. 625/50, 525/60, 525/59.94.
Sub PCB Type	Displays type of piggyback fitted in front and rear positions i.e. None, DIOP4, 3G-AIP2, 3G-AOP2.

Audio Settings Menu

Delay, Invert & Mono
Display status of incoming audio signals, invert and delay.

Present	Indicates when input channel is present (AES only). LED always on for analogue inputs.
Silent	Indicates when input channel is silent. i.e. consistently below -63dBFS.
Invert	Select to invert channel.
Mono	Select to mono channel pair. *N.B. Only the 1st channel of the stereo pair is converted to mono, the 2nd channel is unchanged. The mono output is gain corrected to maintain unity gain.*
User Delay	Select to enable the variable delay (0 to +400ms from 'User Delay' control) for the selected channel pair.
PCM Audio (mS)	Use this control to set the variable delay value (0 to +400ms) for all audio channel pairs programmed to use the User Delay.

Audio Gain

Control the gain of the audio channels by ± 18dB relative to the input level up to the point where digital clipping will occur.

Select Channels	AES C1 to C4 AES C5 to C8 Front Aip C1 to C4	Select which audio group of four channels to apply gain to. Select AES C1-C4 or C5-C8 for DIOP4 AES inputs or C1-C4 for 3G-AIP2 analogue inputs.
Gain 1-4		Use these controls to set the audio gain by +/- 18dB individually for each of the four channels of the group. Select the group first and then adjust the gain. Gain control is prior to the audio output router and can be applied to all available sources.
Cal Audio Gain		Select to return all channels to the calibrated gain level.

AES Output Router

Route AES audio inputs to AES audio outputs. Mute output channels. This menu is only available if DIOP4 piggybacks are fitted.
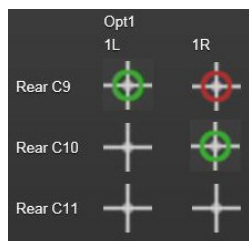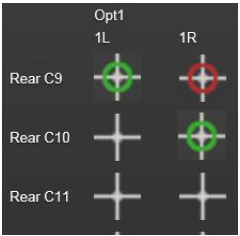
Audio Op Channels		Display current selections (green circles) and pre-select the cross point to be routed when the 'Take' button is pressed (red circles). The AES inputs shown along the top of the matrix will be routed to the AES output channels shown down the left hand side. The screen grab above has an input DIOP4 piggyback fitted in the front position (1-4 L & R) and an output DIOP4 in the rear position (C9-C16). Clicking on the intersection of the input and output will show a red circle which will change to green when the 'Take' control is selected. All cross points can be pre-selected. The screen grab above shows inputs 1R-3R pre-selected to output DIOP4 channels C9-C13.
Present	On when audio inputs are present.	
Mute	Mute the selected output channels.	
Take	Switch all pre-selected cross points in one go.	

AOP Output Router

Route analogue audio inputs to analogue audio outputs. Mute output channels. This menu is only available if the 3G-AIP2 and 3G-AOP2 piggybacks are fitted.

Audio Op Channels		Display current selections (green circles) and pre-select the cross point to be routed when the 'Take' button is pressed (red circles). The analogue inputs shown along the top of the matrix will be routed to the analogue output channels shown down the left hand side. The screen grab above has an input 3G-AIP2 piggyback fitted in the front position (1-2 L & R) and an 3G-AOP2 in the rear position (C9-C12). Clicking on the intersection of the input and output will show a red circle which will change to green when the 'Take' control is selected. All cross points can be pre-selected. The screen grab above shows inputs 2L-2R pre-selected to output channels C9-C10.
Present	On when audio inputs are present.	
Mute	Mute the selected output channels.	
Take	Switch all pre-selected cross points in one go.	

Presets, Reset & GPI/Os Menu

<table>
<tr><th colspan="2">Presets</th></tr>
<tr><td colspan="2">Up to 16 user-defined configurations may be stored and recalled either from VisionWeb or through the use of external GPIs. Presets store the board setup data including operating mode card status. The presets are numbered 1-16.</td></tr>
</table>

Preset select		**Store or recall ADP 310's configuration to one of 16 memory locations.**
GPI Enable		**Select to recall previously saved presets via the external GPI port. See Chapter 'General Purpose Interface' for more information on GPIs.**
GPI Level		**Select either low or high level to trigger the GPI recall.**
GPI Trigger		**Select either level or pulse to trigger GPI recall.**

Resets
Reset the board to its default settings.

Fact. Res Exc Preset	Reset the board to default settings but leave preset memories unaffected.
Fact. Res Inc Preset	Reset the board to default settings and erase preset memories.

GPO5 / GPO6 Alarms
The GPO 5 and GPO 6 outputs are reserved for alarm indication and may each be assigned to the reference video or any of the audio alarm conditions. Silence alarms have a delay timer to set the amount of time that the alarm condition must exist before the GPO is asserted. Audio alarms available depend on the type of piggyback fitted. Screen grabs are shown below for AES I/O (DIOP4 piggybacks) and analogue I/O (3G-AIP2 + 3G-AOP2 piggybacks). *GPO 6 alarms are not shown below but are identical to GPO 5.*

GPO 5/6 Alarms menu with DIOP4 piggybacks fitted

GPO 5/6 Alarms menu with 3G-AIP2 + 3G-AOP2 piggybacks fitted.

GPO5/6 Asserted	On if the alarm conditions are met.
Reference Missing	Assert if video reference missing.
AES Missing	Assert if AES channel pair is missing (DIOP4 piggybacks must be fitted).

Silence	Assert if AES pair or analogue pair is silent (<-63dBFS) for the period set by the Silence Alarm Delay control.

Silence Alarm Delay

Set the period that a signal must be silent before asserting an alarm.
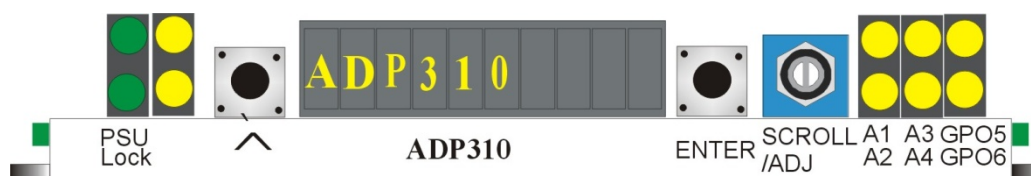

Silence Alarm Delay	Set the period (0 to 127 seconds) that a signal must be silent (<-63dBFS) before asserting GPO 5 or GPO 6 alarms set to trigger on audio silence.

7 Troubleshooting

Card edge monitoring

The front edge of the card provides useful power rail monitoring and input status.

ADP 310 front edge view

See **Card Edge Controls** for explanation of card edge LEDs.

The card edge LEDs and 10-digit display may be used in conjunction with status information from any connected remote status panel display or from VisionWeb or Statesman if available.

Board edge control was removed from ADP 310 in 2018. Therefore the card edge control information is only relevant for older versions of the product.

Basic fault finding guide

The Power OK LEDs are not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

The card no longer responds to card edge or front panel control

Check that the card is seated correctly and that the Power OK LEDs are lit

Check any active control panel cabling

Check if the control panel can control another card in the same rack

If necessary reset the card

Resetting the card

If required, the card may be reset by removing the card from the rack and then re-inserting it

It is safe to re-insert the card whilst the rack is powered. Any previous configuration will be retained, use a factory reset to erase any configurations stored in the card.

8 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector.
Weight	200g.
Power consumption	ADP 310 - 9 Watts. .

Inputs

Ref Video standards supported	Black and Burst or tri-level sync 625/50, 525/60, 525/59.94.
Return loss	50Mhz to 1.5GHz -15dB.
Audio	Digital: Up to four 24 bit stereo pairs (total of eight inputs) 48kHz sampled. AES3 110 ohm or HiZ (balanced) D-Type, or AES3-id (unbalanced) 75 ohm BNC. Analogue: Up to two stereo pairs (total of four mono channels). Hi-Z balanced.

Outputs

Audio	Digital: Up to four 24 bit stereo pairs (total of eight outputs). AES: 110 ohm balanced D-Type or 75 ohm unbalanced BNC. Analogue: Up to two stereo pairs, low-Z balanced.

Rear Module I/O

RM47	110 ohm balanced audio on a high density D-type. Reference video Black and Burst or tri-level sync input.
RM74	75 ohm unbalanced audio on BNCs. Reference video Black and Burst or tri-level sync input.
Audio Delay	Adjustable audio delay of up to 400ms on each channel. Delay is either on or off for any given channel. Store presets and control via the card, frame active front panel, remote panel and Statesman.
Audio Processing	Gain level adjustment on each channel between +18dB and -18dB in 0.1dB steps with 0dB calibration. Mute. Stereo to mono conversion.

Status monitoring

LEDs	Front of card edge LED indicators to indicate: PSU rails present. AES Inputs present. GPI Out 5 and 6 active.

GPI inputs

Number and type: 4 x GPI inputs. Recall of presets.
Active pull to ground, pulled up to +5V through 7 kohm.

GPI outputs

Number and type: 2 x GPI outputs, assignable to any of nine alarm condition such as loss of reference input, audio missing and audio channel silence (<-63dBFS).
Electrically: Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 7 kohm.

Control

Local: Intuitive board edge interface with two select buttons, shaft encoder and ten character alphanumeric display.

Remote: RS422/485.
19200 baud, 8 bits, 1 stop no parity.
Control from frame active front panel and remote panel.
VisionWeb Control is available via the web server on the frame and allows operation using a standard web browser on a PC or tablet.
Statesman Lite allows control from any PC on a network.
SNMP control and monitoring via frame CPU and Ethernet connection.

9   Appendix 1

Statesman

In July 2014, Statesman control of ADP 310 was superceded by VisionWeb control. Statesman is no longer supported after this date, but information for existing users is included in this appendix.

Introduction

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via Ethernet control from a PC. Statesman provides a user friendly means of configuring and operating Crystal Vision modules with the benefit of "see-at-a-glance" status monitoring.

The main Statesman application communicates with each module in a frame through a Statesman-capable front panel CPU or full active control panel. Either of these must be fitted to allow Statesman control.

Statesman operation

The initial view will show an Explorer style view of the connected frames and modules. Double clicking on a module will enable the display of the main application menus.
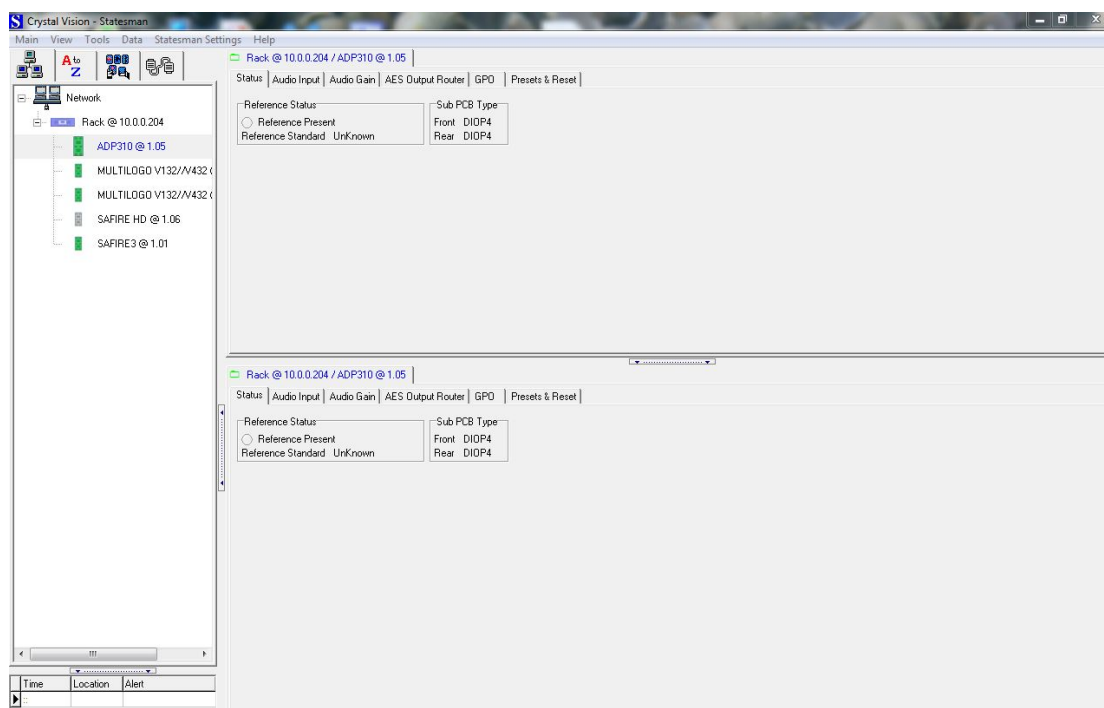
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower pane or drag the button to vary the size of the panes.

Note:	The above and following screen grabs contain some status information that will not be shown if the optional modules are not fitted.
Note Also:	For further details of Statesman configuration and operation please refer to the Statesman manual.

Control Descriptions

The controls of ADP 310 are accessible from the front panel, the board edge or from Crystal Vision's Statesman software. The description of controls used in this manual is based on Statesman but the path to locate controls via the front panel or board edge follows the same logic. For instance, in the Statesman GUI the 'Reference Present' control is located in the '**Reference Status'** group of the '**Status'** tab. To find the same control using the card edge or front panel follow the path **Status->Reference Status** to the **Reference Present** control.

Statesman GUI controls are located in a number of tabs each containing panels which mostly contain the controls. Some controls are LEDs that are used to show status, others are check boxes, buttons or sliders which change various ADP 310 settings.

The description of the tabs is in the order shown in the GUI i.e.

**STATUS, AUDIO INPUT, AUDIO GAIN, AOP OUTPUT ROUTER / AES OUTPUT ROUTER, GPO, PRESETS AND RESET**.

*(Note that the **AOP OUTPUT ROUTER** tab is only available whenever a 3G-AOP2 piggyback is fitted. If a DIOP4 piggyback is fitted instead, the tab displayed becomes **AES OUTPUT ROUTER**.)*

Each tab is shown with a screen grab and description of each control's function. The controls that are available vary with the option boards fitted and this is most noticeable with the output routers as the number of audio inputs and outputs will vary according to the optional audio I/O piggybacks that are fitted.

The ADP 310 can work for either analogue or digital (AES) audio signals. The following screen grabs were taken with either a DIOP4 in both piggyback positions or a 3G-AIP2 in the front position and a 3G-AOP2 in the rear. Grabs from both set-ups are shown where relevant.

| Status	The board status is shown using a mixture of simulated LEDs and text information. As a general rule a green LED shows a good condition such as input present. A greyed LED will indicate an absence such as non-alarm or non-warning status.
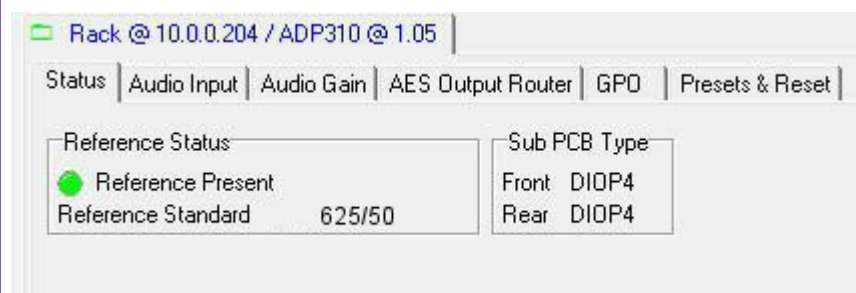
| Reference Status	
Reference Present	On when valid Black and Burst or tri-level video input present.
Reference Standard	Shows reference video standard e.g. 625/50, 525/60,525/59.94.

Sub PCB Type	
Front PCB	Type of piggyback PCB fitted in front position i.e. DIOP4, 3G-AIP2.
Rear PCB	Type of piggyback PCB fitted in rear position i.e. DIOP4, 3G-AOP2.

Audio Input	Indicates the presence and silence of all audio inputs. Option to invert, convert channel pairs to mono and set a global user delay. User delay selects the global 0 to 400ms delay for all channel pairs selected.
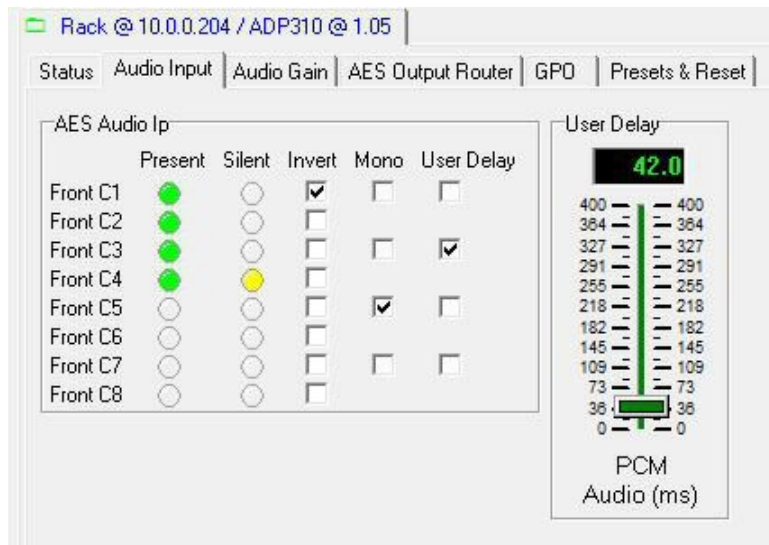
*Audio Input tab with DIOP4 piggback in front position showing a delay of 42ms applied to channel pairs C3+C4.*
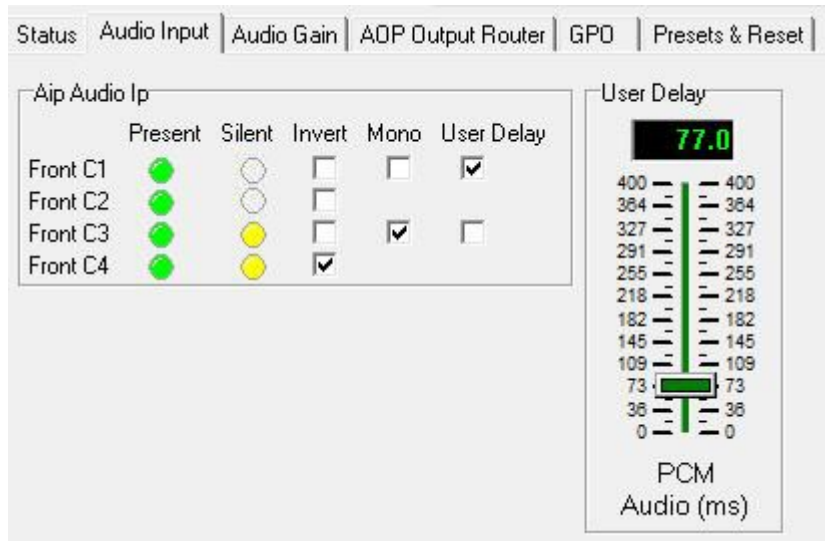
Audio Input tab with 3G-AIP2 in front position showing a 77ms delay applied to channel pairs C1+C2.

Aip/AES Audio Ip	
Present	**Indicates when input channel is present (AES only). LED always on for analogue inputs.**
Silent	**Indicates when input channel is silent. i.e. consistently below -63dBFS.**
Invert	**Select to invert channel.**
Mono	**Select to mono channel pair. *N.B. Only the 1st channel of the stereo pair is converted to mono, the 2nd channel is unchanged. The mono output is gain corrected to maintain unity gain.***
User Delay	**Select to enable the variable delay (0 to +400ms from 'User Delay' control) for the selected channel pair.**

Audio Delay	
PCM Audio (ms)	**Use this control to set the variable delay value (0 to +400ms) for all audio channel pairs programmed to use the User Delay.**

| **Audio Gain** | Gain controls will give ± 18dB of gain relative to the input level up to the point where digital clipping will occur. |
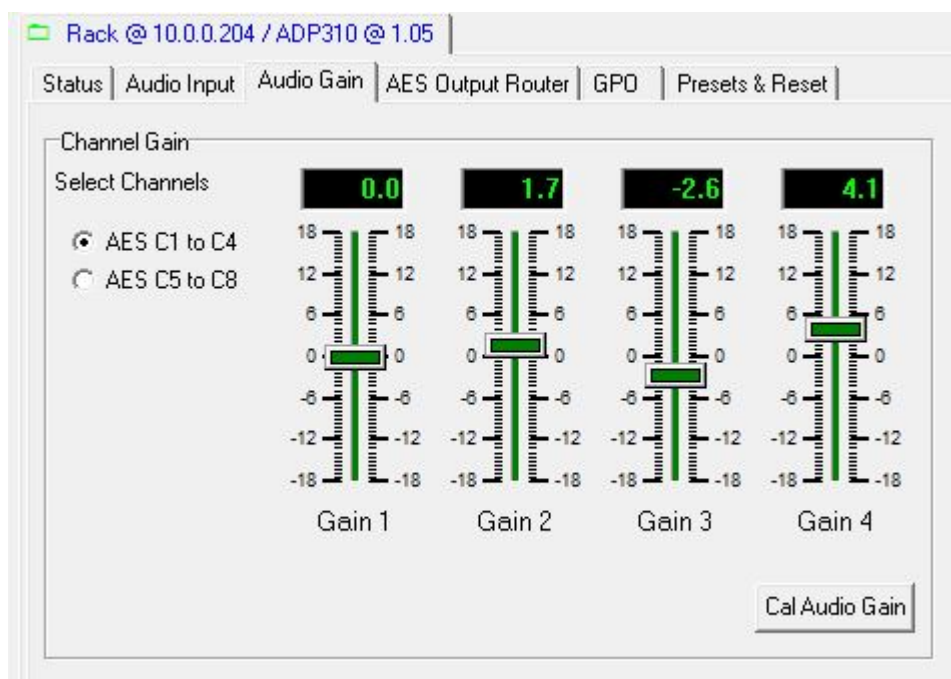
Audio Gain tab with DIOP4 in front position.
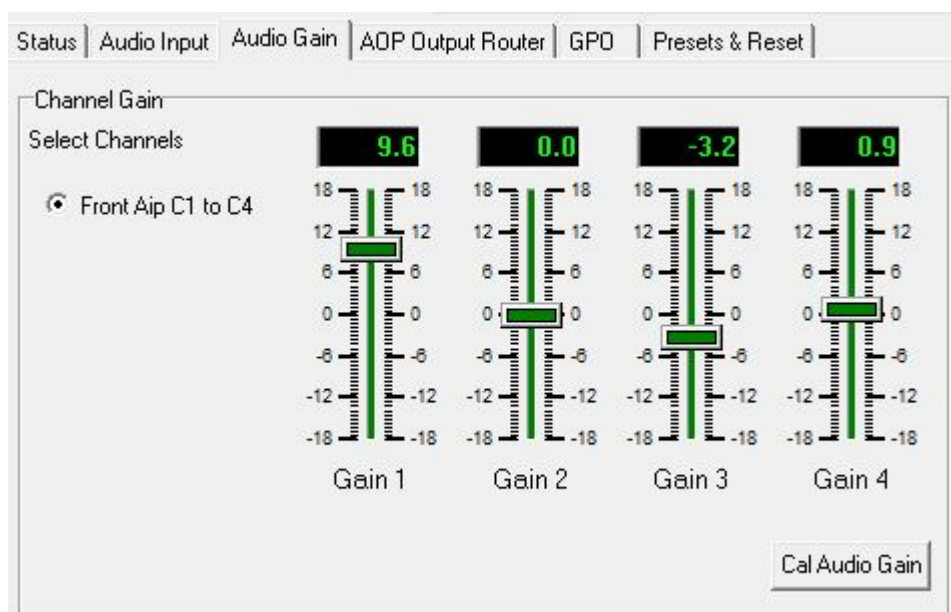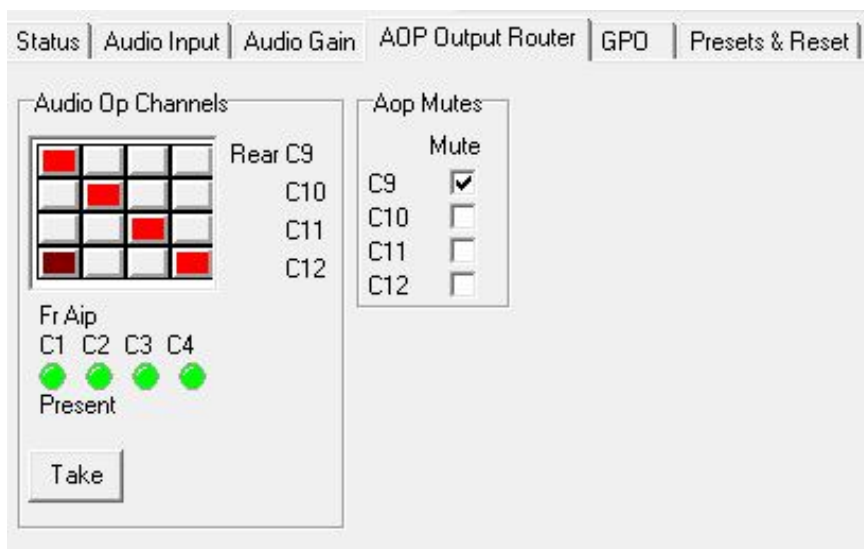

Audio Gain tab with 3G-AIP2 in front position.

Channel Gain	
Select Channels	**Select the audio group of four to apply the gain controls to.**
Gain 1-4	**Use these controls to set the audio gain by +/- 18dB individually for each of the four channels of the group. Select the group first and then adjust the gain. Gain control is prior to the audio output router and can be applied to all available sources.**
Cal audio Gain	**Select to return all channels to the calibrated gain level.**

N.B. To set the gain in Statesman, first select the audio group, adjust the gain for the individual channels within the group and press 'ENTER' on the keyboard to store.

AES input channels C1-C8 corresponds to rear module stereo pairs AES 1-4.

<table>
<tr>
<td>

AOP Router

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<td>

The 4x4 analogue output router allows any of the four analogue inputs to be routed to any of the four analogue output channels. The entire router configuration can be preset and activated with a single 'Take'. All channels can be individually muted. This tab only appears when a 3G-AOP2 piggyback is fitted in the rear position.

</td>
</tr>
</table>

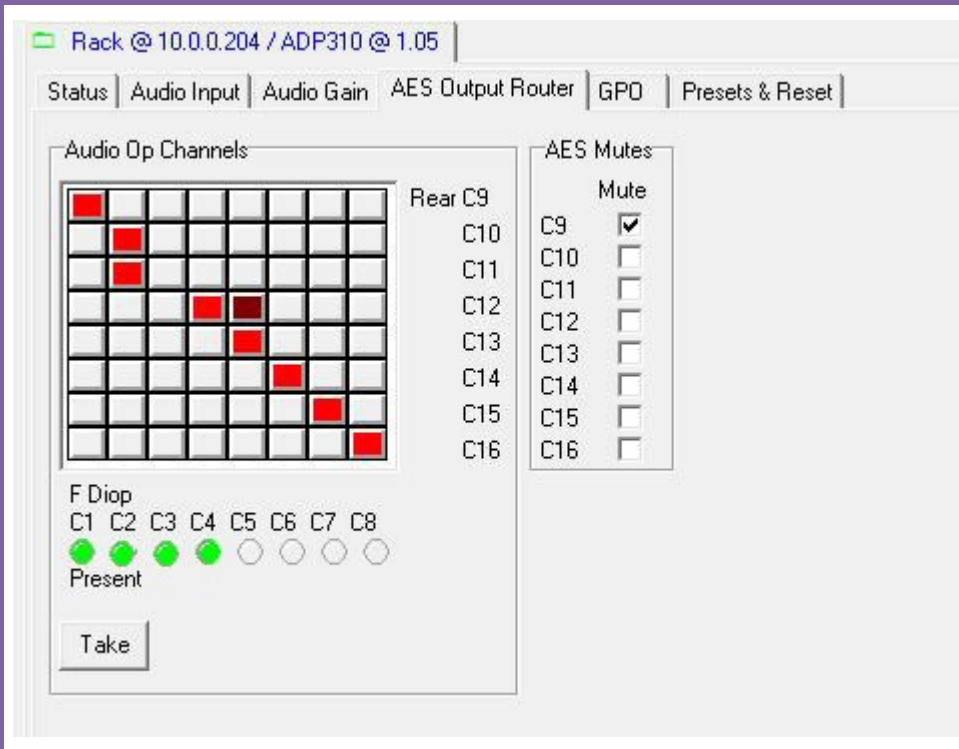| Audio OP Chs	
Route the four analogue input channels to the analogue outputs.	
Router selection buttons	Preset the router condition by selecting the button at the intersection of the input and output channel. Input selections are labelled at the bottom and output selections on the right. The button will light dark red once selected and red once taken. *N.B. GUI example shows the four input channels routed to the four output channels one-to-one. Input front 3G-AIP2 C1 is preset to be routed to output Ch 12.*
Take	Select this to action all presets. *N.B. Dark red preset selections will light red once taken.*
Present	LEDs always on for analogue inputs.

Embed Mute	
For all four analogue output channels.	
Output channels C9-C12	Select to mute analogue output channel.

This 8x8 router is for routing AES signals to the digital audio output module. Any of the eight audio inputs can be routed to eight audio outputs. This tab appears whenever a DIOP4 piggyback is fitted in the rear position.

Audio Op Channels		
Route the eight input channels to the eight audio outputs.		
Router selection buttons	Preset the router condition by selecting the button at the intersection of the input and output channel. Input selections are labelled at the bottom and output selections on the right. The button will light dark red once selected and red once 'taken'. *N.B. GUI example with two DIOP4 boards fitted shows the first eight input channels mainly routed to the eight output channels one-to-one (except input Ch 3). Input Ch 5 is preset to be routed to output Ch 12.*	
Take	Select this to action all presets. *N.B. Dark red preset selections will light red once taken.*	
Present	On if audio signal is present. Shows all input audio signals, embedded and external.	

Diop Mutes	
For DIOP4 output piggyback.	
Output channels Ch9-16	Select to Mute output channel.

N.B. Matrix output channels C9-16 correspond to rear module stereo pairs AES 5-8.

GPI outputs AES I/O	The GPO 5 and GPO 6 outputs are reserved for alarm indication and may each be assigned to any of the video and audio alarm conditions. Reference video and audio missing will assert an alarm immediately whereas the silence alarms can be assigned a delay timer to delay the time after which an alarm is asserted.

GPO tab with DIOP4 fitted in both positions – example shows GPO 5 alarm asserted due to missing video reference and GPO 6 alarm asserted due to AES channel pair C1+C2 missing.

GPO5 / GPO6		
Set the various conditions that assert GPO 5 and GPO 6.		
Status	**On if GPO is asserted.** *N.B. Visual indication of GPO 5 and GPO 6 status is provided on the board edge.*	
Video	**Select to assert the alarm if the video reference is missing.**	
AES	**Set the conditions for the AES input signals that assert the GPO.**	
	Missing	**Set to assert GPO if a channel pair missing.**
	Silence	**Set to assert GPO if a channel pair is silent for the period set by the Alarm Delay.**
Silence Alarm Delay	**Set the time period that a silence condition must be true before asserting the GPO from 0 to 127 secs. This feature is especially useful to prevent false alarming during quiet periods in the audio.**	

GPI outputs Analogue I/O	The **GPO 5 and GPO 6** outputs are reserved for alarm indication and may each be assigned to any of the video and audio alarm conditions. Reference video and audio missing will assert an alarm immediately whereas the silence alarms can be assigned a delay timer to delay the time after which an alarm is asserted.

GPO tab with 3G-AIP2 fitted in front position and 3G-AOP2 in rear – example shows GPO 5 alarm asserted due to channel pair C1+C2 being silent for more than seven seconds and GPO 6 alarm not asserted.

GPO5 / GPO6		
Set the various conditions that assert GPO 5 and GPO 6.		
Status	On if GPO is asserted. *N.B. Visual indication of GPO 6 status is provided on the board edge.*	
Video	Select to assert the alarm if the video reference is missing.	
AES	Set the conditions for the incoming audio input signals that assert the GPO.	
	Missing	Set to assert GPO if a channel pair missing.
	Silence	Set to assert GPO if a channel pair is silent for the period set by the Alarm Delay.
Silence Alarm Delay	Set the time period that a silence condition must be true before asserting the GPO from 0 to 127 secs. This feature is especially useful to prevent false alarming during quiet periods in the audio.	

<table>
<tr><td>

Presets and Reset

</td><td>

Up to 16 user-defined configurations may be stored and recalled either from Statesman or through the use of external GPIs. Presets store the board setup data including operating mode card status. The presets are numbered 1-16. Reset the board to factory (default) settings.

</td></tr>
</table>

Preset		
Save or recall ADP 310 settings.		
Preset Select	**Select which preset to store or recall.**	
Store/Recall	**Store**	**Save the setup in preset memory 1-16.**
	Recall	**Recall the setup from preset memory 1-16.**
GPI Preset Recall	**GPI Enable**	**Select to recall previously saved presets via the external GPI port. See Chapter 4 for more information on GPIs.**
	GPI Level	**Select either low or high level to trigger the GPI recall.**
	GPI Trigger	**Select either level or pulse to trigger GPI recall.**

Board Reset	
Reset ADP 310 settings to default values.	
Fact Res Exc Presets	**Reset the board to default settings but leave preset memories unaffected.**
Fact Res Inc Presets	**Reset the board to default settings and erase preset memories.**