ADCA412

Analogue to digital audio converter

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Revision 1 RM13 connection table corrected, page 27. 19/06/2011

1 Introduction

The ADCA412 is a dual analogue to digital audio converter designed to convert two dual channel analogue audio inputs to two AES/EBU audio outputs. The module accepts either 525 or 625 references from analogue composite video, word clock or an AES reference.

There are two operational modes 'Auto' that allows flexible phase locked loop sample rate control to accept a wide reference input frequency range and 'Xtal' that allows for crystal locked operation at 48kHz.

In addition to analogue to digital conversion, the ADCA412 incorporates a number of powerful features. For example, a channel swap function allows channels 1 and 2 to be transposed, whilst the phase of the right hand channel can be inverted to correct phasing errors. Analogue monitoring can be used to listen to each incoming stereo pair.

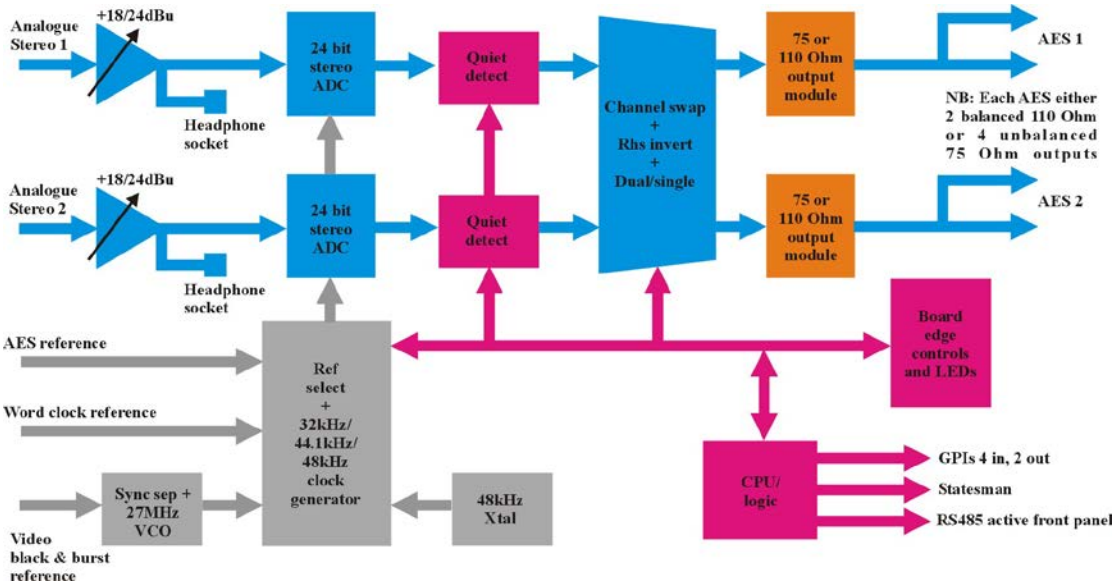
Also 'near silence' detectors monitor the audio signal level in both channels in case they fall below –50dBFS for more than a selected period of time. Silence warning and loss of reference warning status are normally routed by default to the GPI port for each channel.

The main features are as follows:

- 20/24 bit dual analogue to digital audio converter
- +12dBu to +28dBu input level for 0dBFS digital output with input level pre-sets for +18dBu and +24dBu
- 110 Ohm balanced and 75 Ohm unbalanced output versions via sub-module option
- choice of rear connectors to accommodate I/O format options
- external reference accepts video, word clock or AES source
- clock regeneration for 48kHz even when locked to video
- automatic 525/625 operation with AES phase adjustment in 625
- wide ranging 'Auto' mode for sample rates between 30kHz and 50kHz when using AES reference outside 48kHz +/- 50 ppm
- precision, re-clocking 'Xtal' mode for 48kHz output sample rate when locked to any 48kHz reference
- channel swap and RH channel invert
- loss of reference input and sustained silence warning via indicators and external alarms
- GPIs for 'Xtal' and 'Auto' mode change, channel swap and loss of input/silence warning
- control and status monitoring via board edge, frame/remote control panel and Statesman

System overview

The converter is configured as two independent converter channels each with their own silence detection circuitry but sharing the same reference generation circuitry. Intelligent audio routing provides for channel swapping, single channel mode and phase inversion.



A high stability 'Xtal' lock mode supports high quality crystal locked output sample rates at 48kHz and a more flexible 'Auto' mode uses a phase locked loop for other output sample rates. The 'Auto' mode phase lock loop range is useful when using an AES reference outside 48kHz +/- 50ppm but within a wide range from below 30kHz to above 50kHz.

Two AES outputs are available for each channel from the 24 bit analogue to digital converters. Headphone monitoring is provided for the analogue inputs.

Six different rear modules (RM) may be used with ADCA412, the RM03, RM11, RM13, RM14, RM21 and RM35. Further details of the rear modules can be found in the Installation chapter.

Control

Control of the card is on a first come first served basis from the card edge, Statesman, the frame control panel (if fitted) or a remote control panel. For example, if a card edge lever is moved the unit will switch to and remain in the 'Local Control Mode'. If any control panel menu is used, then the unit will switch to and remain in the 'Remote Control Mode'. The settings made will be remembered after a power down and the last control mode used will be retained.

The auto-configuration process performed when an ADCA412 is first powered up, detects the current configuration settings and restores the appropriate control.

Once this initialisation procedure is complete, the card can be controlled or configured from Statesman, the card edge, the frame's local control panel or from a remote control panel.

2 Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC.

The main Statesman application communicates with each module in a frame through an active control panel with an LCD display or a Statesman only panel without an LCD. Statesman will not be able to detect modules used in a frame with only a passive front panel.

2.1 Statesman operation

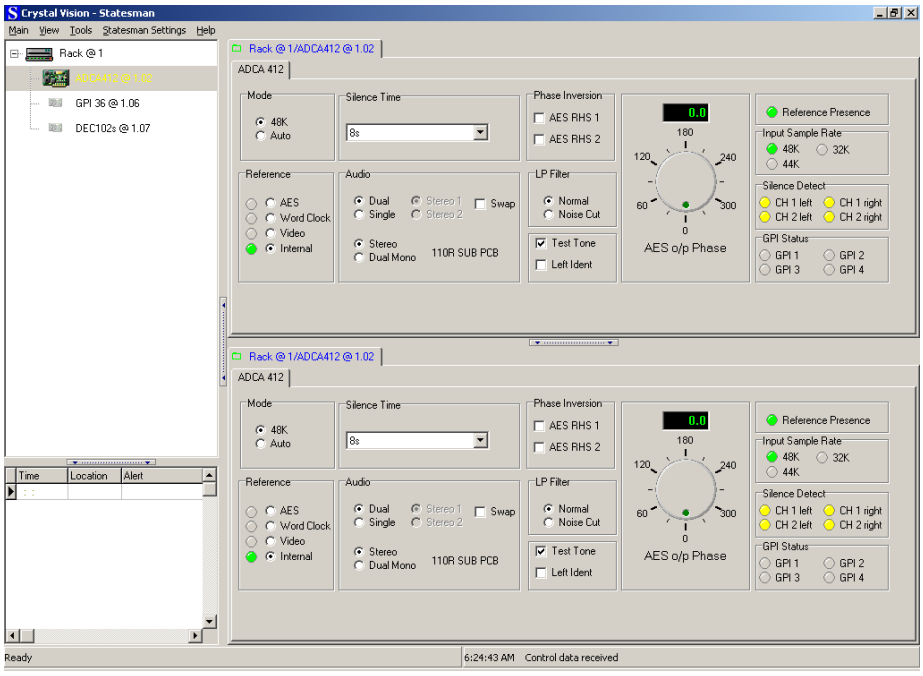
Once Statesman is configured it should automatically detect any statesman compatible modules in the connected frame or frames and display them in the main application left hand Explorer-style window.

Open any frame by clicking on the '+' sign or by double clicking on a frame. Installed modules should be shown with module icons. Frame and module icons can be named as desired by right-clicking or using the edit menu and choosing rename.

To aid user recognition of module and frame status quickly, the following colour and size coding is used:

- A module is shown present by full colour and absent by greyed colour
- A module is shown open by large icon size and closed by small icon
- A module is the source of an active alarm if red and not alarmed if green

Double-clicking on a module will enable the display of the main application menus.



Statesman main application window

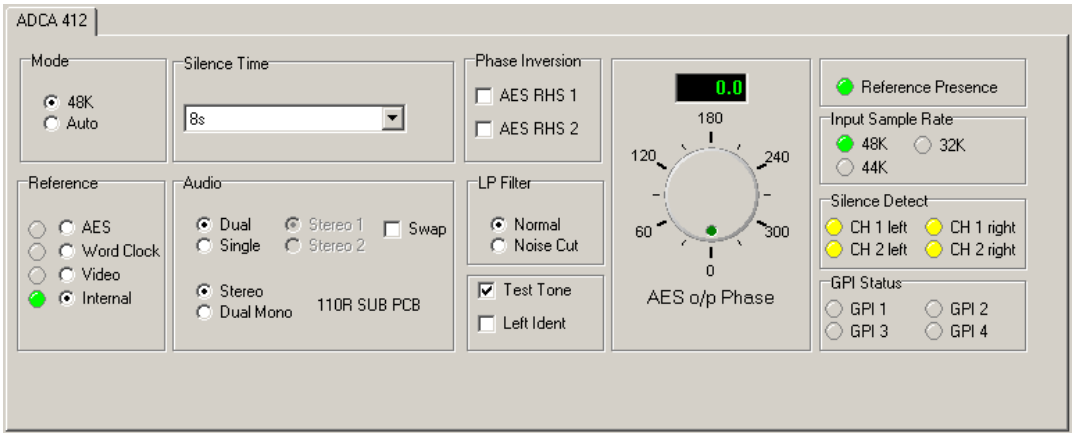
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

Note: For further details of Statesman configuration and operation please refer to the Statesman manual.

2.2 Using ADCA412 controls

The configuration controls are as follows:

- Mode – 48K or Auto
- Reference – AES, Wordclock, Video or Internal
- Silence time – 1.5 to 120 seconds
- Phase inversion
- Audio channel assignment
- LP filter
- Test tone/left ident
- AES output phase
- Status – reference presence, input sample rate, silence detect, GPI state



Configuration

Selecting the sample rate mode

The ADCA412 channel operates in two main modes 48K and Auto. Make the selection with the mouse by placing a selection dot against the required mode.

The primary mode is for the output sample rate clock to be locked to the reference using a 48kHz crystal oscillator to achieve optimum distortion figures. This is referred to as 'Xtal' mode and should be used at all times if possible.

The second mode uses built-in phase locked loops and VCOs to accept an AES reference which may vary from below 30 kHz to above 50 kHz. This is referred to as 'Auto' mode, and should be used when the AES reference sample rate is outside 48 kHz +/- 50 PPM.

Notes: 'Auto' mode can only be used with an AES reference. The 'Xtal' mode is designed for use with a video, word clock or AES reference at 48kHz.
GPI connections to the Auto/ Xtal mode change line will override the card edge switch if asserted to a logic low or grounded.

Selecting the reference

The ADCA412 output clock may be locked to AES reference, word clock, analogue video (or black and burst) or left to run off a 48kHz internal clock. References that are available will be shown with a green indicator.

Make the required reference selection with the mouse by placing a selection dot against an available clock source.

Note: If a reference source is selected that is not there or is lost, the module will automatically attempt to select one that is present. If no external reference can be found the internal clock will be selected.

Channel swapping, single channel mode and phase inversion

Channel routing logic following the silence detection circuits allows the incoming analogue signals to be assigned to digital outputs in a variety of ways.

The possible variations are as follows:

- channels may be swapped so that Input 1 feeds AES Output 2 and Input 2 feeds AES Output 1
- both output stages may be assigned to either Input 1 or Input 2 effectively doubling the duplicate outputs for a single analogue input.
- the phase of the right output of AES Output 1 **OR** AES Output 2 may be inverted

Make the selection with the mouse by placing a selection dot against the required options.

Note: GPI connections to the shuffling mode lines will override card edge switches if asserted to a logic low or grounded.

Selecting silence options

Each input channel is equipped with 'near silence' detectors. If the audio signal levels are sustained at below –50dBFS for more than a selected period of time, an indicator for each channel comes on and an appropriate GPI output can be asserted low.

To change the time required for a sustained silence to raise alarms and display warnings click on the Silence Time drop down box and select from the following range:

1.5 seconds 8 seconds every 8 seconds until… 120 seconds

Card-edge switches may be used to prevent silence detection from raising alarms via these GPI outputs. Please refer to the Using card edge controls chapter for more information.

Note: The routing of 'Loss of Reference Input' warning to the GPI port cannot be disabled.

Adjusting the AES output phase

The time/phase relationship between the current reference input and the actual AES output can be adjusted using the rotary AES o/p phase control.

Note: The Set Phase function does not work unless a valid external reference is selected. If the internal crystal oscillator is used, the phase control will be disabled.

To return the phase control to zero quickly, hold the mouse over the control, right click and then select 'Calibrate'.

The phase angle setting is stored in non-volatile memory. Each reference input (AES, Video or Word Clock) have their own memories for these values.

Every time the unit is powered up or the reference input selected or used is changed, the new values are loaded into the ADCA output PCB to ensure optimum performance.

Audio monitoring

Audio monitoring is provided at the card edge with two miniature stereo jack sockets. The left hand socket is connected to the Stereo 1 input signal and the right hand socket is connected to the Stereo 2 input signal.

Setting channel gain and input termination

Please refer to the Hardware configuration section of the Installation chapter for channel gain and input termination settings.

3 Using the front control panel

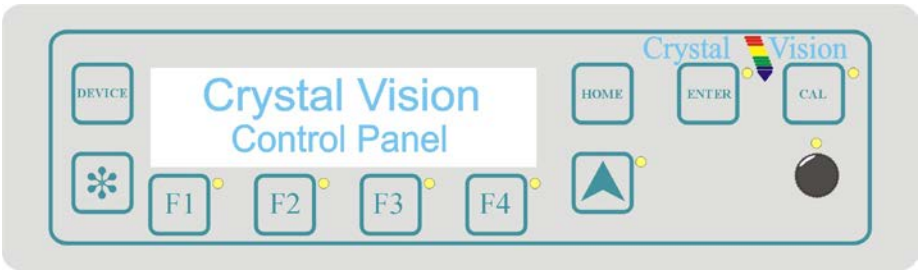
This operational guide assumes that the panel has been set up according to the Panel setup procedure described in the Crystal Vision Control Panels manual.

Note: It is **ESSENTIAL** that the Panel setup procedure is followed and any old or unknown passwords cleared prior to using the panel for the first time.

At power up, the two line 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel key LEDs will illuminate.

The Crystal Vision control panel start up display

'Control Panel' then briefly replaces the version number display.



If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.

Statesman mode is entered by default

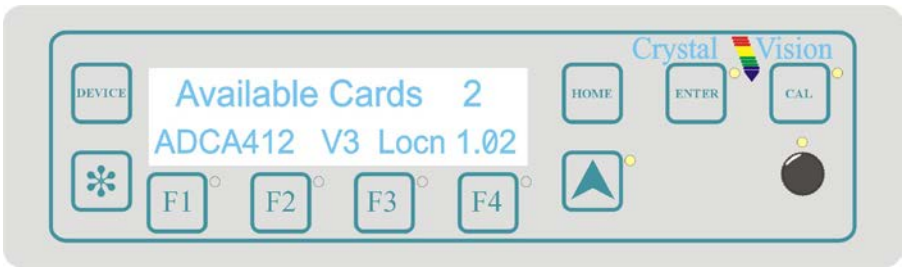
To continue with control panel operation or configuration, press the 'CAL' key once. A second press of the 'CAL' key will return to Statesman control.

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.

Selecting the ADCA412

To select a particular card in a frame, press the DEVICE key to go to the Device menu. The top line of the display will show 'Available Cards X', where X is the number of cards that have responded so far to the polling request.



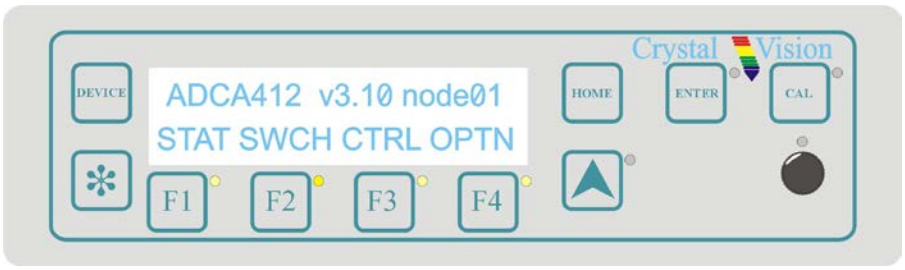
The Available Cards menu

Rotate the shaft encoder and the bottom row will display the successfully polled cards by name and location or slot number.

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.

If remote control has been enabled, the control panel will then enter card mode and communicate with the selected module at the node number last displayed in the available cards list.



The ADCA412 Home menu

Navigating the display

The functions assigned to control panel keys are dependent on the card selected for control, and the panel mode. The following list illustrates the functions when controlling the ADCA412:

DEVICE – enters Device menu to select a card or card to control / enter Panel setup when held down during power up / shows frame status when pressed from Statesman mode

CAL – Enter or leave Statesman mode / enter Panel Diagnostics mode when held down during power up / updates the display

Asterisk – enters Board Rename menu from the Device menu

F1 to F4 – soft keys, function assigned within each menu

HOME – moves the display to the Home menu

ENTER – accept current selection

Upward arrow – used to move up the menu structure / enter Lock Panel menu from the Device menu

Rotary control – shaft encoder used to select options or variable data

Note: Please refer to the Crystal Vision Control Panel manual for details of the Panel Setup, Lock Panel and Diagnostic menus.

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 mode changes occur through the use of Statesman, card edge controls or through automatic response to the input video signal, the text displayed on the active front panel will not be updated immediately. If necessary, press CAL to update the display.

The ADCA412 menu structure

The main top-level menus are obtained by pressing the F1, F2, F3 and F4 keys from the Home menu. Menu keys are illuminated when active and when further menus are available. The four top-level menus are:

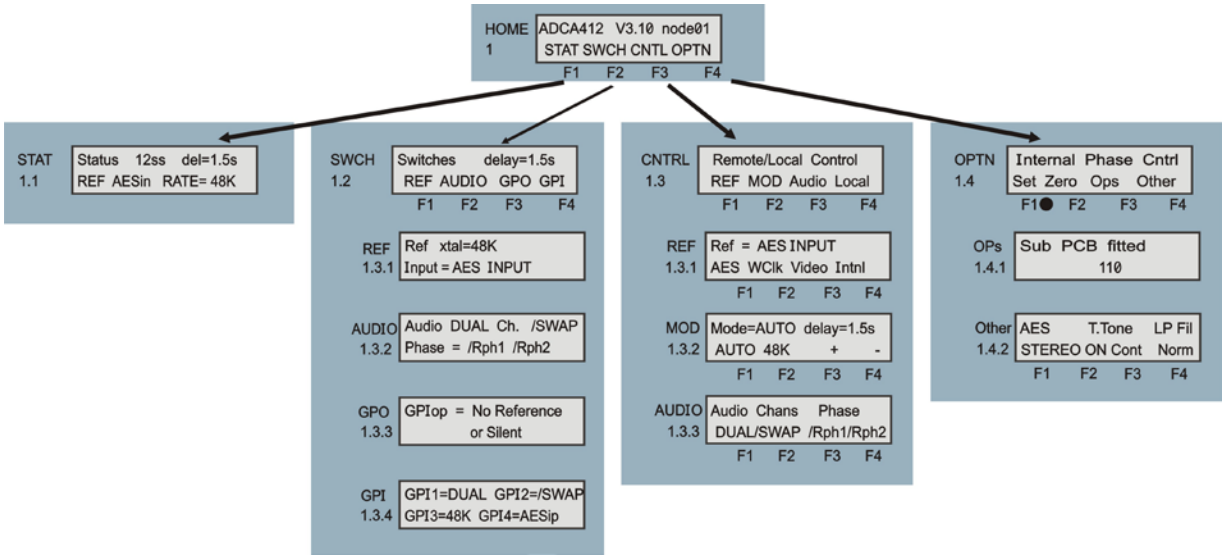
STAT (Status) – press F1

SWCH (Switch) – press F2

CNTL (Control) – press F3

OPTN (Option) – press F4

The following chart shows the majority of the available menus. The actual menus available may vary slightly as ADCA412 software is updated.



The ADCA412 menu tree

Note: Function keys and shaft encoder LEDs are illuminated when active.
Function keys associated with the shaft encoder for changing assigned values are shown with a black circle.
The use of STATUS or SWITCH monitoring functions in no way affects whether the module is operating in 'LOCAL CONTROL MODE', or 'REMOTE CONTROL MODE'.
The STATUS display data may differ from the actual settings due to Statesman, GPI inputs or remote CONTROL settings from the front panel overriding the front PCB control settings. Press the CAL button to update the display.

Menu numbering scheme

This manual uses a simple menu numbering convention based on the sequence of keys required to reach each menu from the top level Home menu. For example, menu 1.1.2 is reached from the Home menu by pressing F1, then F2. Menu 1.1.2.1 is reached by pressing F1, F2 and then F1 again.

Shorthand codes

The following shorthand codes are used in the control panel menus:

Menu code	Function description
AES1/2	AES/EBU digital audio signal 1/2
ST1/2	Analogue stereo 1 or 2 input signal
GPI	General Purpose Interface INPUT
GPO	General Purpose Interface OUTPUT
/	Indicates no-effect when used in front of menu code
/Rph	NO phase inversion of right hand channel
Rph	Right hand channel IS phase inverted
AUTO	Follows ref input clock frequency between 30 and 50kHz
48K	Locked to 48kHz crystal oscillator
DUAL	Dual channel operation
SWAP	Inputs are swapped
/SWAP	Inputs are NOT swapped
SNGL	Single channel mode
delay	Time period required for signal to remain below threshold before input silent is asserted
s	Audio signal silent (below –50dBs FS longer than delay period)

Note: Remember, the '/' symbol negates the effect of a menu code it precedes.

Setting channel gain and input termination

Please refer to the Hardware configuration section of the Installation chapter for channel gain and input termination settings.

Status menus

Pressing F1 from the home menu will bring up the top Status menu. The Status menus provide the following information:

Audio activity

Audio silence sustain delay

Output sample rate

Status menu	Description
STAT 1.1 Status 12ss del=1.5s Aref INTNL RATE= 48K	The top menu line displays the currently selected sustained silence delay before the 'Silence' LEDs are illuminated, and (optionally) the relevant GPI outputs are asserted low. Active audio channels are indicated by the numbers 1234 (ST1Left = 1, ST1Right = 2, ST2Left = 1, ST2Right = 2). Any silent channels are indicated by the symbol 's'. The bottom line shows the reference source in use (REF followed by VIDEO, AES or W.CLOCK). Aref instead of REF indicates that the source in use is an **alternative** because the selected source is not suitable or not available. RATE shows the sample rate and AES output rate.

Note: Each input channel is equipped with 'near silence' detectors. If the audio signal levels are sustained at below –50dBFS for more than a selected period of time, an indicator for each channel comes on and an appropriate GPI output can be asserted low.
Stereo 1 silent in audio channel 1 or 2 will illuminate 'silent' LED 1 and assert GPO5 low if enabled.
Stereo 2 silent in audio channel 3 or 4 will illuminate 'silent' LED 2 and assert GPO6 low if enabled.

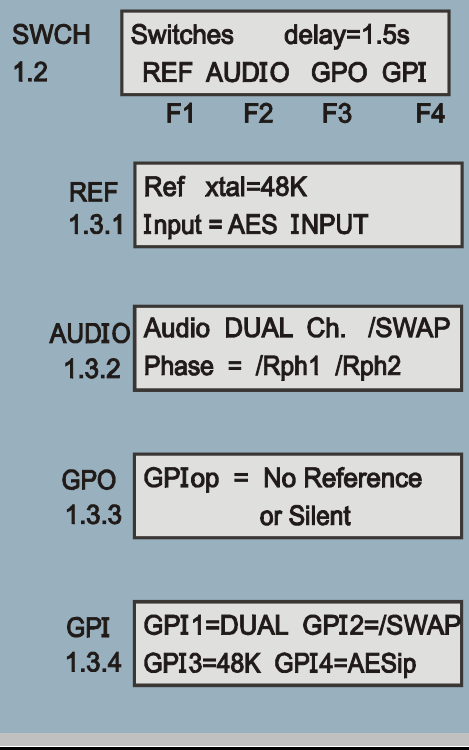
Switch status menus

Pressing F2 from the Home menu will bring up the top Switch status menu. This menu provides the following information:

Further AES channel status

Mode selected status

GPI status

Switch status menu	Description
	The 'SWTCH' menu displays the PCB front control SWITCH settings. F1, F2, F3 and F4 select further menus. The REF sub-menu shows the crystal fitted (normally 48 kHz) and the reference selected with SW3-1 and SW3-2 (AES, WORD CLOCK, VIDEO SYNCS or INTERNAL). The AUDIO sub-menu shows the main operational mode (SINGLE, DUAL) as selected by SW3-6. The top line also shows if the channel inputs are swapped in using SW3-5. The bottom line shows the effect of SW3-7 and SW3-8 on the phase of the RHS of Stereo 1 and 2. The GPO sub-menu shows the effect of SW3-4 on silence warning via GPO5 and GPO6. The GPI sub-menu shows the state of the four GPI inputs as explained in the table below.

Note: The effect of swapping inputs with SW3-5 is shown differently depending on the selected operating mode. In DUAL mode SWAP or /SWAP is shown. In SINGLE mode ST1 or ST2 is shown to indicate which stereo input feeds both AES outputs.

GPI sub-menu

This menu can display the following GPI information:

Display	Meaning	Notes
GPI1=DUAL	GPI1 is NOT asserted low	DUAL mode
GPI1=SINGLE	GPI1 is asserted low	SINGLE mode
GPI2=/SWAP	GPI2 is NOT asserted low and GPI1 is NOT asserted low	DUAL mode Inputs NOT swapped
GPI2=SWAP	GPI2 is asserted low and GPI1 is NOT asserted low	DUAL mode Inputs swapped
GPI2=AES1	If GPI1 is already asserted low, then GPI2=S1 means GPI2 is NOT asserted low	SINGLE mode Input 1 feeds AES1&2
GPI2=AES2	If GPI1 is already asserted low, then GPI2=S2 means GPI2 is asserted low	SINGLE mode Input 2 feeds AES1&2
GPI3=48K	GPI3 is NOT asserted low	'Xtal' mode
GPI3=AUTO	GPI3 is asserted low (only effective if AES reference input has been selected and a valid input is present AND GPI4 is NOT asserted low)	'AUTO' mode
GPI4=AES/W.CLK	GPI4 is NOT asserted low	AES or WORD CLOCK reference selected
GPI4=VIDEO	GPI4 is asserted low, or VIDEO syncs already selected	VIDEO reference selected
GPI4=INTERNAL	GPI4 ignored	ADCA412 is fixed in free run mode

Card edge switches may be used to prevent silence detection from raising alarms via these GPI outputs. Please refer to the Using card edge controls chapter for more information.

Note: The routing of 'Loss of Reference Input' warning to the GPI port cannot be disabled.

Control menus

Pressing F3 from the Home menu will bring up the top Control menu. This function allows the module to be configured without the need to access the PCB switches. The menu provides the following functions:

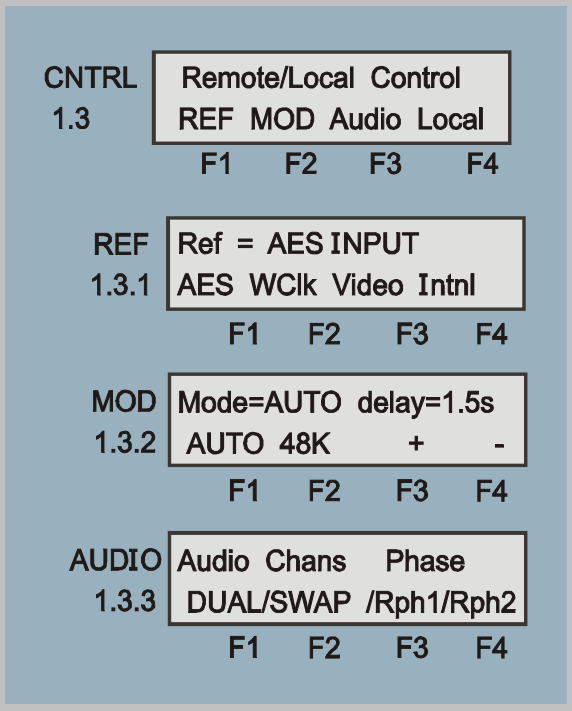
AUTO/Xtal lock

Right hand channel phase

Single or Dual mode selection

Silence threshold delay

Re-establish LOCAL control

Control menu	Description
	The CNTRL menu allows remote access to the functions normally controlled by front PCB controls. The REF menu allows the reference to be selected using F1-F4 from, AES, WORD CLOCK, VIDEO or the INTERNAL oscillator. The MODE menu selects between AUTO and 48KHz (Xtal) modes using F1and F2. Silence delay may be increased using the F3 '+' or decreased using F4 '-' between 1.5s and 120s in 8s steps. In SNGL mode use F2 to select the AES channel before changing the delay. The AUDIO menu provides control over the main operating mode with F1 (DUAL/SINGLE) and provides control of the channel swap function with F2. F3 and F4 allow the RHS of each channel to be inverted.

Note: If mains power is removed and re-applied the module will return to exactly the same settings on power-up as existed when mains power was lost.

Accessing any remote Control menu will always establish REMOTE CONTROL MODE. If any PCB switch levers or the rotary hex switch is altered, the module will switch back to 'LOCAL CONTROL MODE', and operate in accordance with the front of PCB switch settings. It will remain that way until any remote control command is received. The LOCAL button in the top CNTRL menu, F4, will also return the unit to local control.

Option menus

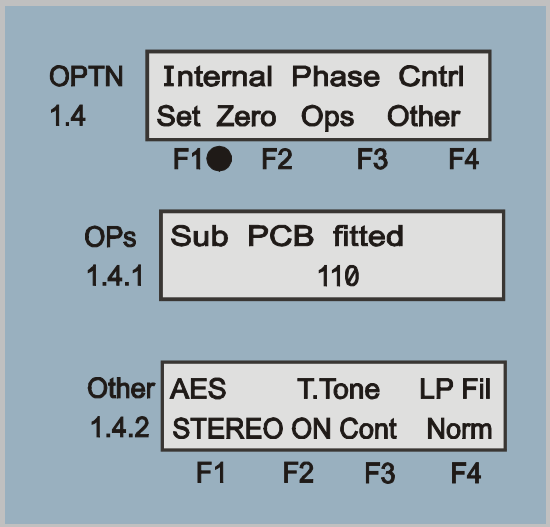
Pressing F4 from the Home menu will bring up the top Option menu. This menu provides the following functions:

Select Stereo or Dual Channel AES message format

Adjust AES output phase (external reference must be selected)

Set test tone options

Shows sub-PCBs fitted

Option menu	Description
	Adjust the phase relationship between the selected external reference and the AES output by pressing F1 (SET) and rotating the shaft encoder. Use F2 (ZERO) followed by CAL to calibrate to '0.0'. The OPs menu shows the type of output sub-PCB fitted which can be 75R or 110R. Use the 'Other' menu to access the following: Press F1 to set the AES message format between Stereo or Dual Channel. Press F2 to set the Test Tone output On or Off. Press F3 to select an Ident tone on the left hand channel when the test tone is On. Press F4 to select between Normal and N Cut. N Cut puts a low pass filter in each input to reduce the effects of noise.

Note: The Set Phase function does not work unless a valid external reference is selected. If the internal crystal oscillator is used, the phase control will be disabled.

Set phase adjustment

If the Set Phase function is enabled, the time/phase relationship between the current reference input and the actual AES output will be shown to the nearest 1.5 degrees, relative to the last calibration.

Press the SET button to enable adjustment of the AES output time/phase using the shaft encoder. Once the desired phase has been set, press ZERO followed by [CAL] to calibrate the display to '0.0'. The phase angle setting and the display calibration value are both stored in non-volatile memories. Each reference input (AES, Video or Word Clock) have their own separate memories for these values.

Every time the unit is powered up or the selected or used reference input is changed, the new values are loaded into the ADCA output PCB to ensure optimum performance.

4 Using card edge controls

The front edge of the card provides power rail monitoring, an eight-way configuration switch bank, analogue audio monitoring outputs and a rotary control to set the silence threshold.

LED indicators are provided to monitor power rails, input present, input sample rate and local/remote mode.

Selecting the output clock source

The ADCA412 output clock may be locked to AES reference, word clock, analogue video (or black and burst) or left to run off a 48kHz internal clock.

The choice is made using SW3-1 and SW3-2 as follows:

Lever 1	Lever 2	Function
UP	**UP**	AES reference selected
UP	**DOWN**	Video reference selected
DOWN	**UP**	Word clock selected
DOWN	**DOWN**	Internal clock source selected

Selecting the sample rate mode

The ADCA412 channel operates in two main modes. The primary mode is for the output sample rate clock to be locked to the reference using a 48kHz crystal oscillator to achieve optimum distortion figures. This is referred to as 'Xtal' mode and should be used at all times if possible.

The second mode uses built-in phase locked loops and VCOs to accept an AES reference which may vary from below 30 kHz to above 50 kHz. This is referred to as 'Auto' mode, and should be used when the AES reference sample rate is outside 48 kHz +/- 50 PPM.

Note: 'Auto' mode can only be used with an AES reference. The 'Xtal' mode is designed for use with a video, word clock or AES reference at 48kHz.

The sample rate mode for each channel can be controlled from the card edge using the third lever of the DIL switch as explained in the following table:

Lever	Function
3	Down = Auto (30-50kHz) mode, Up = Xtal (48kHz) mode

Note: GPI connections to the Auto/ Xtal mode change line will override the card edge switch if asserted to a logic low or grounded.

Channel swapping, single channel mode and phase inversion

Channel routing logic following the silence detection circuits allows the incoming analogue signals to be assigned to digital outputs in a variety of ways.

The possible variations are as follows:

- channels may be swapped so that Input 1 feeds AES Output 2 and Input 2 feeds AES Output 1
- both output stages may be assigned to either Input 1 or Input 2 effectively doubling the duplicate outputs for a single analogue input.
- the phase of the right output of AES Output 1 **OR** AES Output 2 may be inverted

The various channel shuffling modes are selected as follows:

Lever	Function
5	Down = Channels swapped, Up = Normal
6	Down = SINGLE channel mode, Up = DUAL mode (Note: Lever 3 = Down will swap channels so Input 2 feeds all outputs)
7	Down = CH 1 output RHS inverted, Up = CH1 normal
8	Down = CH 2 output RHS inverted, Up = CH2 normal

Note: GPI connections to the shuffling mode lines will override card edge switches if asserted to a logic low or grounded.

Setting channel gain and input termination

Please refer to the Hardware configuration section of the Installation chapter for channel gain and input termination settings.

Selecting silence warning options

Each input channel is equipped with ‘near silence’ detectors. If the audio signal levels are sustained at below –50dBFS for more than a selected period of time, a LED indicator for each channel comes on and an appropriate GPI output can be asserted low. DIP switch SW3-4 can be used to prevent silence detection from raising alarms via these GPI outputs.

The top amber 'SIL' LED indicates that either the left or right channel of the analogue stereo 1 signal has been silent, while the bottom 'SIL' LED shows that either the left or right channel of the analogue stereo 2 signal has been silent.

Card edge switches may be used to prevent silence detection from raising alarms via these GPI outputs.

Setting SW3 lever 4 low disables both Stereo 1 silence from asserting GPO5 low and Stereo 2 silence from asserting GPO6 low. However, loss of the selected reference input ALWAYS asserts GPO5 and GPO6 low, even if a suitable alternative reference has been automatically selected to sustain a locked sample rate and correct AES output frequency and phasing.

Lever	Function
4	Down = Disable both stereo input silence warning GPI outputs, Up = Enable

Note: The routing of 'Loss of Reference Input' warning to the GPI port cannot be disabled.

Setting the silence threshold

The Hex rotary switch, 'SIL TIME' is used to set the required sustained silence period before the LED indicators are illuminated and associated warnings raised. Switch position '0' provides 1.5 seconds of sustained silence. Positions '1' through to 'F' provide a range of 8 to 120 seconds in 8-second increments.

The following table shows the silence threshold timing available:

SIL TIME	Threshold	SIL TIME	Threshold
0	1.5 seconds	**8**	64 seconds
1	8 seconds	**9**	72 seconds
2	16 seconds	**A**	80 seconds
3	24 seconds	**B**	88 seconds
4	32 seconds	**C**	96 seconds
5	40 seconds	**D**	104 seconds
6	48 seconds	**E**	112 seconds
7	56 seconds	**F**	120 seconds

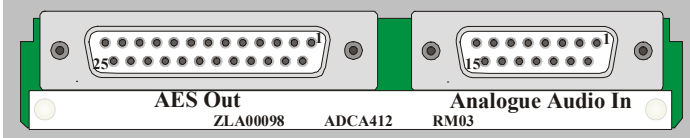
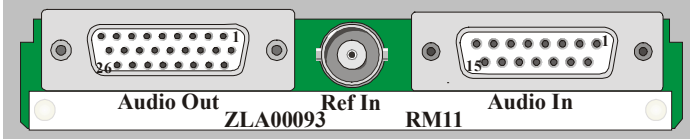
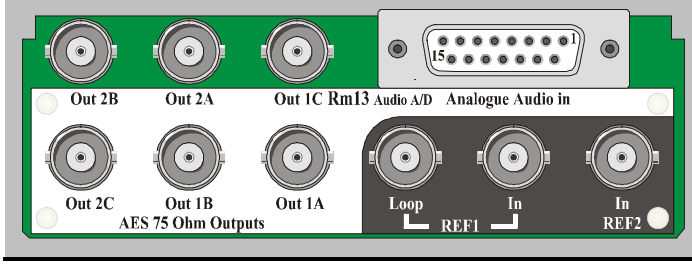
Audio Monitoring

Audio monitoring is provided at the card edge with two miniature stereo jack sockets. The left hand socket is connected to the Stereo 1 input signal and the right hand socket is connected to the Stereo 2 input signal.

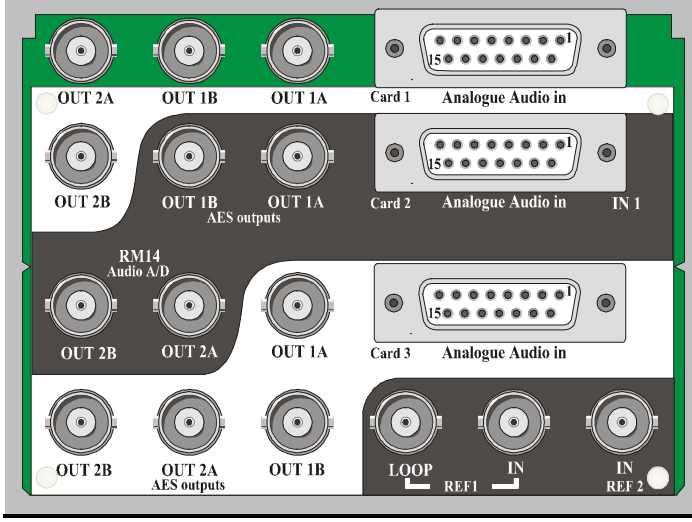
5 Installation

Six different rear connector modules (RM) may be used with ADCA412. There are single, dual and triple slot versions available offering a variety of I/O options and rack population densities. Other Crystal Vision RM and Interface PCBs can be mixed in any quantity with the ADCA412, up to a maximum of 24 PCBs, providing the other PCBs do not exceed the power rating of the PSU chosen (normally 150 watts).

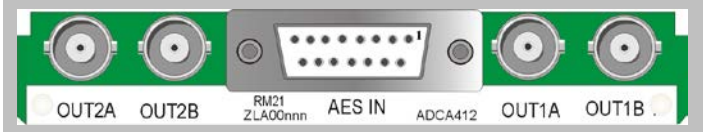
The available rear connectors are as follows:

Rear Connectors	Description
  	**RM03 – ZLA00098** • 24 modules per Indigo 4 frame • Recommended for 110 Ohm balanced AES outputs and AES Ref in • GPI lines also available at frame remote connectors • All frame slots can be used **RM11 – ZLA00093** • 24 modules per Indigo 4 frame • Recommended for 110 Ohm balanced AES outputs and video or word clock Ref in • GPI lines also available at frame remote connectors • All frame slots can be used **RM13** • 12 modules per Indigo 4 frame • Recommended for 75 Ohm unbalanced AES outputs • GPI lines only available at frame remote connectors • Slots 1,3,5,7,9 and 11 used

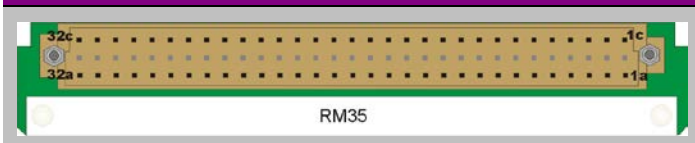
Notes: The RM11 is similar to the RM03, but has an additional BNC input for the reference signals required for ADCA412 PCBs, and has a high density 26 way D-connector instead of the standard 25 way D-connector. If the rack frame has a mixture of DACA214 and ADCA412 PCBs, the user may wish to standardise on one common RM11 for both DACA214 and ADCA412 board types.
The RM03 can accept 75 Ohm circuits if required.
Only plug the ADCA412 cards into the top slot associated with the RM13 rear module, the bottom slot is not used and MUST be left vacant.

Rear Connectors	Description
	**RM14** • 9 modules per Indigo 2 frame • Recommended for 75 Ohm unbalanced AES outputs with high packing density per frame for multiple ADAC modules • GPI lines only available at frame remote connectors • Card 1 fits in slots 1, 5 and 9 • Card 2 fits in slots 2, 6 and 10 • Card 3 fits in slots 3, 7 and 11 • No card fits in 4, 8 or 12

Notes: Each RM14 is four slots high for three ADCA412 modules sharing a common reference input.
The last module in the chain should terminate any looped video reference.
Only plug the ADCA412 cards into the top three slot associated with the RM14 rear module, the bottom slot is not used and MUST be left vacant.

Rear Connectors	Description
	**RM21** • 24 modules per 4U frame, 12 per 2U frame, 6 per 1U frame and 2 per DTB. • All frame slots can be used.

Notes: The single slot high RM21, like the RM14, is for 75 Ohm use and allows a greater packing density. This has been achieved by moving the reference input from a dedicated BNC to the D-Type connector.

Rear Connectors	Description
	**RM35** • 24 modules per 4U frame, 12 per 2U frame, 6 per 1U frame and 2 per DTB. • All frame slots can be used.

For details of fitting rear connectors please refer to the Indigo frame manual

5.1 Rear module connections

RM03

RM03 Audio Out connector 25 way D-Type socket (cable has plug on it)

Pin Number	Function	Comments	
1	GPI-1	Single / Dual mode	input
2	GPI-3	Auto/Xtal	input
3	GPI-5	Stereo 1 alarm	output
4	GND		
5	OP1+1		
6	OP1-1	Stereo 1 AES output	
7	OP1+2		
8	OP1-2		
9	OP2+1		
10	OP2-1	Stereo 2 AES output	
11	OP2+2		
12	OP2-2		
13	GND		
14	GPI-2	Swap/AES inputs	input
15	GPI-4	Video Sync REF	input
16	GPI-6	Stereo 2 alarm	output
17	GND		
18	OP1+3		
19	OP1-3	Stereo 1 AES output	
20	OP1+4		
21	OP1-4		
22	OP2+3		
23	OP2-3	Stereo 2 AES output	
24	OP2+4		
25	OP2-4		

Notes: The GPI lines 1-6 are also available from the rear of the Indigo frames. See chapter 5.3 Using GPIs

RM03 Audio In connector 15 way D-type socket (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Low (screen) for signal pair (left 1)
2	IP-L1-	Stereo 1 left Input
3	IP-L1+	
4	IP-L2-	Stereo 2 left Input
5	IP-L2+	
6	IP-2LO	Low (screen) for signal pair (left 2)
7	AES-1	AES REF input
8	AES+1	
9	IP-R1-	Stereo 1 right Input
10	IP-R1+	
11	IP-R2-	Stereo 2 right Input
12	IP-R2+	
13	GND	Chassis
14	IP-3LO	Low (screen) for signal pair (right 1&2)
15	Sync	Video (syncs./black and burst) or Word Clock in

RM11

RM11 Reference 75 Ohm BNC connectors

BNC	Function
REF IN	75 Ohm BNC connector for video reference (black and burst) or Word Clock

RM11 Audio In connector 15 way D-type socket (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Low (screen) for signal pair (left 1)
2	IP-L1-	Stereo 1 left Input
3	IP-L1+	
4	IP-L2-	Stereo 2 left Input
5	IP-L2+	
6	IP-2LO	Low (screen) for signal pair (left 2)
7	AES-1	AES REF input
8	AES+1	
9	IP-R1-	Stereo 1 right Input
10	IP-R1+	
11	IP-R2-	Stereo 2 right Input
12	IP-R2+	
13	GND	Chassis
14	IP-3LO	Low (screen) for signal pair (right 1)
15	IP-4LO	Low (screen) for signal pair (right 2)

RM11 Audio Out connector 26 way High Density D-Type socket (cable has plug on it)

Pin number	Function	Comments	
1	GND	Chassis	
2	OP2+3		
3	OP2-3		
4	OP2+1		
5	OP2-1	Stereo 2 AES output	
6	OP2+4		
7	OP2-4		
8	OP2+2		
9	GND	Chassis	
10	OP1+3		
11	OP1-3		
12	OP1+4		
13	OP1-4		
14	OP1+1	Stereo 1 AES output	
15	OP1-1		
16	OP1+2		
17	OP1-2		
18	OP2-2	Stereo 2 AES output	
19	GND	Chassis	
20	GP1-1	Single / Dual mode	input
21	GP1-2	Swap/AES inputs	input
22	GP1-3	Auto/Xtal	input
23	GP1-4	Video Sync REF	input
24	GP1-5	Stereo 1 alarm	output
25	GP1-6	Stereo 2 alarm	output
26	GND	Chassis	

Notes: The GPI lines 1-6 are also available from the rear of the Indigo frames. See chapter 5.3 Using GPIs

RM13

RM13 Digital Audio Out AES 75 ohm BNC connectors

BNC	Function
Out 1A	OP1+1
Out 1B	OP1+2, duplicate of OP1+1
Out 1C	OP1+3, duplicate of OP1+1
Out 2A	OP2+1
Out 2B	OP2+2, duplicate of OP2+1
Out 2C	OP2+3, duplicate of OP2+1

RM13 Reference 75 Ohm BNC connectors

BNC	Function
REF 1 IN	75 Ohm BNC connector, with loop through for video reference (black and burst)
REF 2 IN	75 Ohm BNC connector for AES reference – a jumper link on the ADAC412 terminates this input with 75 Ohms

RM13 Audio In connector 15 way D-Type socket (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Low (screen) for signal pair (left 1)
2	IP-L1-	Stereo 1 left Input
3	IP-L1+	
4	IP-L2-	Stereo 2 left Input
5	IP-L2+	
6	IP-2LO	Low (screen) for signal pair (left 2)
7	AES-1	No connection
8	AES+1	
9	IP-R1-	Stereo 1 right Input
10	IP-R1+	
11	IP-R2-	Stereo 2 right Input
12	IP-R2+	
13	GND	Chassis
14	IP-3LO	Low (screen) for signal pair (right 1)
15	IP-4LO	Low (screen) for signal pair (right 2)

RM14

RM14 Digital Audio Out AES 75 Ohm BNC connectors

BNC	Function
Out 1A	OP1+1
Out 1B	OP1+2, duplicate of OP1+1
Out 2A	OP2+1
Out 2B	OP2+2, duplicate of OP2+1

RM14 Reference 75 Ohm BNC connectors

BNC	Function
REF 1 IN	75 Ohm BNC connector, with loop through for video reference (black and burst)
REF 2 IN	75 Ohm BNC connector for AES reference

Note: Only 1 of the 3 ADCA412 cards should have its AES reference input terminated (by jumper link) to 75 Ohm. The other cards should be set to Hi-Z.

RM14 Audio In connector 15 way D-Type socket (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Low (screen) for signal pair (left 1)
2	IP-L1-	Stereo 1 left Input
3	IP-L1+	
4	IP-L2-	Stereo 2 left Input
5	IP-L2+	
6	IP-2LO	Low (screen) for signal pair (left 2)
7	AES-1	AES REF input
8	AES+1	
9	IP-R1-	Stereo 1 right Input
10	IP-R1+	
11	IP-R2-	Stereo 2 right Input
12	IP-R2+	
13	GND	Chassis
14	IP-3LO	Low (screen) for signal pair (right 1)
15	IP-4LO	Low (screen) for signal pair (right 2)

RM21

RM21 Digital Audio Out AES 75 Ohm BNC connectors

BNC	Function
Out 1A	AES 1A output
Out 1B	AES 1B output (duplicate of 1A)
Out 2A	AES 2A output
Out 2B	AES 2B output (duplicate of 2A)

RM21 Audio In connector 15 way D-Type socket (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Low (screen) for signal pair (left 1)
2	IP-L1+	Stereo 1 left Input
3	IP-L1-	
4	IP-L2+	Stereo 2 left Input
5	IP-L2-	
6	IP-2LO	Low (screen) for signal pair (left 2)
7	AES-1	AES REF input
8	AES+1	
9	IP-R1+	Stereo 1 right Input
10	IP-R1-	
11	IP-R2+	Stereo 2 right Input
12	IP-R2-	
13	GND	Chassis
14	AES1LO	Low (screen) for AES REF
15	REF IN	75 Ohm video reference (black and burst) or Word Clock or AES, link selectable.

RM35

Pin number	Function	Comments	Pin number	Function	Comments
c1	SYNC IN	Video or Word Clock in	a1	GND	Chassis
c2	GND	Chassis	a2	IP-R1+	} Stereo 1 right Input
c3	NC	No user connection	a3	IP-R1-	
c4	AES1LO	Low (screen) for AES REF	a4	IP-1LO	Low (screen) for signal pair (left 1)
c5	AES+1	} AES REF input	a5	IP-L1+	} Stereo 1 left Input
c6	AES-1		a6	IP-L1-	
c7	NC	No user connection	a7	IP-1LO	Low (screen) for signal pair (left 1)
c8	NC	No user connection	a8	IP-R2+	} Stereo 2 right Input
c9	NC	No user connection	a9	IP-R2-	
c10	NC	No user connection	a10	IP-2LO	Low (screen) for signal pair (left 2)
c11	NC	No user connection	a11	IP-L2+	} Stereo 2 left Input
c12	NC	No user connection	a12	IP-L2-	
c13	GPI_1	Single/Dual mode input	a13	IP-2LO	Low (screen) for signal pair (left 2)
c14	GPI_2	Swap/AES inputs input	a14	NC	No user connection
c15	GPI_3	Auto/Xtal input	a15	NC	No user connection
c16	GPI_4	Video Sync REF input	a16	NC	No user connection
c17	GPI_5	Stereo 1 alarm output	a17	NC	No user connection
c18	GPI_6	Stereo 2 alarm output	a18	NC	No user connection
c19	NC	No user connection	a19	NC	No user connection
c20	GND	Chassis	a20	GND	Chassis
c21	OP1+1	} Stereo 1 AES output	a21	OP1+3	} Stereo 1 AES output
c22	OP1-1		a22	OP1-3	
c23	GND	Chassis	a23	GND	Chassis
c24	OP1+2	} Stereo 1 AES output	a24	OP1+4	} Stereo 1 AES output
c25	OP1-2		a25	OP1-4	
c26	GND	Chassis	a26	GND	Chassis
c27	OP2+1	} Stereo 2 AES output	a27	OP2+3	} Stereo 2 AES output
c28	OP2-1		a28	OP2-3	
c29	GND	Chassis	a29	GND	Chassis
c30	OP2+2	} Stereo 2 AES output	a30	OP2+4	} Stereo 2 AES output
c31	OP2-2		a31	OP2-4	
c32	GND	Chassis	a32	GND	Chassis

Notes: The GPI lines 1-6 are also available from the rear of the Indigo frames. See chapter 5.3 Using GPIs

5.2 Signal earthing

Audio inputs are designed to have floating 'signal low' connections for cable screens, with internal RC networks connected between cable screens and chassis ground. This helps reduce the risk of high earth currents when AC power is induced into the cable, or when an offset voltage exists between the product chassis and the local signal source ground or chassis.

The internal RC network components fitted in the ADCA412 PCB are as follows:

Component	Signal low (screen)	Chassis ground
1µF capacitor	IP-1LO / IP-2LO / IP-3LO / IP-	PCB GND
10K ohm resistor	IP-1LO / IP-2LO / IP-3LO / IP-	PCB GND

Note: Video and audio output cable screens are normally hard-wired directly to local chassis ground.

5.3 Using GPIs

GPI input assignments

The ADAC412 supports four GPI input lines, which are assigned functions as follows:

GPI	Effect when GPI input is asserted low
GP1-1	Changes dual input circuits to just one stereo audio input feeding all AES outputs.
GP1-2	Swaps stereo audio 1 input circuit with stereo audio 2 input circuit to exchange the two AES output signal contents one with the other.
GP1-3	Changes AES Reference input circuit only from Xtal Mode to Auto Mode.
GP1-4	Changes AES Reference input or Word Clock input to VIDEO Syncs Reference Input, if present. Ignored if INTERNAL free run clock has

The GPI inputs override the switch settings and remote control settings, unless the existing setting selects the same operation, as the GPI input would have done, in which case there is no change of operation.

Each input looks like a TTL/CMOS input and has a 10k pull up to +5V, and is 'asserted' by pulling down to 0v.

GPI output assignments (alarms)

The ADAC412 supports two GPI output lines, which are assigned functions as follows:

GPI	Alarms are active when asserted low
GP1-5	AES 1 Alarm - loss of input and silence detected
GP1-6	AES 2 Alarm - loss of input and silence detected

Normally loss of Selected Reference Input will assert both GPO 5 and GPO 6 low and any sustained silence on channel 1 will assert GPO 5 low and sustained silence on channel 2 will assert GPO 6 low.

To prevent silence detection from raising alarms via GPI lines please refer to the Using Card edge controls chapter.

Note: The routing of 'Loss of Reference Input' warning to the GPI port cannot be disabled.

GPI Connections

GPI lines 1 to 6 of each card are brought to one of the four remote connectors at the rear of the Indigo frames as follows:

Indigo 2 and Indigo 4 upper. (Indigo 1 use slots 1, 2, 5, 6, 9 & 10. Indigo DT 1 & 2)

Slot no.	GPI 1		GPI 2		GPI 3		GPI 4		GPI 5		GPI 6	
	pin	rem	pin	rem	pin	rem	pin	rem	pin	rem	pin	rem
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

Indigo 4 lower

1	8	5	9	5	18	5	26	5	19	6	20	6
2	7	5	16	5	17	5	25	5	10	6	11	6
3	8	7	9	7	18	7	26	7	19	8	20	8
4	7	7	16	7	17	7	25	7	10	8	11	8
5	5	5	6	5	15	5	24	5	1	6	2	6
6	4	5	14	5	13	5	23	5	3	6	4	6
7	5	7	6	7	15	7	24	7	1	8	2	8
8	4	7	14	7	13	7	23	7	3	8	4	8
9	3	5	12	5	22	5	21	5	12	6	13	6
10	10	5	11	5	19	5	20	5	21	6	22	6
11	3	7	12	7	22	7	21	7	12	8	13	8
12	10	7	11	7	19	7	20	7	21	8	22	8

Note: Remote 1, 3, 5 and Remote 7 are 26 way high density 'D' type female sockets and frame ground is pin 2 in each case.
Remote 2, 4, 6 and Remote 8 are 26 way high density 'D' type male plugs and frame ground is pin 6 in each case.

5.4 Wiring XLR breakout leads

AES/WC REF leads	XLR to 15 way male 'D' plug	
XLR female pin-	**15 way male 'D' plug pin-out**	
	AES REF	Word Clock Ref
1 (screen)	13	13
2 (+)	8	15
3 (-)	7	13

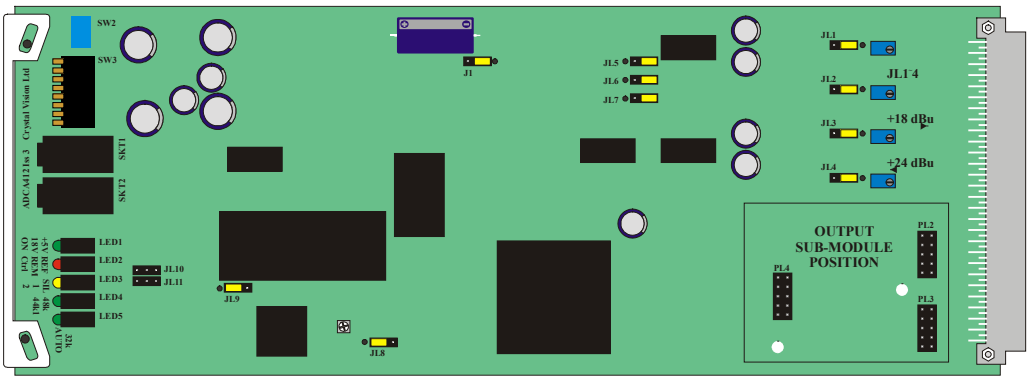
Analogue input: leads	XLR to 15 way male 'D'plug			
XLR female pin-out	**15 way male 'D' plug pin-out**			
	CH1 L1	CH1 R1	CH2 L2	CH2 R2
1 (screen)	1 CH1 common		6 CH2 common	
2 (+)	2	9	4	11
3 (-)	3	10	5	12

Digital output:	XLR to 25 way male 'D'plug leads							
XLR male pin-out	**25 way male 'D' plug pin-out**							
	AES 1-1	AES 1-2	AES 1-3	AES 1-4	AES 2-1	AES 2-2	AES 2-3	AES 2-4
1 (screen)	4-13 tinned copper wire common ground link							
2 (+)	5	7	18	20	9	11	22	24
3 (-)	6	8	19	21	10	12	23	25

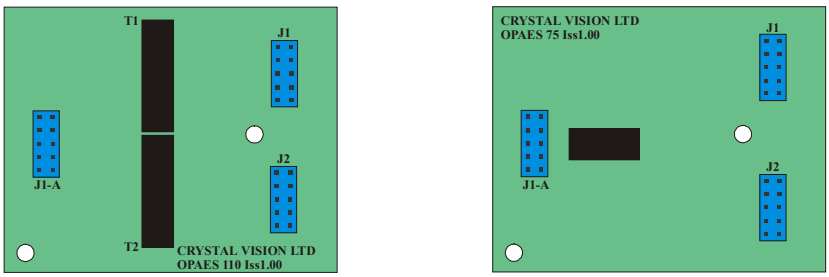
Digital output:	XLR to 26 way male 'HD'plug leads							
XLR male pin-out	**25 way male 'HD' plug pin-out**							
	AES 1-1	AES 1-2	AES 1-3	AES 1-4	AES 2-1	AES 2-2	AES 2-3	AES 2-4
1 (screen)	1-26 tinned copper wire common ground link							
2 (+)	14	16	10	12	4	8	2	6
3 (-)	15	17	11	13	5	18	3	7

5.5 Fitting a digital audio output sub-module

The ADCA412 is available in two versions, depending on the output sub-module fitted. The OPAES 75 sub-module provides unbalanced 75 Ohm outputs whilst the OPAES110 sub-module provides balanced 110 Ohm outputs. Each sub-module plugs via headers on the main card.



ADCA412 card showing the output sub-module headers, PL2, PL3 and PL4



OPAES 110 **OPAES 75**

The OPAES 110 and OPAES 75 output sub-modules

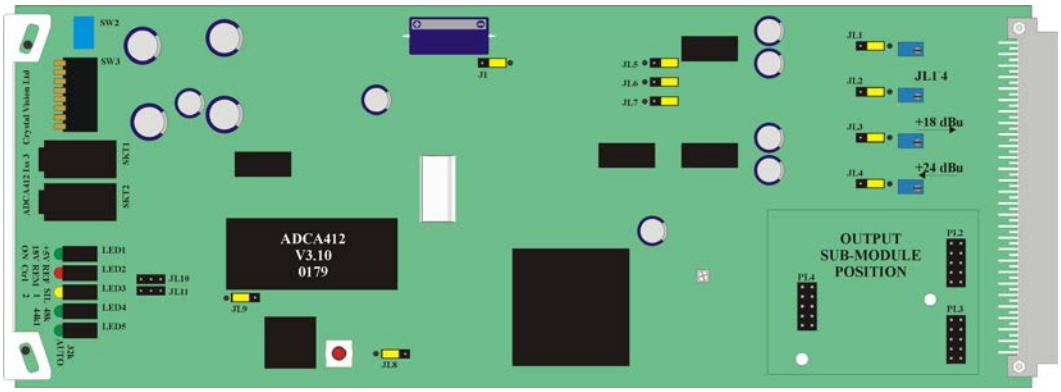
To fit a sub-module proceed as follows:

- ensure that all static electricity precautions have been taken
- offer up the chosen sub-module to its intended position on the main card with the component side up
- check that the orientation is correct and that the header sockets line up with the corresponding header plugs on the main card
- push the sub-module in place firmly taking care not to bend any pins

Removal is the reverse of the above procedure.

5.6 Hardware configuration

This section deals with hardware jumper links to change channel gain and input/reference termination.



ADCA412 card with OPAES 110 sub-module - jumper positions are shown in yellow

Note: Pin 1 of a jumper header is indicated by a square pad on the underside of the PCB, in the above diagram, pin 1 is also indicated by a small black circle.

Setting reference options

The ADCA412 output clock may be locked to AES reference, word clock, analogue video (or black and burst) or left to run off a 48kHz internal clock using SW3-1 and SW3-2 as previously explained.

AES reference input source and AES/Video termination selection is done using jumpers as explained in the following table:

Link	Explanation
J1	75 Ohm/Hi-Z termination for video syncs/word clock input
1-2 (rearwards)	75 Ohm
2-3 (forwards)	high impedance
JL5,JL6	AES reference input select
1-2 (forwards)	'D connector' or REF2 BNC (RM13 & RM14)
2-3 (rearwards)	REF BNC (RM11) or REF1BNC (RM13 & RM14)
JL7	AES reference input termination select
1-2 (forwards)	110 Ohm
2-3 (rearwards)	75 Ohm
	high impedance (Hi-Z)
No-jumper	Park jumper using just one pin for Hi-Z

Note: Take care to place jumpers correctly. JL5, JL6 and JL7 all have pin 1 nearest the front of the card. Jumper J1 has pin 1 facing the rear of the card.

Setting input analogue gain

The ADCA412 analogue gain is accomplished using jumpers and/or gain potentiometers as explained in the following table:

Link/Pot	Explanation
JL1	Analogue 1, stereo 1 left gain. Factory set = 0 dBFS output
1-2 (rearwards)	+18 dBu = 0 dBFS
2-3 (forwards)	+24 dBu = 0 dBFS
R8	Adjusts analogue 1 gain
JL2	Analogue 2, stereo 1 right gain. Factory set = 0 dBFS output
1-2 (rearwards)	+18 dBu = 0 dBFS
2-3 (forwards)	+24 dBu = 0 dBFS
R9	Adjusts analogue 2 gain
JL3	Analogue 3, stereo 2 left gain. Factory set = 0 dBFS output
1-2 (rearwards)	+18 dBu = 0 dBFS
2-3 (forwards)	+24 dBu = 0 dBFS
R10	Adjusts analogue 3 gain
JL4	Analogue 4, stereo 2 right gain. Factory set = 0 dBFS output
1-2 (rearwards)	+18 dBu = 0 dBFS
2-3 (forwards)	+24 dBu = 0 dBFS
R11	Adjusts analogue 4 gain

Note: R8 – 11 have a gain range of about –6 to +4dB wrt the gain selected by JL1~4. For the +18 dBu link selection, the range is approximately +12 dBu to +20 dBu = 0 dBFS. For the +24 dBu link selection, the range is approximately +20 dBu to +28 dBu = 0 dBFS. Balanced outputs require the use of rear modules with a 'D' type connector and unbalanced outputs are for use with BNCs.

Other link settings

The module has the following links or headers, which must be set as follows:

- JL8, JL9 both links always fitted 1-2 (forwards)
- JL10, JL11 no links fitted
- PL2-4 either OPAES 75 or OPAES 110 MUST be fitted
- PL5 nothing fitted

6 Problem solving

The front edge of the card provides LED indicators are provided to monitor power rails, input presence/silence, input sample rate and local/remote mode.

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

Name	LED Colour	Description
+5V and 18V	**Green**	Illuminates when on-board power is OK
Ref	**Red**	Illuminates when either video or word clock is selected but no valid reference input is present
Rem	Yellow	Illuminates when board has been last accessed by remote control
Sil1	Yellow	Silence detected on input 1
Sil2	Yellow	Silence detected on input 2
48k, 44k, 32k or Auto	Yellow	Sampling Frequency (32, 44.1, or 48 kHz) or Automatic AES Reference Mode (for 30-50kHz)

Status is also available using an active control panel and Statesman control. Please refer to the appropriate chapter for further information.

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

There are no audio outputs

Check that the silence threshold delay is not set to low

Check that functioning digital audio output sub-modules are fitted securely

Check that any audio cabling is intact

The audio output lacks high frequency content

Check the Low Pass Filter setting available under Options on a remote or front panel LCD control.

The digital audio output produces clicks and pops in downstream equipment

Check that an appropriate external reference synchronous with the system audio clock is connected.

Check that the downstream equipment is properly referenced to the system audio reference.

AES output relative timing is incorrect

Check the Set Phase timing adjustment available under Options on a remote or front panel LCD control or the AES o/p phase control in Statesman. Note that this control will be disabled if no valid external reference is used.

Audio phase is incorrect

Check digital audio phase inversion is not selected

The card no longer responds to Statesman/front panel control

Check that the card is seated correctly and that the Power OK LED is lit

Check that the Comms LED in an Indigo frame flashes when Statesman communication control is attempted

Check any active control panel/Statesman cabling

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

If necessary re-set the card

Statesman settings change unexpectedly

Active control panel or card edge control settings may have overridden Statesman settings if they were changed more recently

Card edge settings have changed unexpectedly

Statesman or active control panel settings may have overridden card edge control settings if they were changed more recently

Active control panel settings change unexpectedly

Statesman or card edge control settings may have overridden control panel settings if they were changed more recently

Re-setting the card

If required, the card may be reset by simply removing the rack power and re-applying power after a few seconds or by removing the card from the rack re-inserting the card. It is usually safe to reinsert the card whilst the rack is powered.

7 Specification

Inputs

Audio	2 analogue stereo pairs or 4 mono channels, 20 bit quantising A to Ds, Electronically balanced. High input impedance (20Kohm) balanced.
External reference	1 AES/EBU reference 110 Ohm, 75 Ohm or high impedance.
	1 word clock reference 110 Ohm, 75 Ohm or high impedance
	1 video syncs reference 110 Ohm, 75 Ohm or high impedance
Reference sources	The same reference is selected for both AES/EDU channels.
	Video mixed syncs or Black and Burst, 525 or 625 standard, 48kHz.
	AES/EBU input 48kHz, 44.1kHz or 32kHz.
	Word clock input at 48kHz
	(Note: video syncs and word clock share the same input)

Outputs

Audio	2 independent 20 bit AES/EBU stereo pairs. 110 Ohm with output sub-module OPAES-110 or 75 Ohm (unbalanced) with output sub-module OPAES-75. Each AES/EBU signal has 4 identical outputs.
	(Note: either OPAES-110 or OPAES-75 must be fitted)
Monitoring	2 x miniature front mounted audio jacks to monitor stereo inputs. Also available on rear connector
Output sampling frequency	Crystal re-clocking for 48 kHz sample rate, for minimum THD and maximum reference input signal noise and jitter rejection. From 30 kHz to 50 kHz in 'Auto' Mode for AES reference only. The 2 AES channels are interdependent and will be at the same frequency at all times.

Performance

Noise	< -95dB wrt full scale analogue input/ 0dBFS AES/EBU input.
THD+N	<0.005% at –0.5dB wrt full scale analogue input
Output Range	Potentiometer adjustment and links for 0dBFS AES level, from +12dBu to +28dBu analogue input.
	Default level: 0dBFS = +18dBu or +24dBu by on-board link.

Shuffle modes

Channels may be swapped so that Stereo Input 1 feeds AES 2 and Stereo Input 2 feeds AES 1.

Both output stages may be assigned to either Stereo Output 1 or Stereo Output 2 (DUAL mode).

	The phase of the right hand component of Stereo Input 1 **OR** Stereo Input 2 may be inverted.
Line selection	525/625 automatic
Silence threshold delay	Silence threshold delay for both sides is pre-settable for the amount of time a signal is allowed to remain below –50dB wrt Full Scale before a silence error is flagged. Values start at 1.5 seconds, 8 seconds and then in increments of 8 seconds to 120 seconds.
GPIs	Four GPIs are available for external control of AUTO/Xtal mode per channel, Dual/Single mode and Channel Swap. Two GPIs are available to provide alarm monitoring of input missing and silence detection (optional).
Status monitoring	Front card edge visual monitoring with LED indicators. Remote control panel also available.
Weight	200g with sub-module fitted