AADA416FR

Analogue Audio Distribution Amplifier

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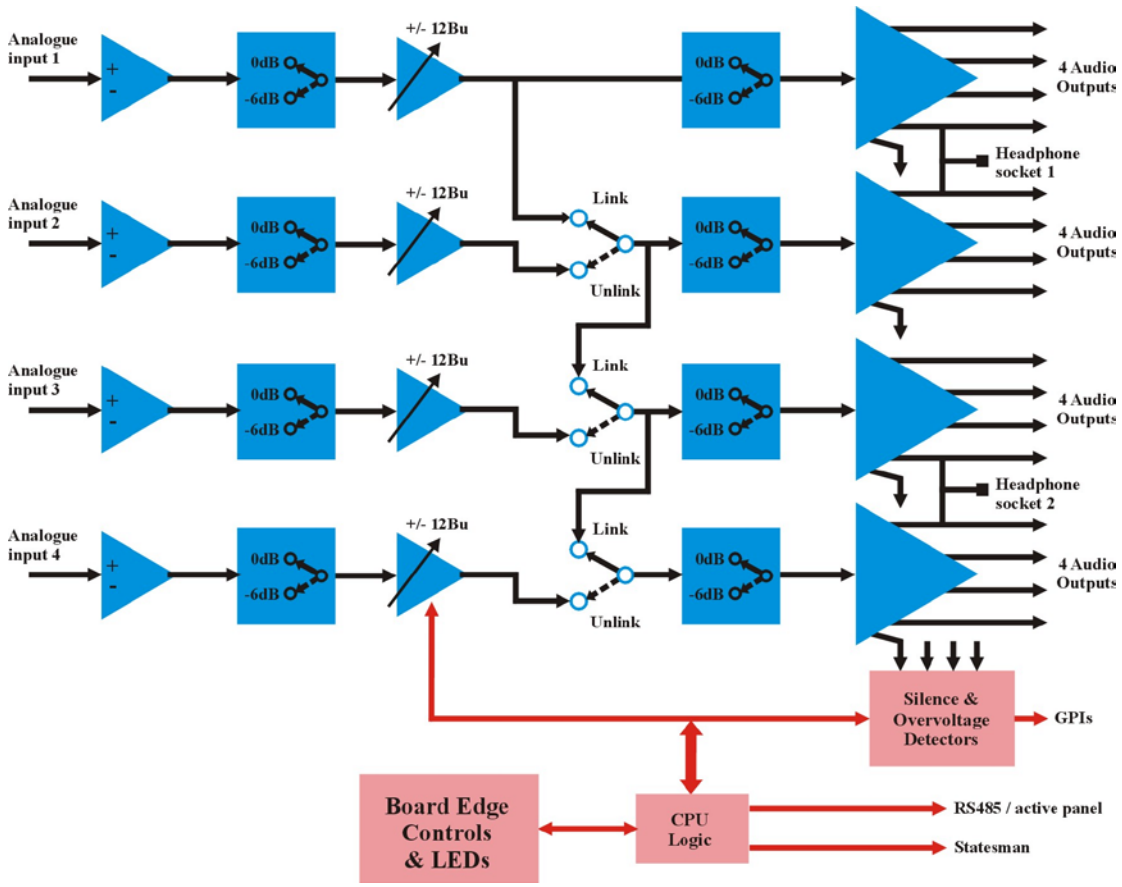
1 Introduction

The AADA416FR quad audio distribution amplifier with individually balanced floating outputs can be used in either local or remote modes and can be configured in a variety of input/output configurations.

Audio gain is adjustable to suit operating levels of 18dBu*, and 24/28dBu with the provision of on-board movable PCB header blocks.

Continuous variable control of level is available from the card edge in local mode, from an active control panel in remote mode and from Statesman.



AADA416FR quad distribution amplifier

The AADA416FR can be configured in any of the following modes:

- 4 channels - each channel is 1-in 4-out
- 3 channels - channels 1 and 2 are 1-in 4-out; channel 3 is 1-in 8-out
- 2 channels - channels 1 and 3 are 1-in 8-out
- 2 channels - channel 1 is 1-in 4-out; channel 2 is 1-in 12-out
- 1 channel - channel 1 is 1-in 16-out

Each channel has an audio silence detector with 16 different user adjustable time settings.

Note: The maximum input signal level is +28dBu and the maximum output level is +25dBu.

The silence detect delay is selectable from around 2 seconds to 120 seconds in 15 8 seconds steps. Its default value is 56 seconds.

The silence threshold level can be adjusted from -18dBu to -42dBu and its default value is –30dBu.

Each channel also has an overvoltage detector that can be adjusted from +6dBu to +25dBu. The default value is +25dBu.

The AADA416FR has LED and GPI indication of audio silence and overvoltage status for each channel. General Purpose Interface (GPI) lines are also provided to indicate audio silence/overvoltage status.

Two 3.5mm jacks are provided for local audio monitoring using headphones.

The main features are as follows:

- Quad audio distribution amplifier with five configuration modes
- Suitable for operating levels of 18dBu and 24dBu/28dBu to European levels (+18/+24 dBu)
- Per channel silence detection with adjustable threshold level and duration
- Per channel overvoltage detector with adjustable threshold level
- Electronically balanced inputs and outputs
- Headphone monitoring for all channels
- GPI silence/overvoltage indication
- Easy unity gain calibration mode
- Card edge, active/remote panel and Statesman control options

The AADA416FR is a 100mm x 266mm module, which fits in the three standard frames and can be integrated with any boards from the company's full product range. It uses the RM17 and RM37 single height rear connectors.

Note: This manual covers the AADA416FR. The AADA416FM, without remote control, is also available.

The maximum input signal level is +28dBu and the maximum output level is +25dBu.

2 Hardware installation

The AADA416FR quad distribution amplifier fits into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

2.1 Rear modules and signal I/O

The AADA416FR is used with the RM17 and the RM37 “easywire” single slot rear connectors in all Crystal Vision frames.

The 4U Indigo 4 frame will house up to 24 modules and triple power supplies.

The 2U Indigo 2 frame will house up to 12 modules and dual power supplies.

The 1U Indigo 1 frame will house 6 modules and a single power supply.

The 1U Indigo DT desk top box has a built-in power supply and will house up to 2 modules.

On the 1U, 2U and 4U frames a hinged front panel gives access to the PSU and all modules. The desk top box has a removable front. The universal frame wiring system allows any of the interface range of modules to be fitted in any position with the use of removable rear modules.

RM17 rear module connections

RM17

RM17 (ZLA00099 artwork)

- 24 modules per 4U frame, 12 per 2U frame, 6 per 1U frame & 2 per desk top box
- All frame slots can be used

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

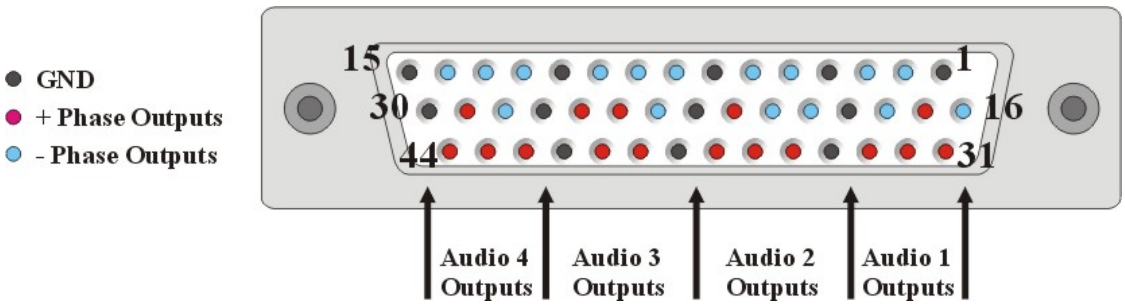
Audio in - 15 pin D-Type connector (cable has plug on it)

Pin number	Function	Comments
1	IP-1LO	Screen for input 1
2	IP-R1+	} Stereo 1 Right input (Audio 1)
3	IP-R1-	
4	IP-R3+	} Stereo 2 Right input (Audio 3)
5	IP-R3-	
6	IP-2LO	Screen for input 2
7	N/C	No connection
8	N/C	
9	IP-L2+	} Stereo 1 Left input (Audio 2)
10	IP-L2-	
11	IP-L4+	} Stereo 2 Left input (Audio 4)
12	IP-L4-	
13	GND (Chassis)	
14	IP-3LO	Screen for input 3
15	IP-4LO	Screen for input 4

Note: Stereo 1 channel uses audio 1 for right signal (R1) and audio 2 for left signal (L1). Stereo 2 channel uses audio 3 for right signal (R2) and audio 4 for left signal (L2). In 2-in, 2x8-out mode, it is worth noting that headphone monitor 1 has audio 1 on both channels, and headphone monitor 2 has audio 3 on both channels.

Audio out - 44 pin high density D-Type connector (cable has plug on it)

Pin	Signal	Desc	Pin	Signal	Desc	Pin	Signal	Desc
1	GND		16	OP1B-	Audio 1	31	OP1A+	Audio 1
2	OP1A-	Audio 1	17	OP1B+	Audio 1	32	OP1C+	Audio 1
3	OP1D-	Audio 1	18	OP1C-	Audio 1	33	OP1D+	Audio 1
4	GND		19	GND		34	GND	
5	OP2B-	Audio 2	20	OP2A-	Audio 2	35	OP2A+	Audio 2
6	OP2C-	Audio 2	21	OP2D-	Audio 2	36	OP2B+	Audio 2
7	GND		22	OP2C+	Audio 2	37	OP2D+	Audio 2
8	OP3A-	Audio 3	23	GND		38	GND	
9	OP3D-	Audio 3	24	OP3C-	Audio 3	39	OP3A+	Audio 3
10	OP3B-	Audio 3	25	OP3C+	Audio 3	40	OP3B+	Audio 3
11	GND		26	OP3D+	Audio 3	41	GND	
12	OP4C-	Audio 4	27	GND		42	OP4A+	Audio 4
13	OP4D-	Audio 4	28	OP4A-	Audio 4	43	OP4C+	Audio 4
14	OP4B-	Audio 4	29	OP4B+	Audio 4	44	OP4D+	Audio 4
15	GND		30	GND				



Arrangement of audio outputs and GND pins on 44 way D-Type Connector

RM37 rear module connections

RM37

RM37

- 24 modules per 4U frame, 12 per 2U frame, 6 per 1U frame & 2 per desk top box
- All frame slots can be used

Audio in

Pin number	Function	Comments
a1	IP-L1+	} Stereo 1 Left input (Audio 1)
a2	IP-L1-	
a3	Input_LO	Screen for input 1
a4	IP-R1+	} Stereo 1 Right input (Audio 2)
a5	IP-R1-	
a6	Input_LO	Screen for input 2
a7	NC	No connection
a8	GND	
c1	IP-L2+	} Stereo 2 Left input (Audio 3)
c2	IP-L2-	
c3	Input_LO	Screen for input 3
c4	IP-R2-	} Stereo 2 Right input (Audio 4)
c5	IP-R2+	
c6	Input_LO	Screen for input 4
c7	NC	No connection
c8	GND	

Note: Stereo 1 channel uses Audio 1 for left signal (L1) and Audio 2 for right signal (R1).
Stereo 2 channel uses Audio 3 for left signal (L2) and Audio 4 for right signal (R2).
In 2-in, 2x8-out mode, it is worth noting that headphone monitor 1 has audio 1 on both channels, and headphone monitor 2 has audio 3 on both channels.

Audio out

Pin	Signal	Description	Pin	Signal	Description
a9	OP1A+	Audio 1	**c9**	OP1B-	Audio 1
a10	OP1A-		**c10**	OP1B+	
a11	GND		**c11**	GND	
a12	OP1C-	Audio 1	**c12**	OP1D-	Audio 1
a13	OP1C+		**c13**	OP1D+	
a14	GND		**c14**	GND	
a15	OP2A-	Audio 2	**c15**	OP2B-	Audio 2
a16	OP2A+		**c16**	OP2B+	
a17	GND		**c17**	GND	
a18	OP2C+	Audio 2	**c18**	OP2D-	Audio 2
a19	OP2C-		**c19**	OP2D+	
a20	GND		**c20**	GND	
a21	OP3A+	Audio 3	**c21**	OP3B+	Audio 3
a22	OP3A-		**c22**	OP3B-	
a23	GND		**c23**	GND	
a24	OP3C-	Audio 3	**c24**	OP3D-	Audio 3
a25	OP3C+		**c25**	OP3D+	
a26	GND		**c26**	GND	
a27	OP4A+	Audio 4	**c27**	OP4B+	Audio 4
a28	OP4A-		**c28**	OP4B-	
a29	GND		**c29**	GND	
a30	OP4C-	Audio 4	**c30**	OP4D-	Audio 4
a31	OP4C+		**c31**	OP4D+	
a32	NC		**c32**	NC	

Note: Pin numbers refer to the plug numbering scheme.

2.2 Using unbalanced audio

As the AADA416FR outputs are floating, it is possible to obtain up to 16 unbalanced audio outputs by wiring the RM17 or RM37 in the correct manner.

An unbalanced output may be obtained by using either the +ve or –ve phase of the audio signal pair. To produce the required unbalanced output the unused phase of the signal pair must then be connected to the signal ground.

Note: It is recommended to set the input gain to -6dB (using PL12-15) to avoid output clipping when using unbalanced output connections. This is because connecting 1 phase to ground increases the level on the other phase by +6dB.
To avoid damage to driver outputs, do not connect both phases to ground.

2.3 General purpose interface

GPI outputs ‘a’ to ‘d’ use switch-closure to indicate AADA416FR status. When closed-circuit, the GPI line is connected to frame ground.

As supplied, each GPI output has a 330Ohm resistor in series with its output. This allows for an external LED connected to a DC supply voltage of +5V. GPI inputs ‘e’ and ‘f’ have a pull up 10k Ohm resistor to +5V.

GPI lines 'e' and 'f' control the overvoltage and silence warning GPI outputs.

GPI status:

GPI	Closed-circuit (Ground)	Open-circuit
‘a’	Audio 1 silence/overvoltage warning	Audio 1 silence/overvoltage is OK
‘b’	Audio 2 silence/overvoltage warning	Audio 2 silence/overvoltage is OK
‘c’	Audio 3 silence/overvoltage warning	Audio 3 silence/overvoltage is OK
‘d’	Audio 4 silence/overvoltage warning	Audio 4 silence/overvoltage is OK
‘e’ (input)	GPI ‘a’ to ‘d’ overvoltage indication is inhibited	GPI ‘a’ to ‘d’ indicates overvoltage warning and silence warning (depends on ‘f’ input)
‘f’ (input)	GPI ‘a’ to ‘d’ silence indication is inhibited	GPI ‘a’ to ‘d’ indicates silence warning and overvoltage warning (depends on ‘e’ input)

4U frame GPI Connections

GPI lines ‘a’ to ‘f’ of each card connect to 1 of 8 rear remote connectors as follows:

Slot no.		‘a’ pin	‘b’ pin	‘c’ pin	‘d’ pin	‘e’ pin	‘f’ pin
1	**Upper**	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)

Slot no.		'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	Lower	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, remote 3, remote 5 and remote 7 are 26-way high density D-Type female sockets and 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 and +5V @500mA is pin 15 in each case.

2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one 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 and 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 and +5V @500mA is pin 15 in each case.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to 1 of 2 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 socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26-way high density D-Type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

DTB-AV desk top box GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	1	2	3	4	5	6
2	9	10	11	12	13	14

Note: Remote connector is 15-way normal density D-Type socket. Frame ground is pin 15.

Indigo DT desk top box GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector 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)

Note: Remote 1: 26-way high density D-Type socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26-way high density D-Type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

The modules can be plugged in and removed while the frame is powered without damage.

The AADA416FR is used with the RM17 and RM37 single slot rear connectors which allow up to 12 such modules, in any mix in a 2U frame.

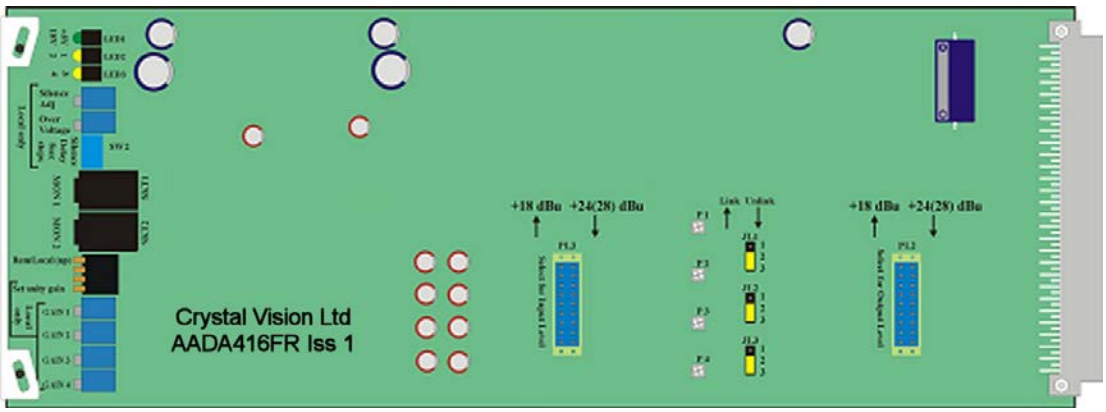
Other Crystal Vision rear modules and interface cards can be mixed in any quantity with AADA416FR cards, up to a maximum of 12 cards, providing the other cards do not exceed the power rating of the PSU chosen (normally 150W).

2.4 Configuration

The AADA416FR is equipped with on-board PCB header blocks, PL3 and PL2 to configure the amplifier for different maximum operating levels. This enables the module to be matched to both +18dBu and *+24/+28dBu.

There are also 3 jumper links, JL1, JL2 and JL3 provided to link audio channels together to provide a variety of input / output configurations.

Other settings on the card should normally be left in the factory default positions.



AADA416FR showing configuration jumpers and PCB header blocks

Note: The maximum input signal level is +28dBu and the maximum possible output level is +25dBu.

Monitoring output

Two 3.5mm jacks labelled MON 1 and MON 2 are provided to monitor the output of the distribution amplifier after any gain or channel combining settings.

The signal is scaled down so that the headphone sockets produce +10dBU for 0dBFS at the distribution amplifier output.

For MON 1 the tip of the 3.5mm jack is audio 2 and the ring is audio 1 and for MON 2 the tip of the 3.5mm jack is audio 4 and the ring is audio 3.

Linking audio channels together

Links JL1, JL2 and JL3 on the AADA416FR board allow audio channels 1 to 4 to be configured in any of the following modes.

a. 4 channels- each channel is 1-in, 4-out

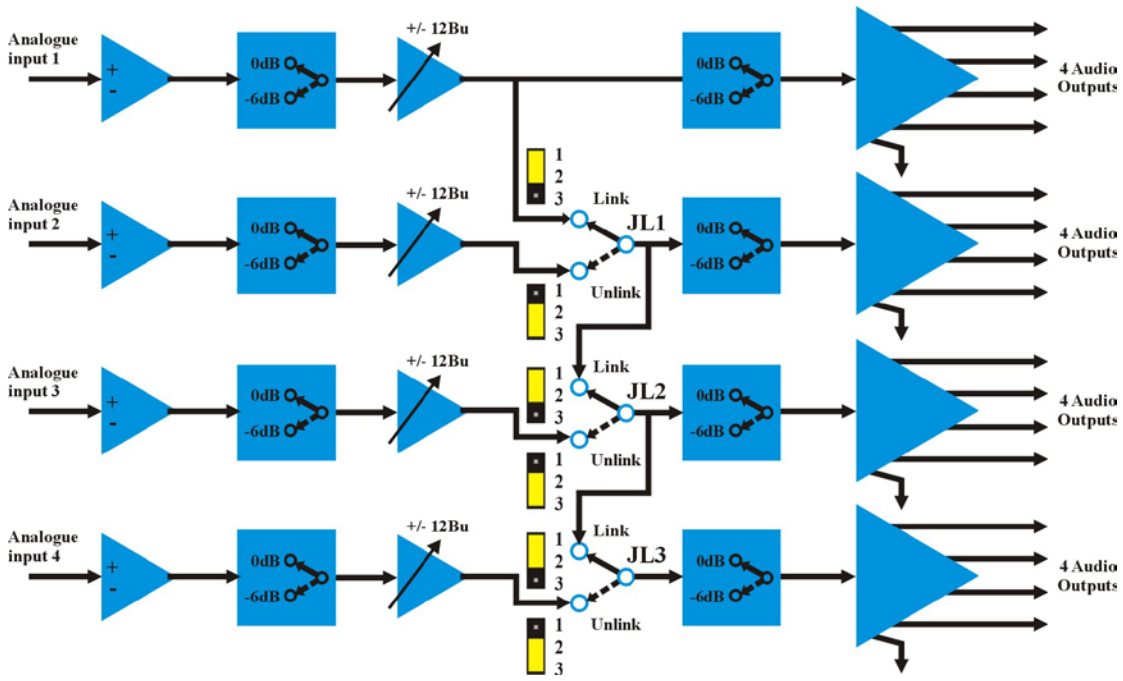
b. 3 channels- channels 1 and 2 are 1-in, 4-out; channel 3 is 1-in, 8-out

c. 3 channels - channels 1 and 3 are 1-in, 8-out

d. 2 channels - channel 1 is 1-in, 4-out; channel 2 is 1-in, 12-out

e. 1 channel- channel 1 in 16 channels out

The link settings required for each mode are as follows:



AADA416FR showing channel combining links

Modes	JL1	JL2	JL3	Comments
a	Unlink	Unlink	Unlink	4 separate audio channels
b	Unlink	Unlink	Link	Audio 4 outputs same as audio 3 outputs and uses audio 3 input Audio 4 gain pot is out of circuit LED 4 conveys the same information as LED 3 Only audio 1, 2 and 3 inputs are used
c	Link	Unlink	Link	Audio 2 outputs same as audio 1 outputs and uses audio 1 input Audio 2 gain pot is out of circuit LED 2 conveys the same information as LED 1 Audio 4 outputs same as audio 3 outputs and uses audio 3 input Audio 4 gain pot is out of circuit LED 4 conveys the same information as LED 3 Only audio 1 and 3 inputs are used
d	Unlink	Link	Link	Audio 3 and 4 outputs same as audio 2 outputs and uses audio 2 input Audio 3 and 4 gain pots are out of circuit LED 3 and 4 convey the same information as LED 2 Only audio 1 and 2 inputs are used
e	Link	Link	Link	Only audio 1 input is used Audio 2, 3 and 4 outputs same as audio 1outputs Audio 2, 3 and 4 gain pots are out of circuit LED 2, 3 and 4 convey the same information as LED 1

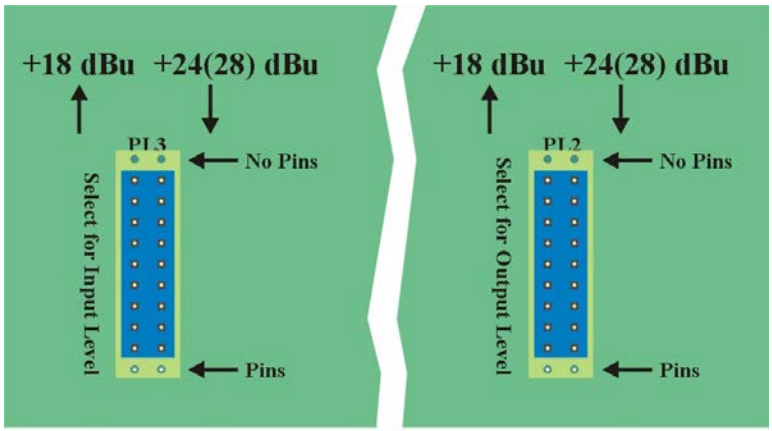
Note: Link corresponds to jumper in 1-2 position (towards TOP)
Unlink corresponds to jumper in 2-3 position (towards BOTTOM)

Changing the maximum operating level

The maximum operating level is changed by moving the position of two 18-way (2 x 9) PCB header blocks, PL3 and PL2.

To change the maximum operating level from the default of +24/+28 dBu to +18dBu proceed as follows:

- Move both PL3 and PL4 from the lower position to the upper position to increase the input gain of all 4 channels by 6dB and decrease the output gain of all 4 channels by 6dB

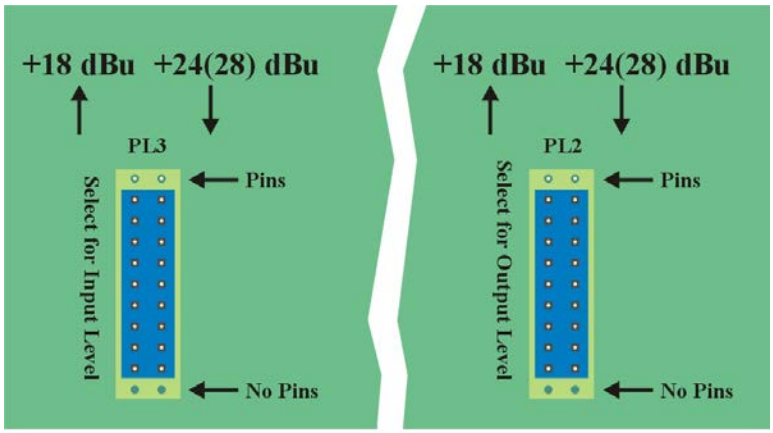


PL2 and PL3 in upper position (+18 dBu)

Note: In the upper position, the lowest two pins of the 20 way plugs on the main module should go through the lower holes in the PCB header block.

To change the maximum operating level from +18dBu to +24/+28 dBu proceed as follows:

- Move both PL3 and PL4 from the upper position to the lower position to decrease the input gain of all 4 channels by 6dB and increase the output gain of all 4 channels by 6dB



PL2 and PL3 in lower position (+24/+28 dBu)

Note: In the lower (default) position, the top two pins of the 20-way plugs on the main module should go through the upper holes in the PCB header block.

The factory default position for PL3 and PL2 is for both to be in the bottom position; this will allow audio signal levels of up to +28dBu at the inputs and +25dBu outputs.

Warning: Take care that no pins appear outside the area of the PCB header blocks.

PL3/2– Input/output signal level select, audio channels 1 to 4

Max DFS level	Input gain PL3	Output gain PL2	Var gain range
+18 dBu in and out	Towards top	Towards top	-12dB to +12dB
+24/25 dBu in and out	Towards bottom	Towards bottom	-12dB to +12dB
+24/28 dBu in +18 dBu out	Towards top	Towards bottom	-6dB to +18dB *
+18dBu in +24/25dBu out	Towards bottom	Towards top	-18dB to +6dB *

DFS = Digital Full Scale

Notes: *For the easy set unity gain facility to function properly, jumpers PL3 and PL4 must both be in the top or bottom position, otherwise the set-gain utility gain will produce an error of -/+6 dB.
Statesman and the active panel LCD display will take into account the position of PL3 and PL2 when showing the available gain range.

3 Card edge operation

Once the start-up initialisation procedure is complete, the AADA416FR card can be controlled or configured from the card edge, the active control panel or the Statesman PC Control System. This chapter will concentrate on the card edge controls.

The front edge of the card provides power rail monitoring, channel gain adjustment, silence threshold, silence time, overvoltage level, analogue audio monitoring outputs, remote/local selection and an easy unity gain setup facility.

AADA416FR front edge view

The 4-way piano switch allows the operating mode and unity gain setup facility to be selected.

Lever	Function	Action
All up	Local mode	Card edge control enabled
1 down	Remote mode	Active control panel enabled
2 down	N/A	No function assigned
3 down	N/A	No function assigned
4 down	Unity gain	Easy unity gain setup facility

4-way piano switch menu functions

LED INDICATION

LED	Function	Action
Yellow (top left)	Warning	Audio 1 channel Overvoltage(LED flash)/Silence(LED on)
Yellow (bottom left)	Warning	Audio 2 channel Overvoltage(LED flash)/Silence(LED on)
Yellow (top right)	Warning	Audio 3 channel Overvoltage(LED flash)/Silence(LED on)
Yellow (bottom left)	Warning	Audio 4 channel Overvoltage(LED flash)/Silence(LED on)
Green (top)	PSU	+ 5V power supply OK
Green (bottom)	PSU	+/- 18Vpower supply OK

LED indicators

Audio gain

Gain is variable over 24.0dB in 0.5dB steps for each channel using the front 4 preset multiturn potentiometers labelled 'Audio Gain'. The AADA416FR is supplied with a factory-set gain of 0dB.

Easy unity gain setup

The AADA416FR allows a special mode for adjusting the four controls, for gain of 0dB, without the use of external audio signals and level meters.

- The card edge unity gain setup procedure is as follows:-
- While in local mode switch lever 4 of the 4-way piano switch to the DOWN position
- The yellow LEDs will now indicate the gain setting for each channel
- Adjust each of the 4 audio gain potentiometers in turn so that the corresponding front LEDs 1 to 4 light up - ensure that the adjustment is in the centre of the range over which the LEDs light up
- The gains are now at 0dB
- Return pole 4 of the 4-way piano switch to the up position

The state of the 4 LEDs will now determined by the level of the audio signal at the output of the AADA416FR.

Note: The jumpers PL2 and PL3 must both be in the top position or bottom position, otherwise the gain will actually have -/+6 dB added to it.
The factory default setting also lights the 4 yellow LEDs.

Overvoltage detection level

Overvoltage detection level, labelled **0V** is adjustable from the front of the board. Turning the potentiometer fully clockwise will set the overvoltage limit to +25dBu. The potentiometer range is from 6dBu to 25dBu.

Any peak audio signals, which exceed the overvoltage limit, will illuminate the corresponding LED by flashing it 4 to 5 times a second. This flashing will continue for 0.8 seconds after the peak audio signal has dropped below the overvoltage limit.

Silence detection level

Silence detection level labelled **Sil** is adjustable from the front of the board. It is factory set to an output level of –30dBu. Audio signals above this level (and below the overvoltage level) will produce no illumination of the corresponding LED.

The potentiometer range is from -18dBu to -42dBu.

Silence time

A 16-position switch at the front of the board labelled **Sil Time** determines the time duration to detect that an audio signal is continuously below the silence detection level limit. Each of the 4 channels is timed individually.

Position 0 is a time of 1 to 2 seconds, position 1 is approximately 8 seconds, and for position steps of 2 to 9 and A to F add on another 8 seconds for each step giving a maximum time of 120 seconds for position F. If these times are exceeded the LED for that channel will illuminate and stay illuminated until the audio signal level is greater than the silence level. If this occurs the LED will turn off.

Note: In remote mode, many of the above adjustments can be set to different values to that set in local mode. These values are retained through power down, and restored when the unit is powered up.

4 Using the active front panel

This operational guide assumes that the panel has been set up according to the Panel setup procedure described in the Crystal Vision Controls Panel 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 2-line 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All 8 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

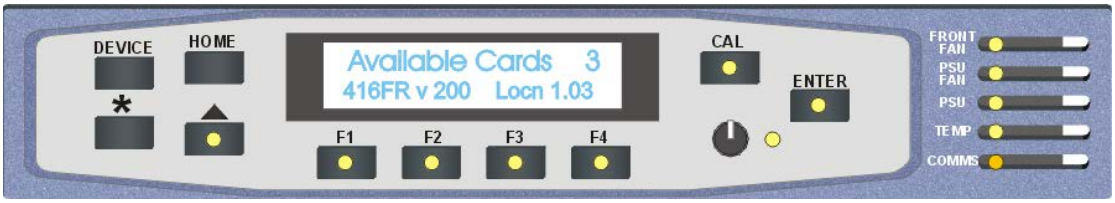
To continue with control panel operation or configuration, press the CAL key once. A second press of the CAL key will return to Statesman control.

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 AADA416FR

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.



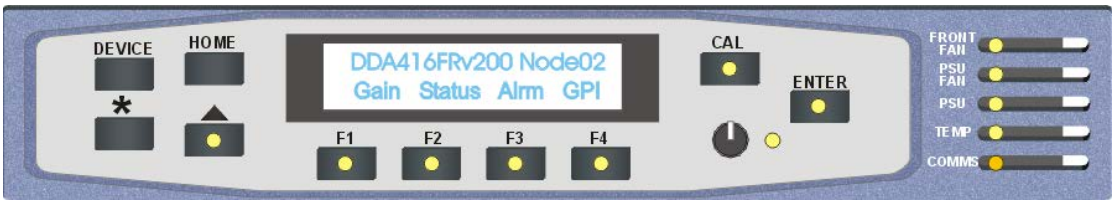
Device menu showing available cards

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 12.

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 AADA416FR at the node number last displayed in the available cards list. If the card is in local mode, 'Remote Ctrl Disabled' will be displayed.



The AADA416FR Home menu

Note: The AADA416FR will need to have the card edge local/remote switch (lever 1) in the DOWN position to enable active or remote control panel operation. Refer to the Card edge operation chapter or Installation chapter for more information.

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 an AADA416FR.

- DEVICE – enters Device menu to select a card or cards to control / enters Panel Setup when held down during power up / shows frame status when pressed from Statesman mode
- CAL – Enters or leaves Statesman mode / enters Panel Diagnostics mode when held down during power up
- 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 – accepts current selection
- Upward arrow – used to move up the menu structure / enters 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.

Using the shaft encoder

The shaft encoder function is dependent on the menu currently active. In general in top-level menus the shaft encoder is used to cycle through settings or functions to adjust. Once the desired gain or alarm setting is displayed, pressing the ENTER key will allow the shaft encoder to change the assigned value for that setting or function.

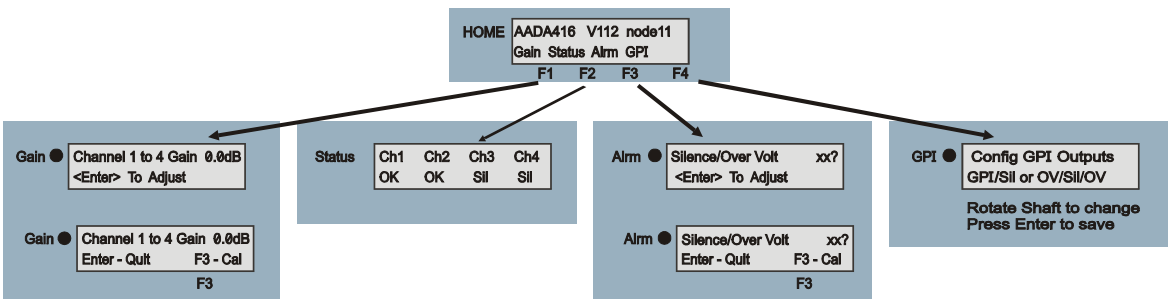
The ENTER key must be pressed again to leave the data assignment mode and to continue navigating the menu.

4.1 The AADA416FR active panel menu structure

The main top-level menus for the AADA416FR module are obtained by pressing the F1, F2, F3 and F4 keys from that module's Home menu. Menu keys are illuminated when active and when further menus are available. The four top-level menus are:

- Gain for channels 1 to 4 – press F1
- Status – press F2
- Alrm – press F3
- GPI – press F4

The following chart shows the available menus.



The AADA416FR menu tree

Note: Function keys and shaft encoder LEDs are illuminated when active.
Menus associated with the shaft encoder for changing assigned values are shown with a black circle.

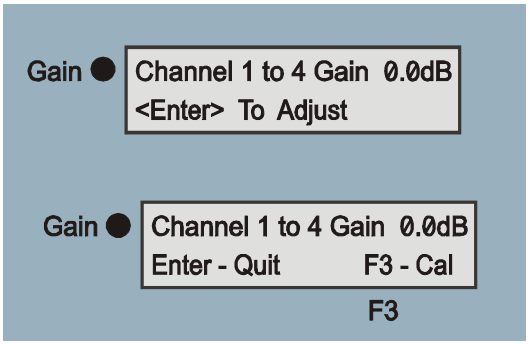
Shorthand codes

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

Menu code	Function description
Sil	Audio silence
OV	Audio over voltage
GPI	General Purpose Interface

4.2 Adjusting channel gain

Pressing F1 from the Home menu will display the Top Gain menu for channels 1 to 4.

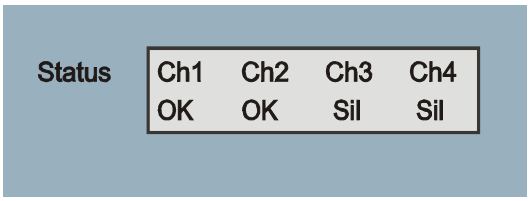
Channel gain menu	Description
	Rotate the shaft encoder to select a channel from the 4 available To access the Gain Setting menu for the chosen channel press the ENTER key
	Rotate the shaft encoder to change the assigned audio gain Press F3 to calibrate the channel to unity gain Press the ENTER key to leave data change mode and return to menu navigation

Note: Gain can be varied over 24dB in 0.5dB steps with an adjustment range centre point that can be moved up or down by 6dB by moving the position of PL3 and PL2 jumper links as explained in the installation chapter.
The gain values in remote mode and local mode may be different to each other and are retained through power down, and restored when the unit is powered up.

4.3 Channel status

Pressing F2 from the Home menu will display the level status of the 4 audio channels monitored at the output. Each audio output 1 to 4 is in 1 of 3 states:

- SIL – audio level is below silence limit for a given time limit
- OK – audio level is above silence limit and below overvoltage limit
- OV – audio level is above overvoltage limit

Channel status menu	Description
	Rotate the shaft encoder to select a channel from the 4 available To access the gain setting menu for the chosen channel press the ENTER key

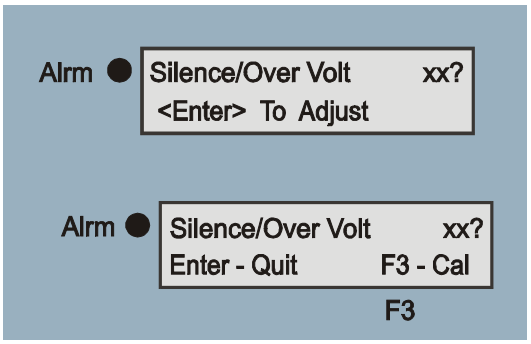
Note: OV is only shown while the audio signal is above the overvoltage limit and for a further 0.8 seconds after the signal has not exceeded the overvoltage limit.

4.4 Adjusting alarm settings

Pressing F3 from the Home menu will display the top Alarm menu.

The following alarm settings can be adjusted:

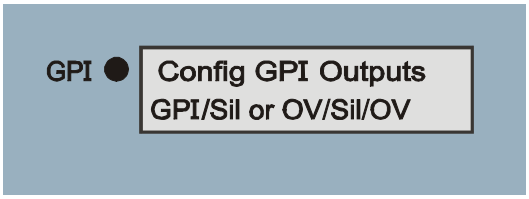
- Overvoltage level between +6dB and +25dB monitored at output
- Silence delay between 2 seconds, 8 seconds and then in 15 steps of 8 seconds to 120 seconds
- Silence threshold between -42 dBu and –18 dBu monitored at the output

Channel alarm menu	Description
	Rotate the shaft encoder to select silence delay, silence threshold or over volt level Press the ENTER key to enter data change mode for the selected variable Rotate the shaft encoder to change the assigned value xx? Press F3 to select the default value Press the ENTER key to leave data change mode and return to menu navigation

Note: Default values are:
Silence Delay: 56 seconds
Silence Threshold: -30dBu
Over Volt Level: 25dBu
The silence threshold and overvoltage level values in remote mode and local mode may be different to each other and are retained through power down, and restored when the unit is powered up.

4.5 Configuring GPI outputs

Pressing the F4 key provides access to the GPI menus which allows 4 different selections of the GPI outputs ‘a’ to ‘d’ for audio channels 1 to 4.

Channel GPI menu	Description
	Rotate the shaft encoder to select silence warning only, overvoltage warning only, both silence and overvoltage warning or 'Control by GPI e – f'

Note: Control by GPI e – f allows the state of the GPI outputs to be controlled by the state of GPI inputs 'e' and 'f' as explained in the Installation chapter.
The selection in remote mode and local mode may be different to each other and are retained through power down, and restored when the unit is powered up.

5 Statesman

5.1 Statesman operation

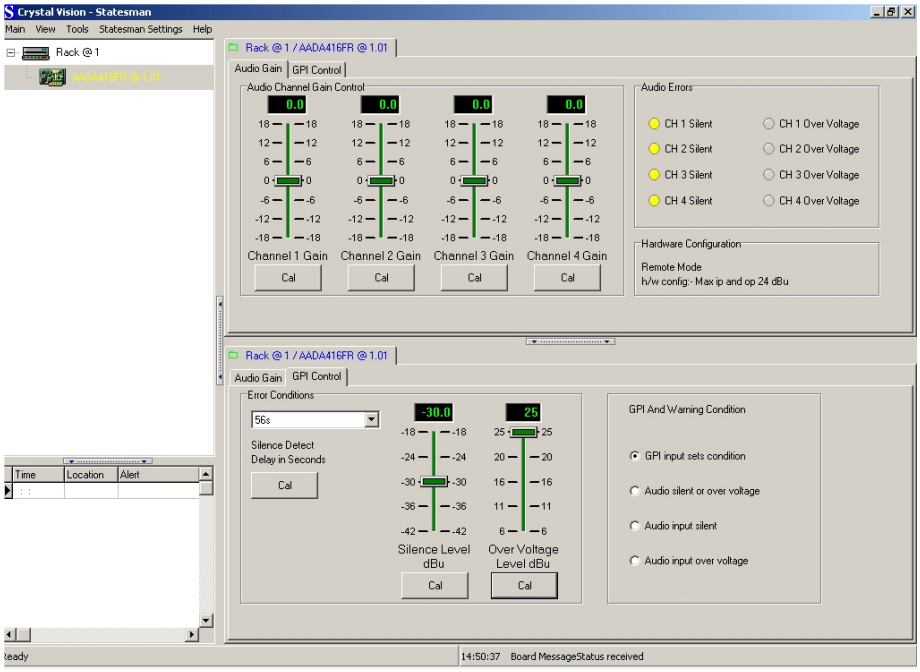
Once Statesman is configured it should automatically detect any Statesman compatible modules in the connected frame or frames and display them in the main application left hand Explorer-style window.

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

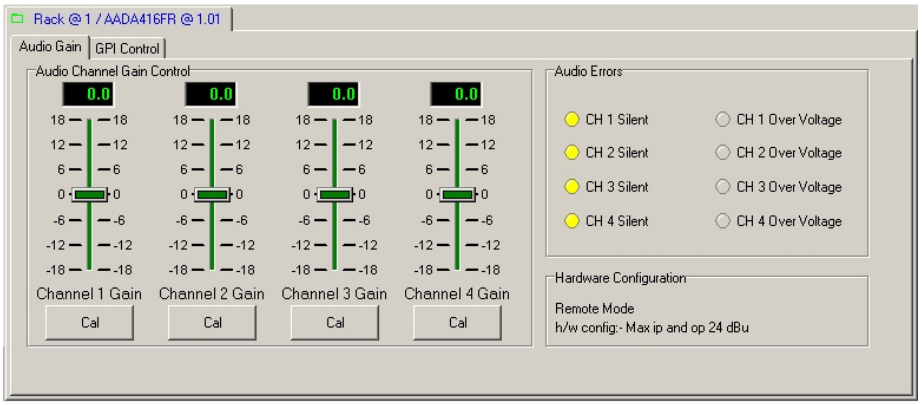
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

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

5.2 Controlling audio channel gain

The Audio Gain tab provides access to the following

- Variable gain for audio channel 1 to 4
- Input status
- Gain link settings
- Remote/local status



Audio gain control

Gain

Gain is variable over 24.0dB in 0.5dB steps for each channel using the sliders provided.

The minimum and maximum values of the gain range and the maximum operating level are dependent on the position of the PCB header blocks as explained in the installation chapter.

Note: Audio levels of up to 28dBu are handled correctly in the +24dBu link setting.

The Audio Gain tab will indicate the currently configured gain range.

If desired it is possible to gang 2 or more gain controls to allow them to be moved as one. This feature is implemented by holding the shift button down and left clicking on the selected gain controls in turn. Note that the first control selected becomes the master control with all further selected controls being slaved to the master control.

Note: Shift must be depressed and held prior to ganging audio controls.

To clear ganged controls and restored them to individual use, select ‘Clear Ganged Controls’ in the Tools menu. The control is only available when a module application is active and controls have been ganged.

To set a channel to its default value of zero gain click on the CAL button at the bottom of the slider.

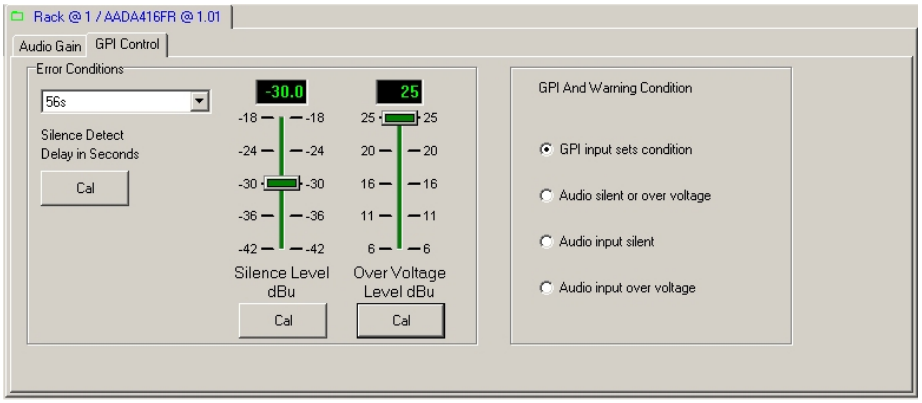
Status

The 4 Silence/Overvoltage indicators will appear yellow if either error is present.

5.3 Setting error and GPI options

The GPI tab provides access to the following:

- Silence detect delay
- Silence level
- Over voltage level
- GPI configuration



GPI and error settings

GPI error assignments

The following error conditions are supported:

- Silence detect - if a channel input falls below the silence (threshold) level for a period of time that exceeds the audio silence detect delay time a warning will appear in status area of the audio gain tab and may optionally be set on the appropriate GPI for that channel
- Output over voltage - if a channel output voltage rises above the over voltage level a warning will appear in status area of the audio gain tab and may optionally be set on the appropriate GPI for that channel

Note: Although the minimum indication for the silence detect delay shows zero, it is around 2 seconds in practice.

Enabling GPI warnings

GPI warnings may be enabled for the following errors and error combinations

- Silence or over voltage
- Silence
- Over voltage

- GPI inputs 'e' and 'f' control the selection

Refer to the Installation chapter for details of GPI pinout and trigger levels.

Default values

To set a parameter to its default value click on the CAL button at the bottom of the slider. Default values from left to right are 56 seconds, -30dBu and 25dBu.

6 Trouble shooting

The front edge of the card provides useful power rail monitoring, in addition to card edge controls and headphone monitoring outputs.

AADA416FR front edge view

The bottom green LED indicates good +/- 18 Volt power rails when lit and the upper green LED indicates a good +5 Volt rail when lit.

The yellow LEDs normally indicate the presence of an output overvoltage error or channel silence error. The top left hand yellow LED is for channel 1, the lower left hand yellow LED is for channel 2. Similarly, the top right hand yellow LED is for channel 3 and the bottom right hand yellow LED is for channel 4.

The headphone outputs is a useful way of monitoring the presence and quality of audio at the output of the quad amplifier, after all the gain adjustments and channels have combined.

Caution: Take care when using headphone monitoring that high signal levels are not present which could damage hearing.

Statesman and any connected active panel can be used to look at signal status, and in addition the gain range obtained with the PCB header block positions used is also shown.

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

Check that the card is seated correctly in the frame

There is no audio output

Check that valid audio inputs are present and that any cabling is intact

Check that the inputs and output(s) used are valid for the combining link positions in use

Check that PCB header blocks PL3 and PL2 are fitted correctly, and no pins can be seen outside the PCB block

The gain range is not as expected

The gain range and maximum output level are dependent on the position of the PCB header blocks as explained in the installation chapter

Check that PCB header blocks PL3 and PL2 are fitted correctly, and no pins can be seen outside the PCB block

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

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

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

Is it safe to ground either the positive or negative audio output for unbalanced operation?

No. This is unsafe. An unbalanced output may be obtained by using the +ve of an audio signal pair with the unbalanced return connected to ground

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 and then re-inserting the card

It is safe to re-insert the card whilst the rack is powered

7 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector
Weight	175g
Power consumption	9 W nominal, 12 W max

Audio inputs

Number and type:	4 mono, electronically balanced high impedance input (>20kΩ)
Maximum input level:	+28dBu
Factory set default:	0dBFS = = + 18dBu or +24dBu (using two 0/-6dBu links)

Audio outputs

Number and type:	16 (4 per channel), electronically balanced
Impedance:	100 Ohms
Factory set default:	0dBFS = +18dBu or +24dBu by on-board link (0dB or +6dB gain)
Max output level:	+25dBu
Loading:	Maximum of only 4 outputs (1 per channel) into 600 Ohms Maximum of 16 outputs into >10k Ohms

Gain adjustment

Continuous adjustment:	± 12dB in 0.5dB steps (multiturn gain pot or by front panel remote control) +6dB, 0dB, -6dB (onboard link settings) Total gain adjustment ± 18dB
Link adjustment:	+6dB, 0dB, -6dB (onboard link settings)
Total gain adjustment:	± 18dB

Performance

Signal to noise ratio:	>104dB , 0dB gain, 0dBFS = +24dBu (20Hz to 20kHz)
Frequency response:	± 0.05dB 20Hz to 20kHz.
Total Harmonic Distortion (THD):	<0.003% at 1kHz, +18dBu/+24dBu
Common Mode Rejection:	> 74 dB (20Hz to 20kHz)
Channel to Channel cross talk:	< -100dB, 10kHz

Monitoring audio

Number and type:	2 stereo (4 mono) via two 3.5mm stereo jack sockets
Output level:	OdBFS = + 10dBu

Silence detectors

Number:	4 (1 per audio channel)
Duration limit:	1 second to 120 seconds in 15 steps of 8 seconds

Overvoltage detectors

Number:	4 (1 per audio channel)
Detect level:	+6dBu to +25dBu at output - adjustable at card edge (factory set to +25dBu)

GPI lines

Inputs:	2, active low, 10k Ohm pull-up resistors to +5v. Selects silence or overvoltage or both indications on GPI outputs
Outputs:	4, active low, 330 Ohm resistors in series with output to drive LEDs. Indicates silence/overvoltage status per channel

Status monitoring

LED display	Front of card edge visual monitoring with LED indicators to indicate: PSU rails present Overvoltage/silence per channel