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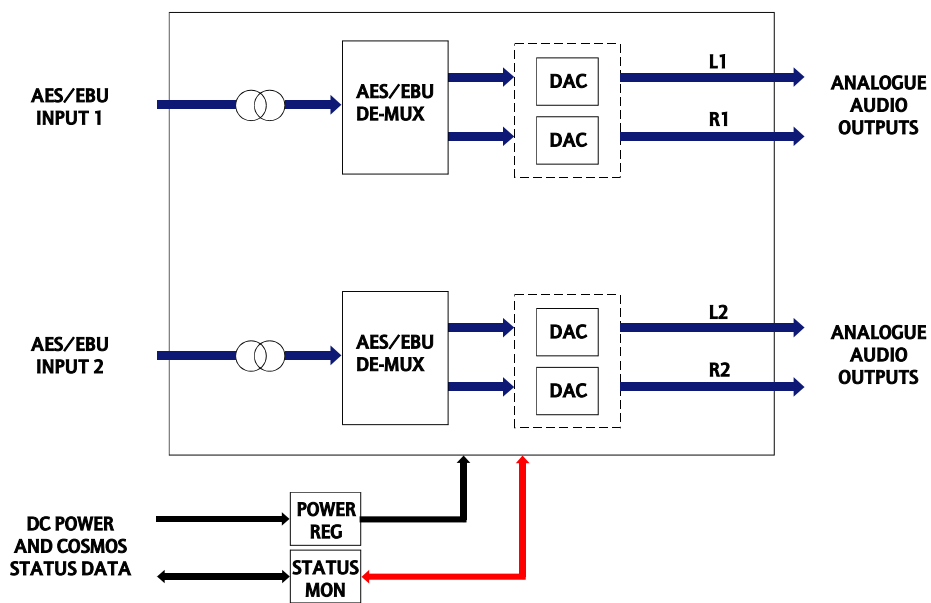
1 Introduction

The 4411 module is an audio digital to analogue converter which may be fitted with one or two stereo DAC sub-boards, each providing electronically balanced analogue outputs from balanced or unbalanced digital inputs.

Two rear connectors are available depending on the choice of balanced or unbalanced digital I/O. The module is designed to fit in the 1050 3U and 1051 1U Pro-Bel ICON modular product rackframes.

Characteristics of the 4411 module are:

- one or two stereo DACs per module
- balanced or unbalanced AES inputs
- full 20 bit conversion
- electronically balanced outputs
- conversion gain to match EBU or SMPTE levels
- sample rate 32kHz to 54kHz (continuous)
- compatible with COSMOS, Pro-Bel status monitoring



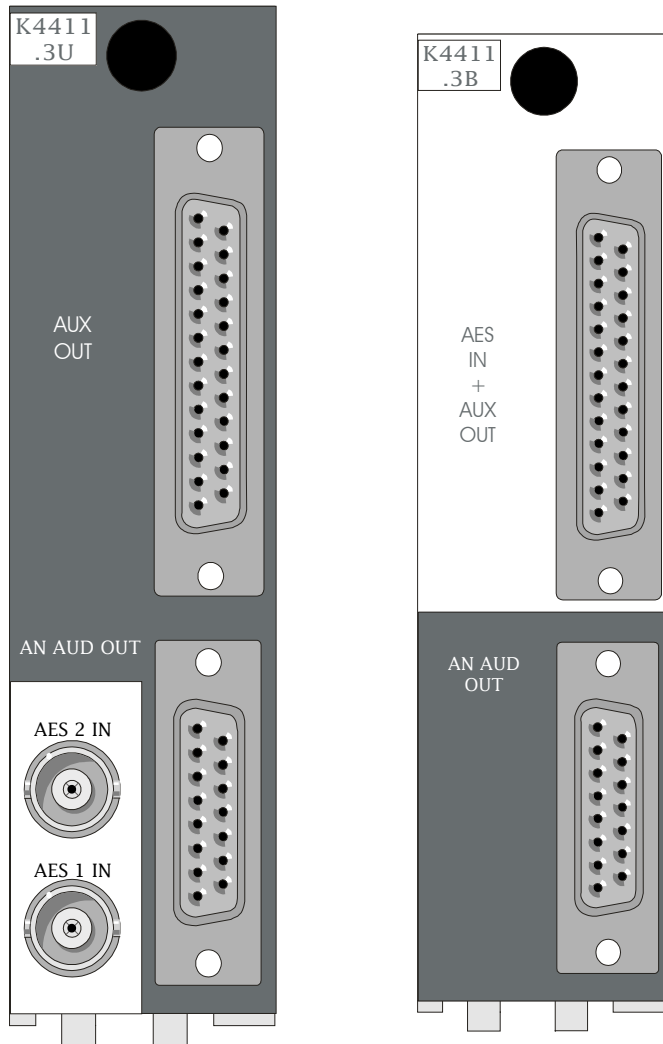
The 4410 audio analogue to digital converter

2 Installation

For module installation instructions please refer to the appropriate ICON rack frame section of the manual

2.1 Selecting a rear connector

There are two alternative rear connectors available. The K4411.3B is used for balanced signals, whilst the K4411.3U is used for unbalanced signals. Both occupy 30mm of rack width in the 1050 3U Icon rack frame or 1 slot in the 1051 1U rack frame.



AES in + AUX out			
Pin	Function	Pin	Function
1	N/C	14	N/C
2	Sample Rate Clock, Ch 1	15	Sample Rate Clock, Ch 2
3	GND	16	GND
4	N/C	17	N/C
5	CBL, Ch 1	18	CBL, Ch 2
6	AES IP2-	19	AES IP 1 -
7	AES IP2+	20	AES IP1+
8	GND	21	N/C
9	N/C	22	Channel Status, Ch 2
10	Channel Status, Ch 1	23	GND
11	GND	24	N/C
12	N/C	25	User Data, Ch 2
13	User Data, Ch 1		

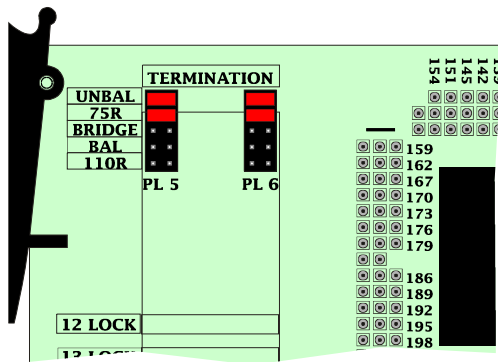
Analogue audio out			
Pin	Function	Pin	Function
1	AUDL1+	9	AUDL1-
2	GND	10	AUDR1+
3	AUDR1-	11	GND
4	N/C	12	N/C
5	GND	13	AUDL2+
6	AUDL2-	14	GND
7	AUDR2+	15	AUDR2-
8	GND		

The following 5V 'auxiliary' signals are for Pro-Bel use only; CBL(block start), Channel Status, User Data and Sample Rate Clock. These pins should not be grounded or terminated.

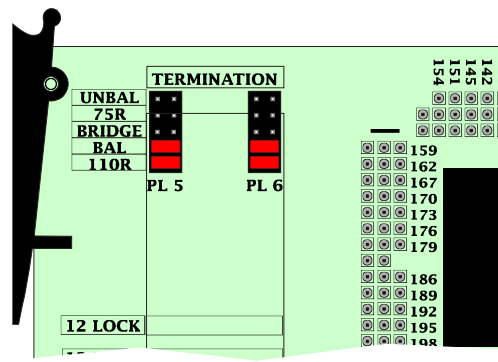
3 Configuration

3.1 Configuring AES inputs

Jumper blocks PL5 and PL6 are provided to set AES input termination values and select balanced or unbalanced operation.



Example termination for unbalanced 75 Ω AES inputs

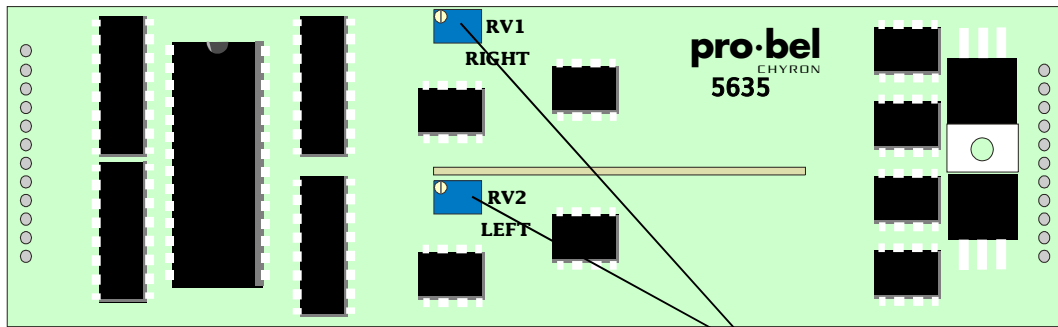


Example termination for balanced 110 Ω AES inputs

DAC inputs can be balanced or unbalanced and of different termination values . However, these parameters will be determined by the system installation and to some extent the choice of back connector.

3.2 Setting analogue output levels

The analogue output levels of each 5635 DAC sub-module can be adjusted with RV1 for the right channel and RV2 for the left channel. The adjustment range is +15dBu to +24dBu for Full Scale Digital (maximum digital value). Standard factory setup is +18dBu=0dB, FSD for Europe and +24dBu=0dB, FSD for the US. See 'Ordering Information' for the appropriate order codes for the two setup options.



Converter gain

4 **Trouble shooting**

There is no output signal

- ensure that the green power LED on the front of the card is lit

If not:

- check the resettable fuses protecting the card - do this by removing the power to the card for about 30 seconds then restore the power
- check the PSU indicators to confirm that there is power to the frame
- check that the inputs are connected to the rear panel and valid signals are present
- check that the red Invalid LED is not lit for either sub-module
- check that the red Loss of I/P is not lit for either sub-module

Notes:

The card edge green power LED will only illuminate if all voltage rails regulated on the module are present.

The Invalid LED will light if the Validity bit in the input bit-stream has been set to 1, to indicate that the associated sample is not suitable for conversion. This could occur if other than a linear PCM digital signal, such as Dolby AC3, were ever input to the card.

The output signal is corrupted

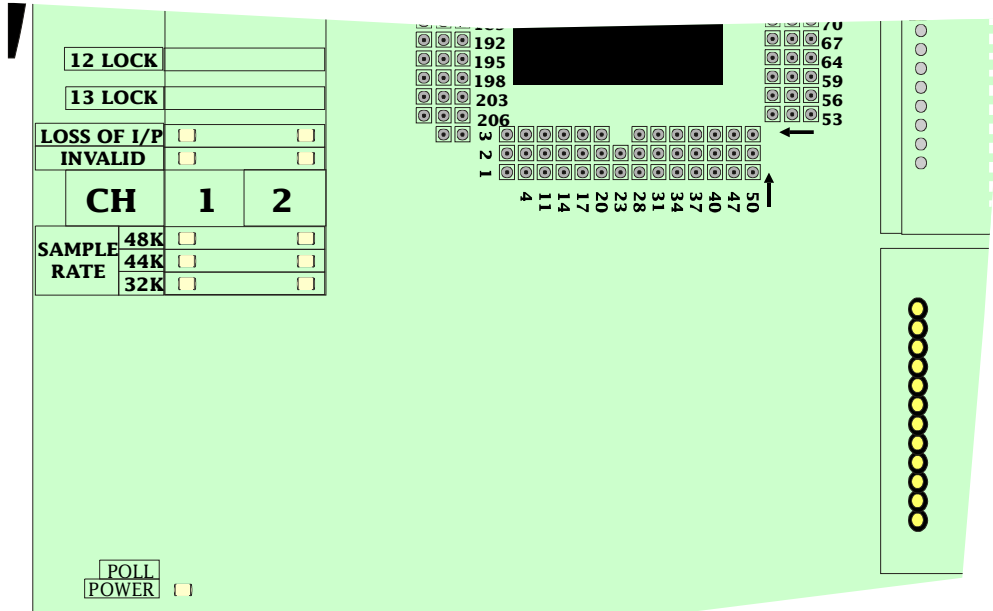
- check the quality of the input signal
- check that the appropriate terminations have been set
- check that a green sample rate LED is lit and is appropriate for each sub-module input

The output signal has pops and clicks sometimes

- check for a valid common reference for all digital audio source or processing equipment in the system

Note: It is recommended to employ a common station video reference or a common AES11 reference for all digital audio equipment if accurate phasing to station signals is required throughout a facility.

Status indicators



Status indicators		
LED label	4411 function	Meaning when lit
12 LOCK	Not fitted	
13 LOCK	Not fitted	
LOSS OF I/P	Loss of input	Lights red for loss of input on either sub-module
INVALID	Invalid input	Lights red to Indicate an invalid AES input on either sub-module
POWER	Power OK	Lights green if all voltage rails present
SAMPLE RATE	48K	48kHz sample rate detected
	44K	44.1 kHz sample rate detected
	32K	32kHz sample rate detected

4411 status indicator assignments

5 COSMOS Status Monitoring

If the frame is equipped with a COSMOS controller card, the following parameters will be reported back to the COSMOS status monitoring system.

- module present
- sample rate detected, DAC one and DAC two
- loss of input, DAC one and DAC two
- invalid input, DAC one and DAC two
- power OK

In addition, the module is programmed with the following information, which can be read by the status monitoring controller:

- Module type
- Module bar code
- Module issue no

For further details of the Pro-Bel status monitoring system please refer to the COSMOS status monitoring manual.

6 Specification

Inputs (per sub-module)

Number and type:	1, AES3-1992 balanced or AES3-id unbalanced
Impedance:	selectable 110 Ω , 75 Ω or high impedance

Outputs (per sub-module)

Number and type:	2, analogue audio, electronically balanced
Level at 0dB, FSD:	+15dBu to +24dBu
Auxiliary 5V logic signals (per sub-module):	Sample rate clock Channel status User data Block start (CBL)

Performance

Sample rate:	32kHz to 54kHz continuous automatic adjustment
Frequency response:	± 0.05 dB 50Hz to 15kHz, ± 0.2 dB 40Hz to 20kHz
THD+N:	<0.007% at 1kHz and -1dB FSD <0.1%, 50Hz to 15kHz, -28dB FSD
Noise (idle channel):	-96dB quasi-peak weighted (-78dBu for 0dB FSD=+18dBu)
Dynamic range:	107dB (measured)

Indicators

Power on:	Green LED
Loss of input 1&2:	Red LED
Invalid input 1&2:	Red LED
Sample rate:	yellow LEDs, 48K, 44K and 32K

Technical Manual

Temperature range

Operating:

0° to +40°C

Storage:

-10°C to +70°C

7 **Ordering information**

ICO-4411-3BHS	Audio DAC with 30mm rear panel, balanced AES3 input, peak level +24dBu, single stereo converter
ICO-4411-3BHD	Audio DAC with 30mm rear panel, balanced AES3 inputs, peak level +24dBu, dual stereo converter
ICO-4411-3BLS	Audio DAC with 30mm rear panel, balanced AES3 input, peak level +18dBu, single stereo converter
ICO-4411-3BLD	Audio DAC with 30mm rear panel, balanced AES3 inputs, peak level +18dBu, dual stereo converter
ICO-4411-3UHS	Audio DAC with 30mm rear panel, unbalanced AES3 input, peak level +24dBu, single stereo converter
ICO-4411-3UHD	Audio DAC with 30mm rear panel, unbalanced AES3 inputs, peak level +24dBu, dual stereo converter
ICO-4411-3ULS	Audio DAC with 30mm rear panel, unbalanced AES3 input, peak level +18dBu, single stereo converter
ICO-4411-3ULD	Audio DAC with 30mm rear panel, unbalanced AES3 inputs, peak level +18dBu, dual stereo converter