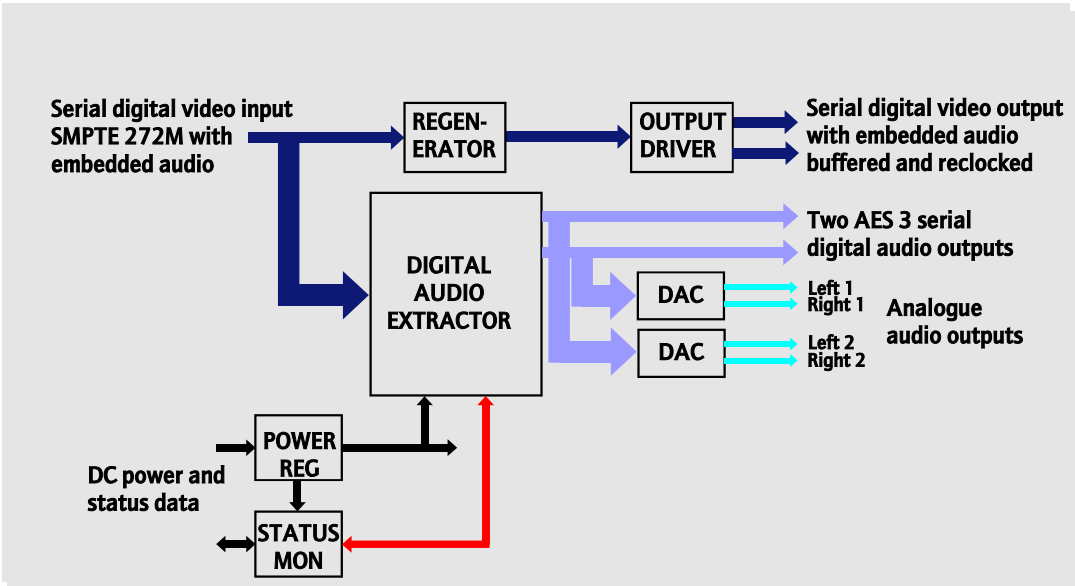
Contents

1 Introduction

The 4421 permits the extraction of up to two dual channel digital audio signals and their analogue equivalents from a serial digital video input with embedded audio. User controls permit decoding of the four groups available. The 4421 automatically adjusts to receive signals encoded to the continuous or SMPTE-272M standards (the SMPTE 272M standard prohibits the insertion of audio samples on certain lines to avoid EDH packets and the video switching point. Some early equipment embeds on all lines and is referred to as 'continuous'). Equalised and regenerated copies of the digital video input are provided.

Other important features of this module are:-

- 270Mbit/s component only (SMPTE 259M level C)
- the module will recover from illegal input signals within one second of a legal signal being restored.
- AES output synchronous with video, or asynchronous.

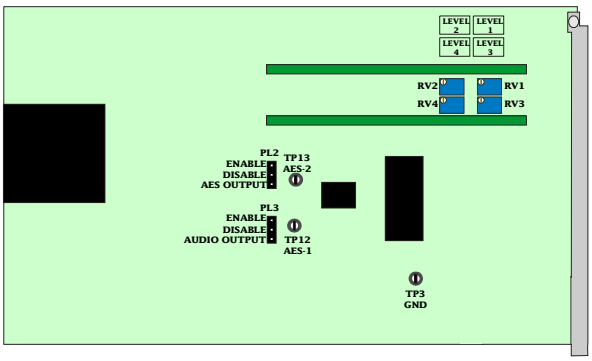


Audio extractor block diagram

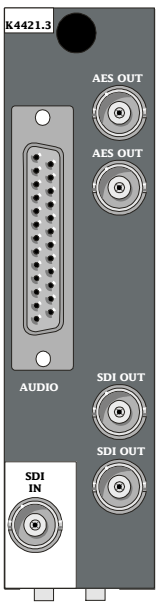
Note: The asynchronous mode operates with both synchronous and asynchronous audio sample rates relative to video. The synchronous mode is only compatible with synchronous audio but allows the benefit of a substantially more stable audio output clock.

2 Configuration

The audio extractor consists of a 4421 ICON module which uses the 30mm K4421.3 rear connector. The 30mm rear connector requires three slots in a 3U 1050 ICON frame and one module position in the 1U 1051 ICON frame.



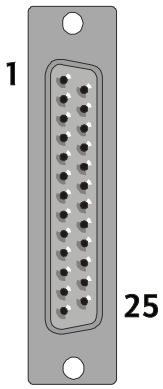
The K4421.3 rear connector has five BNC connections for signal I/O and one 25 way 'D' type female socket for the audio outputs



Note: Please refer to the frame manual section for module and rear connector installation assistance.

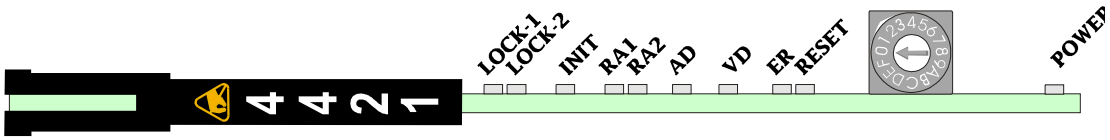
2.1 AES/EBU connector pin-out

AES audio output connector 25 way 'D' female socket	
Pin	**Function**
1	Analogue 1- (AES 1A)
2	Analogue 1+ (AES 1A)
3	GROUND
4	Analogue 3- (AES 2A)
5	Analogue 3+ (AES 2A)
6	GROUND
7	N/C
8	GROUND
9	N/C
10	N/C
11	GROUND
12	N/C
13	N/C
14	Analogue 2- (AES 1B)
15	Analogue 2+ (AES 1B)
16	GROUND
17	Analogue 4- (AES 2B)
18	Analogue 4+ (AES 2B)
19	N/C
20	GROUND
21	AES1-
22	AES1+
23	GROUND
24	AES2-
25	AES2+



2.2 Setting the operating mode

The rotary HEX switch, SW1, mounted on the front edge of the module sets the audio group to be extracted as detailed in the table below. The asynchronous mode should be used in situations where the embedded AES3 audio is unlocked.



Hex switch settings

Mode	Group	Sync/Async
0	1	Sync
1	2	Sync
2	3	Sync
3	4	Sync
4	1	Async
5	2	Async
6	3	Async
7	4	Async

2.3 Enabling the audio outputs

AES output

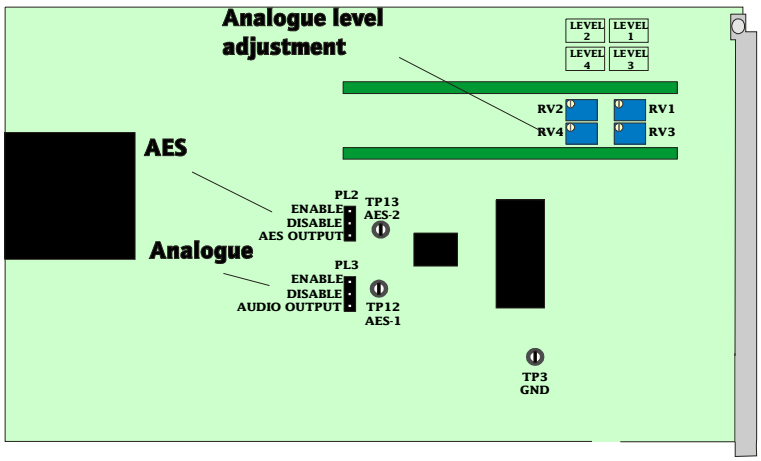
The AES output of the extractor may be enabled/disabled by jumper PL2 and is described in the following table.

Enabling the AES output	
Position	**Function**
Enable	Enables the AES output
Disable	Disables the AES output

Analogue Audio output

The audio output of the extractor may be enabled/disabled by jumper PL3 and is described in the following table.

Enabling the analogue audio output	
Position	**Function**
Enable	Enables the analogue output



Jumper and level adjustment positions

2.4 Adjusting the analogue audio output

The analogue full scale output can be adjusted for each of the four audio outputs to suit the levels used in most facilities. The adjustment range is from 15 to 24.5 dBu into a 10kΩ load.

The adjustments are as follows:-

Output level adjustment	
Adj	**Function**
RV 1	Analogue audio output 1, AES 1A
RV 2	Analogue audio output 2, ,AES 1B
RV 3	Analogue audio output 3, AES 2A
RV 4	Analogue audio output 4, AES 2B

The factory pre-set level may be chosen as +18dBu or +24dBu by use of the appropriate order code.

3 Operation

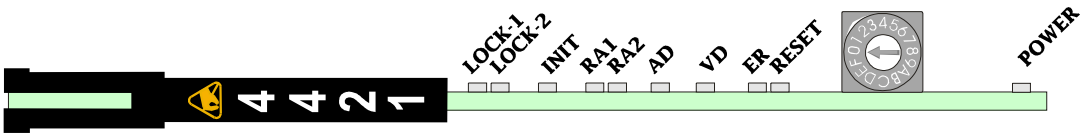
The purpose of this module is to extract digital audio signals embedded in a video signal meeting the standard SMPTE 272M or the slightly different format used by Sony Betacam equipment. The module can extract any one of the four groups, that is channels 1-4, 5-8, 9-12 or 13-16, but not combinations.

A programmable logic device reads data from a parallel to serial converter and loads the audio words into a FIFO. A 48kHz frame clock is provided by an onboard oscillator whose frequency is controlled by the FIFO fill state for asynchronous operation or from the video signal for synchronous operation. This clock is then used to generate the two AES 3 outputs from the module.

Once configured, the module should not need further operational adjustments unless signal or system requirements change. However, status LEDs are provided to assist in the unlikely event that problems with configuration or module performance arise.

3.1 Trouble shooting

In normal operation the following green LEDs should be illuminated, VD, AD, RA1, RA2, Lock1, Lock2 and Power. No red or yellow LED should be permanently lit, but may flash briefly during power-up.



The green video present LED, VD is not illuminated

- check that the input cable is connected securely to the BNC socket on the rear panel
- check that there is a digital video signal of the correct format connected

The red ER LED is illuminated, red reset LED flashes

- if this red LED is on, then there is no video signal present
- perform checks as for the VD LED is not illuminated

The green audio present LED, AD is not illuminated

- check that the input cable is connected securely to the BNC socket on the rear panel
- check that there is a digital video signal of the correct format and with embedded audio connected
- check Hex switch is set for correct mode of operation

The green read FIFO LEDs, RA1 and RA2 are not illuminated

- RA1 and RA2 indicate the presence of either of the dual audio channels to be extracted from the chosen group
- if audio present LED, AD is lit, a module fault is indicated

The green lock LEDs, LOCK 1 and LOCK 2 are not illuminated

- these LEDs monitor the output audio phase lock loops and illuminate when locked to video.
- if only one audio channel is locked then only one LED will be illuminated
- LEDs will not be illuminated when module is in asynchronous mode

The red reset LED, RESET stays illuminated or flashes continuously

- there is a fault with the module, this LED should flash briefly on power-up

The yellow initialise LED, INIT stays illuminated

- there is a problem initialising the card, this LED should flash briefly on power-up

The green power LED is not illuminated

- check mains power to the frame is turned on
- if necessary check the PSU as explained in the power supply section
- check the card is plugged in securely
- check to see if one of the resettable fuses have operated, perhaps after recent servicing work on the board. To do this turn the power off, wait for thirty seconds and then restore the power

4 Status Monitoring

The 4421 module will provide the following information to the COSMOS status monitoring controller (if fitted):

- video input status
- audio detected
- audio output locked to video
- power status

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

- module present
- 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.

5 Specification

Inputs

Video:

Number and type:	One serial digital video to SMPTE 259M-C (270Mb/s) with embedded audio to SMPTE 272M level A (locked 48kHz) or level D (unlocked 48kHz). Fully compliant or embedded on all lines.
Impedance:	75Ω
Return Loss:	>15dB, 10MHz to 300MHz
Equalisation:	> 200m Belden 8281, PSF1/2 or equivalent

Outputs

Video:

Number and type:	Two serial digital video, as input, equalised and re-clocked
Impedance:	75Ω
Return loss:	>15dB, 10MHz to 300MHz

Audio:

Digital:	Two serial digital audio, balanced, 110Ω to AES3-1992 or unbalanced, 75Ω to AES-id. Sample rate: 48kHz
Analogue:	Four analogue audio balanced, 0dB FS adjustable +15 to 24.5 dBu into 10kΩ

Indicators

Video present/no video
Audio present
Output channel lock
Initialise and reset
Power status

On-card controls

Extracted group
Synchronous/asynchronous audio
Enable digital audio output
Enable analogue audio output
Four analogue output level adjustments

6 Ordering information

ICO-4421-30L0	SDI Audio extractor with 30mm rear panel providing AES3 and stereo analogue audio, peak level +18dBu
ICO-4421-30H0	SDI Audio extractor with 30mm rear panel providing AES3 and stereo analogue audio, peak level +24dBu