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1 Introduction

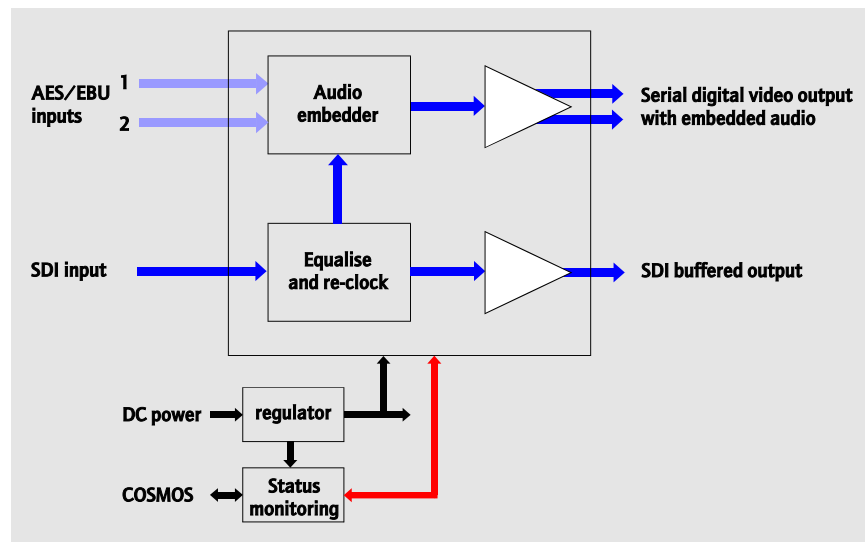
The 4422 inserts one or two digital audio signals into a serial digital component video data stream. The audio signals may be synchronous or asynchronous to each other and to the video signal which can be 525 or 625 line standard.

The audio encoding method is selectable between a continuous structure which inserts audio on all television lines and the SMPTE 272M standard which keeps some vertical interval lines free to facilitate clean switching.

Card edge controls provide selection of the group in which to embed the audio.

4422 feature summary:

- embeds one or two AES/EBU signals into component serial digital video data stream
- handles synchronous or asynchronous digital audio
- 525/625 operation
- balanced or unbalanced AES/EBU rear connectors
- SMPTE 272M or continuous embedding
- COSMOS status monitoring equipped

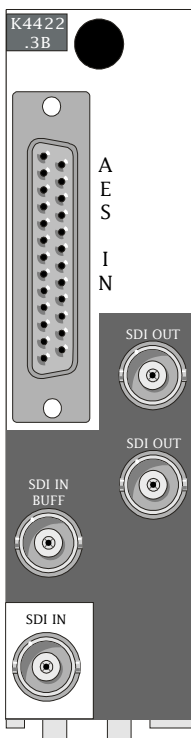


Audio embedder block diagram

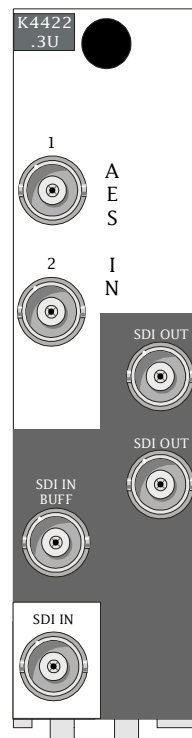
2 Configuration

2.1 Selecting the rear connector

The 4422 may be used with one of two 30mm rear panels depending on whether balanced or unbalanced audio inputs are required.



K4422-3B rear panel for balanced audio inputs



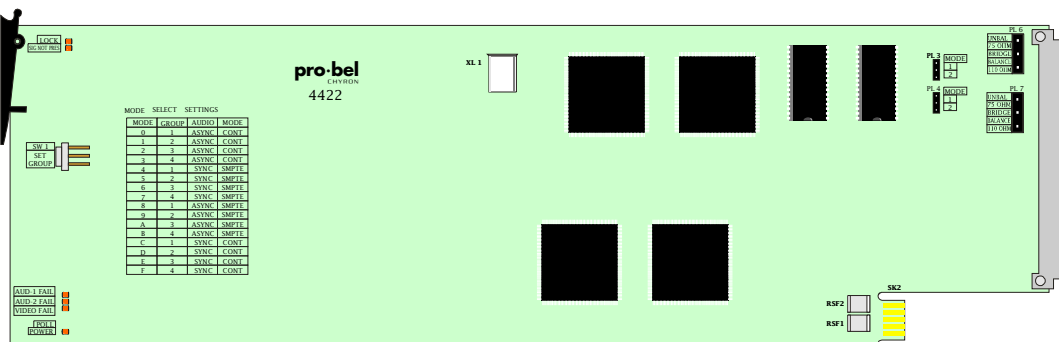
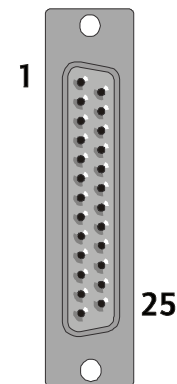
K4422-3U rear panel for unbalanced audio inputs

The K4422-3B has four BNC's and one 25 way 'D' female connector and supports balanced audio inputs whilst the K4422-3U rear panel has six BNC connectors and supports unbalanced digital audio inputs

2.2 Balanced audio pin-out

The K4422-3B rear panel balanced digital audio input pin-outs are as follows:

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



The 4422 AES/EBU embedder module

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

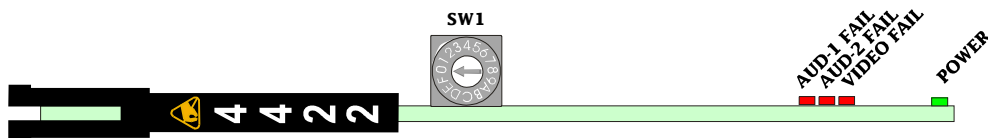
2.3 Selecting embedding options

The rotary HEX switch, SW1, on the front edge of the module sets the audio group into which audio data will be embedded and the synchronisation and insertion modes.

There are two modes of synchronisation, synchronous for audio data locked to the incoming video and asynchronous for audio data that is free running or not locked to the video input.

There are also two insertion modes, SMPTE 272M level A/D or continuous. When the SMPTE mode is selected audio is not inserted for certain lines of the vertical interval in each field to avoid data corruption during downstream switching.

Group/Mode select settings			
SW1	Group	Audio synchronisation	Insertion mode
0	1	Async	Continuous
1	2	Async	Continuous
2	3	Async	Continuous
3	4	Async	Continuous
4	1	Sync	SMPTE
5	2	Sync	SMPTE
6	3	Sync	SMPTE
7	4	Sync	SMPTE
8	1	Async	SMPTE
9	2	Async	SMPTE
A	3	Async	SMPTE
B	4	Async	SMPTE
C	1	Sync	Continuous
D	2	Sync	Continuous
E	3	Sync	Continuous
F	4	Sync	Continuous



Notes:

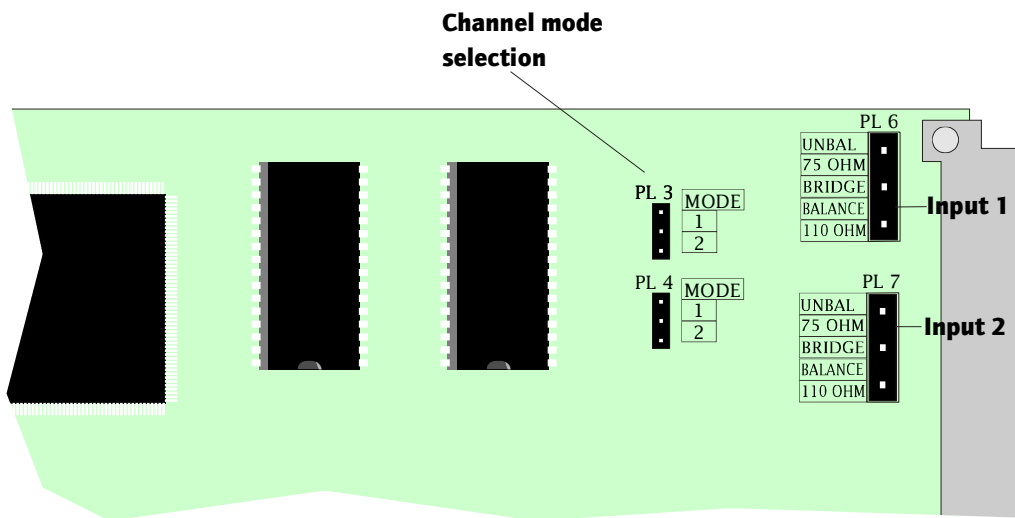
In the SMPTE mode, insertion is omitted on lines 5/8 and lines 318/321 for 625 line systems and lines 9/12 and lines 272/275 for 525 line systems.

All packets of audio already embedded in the same group selected for insertion will be deleted, regardless of the insertion mode selected and a new audio stream will be embedded.

2.4 Selecting single or dual channel operation

If the inserter is to embed audio correctly there must be an AES/EBU signal on both audio inputs. To ensure correct operation with only one input, jumpers PL3 and PL4 are used to feed input 1 to both channels.

PL3 and PL4	Function
Both jumpers in position 1	One input channel present
Both jumpers in position 2	Two input channel present



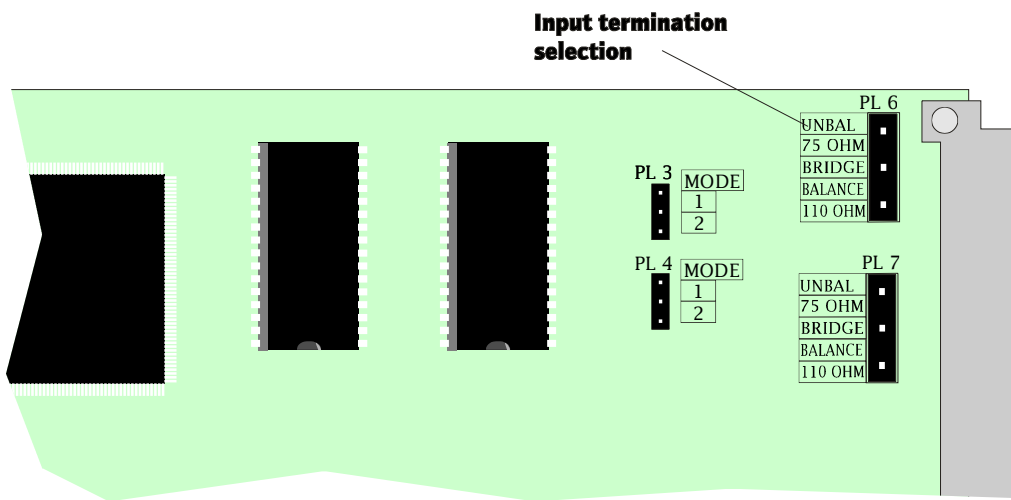
Single and dual channel jumper positions

2.5 Selecting the audio input impedance

The digital audio inputs can be balanced or unbalanced and terminated with either 75 Ω, 110 Ω or left high impedance to suit various distribution and cable systems. Normal selection would be 110 Ω for balanced audio inputs and 75 Ω for unbalanced inputs. Two jumpers are used for each input, one selecting balanced or unbalanced operation, the other selecting impedance.

Channel 1 input impedance	
PL6 jumper	Function
75Ω	75Ω termination
110Ω	110Ω termination
Bridge	high impedance
UNBAL	Unbalanced input
BAL	Balanced input

Channel 2 input impedance	
PL7 jumper	Function
75Ω	75Ω termination
110Ω	110Ω termination
Bridge	high impedance
UNBAL	Unbalanced input
BAL	Balanced input



Input termination jumper positions

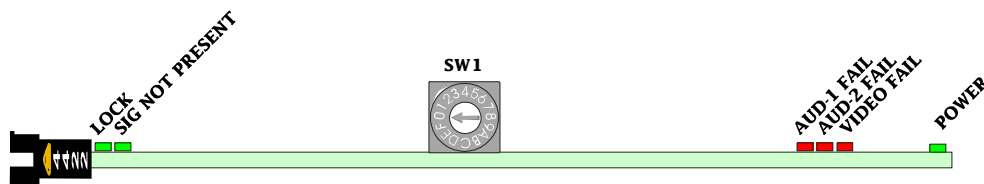
3 Operation

The purpose of this module is to allow two AES 3 digital audio signals to be inserted into a serial digital video signal. A FIFO buffer is filled with audio data and a programmable logic device converts the AES 3 signal into the 10 bit format required by the serial digital video signal. This is read from the FIFO by a 27MHz clock and overwrites the appropriate parts of the serial digital video signal before feeding it back to the output stage.

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 either configuration or module performance arise.

3.1 Trouble Shooting

In normal operation only the green Lock and Power LEDs should be illuminated and no red LEDs should be illuminated.



The red (VIDEO) SIGNAL NOT PRESENT LED is illuminated

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

The red AUDIO-1 or AUDIO-2 fail LEDs are illuminated

Indicates the embedder processor is not receiving valid audio data on one or both channels.

- check that the digital audio cable(s) are connected correctly and that the digital audio is of the correct format
- check that the channel mode jumpers PL3 and PL4 are in the correct position
- check Hex switch is set for correct mode of operation
- check the termination jumpers PL1 and PL2 for the correct value

The red video fail LED is illuminated

Indicates the embedder processor is not receiving valid video data.

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

The green LOCK LED is illuminated

- This indicates video serialiser PLL is locked.

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. To do this turn the power off, wait for thirty seconds and then restore the power.

4 Status Monitoring

The 4422 module will provide the following information to the COSMOS status monitoring controller (if fitted):

- video signal present
- audio input 1 status
- audio input 2 status
- 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)
Impedance:	75Ω
Equalisation:	Up to 200m Belden 8281, PSF1/2 or equivalent
Return Loss:	>15dB, 10MHz to 300MHz

Audio:

Number and type:	Two serial digital audio, balanced, 110Ω to AES3-1992 or unbalanced, 75Ω to AES-id
Sample rate:	48kHz

Outputs

Number and type:	Two serial digital video to SMPTE 259M-C with embedded audio One serial digital video to SMPTE 259-C equalised and re-clocked copy of input
Impedance:	75Ω
Return Loss:	>15dB, 10MHz to 300MHz

Indicators

Signal (video) not present
Lock (video output PLL)
Audio-1 fail, Audio-2 fail
Video fail
Power status

On-card controls

Embedded group
SMPTE 272M/Continuous
Synchronous/asynchronous audio

6 **Ordering information**

ICO-4422-3B00
audio

AES Audio embedder, 30mm rear panel, balanced

ICO-4422-3U00
audio

AES Audio embedder, 30mm rear panel, unbalanced

5 Specification

Inputs

Video:

Number and type:	One serial digital video to SMPTE 259M-C (270Mb/s)
Impedance:	75 Ω
Equalisation:	Up to 200m Belden 8281, PSF1/2 or equivalent
Return Loss:	>15dB, 10MHz to 300MHz

Audio:

Number and type:	Two serial digital audio, balanced, 110 Ω to AES3-1992 or unbalanced, 75 Ω to AES-id
Sample rate:	48kHz

Outputs

Number and type:	Two serial digital video to SMPTE 259M-C with embedded audio One serial digital video to SMPTE 259-C equalised and re-clocked copy of input
Impedance:	75 Ω
Return Loss:	>15dB, 10MHz to 300MHz

Indicators

Signal (video) not present
Lock
Audio-1 fail, Audio-2 fail
Video fail
Power status

On-card controls

Embedded group
SMPTE 272M/Continuous
Synchronous/asynchronous audio