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1 Introduction

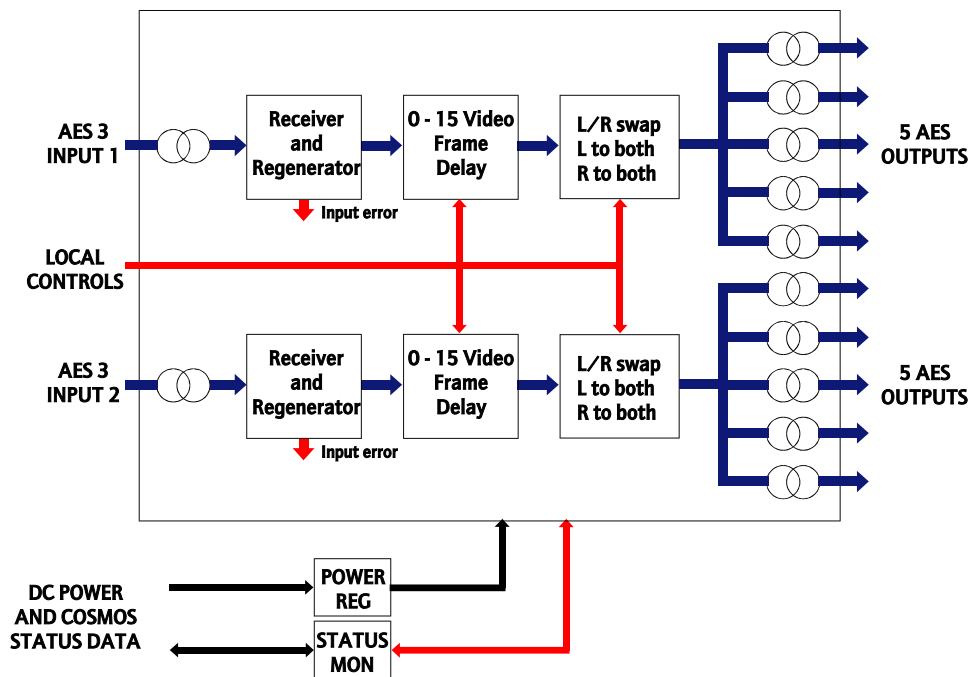
The 4406 dual channel digital audio delay provides for up to the equivalent of 15 video frames of delay for two channels of AES3 serial digital audio. Up to five buffered outputs are available for each channel.

Audio modify features provided are: channel swap and either channel to both output channels.

The 4406 may be used in the 1050 3U and 1051 1U ICON modular product rackframes with a choice of balanced or unbalanced rear connectors.

Characteristics of the 4406 are:

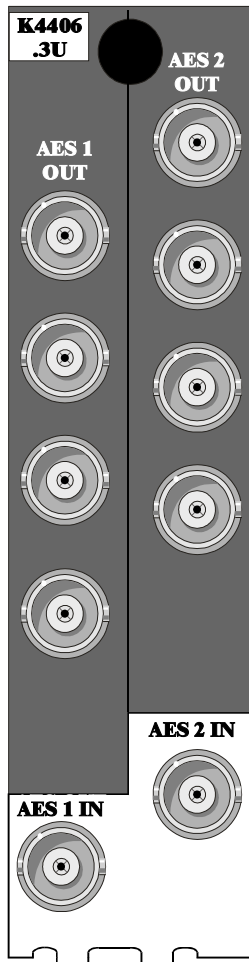
- up to five audio modify/delayed outputs per channel
- balanced (AES3) or unbalanced (AES3 - id) inputs
- variable preset delay from 0 to 15 video frames - common to both channels
- sample rate support from 32 to 48Khz
- switch selectable audio modify facilities (L-both, R-both and L/R swap)
- compatible with Pro-Bel COSMOS status monitoring



The 4406 dual channel digital audio delay

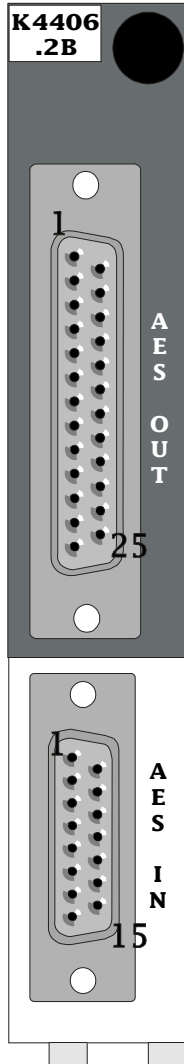
2.1 Signal I/O

The K4406-3U panel is equipped with BNC connectors for unbalanced digital audio, whilst the K4406-2B panel is equipped with a 25 way 'D' type connector for balanced digital audio.



The K4406-3U rear panel for unbalanced I/O

NOTE: The K4406-3U has four outputs per channel



The K4406-2B rear panel for balanced I/O

AES outputs (K4406-2B)			
Pin	Function	Pin	Function
1	O/PA1-	14	O/PB1-
2	O/PA1+	15	O/PB1+
3	GND	16	GND
4	O/PA2-	17	O/PB2-
5	O/PA2+	18	O/PB2+
6	O/PA3-	19	O/PB3-
7	O/PA3+	20	O/PB3+
8	GND	21	O/PB4-
9	O/PA4-	22	O/PB4+
10	O/PA4+	23	GND
11	GND	24	O/PB5-
12	O/PA5-	25	O/PB5+
13	O/PA5+		

Audio input			
Pin	Function	Pin	Function
1	N/C	9	N/C
2	GND	10	N/C
3	N/C	11	GND
4	N/C	12	N/C
5	GND	13	I/PA+
6	I/PA-	14	GND
7	I/PB+	15	I/PB-
8	GND		

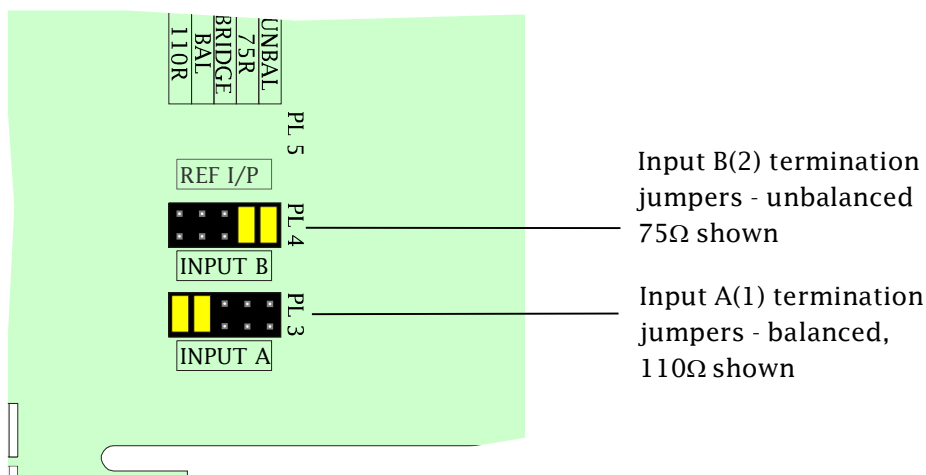
3 Configuration

The 4406 may be configured for different input termination values, audio modify options and digital delay.

3.1 Selecting input termination options

The jumpers to select AES input termination are located near the edge connector. The available options are explained in the following table:

AES input and video reference termination modes	
PL3&5 settings (4406)	Description
UNBAL	Use for unbalanced signal - requires K4406-3U rear panel
75R	Use with unbalanced input to terminate signal with 75 Ω
BRIDGE	Selects high impedance termination (Hi-Z)
BAL	Use with balanced input - requires K4406-2B rear panel
110R	Use with balanced inputs to terminate signal with 110 Ω



Input B(2) termination jumpers - unbalanced 75 Ω shown

Input A(1) termination jumpers - balanced, 110 Ω shown

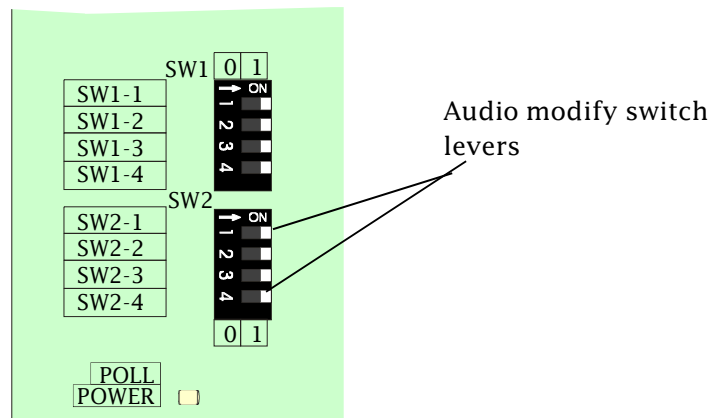
3.2 Setting audio modify options

The audio modify features of the module are set with SW2 as described in the following tables:

Audio modify Input 1		
Function	SW2-1	SW2-2
Normal	OFF	OFF
Input L - both	ON	OFF
Input R - both	OFF	ON
L/R swap	ON	ON

Audio modify Input 2		
Function	SW2-3	SW2-4
Normal	OFF	OFF
Input L - both	ON	OFF
Input R - both	OFF	ON
L/R swap	ON	ON

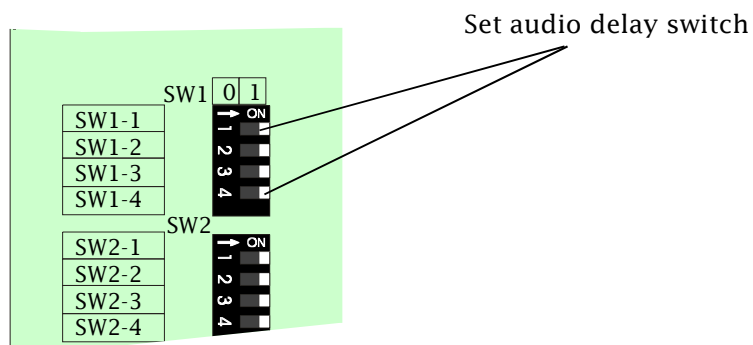
NOTE: '1' or ON is made with the switch slider pushed away from the card edge.



3.3 Selecting the audio delay

The delay of the audio delay path for both inputs is selected with SW1 as follows:

Audio delay 0-15 video frames				
	SW1-1	SW1-2	SW1-3	SW1-4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON



NOTE: Delay is specified in the equivalent of 625/50 video frames, (40ms) and is accurate at 48kHz sampling rate. At other sampling rates, the delay will vary in proportion to the sample period.

4 Status monitoring

The COSMOS frame interface, if fitted, will provide the following information to the COSMOS status monitoring system:

- module present
- I/P 1 (A) present
- I/P 2 (B) present
- SW1 status
- SW 2 status
- 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.

5 **Trouble shooting**

The green card edge POWER LED is not lit

- check the PSU indicator to confirm that there is power to the frame
- check the resettable fuses protecting the card - do this by removing the power to the card for about 30 seconds then restoring the power
- if necessary, refer to the power supply trouble shooting guide in the appropriate ICON rackframe manual section

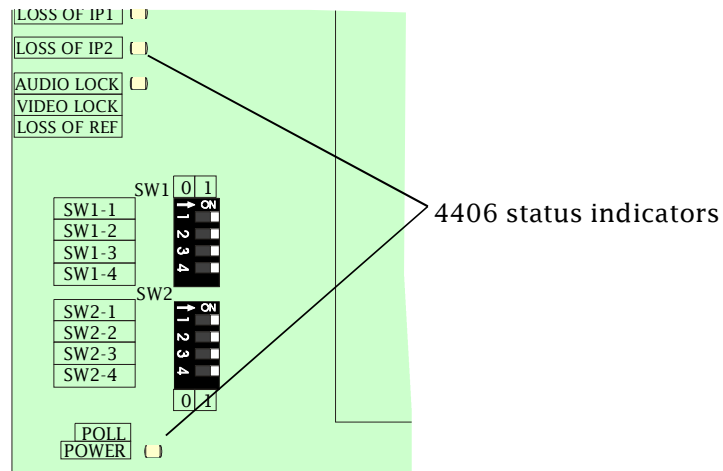
There is no output signal

- ensure that the green power LED on the front of the main card is lit
- check that a valid input is connected to the rear panel
- check that a red LOSS OF INPUT LED is not lit

The output signal is corrupted

- check the quality of the input signal(s)
- check that the appropriate termination has been set

4406 status indicators	
LED label	Meaning when lit
LOSS OF I/P 1	Lights red when I/P 1 is not present or when channel 1 error flag (ERF) is set
LOSS OF I/P 2	Lights red when I/P 2 is not present or when channel 2 error flag (ERF) is set
AUDIO LOCK	Lights green to show that the audio clock is locked
POWER	Lights green if all voltage rails present



6 Specification

Delay input (signal)

Number and type: 2, balanced, transformer coupled to AES3-1992 or unbalanced to AES3-id including SPDIF

Termination: High, 75Ω or 110Ω

Delay outputs

Number and type: 5 per input, transformer coupled, balanced to AES3-1992 or 4 unbalanced to AES3-id

Delay adjustment: Up to 15 x 40 milliseconds of delay. Control is common to both channels

Performance

Bitstream integrity: Transparent to all AES/EBU parameters

Sample rate: 32, 44.1 or 48kHz

Audio modify

Left channel to both

Right channel to both

Left channel swapped with right channel

Invert right channel

Temperature range

Operating: 0° to +40°C

Storage: -10°C to +70°C

7 **Ordering information**

Part number	Description
ICO-4406-2B00	Dual Digital Audio Delay with 20mm rear panel for balanced AES
ICO-4406-3U00	Dual Digital Audio Delay with 30mm rear panel for unbalanced AES