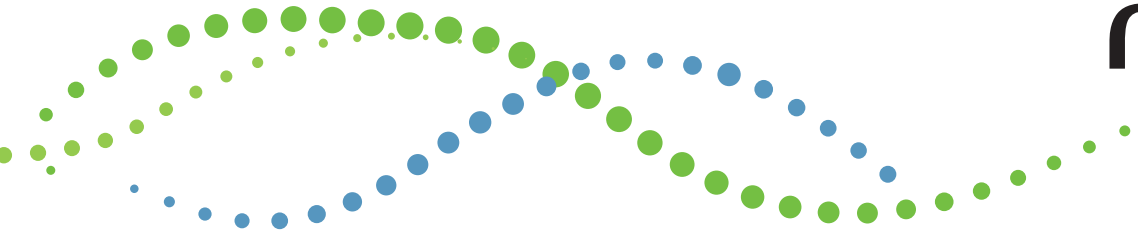


ADA-VMUX
User Manual

Revision: B

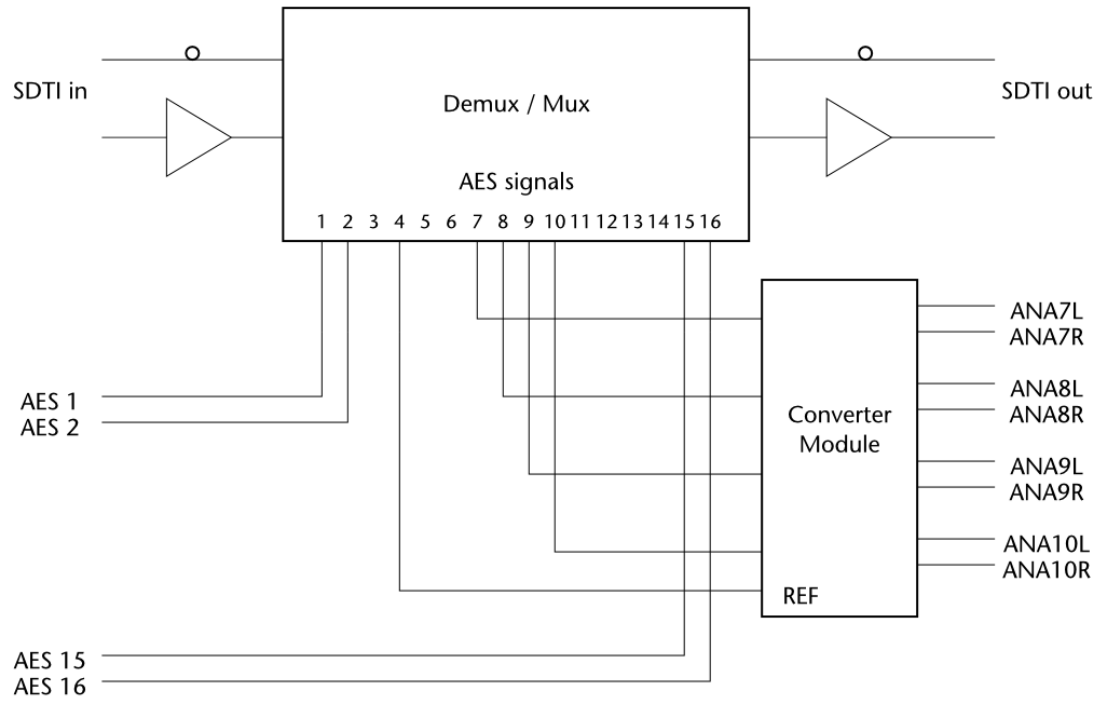
2016-06-17

Contents

1 Revision History

Revision	Date	Comments
B	2016-06-17	Added examples
A	2015-05-09	First revision

2 Product Overview



2.1 Summary

- Digital audio multiplexer with digital and analogue audio
- Uses AES-VMUX multiplexer and audio converter modules.
- 8 analogue audio signals and 4 AES signals.
- 3 different audio modules.
- Less cabling on backpanels.
- High density: Single width backplane with two modules (Not original Flashlink frame or N-box).

3 Introduction

The ADA-VMUX is a integrated analog and digital audio de-/multiplexer module in the Flashlink VMUX range. The product is a two card solution onto a single slot backplane for the Flashcase or Flashlink II frame. The two modules used are the AES-VMUX and one of the -AES8 audio converter modules.

The AES-VMUX is used to transport a large number of digital audio signals. The module is both a multiplexer and demultiplexer and has AES audio ports which may be used as inputs or outputs. The module forms the core of a highly flexible audio transport and routing concept. Modules may be daisy chained with other VMUX modules to increase the number of AES audio signals in the SDTI signal up to a maximum of 64 AES channels.
Demultiplexing may be performed on any module from any of the audio signals in the SDTI multiplex. Each demultiplex channel is, in effect, a 64 to 1 AES router.

The -AES8 audio converter modules have 8 analogue connections and 8 AES. The three different modules are ADC-AES8 ADDA-AES8 and DAC-AES8. The ADC contains 4 stereo A/D converters, the ADDA contains 2 stereo A/D converters and two stereo D/A converters; and the DAC contains 4 stereo D/A converters. The audio conversion is broadcast quality with more than 105dBA dynamic range for any conversion.

The ADA-VMUX-Cn backplanes combine the two modules in a compact form factor. A number of cross connections between the modules reduces the cabling and connector requirements of a system.
The backplanes may be used with the different audio converter modules giving a range of functionality. The following table shows the audio signals available with each combination.

Modules	Analogue inputs	Analogue outputs	AES inputs	AES outputs
AES-VMUX + ADC-AES8	8	0	4	0
AES-VMUX + ADC-AES8	8	0	2	2
AES-VMUX + DAC-AES8	0	8	0	4
AES-VMUX + DAC-AES8	0	8	2	2
AES-VMUX + ADDA-AES8	4	4	2	2

The ADA-VMUX may also be ordered with optical SFP options.

The demultiplex channels are presented as a router level to the Multicon control system allowing for panel control. Control of a distributed router system can easily be configured in the Nevion Configurator as a single virtual level. Panels may then control a router spanning several VMUX modules.
Signal status can be monitored with the front LEDs, the web interface or with SNMP.

The multiplexer channel address setting may be one of 16 positions in the 64 channel multiplex. The analogue channels are always in the middle of the 16 channels in the VMUX module.

Two backplane types are presently available:-

3.1 ADA-VMUX-C1

Single width backplane. 4 AES and 8 analogue signals on female d-sub DC-37, DIN 1.0/2.3 SDTI and dual optical connectors.

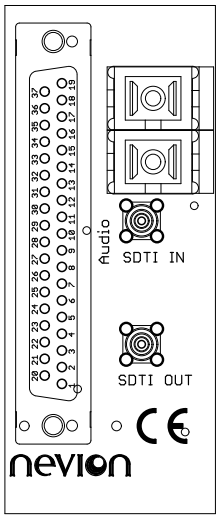


Figure 3.1 ADA-VMUX-C1

3.2 ADA-VMUX-C2

Flashcase single width backplane. 4 AES and 8 analogue signals on Molex Male KK, DIN 1.0/2.3 SDTI and dual optical connectors.

3.3 The Nevion SDTI audio concept

The Nevion SDTI audio uses a normal 625 video frame and data format. This allows simple reuse of existing legacy infrastructure and standard test and signal monitoring facilities.
The audio is embedded into the active video area on all video lines. An extra ancillary data packet in the horizontal blanking area identifies the signal as a Flashlink SDTI audio multiplex.
The audio embedding uses two video lines to optimize the number of channels in the multiplex. Seven stereo audio samples, embedded over two lines gives a maximum sample rate of 54.7 kHz. This gives a high multiplexing efficiency of normal 48 kHz broadcast audio. The embedding pattern repeats over a two frame sequence. The phase reference is only inserted on one of the the two lines and a frame counter is also embedded into the horizontal ancillary data packet.
The audio is embedded in fixed timeslots placed along the video line. The phase words are embedded in a block of video words placed first on every other line followed by seven audio blocks.

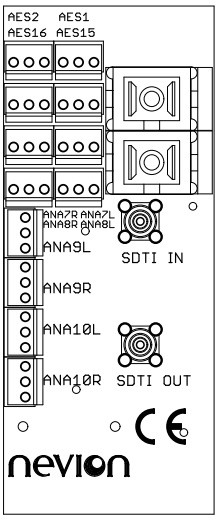


Figure 3.2 ADA-VMUX-C2

Each block has 64 audio timeslots. Each timeslot contains a 24 bit audio sample together with the C, U and V bits from the AES subframe. The frame of AES audio is split between two audio blocks. The audio multiplex appears on a video monitor as a series of vertical lines or stripes on a video monitor. Dark green stripes are areas where no audio is embedded. Light green shows that the channels are embedded but that the AES input is absent. An active audio channel appears as a multicolored vertical stripe.
The SDI embedded clock is used as a clock reference and the audio is sampled with reference to the start of the horizontal blanking. The phase measurement (similar to HD audio) is embedded on the following line. All of the audio channels use the same reference point and all of the phase measurements are embedded together in a block.

4 Connections

A similar pattern to that used on the TASCAM DB-25 is used for the connections on the DC-37 dsub connector as shown below. The numbering refers to the AES number on the AES-VMUX.

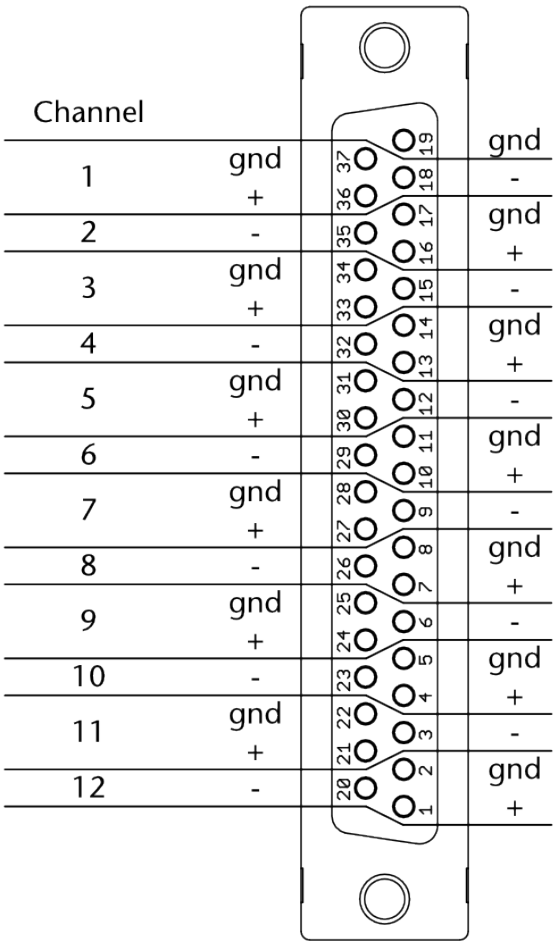


Figure 4.1 dsub DC37 wiring

Table 4.1 DC37 channel assignments with different converter modules

Channel.	ADC-AES8.	DAC-AES8.	ADDA-AES8.
1	AES1	AES1	AES1
2	AES2	AES2	AES2
3	AES15	AES15	AES15
4	AES16	AES16	AES16
5	ADC7 L	DAC7 L	DAC7 L
6	ADC7 R	DAC7 R	DAC7 R
7	ADC8 L	DAC8 L	DAC8 L
8	ADC8 R	DAC8 R	DAC8 R
9	ADC9 L	DAC9 L	ADC9 L
10	ADC9 R	DAC9 R	ADC9 R
11	ADC10 L	DAC10 L	ADC10 L
12	ADC10 R	DAC10 R	ADC10 R

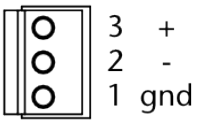


Figure 4.2 Molex KK wiring

5 Configuration

5.1 DIP switch configuration

DIP switch configuration of the two modules in use will always work as described in the respective user manuals. It is up to the user to set the port directions of the AES-VMUX correctly according to the audio converter module in use. The AES ports on the VMUX, used by the audio converter modules are; AES7, AES8, AES9 and AES10. These signals are connected to the AES1 to AES4 respective connections of the audio converter modules as shown below.

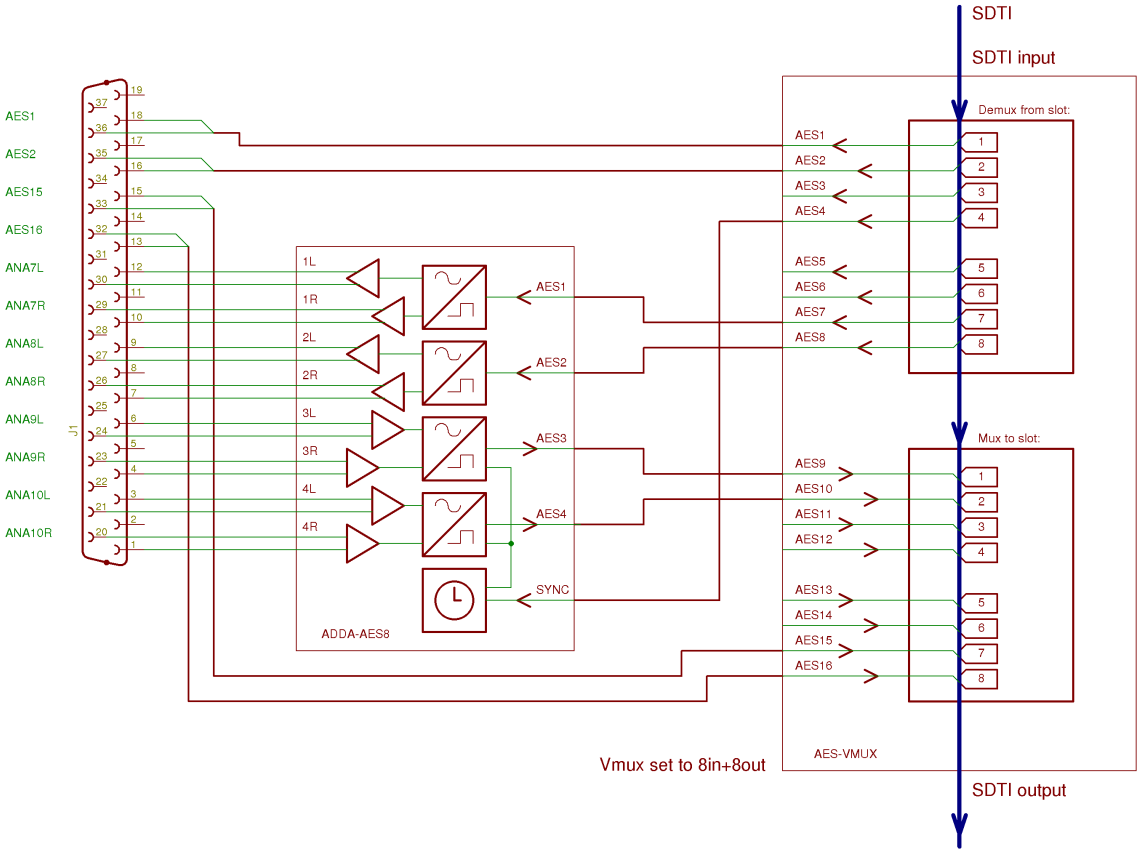


Figure 5.1 -C1 block diagram with ADDA-AES8 module

5.1.1 AES port Directions

The AES port directions possibilities on the AES-VMUX are limited by two things.

1. The outputs are always placed first.
2. The directions are set in groups of 4.

The combinations which function are shown in table below:

Module	Analogue inputs	Analogue outputs	AES inputs	AES outputs	AES-VMUX SW2.1-3
AES-VMUX + ADC-AES8	8	0	4	0	off off off
AES-VMUX + ADC-AES8	8	0	2	2	off off on
AES-VMUX + ADDA-AES8	4	4	2	2	off on off
AES-VMUX + DAC-AES8	0	8	2	2	off on on
AES-VMUX + DAC-AES8	0	8	0	4	on on on

The input address of the VMUX module (SW1.5-8) sets the timeslots of the input multiplexing. The input channels are 'embedded' in the following timeslots relative to the module address:

Module	Analogue inputs	Multiplex channels	AES inputs	Multiplex channels
ADC-AES8	1 - 8	7 - 10	1,2 15,16	1,2 15,16
ADDA-AES8	5 - 8	9,10	1,2	1,2

6 Examples

6.1 Point to point 2 AES + 2 stereo analogue both directions between two sites

This Example uses two ADA-VMUX modules in a back to back configuration. Both modules are used for embedding and de-embedding and the SDTI signal is connected in a loop so one of the modules *must* be the clock master.
The analogue option uses the ADDA-AES8 module as shown in Figure 5.1.

6.1.1 AES-VMUX Switches

VMUX module A (clock master)

DIP SW1	1,2,3,4	Demux Start address
	off,off,on,off	9

DIP SW1	1,2,3,4	Mux Start address
	off,off,on,off	9

DIP SW2	1,2,3	4,5,6,7,8	Outputs	Inputs
	off,on,off	off,off,**on**,off,off	8	8

VMUX module B

DIP SW1	1,2,3,4	Demux Start address
	off,off,on,off	9

DIP SW1	1,2,3,4	Mux Start address
	off,off,on,off	9

DIP SW2	1,2,3	4,5,6,7,8	Outputs	Inputs
	off,on,off	off,off,**off**,off,off	8	8

6.1.2 ADDA-AES8 Switches

Configured for 48 kHz, 0 dBFS = +18 dBu

DIP SW1	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,off

DIP SW2	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,off

6.1.3 Routing

Table 6.1 AES-VMUX Multiplex timeslot usage

Timeslot	Input Connector signal
9	ANA9L + ANA9R
10	ANA10L + ANA10R
15	AES15
16	AES16

The AES-VMUX demux channel routing is controlled though the web GUI on the Multicon. The default routing wil route timeslot 9 to AES1 connector etc. which may not be the desired effect as it swaps the AES and analogue signals. Change the routing on the VMUX modules on both sites as shown below:

VMUX Output	Timeslot
1	15
2	16
3	don't care
4	don't care
5	don't care
6	don't care
7	1
8	2

Channels 3 to 6 are not available on the connector panel.

This will result in the following routing in both directions.

input connector signal	output connector signal
ANA9L	ANA7L
ANA9R	ANA7R
ANA10L	ANA8L
ANA10R	ANA8R
AES15	AES1
AES16	AES2

6.2 Point to point 4 AES + 4 stereo analogue from site A to site B

This Example uses two ADA-VMUX modules but only uses one SDTI connection as all the signals only go one way The analogue options uses one ADC-AES8 module and one DAC-AES8

6.2.1 Site A. AES-VMUX Switches

DIP SW1	1,2,3,4 and 5,6,7,8	Start address
	off,off,off,off	1

DIP SW2	1,2,3	4,5,6,7,8	Outputs	Inputs
	off,off,off	off,off,off,off,on	0	16

6.2.2 Site A. ADC-AES8 Switches

Configured for 48 kHz, 0 dBFS = +18 dBu

DIP SW1	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,off

DIP SW2	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,on

6.2.3 Site B. AES-VMUX Switches

DIP SW1	1,2,3,4 and 5,6,7,8	Start address
	off,off,off,off	1

DIP SW2	1,2,3	4,5,6,7,8	Outputs	Inputs
	on,on,on	off,off,off,off,on	16	0

6.2.4 Site B. ADC-AES8 Switches

Configured for 48 kHz, 0 dBFS = +18 dBu

DIP SW1	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,off

DIP SW2	1,2,3	4,5,6	7,8
	on,off,off	on,off,off	off,on

The channels are connected correctly without using Multicon. AES input 1 at site A in routed to AES1 output at site B

7 General environmental requirements

The equipment will meet the guaranteed performance specification under the following environmental conditions:

Operating room temperature range	0°C to 45°C
Operating relative humidity range	<90% (non-condensing)

The equipment will operate without damage under the following environmental conditions:

Temperature range	10°C to 55°C
Relative humidity range	<90% (non-condensing)

Appendix A Materials declaration and recycling information

A.1 Materials declaration

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
ADA-VMUX	O	O	O	O	O	O
ADA-VMUX-SFP	O	O	O	O	O	O

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

This is indicated by the product marking:

A.2 Recycling information

Nevion provides assistance to customers and recyclers through our web site: http://www.nevion.com/. Please contact Nevion's Customer Support for assistance with recycling if this site does not show the information you require.
Where it is not possible to return the product to Nevion or its agents for recycling, the following general information may be of assistance:
Before attempting disassembly, ensure the product is completely disconnected from power and

signal connections.
All major parts are marked or labeled to show their material content.
Depending on the date of manufacture, this product may contain lead in solder.
Some circuit boards may contain battery-backed memory devices.