



VISTEK V1633/A & V1633/D AUDIO MULTIPLEXER USER GUIDE

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VISTEK V1633/A & V1633/D sdi audio multiplexer

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1. DESCRIPTION

The V1633A Audio Multiplexer is a full broadcast specification embedder of audio data into an SDI data stream. It forms part of the Vistek V1600 range of modular interface products. It is a 3U high card, which is fitted into either the 1U V1601 or 3U V1603 chassis from which it receives its power. It is an improved and upgraded replacement for the V1633. The main improvements are a single board construction, and the fitting of audio sub-boards. This means that either digital AES or analogue inputs can be accepted. Fitting one of two available sub-modules makes the choice. There is also an audio demultiplexer module, the V1634A, which replaces the V1634 and is fully compatible with the V1633A.

In both the V1601 and V1603 racks passive rear modules are required to interface to the outside world. For each rack two rear modules are available depending on whether the audio is required to be analogue, digital AES balanced or digital AES unbalanced. The rear modules are common for the V1633A and V1634A.

The SDI video may be D1 or D2 in either 625/50 or 525/60 standard. The unit automatically detects the standard and format of the input signal and operates accordingly.

If the analogue input module has been fitted then the inputs must be balanced signals. If the digital AES input option is fitted then the AES signals are accepted as either balanced or unbalanced, depending on the type of rear module that is fitted to the rack.

The unit embeds audio onto an SDI video data stream according to SMPTE 272M. Any one of the available audio groups may be embedded; the number depends on whether the signal is D1 or D2. Unlike multiplexers from some other manufacturers the audio does not need to be synchronous with the video into which it is to be embedded. This makes the use of embedded audio within a studio area much simpler to implement. However it must be noted that some other manufacturers de-multiplexers will not accept embedded audio if it is asynchronous to the SDI clock.

Another facility to assist the installation in a real environment is the ability to resample an asynchronous AES input to an external reference, generating synchronous multiplexed audio. The external reference may be a Black and Burst video, another AES signal, or the SDI video itself. With an ADC module, the sampling rate is locked to whichever reference is selected.

There are three SDI outputs that are re-clocked versions of the SDI input. If the signals are D1 then all ancillary data may be stripped off the SDI input signal prior to embedding. The EDH is regenerated on the card. This facility is not available for D2 signals.

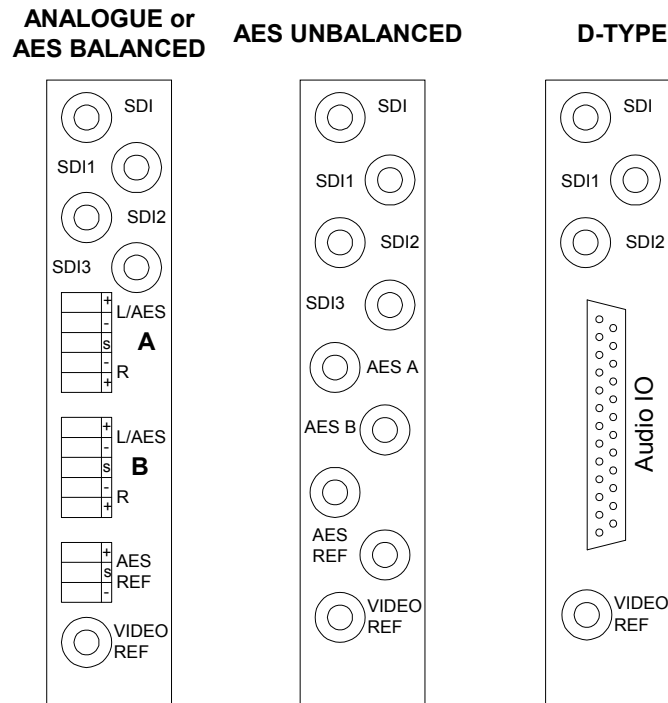
The unit is fully controllable over the DART remote control system.

The output of the unit has full EDH signals applied, but there is no EDH detection on the input.

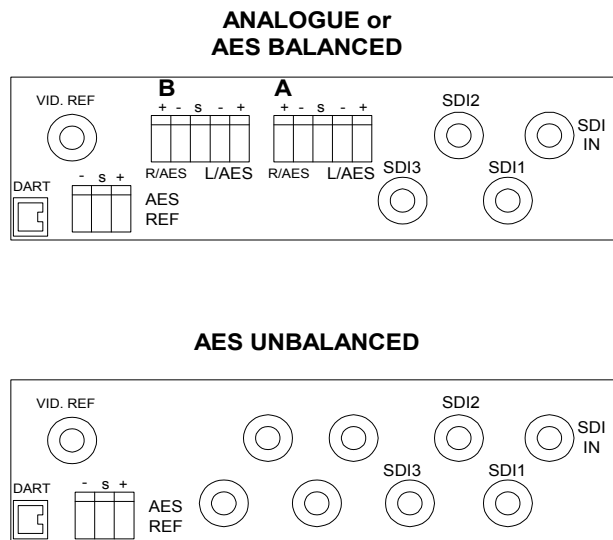
2. INSTALLATION

2.1 Rear Panel – 3U

Two 3U rear panel options are available, depending on the output format. They are shown below:



2.2 Rear Panel – 1U



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2.3 Rear Panel Connections

SIGNAL	CONN	DESCRIPTION
SDI IN	BNC	SDI Video Input
SDI 1, 2, 3	BNC	3 off SDI Video Outputs
A, B		Audio Inputs or Channels A and B
+,-		Indicate the Positive and Negative of AES signal
L/AES		The Left channel (analogue) or AES O/P 1 (digital)
R/AES		The Right channel (analogue) or AES O/P 2 (digital)
AES REF		AES Reference Input
VID. REF	BNC	Video Reference Input
DART	RJ45	DARTNET connection. Only used in one position in 1U rack

2.4 D-Type Connector Pin-out

The D type connector on the unit is female.

Analogue Input

Pin	Function	Pin	Function
1	A Left In -	14	A Left In +
2	GND	15	GND
3	A Right In -	16	A Right In +
4	GND	17	GND
5	B Left In -	18	B Left In +
6	GND	19	GND
7	B Right In -	20	B Right In +
8	GND	21	GND
9	GND	22	GND
10	AES Ref In -	23	AES Ref In +
11	GND	24	GND
12	GND	25	GND
13	GND		

AES Input

Pin	Function	Pin	Function
1	AES A In -	14	AES A In +
2	GND	15	GND
3	N/C	16	N/C
4	GND	17	GND
5	AES B In -	18	AES B In +
6	GND	19	GND
7	N/C	20	N/C
8	GND	21	GND
9	GND	22	GND
10	AES Ref In -	23	AES Ref In +
11	GND	24	GND
12	GND	25	GND
13	GND		

2.5 Power Consumption

The power consumption of the V1633A depends on which output module is fitted and is shown in the following table:

Base Unit :	~6W
Base Unit + Analogue I/O :	~9W
Base Unit + Digital I/O :	~7W

2.6 Insertion Delay

The video insertion delay, from D1 I/P to D1 O/P is **495ms**.

2.7 Module Installation

One of the two available input modules must be fitted. The options are:

Analogue Input	PCB 130-2172
Digital Input	PCB 130-2182

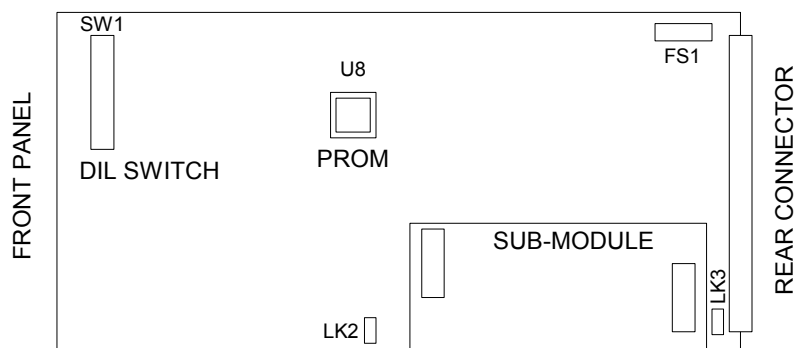
The module fits in the lower right hand area of the PCB labelled 'INPUT MODULE'. Ensure the module is inserted the right way round, so the component ident writing is the **OPPOSITE** orientation as that on the main board. It is not possible to fit one on the sub-boards meant for the companion V1634, but it is possible to fit one of these boards the wrong way round.

NOTE : Do not fit or remove a sub-module with the unit powered. Ensure the module is correctly fitted before applying power.

When the unit is powered, front panel LEDs indicate which type of output module is fitted - ADC or AES.

2.8 Internal Hardware

2.8.1 Main Board



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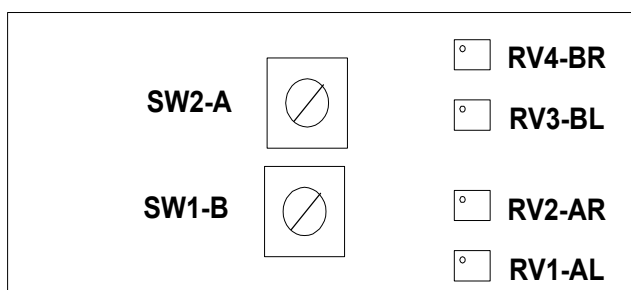
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The significant items on the main board are described here:

FS 1	Input power fuse, 3A.
SW 1	Internal configuration switches, S1 at the top. See Section 3.8 for details. Note that
U8	The PROM that contains the firmware for the programmable device. In the event of upgrades in the field it is most likely that this is the device that will need to be changed.
LK 2	Enables termination of the AES reference: UP = Terminated DOWN = Hi-Z
LK 3	Enables termination of the video reference: UP = Hi-Z DOWN = Terminated
Sub-Module	Fitted with either the Analogue I/P Module (130-2170) or the digital I/P module (130-2180). Check for correct orientation before powering the unit.

2.8.2 Analogue I/P Module



SW 1	Set Maximum INPUT Level (MIL) for channel pair B
SW 2	Set Maximum INPUT Level (MIL) for channel pair A
RV 1	Calibration trim channel AL
RV 2	Calibration trim channel AR
RV 3	Calibration trim channel BL
RV 4	Calibration trim channel BR

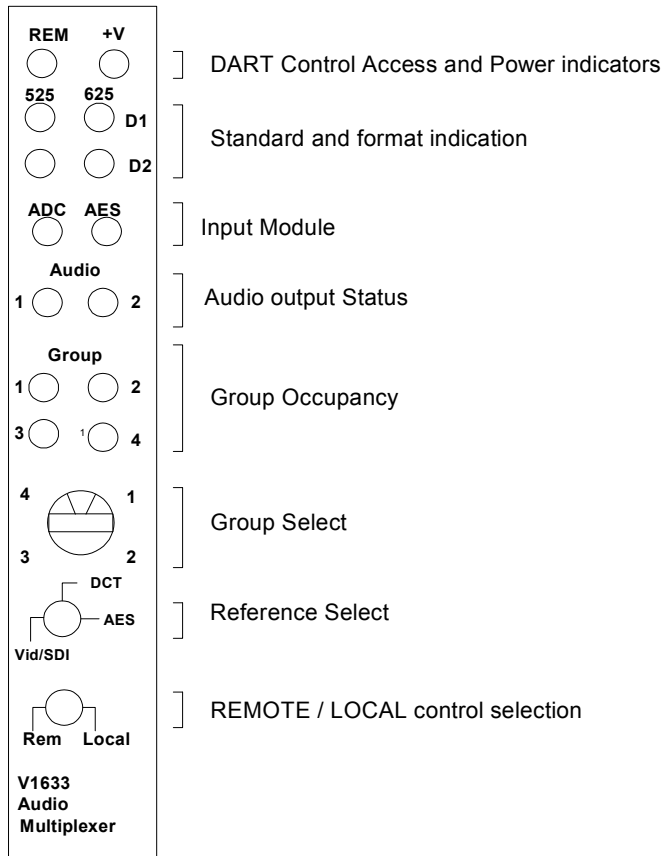
2.8.3 Digital I/P Module



There are no adjustments on the digital I/P module

3. OPERATION

3.1 Front Panel



3.2 Power

The power LED, marked +V, indicates that the 5V VCC power rail is present on the board. This shows not only that power has been applied to the rear, but also that the on board regulator is functioning.

There is a fuse on the unit in series with the power input, and if this has 'blown' then the +V LED will be OFF.

3.3 Remote Control

The V1633A can be controlled from either the front panel, shown above or through the DART remote control network. If DART is used then any DART controller, with knowledge of the V1633A can be used. Vistek can provide either the V1605 1U control panel or VIEWFIND, which is a PC based universal control system. Any DART controller can be used, provided it has 'knowledge' on the V1633A.

The control source, Local or Remote, is selected by the toggle switch on the front panel. The REM LED does not indicate the selection of remote control, but 'blips' to show access by the Rack Controller, if fitted. Only the position of the toggle switch indicates that remote control has been selected.

The status LEDs on the front panel are active for Local or Remote control so always show the operating condition.

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3.4 Standard Indications

Four LEDs on the front panel show the standard and format of the input signal. The unit can operate in either 525/60 or 625/50 formats, each of which can be component (D1) or composite (D2). Only one LED can be on at any one time.

If there is no SDI video input then all four of these LEDs will OFF.

3.5 Module Indication

Two LEDs are used to indicate which of the two available sub-modules is fitted. Normally just one of these LEDs will be ON. It is possible that a future module will provide one AES input and one analogue input, a so-called hybrid module; in this case both LEDs will be ON.

3.6 Group Selections - D1

With a D1 signal, there can be up to four groups of embedded audio, each group carrying two AES streams. The V1633A can only embed on one of these groups selected using a front panel rotary switch with markings 1 to 4. The switch should be used to indicate which of the groups has been selected and not the GROUP LEDs above. Audio can only be embedded on a group which has no audio on it. An option is available on S1 Switch 1, to blank all groups prior to embedding; this is an all or nothing selection. NOTE: Appending audio onto an SDI source already containing audio data from a minority of other manufacturers multiplexers which do not conform fully to the SMPTE spec. may cause problems if the ancillary data space is not pre-blanked.

The 'Group' LEDs indicate which groups are occupied on the output signal, and not which group has been selected. Thus any number of the LEDs may be ON. If there is an error on the input audio, or no signal is present, the group light on the selected group will flash.

3.7 Reference Selection

Many installations have difficulty with embedded audio, which can often be traced to the frequency and phase relationship between the video and AES audio. Unlike many SDI De-multiplexers the V1633A does not require the signals to be synchronous. In fact it is quite possible for the SDI video and the two multiplexed audio data streams to have no defined relationship.

To assist in operational installation the V1633A can be used to resample the audio to 48kHz with respect to various reference signals. This may help if the audio is to be de-multiplexed at a later stage by another manufacturer's de-multiplexer. The reference source may be either an AES signal or a video signal. The video reference may be either the SDI input signal itself or an external analogue black and burst reference.

The front panel has a three-position selection switch used as follows:

POSn	Definition	Description
VID/SDI	Video Ref. and SDI I/P	Use one of the video references. The choice between Ref. and SDI is made by switch 4 on the internal DIL switch. If Ref. is selected but not present, then SDI will be used.
DCT	Direct	Pass AES without synchronisation.
AES	AES Ref.	Use the external AES as a reference. If this is absent then the SDI input will be used. An AES reference of 48kHz must be used.



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3.8 Internal Settings

Switch	Title	Description	Left	Right (= ON)
0	ANC Blank	Blank all ancillary data from the output	Blank	Pass
1		Reserved		
2		Reserved		
3		A->A, A->B / A->A, B->B	A-> both	A->A,B->B
4*	REF SDI	Select video reference between Ext. Ref. and SDI	EXT	SDI
5	LSB		1	0
6	Op. Mode	Select 1 of 8 operating modes	1	0
7	MSB	(switch ON = 0, OFF = 1)	1	0

For normal operation all switches should be set to the right (ON).

* The sense of this switch was incorrectly stated in earlier versions of this manual.

3.9 Operating Modes

Three operating modes have been incorporated into the V1633A. Mode 0 is a full SMPTE specification, allowing synchronous or asynchronous multiplexing, i.e. the AES inputs need not be locked to the SDI or each other when operating in DireCT mode (in Video or AES reference mode the audio is automatically synchronised).

However because some de-multiplexers on the market make certain assumptions about the multiplexed data. For these systems two other modes have been incorporated.

In any one line of video there may be 3 or 4 samples of audio data from each AES stream. Mode 1 forces the number of samples from each channel to be the same i.e. 3 from A and 3 from B, or 4 from A and 4 from B; a combination is not allowed in this mode.

Mode 2 is a basic operating mode, which is entirely synchronous, and does not insert control packets, suitable for basic de-multiplexers types.

Mode	Description
0	Full SMPTE spec. Audio embedding, D1 / D2.
1	AES channels A & B packets aligned
2	Basic Embedding, no Control Status. No asynchronous capability
3	= mode 0
4	= mode 1
5	= mode 2
6	= mode 0
7	= mode 1

3.10 Ancillary Blanking

If the SDI into the V1633A has audio already embedded on the selected group, it is necessary to remove any data already in the ancillary data space, or select another group (see Section 3.6) This can be done by setting S0 of the internal DIL switch accordingly. This can also be set over the remote control.

If the Ancillary data is set to be blanked then ALL data in the ancillary space will be removed, not just the audio data.

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4. ADC INPUT MODULE

4.1 Description

The 130-2172 dual ADC input module features 24-bit ADCs to accommodate future upgrade to 24 bit embedding in the SDI. Each channel pair - consisting of L and R channels - has digitally controlled MIL which may be adjusted from +12dBu to +24dBu by the on-board hex switches SW1 and SW2.

4.2 Max Input Level Setting

The MIL of each of the two channel pairs A and B may be set from +12dBu to +24dBu in 1dB steps by means of the on-board hex switches if the V1633 is operated in local mode. Hex switch SW1 and SW2 control MIL of channel pair A and B respectively and Table 4.2.1 below shows the MIL settings for each hex switch position. The factory supplied shipping setting is +18dBu.

If the V1633 is connected to a DART compatible remote host and operated in remote mode, the MIL may be set remotely and the on-board hex switches are disabled.

Table 4.2.1

Switch Setting	MOL
0	+12dBu
1	+13dBu
2	+14dBu
3	+15dBu
4	+16dBu
5	+17dBu
6	+18dBu
7	+19dBu
8	+20dBu
9	+21dBu
A	+22dBu
B	+23dBu
C	+24dBu
others	+24dBu

4.3 Calibration

The 130-2172 ADC output module has four trimming potentiometers RV1, RV2, RV3 and RV4, which respectively trim the gain of the module's digitally controlled gain block for analogue inputs AL, AR, BL and BR. These potentiometers should not require adjustment by the user, as they are accurately set at the factory.



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5. AES INPUT MODULE

5.1 Description

The 130-2182 AES input module has dual AES inputs which, depending on the reference mode selected, may either be locked to SDI, external Black and Burst video or AES reference source, or passed without resampling in DireCT mode.

If the external Black and Burst video reference is selected, the unit will automatically synchronise to 525 /60 or 625/50 Black and Burst video input to the VID REF connector on the rear panel. If the external 48kHz AES reference is selected, the unit will frequency lock both AES output streams to the external AES applied to the AES REF connector on the rear panel, and will time-align AES input frames and channel status blocks to those of the external AES reference.

If the selected reference source is disconnected or fails, the unit will automatically default to the internal SDI reference.