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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Apr 00
1.0	Released Version Updated Audio Group assignment and Swap DIP switches	Jun 00
1.1	Added information about Breakout panel	Jul 00
1.2	Added information for version A (AES out) and B (AES in)	Jul 00
1.3	General format cleanup	June 09

1. OVERVIEW

The 7760AVM-Lite Video/Audio Monitoring D to A Converter provides a convenient low cost solution for monitoring 270 Mb/s serial digital video signals with embedded audio. The 7760AVM-Lite is available in two versions.

Model	AES Audio Outputs	AES Audio Inputs
7760AVM-Lite-A	2	0
7760AVM-Lite-B	0	2

SMPTE 272M allows for up to four groups (4 channels/group) to be embedded within a serial digital signal. The 7760AVM-Lite-A can monitor one embedded audio group and provide analog and AES outputs. The 7760AVM-Lite-B can monitor one embedded audio group or audio from the AES inputs and provide analog outputs.

Features Common to Both Versions:

- Front panel LEDs indicating module status, video presence, selected audio group data is present
- LED indication for the presence of each of the 4 audio groups within the input video
- Audio group selection via card edge DIP switches
- Audio channel swapping selection via card edge DIP switches
- Built in closed caption decoder
- Selectable NTSC pedestal on/off
- Selectable peak analog audio output levels
- 7760AVM-BHP bulkhead panel is available to facilitate wiring to the high density DB15 connector. (Up to 10 7760AVM-Lite modules can be wired using each bulkhead panel)

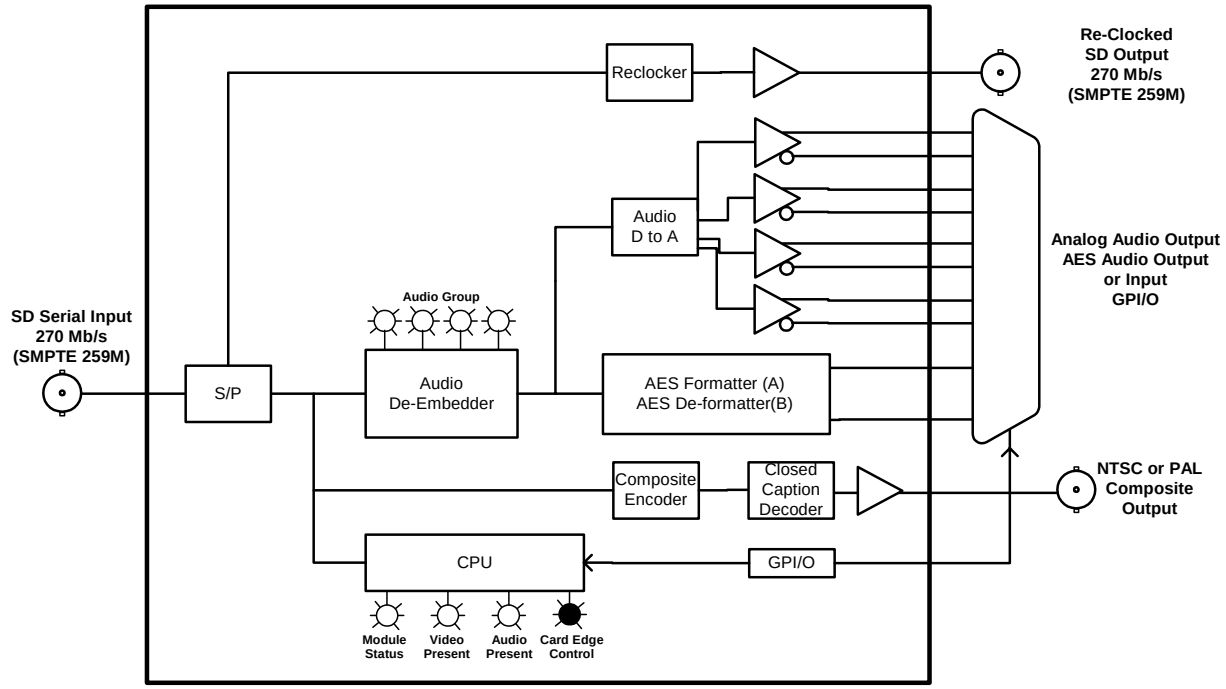

Figure 1-1: 7760AVM-Lite Block Diagram

2. INSTALLATION

The 7760AVM-Lite modules come with a companion rear plate that has 3 BNC connectors and a female high density DB 15 connector. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

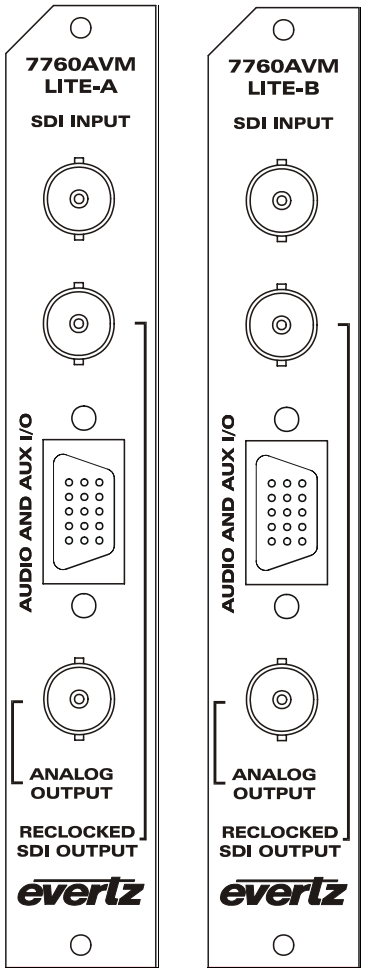

Figure 2-1: 7760AVM-Lite Rear Panels

2.1. VIDEO INPUT AND OUTPUT

SDI INPUT: Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 259M standard.

SDI OUTPUT: BNC connector with reclocked serial component video output, compatible with the SMPTE 259M standard. These outputs contain a reclocked copy of the input video.

ANALOG OUTPUT: BNC connector with composite analog monitor output from the input video.

2.2. AUDIO AND AUX I/O

Both versions of the 7760AVM-Lite have 4 analog audio outputs. These outputs correspond to the 4 channels from the embedded audio group selected by DIP switches 7 and 8. On the B version audio from the AES inputs can also be monitored when DIP switch 3 is On. On the A version, the audio group selected for monitoring is also available as AES outputs. The audio inputs and outputs are available along with the general purpose inputs and outputs on a female HD DB-15 connector labeled **AUDIO AND AUX I/O**. The pinout of this connector is shown in Table 2-1.

Name	Description	DB-15
A1-	Analog Audio Channel 1 -	4
A1+	Analog Audio Channel 1 +	5
A2-	Analog Audio Channel 2 -	14
A2+	Analog Audio Channel 2 +	15
A3-	Analog Audio Channel 3 -	9
A3+	Analog Audio Channel 3 +	10
A4-	Analog Audio Channel 4 -	12
A4+	Analog Audio Channel 4 +	13
AES1	AES Input/Output 1	11
AES2	AES Input/Output 2	7
GPI1	General Purpose Input 1	8
GPI2	General Purpose Input 2	1
GPO1	General Purpose Output 1	3
Tx	RS-232 (Output)	2
Rx	RS-232 (Input)	6

Table 2-1: Audio and Aux I/O Pinout

The physical layout looks like this:

			6	Rx				
1	GPI2		**7**	AES2		**11**	AES1
2	Tx		**8**	GPI1		**12**	A4-
3	GPO1		**9**	A3-		**13**	A4+
4	A1-		**10**	A3+		**14**	A2-
5	A1+					**15**	A2+

Connect to the shell for ground.

Table 2-2: Audio and Aux I/O Physical Layout

2.2.1. Analog Audio Connections

ANALOG AUDIO OUTPUT 1 to 4: Balanced audio output from channels 1 to 4 of the audio group selected by DIP switches 7 and 8 for de-embedding. The balanced audio can be connected to male XLR connectors as follows (standard pin 2 +ve connection):

HD DB-15	XLR
Audio +	2
Audio -	3
Shell	1

Table 2-3: Analog Audio to XLR Connection

2.2.2. AES Audio Connections

On the 7760AVM-Lite-A where the AES pins are outputs, both the analog and AES outputs have the same audio (the de-multiplexed group). On the 7760AVM-Lite-B where the AES pins are inputs, either the input AES audio or the de-multiplexed group can be monitored on the analog audio outputs.

AES1: **Version A:** AES audio output from channels 1 and 2 of the audio group selected by DIP switches 7 and 8 for de-embedding.

Version B: AES audio input for channels 1 and 2 when the DIP switch 3 is On.

AES2: **Version A:** AES audio output from channels 3 and 4 of the audio group selected by DIP switches 7 and 8 for de-embedding.

Version B: AES audio input for channels 3 and 4 when the DIP switch 3 is On.

2.2.3. General Purpose Inputs and Outputs

The 7760AVM-Lite has 2 general purpose inputs and one general purpose output. The GPI's are active low with internal pull up resistors (4.7k Ohms) to +5V. To make an input active, lower the signal to near ground potential (i.e. connect to shell or chassis ground). This can be done with a switch, relay, TTL drive, GPO output or other similar method.

GPI1: Enables the closed caption decoder when it is closed to ground.

GPI2: Turns off the colour on the analog video output when it is closed to ground.

The GPO is active low with an internal pull up resistor to +5V (10k Ohm). When the output goes low it is able to sink up to 10mA. When high, the signal will go high (+5V). Do not draw more than 100μA from the output.

GPO1: Goes active (closure to ground) when video and/or audio is not present.

2.3. INSTALLING THE AVM BULKHEAD BREAKOUT PANEL

The 7760AVM-BHP Bulkhead breakout panel is an accessory that provides you with a convenient way of connecting the audio and GPIO signals into the HD DB-15 connectors on the rear of the modules. This panel occupies 1.5 rack units of rack space and is designed to be mounted at the rear of your rack panel. The breakout panel can be used to connect up to ten 7760AVM-Lite modules. Each of the ten sets of connectors on the breakout panel is fitted with two BNCs for AES audio out, two six position terminal strips for the 4 channels of analog audio, and one six position terminal strip for the GPIO signals. Figure 2-2 shows one section of the breakout panel. On the rear of the breakout panels are ten female HD DB-15 connectors.

To connect the 7760AVM-Lite module to the breakout panel, connect the 15 pin extender cables supplied with the breakout panel between the **Audio and Aux I/O** connector on the rear of the 7760AVM-Lite module and the appropriate D connector on the breakout panel. Make sure that you secure the connectors with the screws supplied. The audio and aux cables can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip is the inserted into the breakout panel and secured using the two hold down screws.

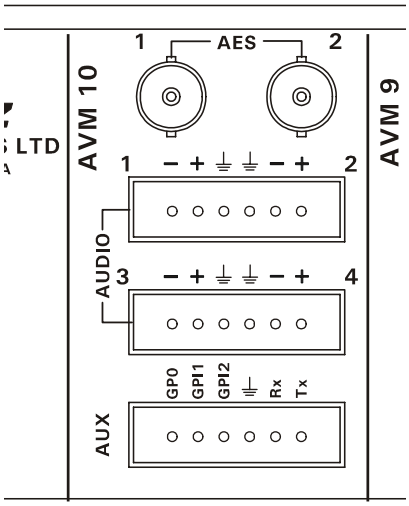

Figure 2-2: Breakout Panel for Wiring Audio and Aux Connections

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standard: SMPTE 259M C – 525 and 625 component, auto standard detect
Connector: BNC per IEC 61169-8 Annex A
Equalization: Automatic 200m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss: > 15 dB up to 270 Mb/s

3.2. RE-CLOCKED SERIAL VIDEO OUTPUT

Number of Outputs: 1
Standard: same as input
Connectors: BNC per IEC 61169-8 Annex A
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 470ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB up to 270 Mb/s
Wide Band Jitter: < 0.2 UI

3.3. ANALOG VIDEO OUTPUT

Number of Outputs: 1
Type: NTSC, SMPTE 170M or PAL, ITU624-4
Connector: BNC per IEC 61169-8 Annex A
Signal Level: 1V nominal
DC Offset: 0V ±0.1V
Return Loss: >35dB up to 5MHz
Freq. Response: 0.8dB to 4 MHz
Diff. Phase: <0.9° (typical. <0.6 °.)
Diff. Gain: <0.9% (typical. <0.5 %)
SNR: >56dB to 5 MHz (shallow ramp)
Processing Delay: 1.9μsec

3.4. ANALOG AUDIO OUTPUTS

Number of Outputs: 4
Type: Balanced analog audio
Connector: Female High Density DB-15
Output Impedance: 33Ohm
Sampling Frequency: 48kHz
Signal Level: 0dB FS => 20dBu, 22dBu, 24dBu
NOTE: High impedance loads only (10kOhms)
Not good for low impedance loads (i.e. 600Ohm)
Frequency Resp.: 50Hz to 20kHz: +/- 0.20dB
SNR: >85dB (50Hz to 20 kHz)
THD+N: 65 dB@ 1kHz, 0 dBFS, typical
Resolution: 24-bit

3.5. AES AUDIO OUTPUTS

Number of Outputs: 2 on version A
Standard: SMPTE 276M, single ended synchronous or asynchronous AES
Connectors: Female High Density DB15
Resolution: 24-bit
Sampling Rate: 48 kHz
Impedance: 75 Ohms unbalanced

3.6. AES AUDIO INPUTS

Number of Inputs: 2 on version B
Standard: SMPTE 276M, single ended synchronous or asynchronous AES
Connectors: High-density female DB-15
Resolution: 24-bit
Sampling Rate: 48 kHz
Impedance: 75 Ohms unbalanced

3.7. ELECTRICAL

Voltage: + 12VDC
Power: 6 Watts
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive

4. STATUS INDICATORS

The location of the status LEDs is shown in Figure 6-1.

4.1. MODULE STATUS LEDS

MODULE OK: This Green LED will be On when the module is operating properly.

LOCAL FAULT: This Red LED makes it easy to identify one module in a frame that is missing an essential input or has another fault.

The LED will blink on and off if the microprocessor is not running.

The LED will be on solid when input video is lost, the selected audio group is missing or has DBN errors, or there is a fault in the module power supply.

SIGNAL PRESENT: This Green LED will be On when there is a valid video signal present at the module input.

AUDIO PRESENT: This Green LED will be On when the selected source is present.

4.2. AUDIO GROUP STATUS LEDS

Four LEDs located on the lower half (opposite the DIP switch) indicates the presence of the four audio groups as shown below. Audio Group LED 1 is located near the center of the printed circuit board.

Audio Group LED	Color	Audio Group Status
1	Off	Group 1 embedded audio is not present on the video input.
	Green	Group 1 embedded audio is present on the video input.
2	Off	Group 2 embedded audio is not present on the video input.
	Green	Group 2 embedded audio is present on the video input.
3	Off	Group 3 embedded audio is not present on the video input.
	Green	Group 3 embedded audio is present on the video input.
4	Off	Group 4 embedded audio is not present on the video input.
	Green	Group 4 embedded audio is present on the video input.

Table 4-1: Audio Group Status LEDs

5. CARD EDGE CONTROLS

At the bottom edge of the module there is an 8 position DIP switch, giving the user control over the de-embedder. The ON position is closest to the PCB. Table 5-1 gives an overview of the DIP switch functions.

DIP Switch	Function
1	Caption Decoder Enable
2	NTSC Setup Pedestal Enable
3	Audio Source Select
4	Peak Analog Audio Output Level
5	
6	Audio Channel Swap Enable
7	Audio Group Selection
8	

Table 5-1: DIP Switch Functions

5.1. ENABLING THE CLOSED CAPTION DECODER

DIP Switch 1 selects if the built in closed caption decoder output will be superimposed on the analog video output or not. Closing GPI input 1 to ground will also enable the caption decoder. The caption decoder displays the captions from the CC1 caption stream on line 21 for 525 line video inputs and line 22 for l625 line video inputs.

DIP 1	Caption Decoder
Off (default)	Caption decoder disabled
On	Caption decoder enabled

Table 5-2: Caption Decoder Switch Settings

5.2. CONTROLLING THE NTSC PEDESTAL

DIP Switch 2 controls whether the NTSC analog output will have a 7.5 IRE pedestal added or not. When the 7760AVM-Lite is operating in the 625 line mode with a PAL analog output, the setting of this switch is ignored.

DIP 2	NTSC Pedestal
Off	NTSC Pedestal disabled
On (Default)	NTSC Pedestal enabled

Table 5-3: NTSC Pedestal Switch Settings

5.3. SELECTING THE AUDIO SOURCE TO MONITOR

On version B, DIP switch 3 controls whether the analog audio output will come from the deembedded audio group selected by DIP switches 7 and 8 or from the AES inputs. On version A this DIP switch is not used.

DIP 3	Audio Source Select
Off	Embedded Audio
On (default)	External AES Inputs

Table 5-4: Audio Source Selection Switch Settings

5.4. SELECTING THE PEAK ANALOG AUDIO LEVEL

DIP Switches 4 and 5 set the analog audio outputs to the desired operating level. The value selected, corresponds to the output level when a 0dB FS input signal is applied. On version A, the levels of the AES audio outputs are fixed depending on the embedded audio level. There are 3 preset values, or the user may define a custom peak output level using the toggle switch.

DIP 4	DIP 5	Peak Analog Audio Output Level
Off	Off	User defined – 8 to 24 dBu
On	Off	20 dBu
Off	On	22 dBu
On	On	24 dBu

Table 5-5: Peak Analog Audio Level Switch Settings

When DIP switches 4 and 5 are Off, the user can define his own peak audio level using the toggle switch on the card edge. Each time the toggle switch is pressed down the peak analog output level will decrease. Each time the toggle switch is pressed up the peak analog output level will increase. The user set peak analog levels will be saved in the non-volatile memory and automatically recalled on power up.

5.5. SELECTING THE AUDIO GROUP THAT WILL BE DE-EMBEDDED

The model 7760AVM-Lite de-embeds one group of audio (selected by switches 7 and 8) onto the analog audio outputs. Switch 6 selects if the channels will be output as they were embedded or if they will be swapped. On version A the same audio will be available on the AES outputs. On Version B, the group selected by these switches will only be monitored when DIP switch 3 is Off.

DIP 7	DIP 8	Audio Group Output on AES 1 and AES 2
Off	Off	1
Off	On	2
On	Off	3
On	On	4

Table 5-6: Audio Group Switch Settings

5.6. SELECTING THE AUDIO CHANNEL SWAP FUNCTIONS

Switch 6 selects if the channels will be output on the analog audio outputs (and AES outputs on version A) as they were embedded or if they will be swapped as shown in Table 5-7.

DIP 6	Channel Swap	AES Outputs		Analog Outputs			
		1	2	1	2	3	4
Off	Channels normal	1 & 2	3 & 4	1	2	3	4
On	Channels swapped	3 & 4	1 & 2	3	4	1	2

Table 5-7: Channel Swap Switch Settings

6. JUMPERS

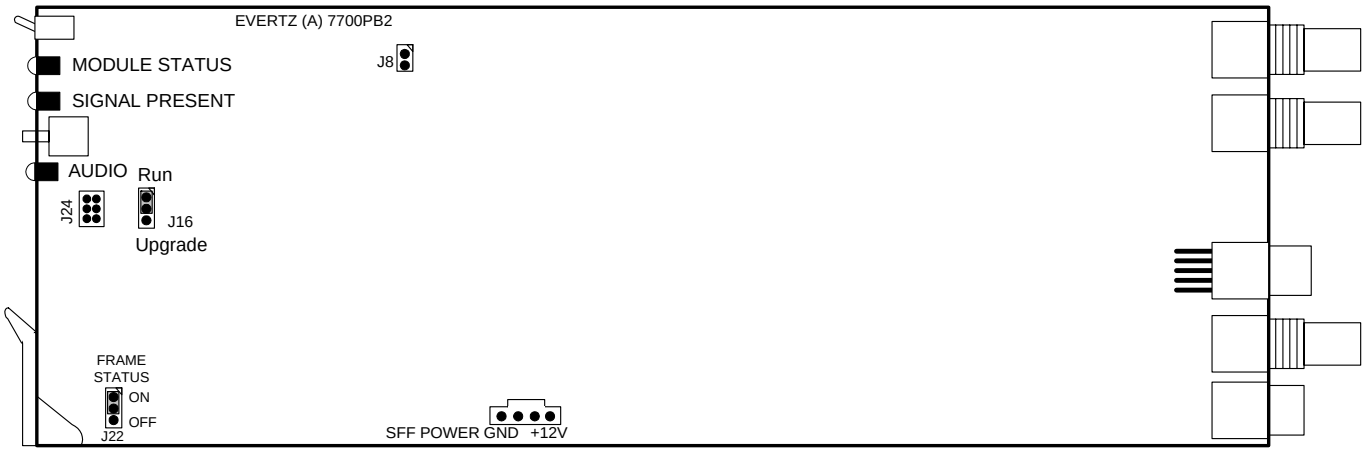

Figure 6-1: Location of Jumpers on 7700PB2 Boards

6.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

FRAME STATUS: The FRAME STATUS jumper J22 located at the front of the module determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

To monitor faults on this module with the frame status indicators (on the PS FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

When this jumper is installed in the Off position, local faults on this module will not be monitored.

6.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE: The UPGRADE jumper J16 located at the front of the module is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J16 into the UPGRADE position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J24 at the card edge. Re-install the module into the frame. Run the upgrade as described in the Upgrading Firmware section of this manual. Once the upgrade is completed, remove the module from the frame, move J16 into the RUN position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

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