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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Dec 05
1.1	Part number changed from 7720AE8-HD to 7721AE8-HD	Aug 06
1.2	Fixed Typos	Feb 08
1.3	Updated Bypass Jumper, Figure 6-1	Aug 08
1.4	Added 7721AE8-B-HD rear plate drawing and information	Feb 09

1. OVERVIEW

The 7721AE8-HD Audio Embedder inserts 8 AES audio signals into a 1.5 Gb/s serial HD input video signal or a 270 Mb/s serial SD input video signal as specified by SMPTE 299M/272M. SMPTE 299M and 272M allocate four groups of two audio pairs that can be embedded into the digital video bitstream. The 7721AE8-HD embeds up to 8 AES audio signals into four groups on the digital video outputs allowing dual 5.1 audio applications.

The 7721AE8-HD is also Dolby E compliant and can handle Dolby E Metadata. Metadata is optionally embedded into Vertical Ancillary data (VANC) and can be provided as an output for downstream devices (i.e. Dolby Encoders, Multichannel Audio Tool, etc.).

The 7721AE8-HD occupies one card slot in the 3RU frame (7700FR-C), which will hold up to 15 1-slot modules or one slot in the 1RU frame (7701FR), which will hold up to three modules. The 7721AE8-HD can also fit in a standalone unit (S7701FR).

VistaLINK® enabled control and configuration capabilities via Simple Network Management Protocol (SNMP). This offers the flexibility to manage the module status monitoring and configuration from SNMP enabled control systems such as Evertz VistaLINK®.

Features:

- Automatic detection of video standard
- Bypass relay protection on one SDI output for power failures
- Flexible audio router (16x16)
- 24-bit AES inputs and audio embedding (HD) and 20-bit (SD)
- Individual audio group embed enable/disable
- Automatic sample rate conversion disable on AES inputs to permit Dolby E embedding
- Programmable audio delays, independent for all channels
- Miniature bar graph display to monitor audio content activity
- Numerous signal monitoring aids
- Ancillary packet cleaner removes any interfering audio groups before embedding
- User may force additional groups to be removed
- Embeds audio on internally generated black or blue video when there is no video input

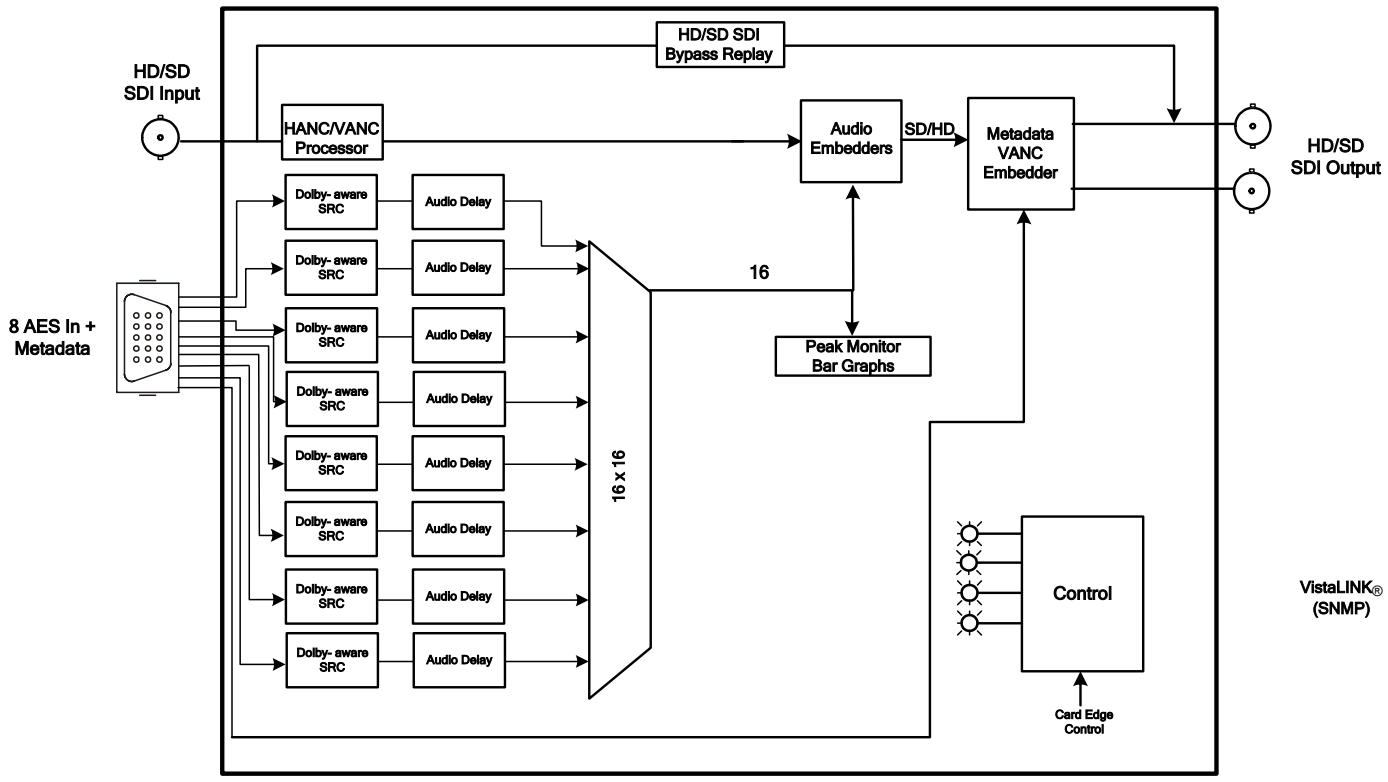

Figure 1-1: 7721AE8-HD Block Diagram

2. INSTALLATION

The 7721AE8-HD comes with a companion rear plate that occupies one slot in the frame. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

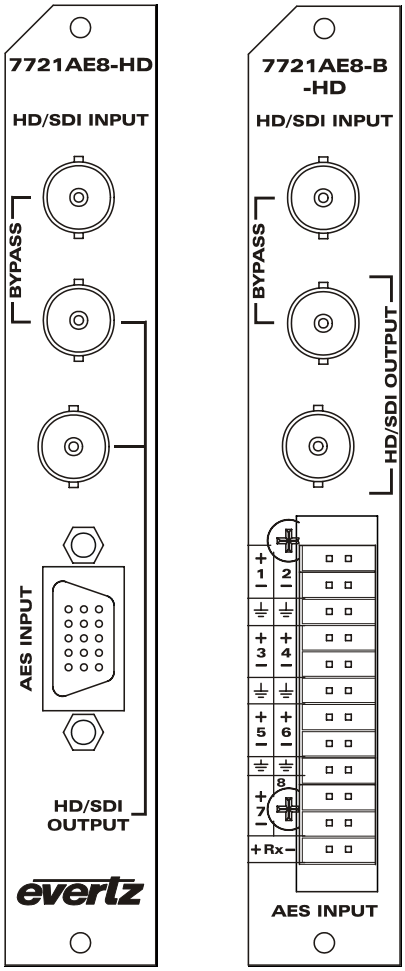

Figure 2-1: Rear Panels

2.1. VIDEO CONNECTIONS

HD/SDI IN: The input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 292M or SMPTE 259M standard. The module can automatically detect the video standard or can be manually set for a specific video standard.

HD/SDI OUT: There are two BNC connectors with reclocked serial component video outputs, in the same video standard as the input. These outputs contain the input video with the audio present at AES inputs 1 to 8 embedded in accordance with the SMPTE 272M or SMPTE 299M standard. The top HD/SDI output is protected by a bypass relay, which will activate in the event of power loss to the module. The remaining output is not bypass protected.

2.2. AES INPUT AUDIO CONNECTIONS

AES INPUT: Eight unbalanced AES inputs conforming to SMPTE 276M are provided on this DB-15 connector. The breakout cable provided will bring these signals conveniently to BNC connectors. Any of the eight AES input channels can be used as a backup or voice-over source. Table 2-1 shows the DB-15 connector pin out. On the 7721AE8-B-HD, there is a 2 x 12 pin terminal strip containing the balanced AES input embedded from the video. The pin-out of the 2 x 12 removable terminal strip is as shown in Figure 2-1.

Name	Description	DB-15 Pin
	Reserved for Future Use	1
META +	Metadata + Input	2
	Reserved for Future Use	3
	Reserved for Future Use	4
	Reserved for Future Use	5
META -	Metadata - Input	6
AES In 2	AES Input 2 - Unbalanced	7
	Reserved for Future Use	8
AES In 6	AES Input 6 - Unbalanced	9
AES In 5	AES Input 5 - Unbalanced	10
AES In 1	AES Input 1 - Unbalanced	11
AES In 8	AES Input 8 - Unbalanced	12
AES In 7	AES Input 7 - Unbalanced	13
AES In 4	AES Input 4 - Unbalanced	14
AES In 3	AES Input 3 - Unbalanced	15
GND	Ground	Shell

Table 2-1: AES INPUT Audio Connector Pin Out

The 7721AE8-HD is shipped with a breakout cable for the DB-15 connector (Evertz Part # WPAES8-BNCM-6F), which can be used to facilitate wiring the AES audio and Metadata connections. The pin out of the cable is shown in Table 2-2.

DB-15 PIN	Wire	Ground/Shield Connection	Label Name	Connector Type	FUNCTION
1	Red		W1 RED	WIRE	X
2	Green		W2 GREEN	WIRE	META +
3	Blue		W3 BLUE	WIRE	X
4	(not used)		(not used)		X
5	(not used)		(not used)		X
6	White		W4 WHITE	WIRE	META -
7	Coax	DB15 Shell	AES A2	BNC MALE	AES In 2
8	Yellow		W5 YELLOW	WIRE	X
9	Coax	DB15 Shell	AES B2	BNC MALE	AES In 6
10	Coax	DB15 Shell	AES B1	BNC MALE	AES In 5
11	Coax	DB15 Shell	AES A1	BNC MALE	AES In 1
12	Coax	DB15 Shell	AES B4	BNC MALE	AES In 8
13	Coax	DB15 Shell	AES B3	BNC MALE	AES In 7
14	Coax	DB15 Shell	AES A4	BNC MALE	AES In 4
15	Coax	DB15 Shell	AES A3	BNC MALE	AES In 3
Shell	Black		GND	WIRE	GND

Table 2-2: AES Audio Breakout Cable (Evertz Part # WPAES8-BNCM-6F)

2.3. METADATA CONNECTIONS

The 7721AE8-HD provides the ability to receive Metadata from a Dolby device (such as the DP570) and embed it into the VANC area of the video. There are two wires (META+ and META-) available on the breakout cable that can be used to connect to the Dolby device. Figure 2-2 shows how to wire the META+ and META- wires to a DP570.

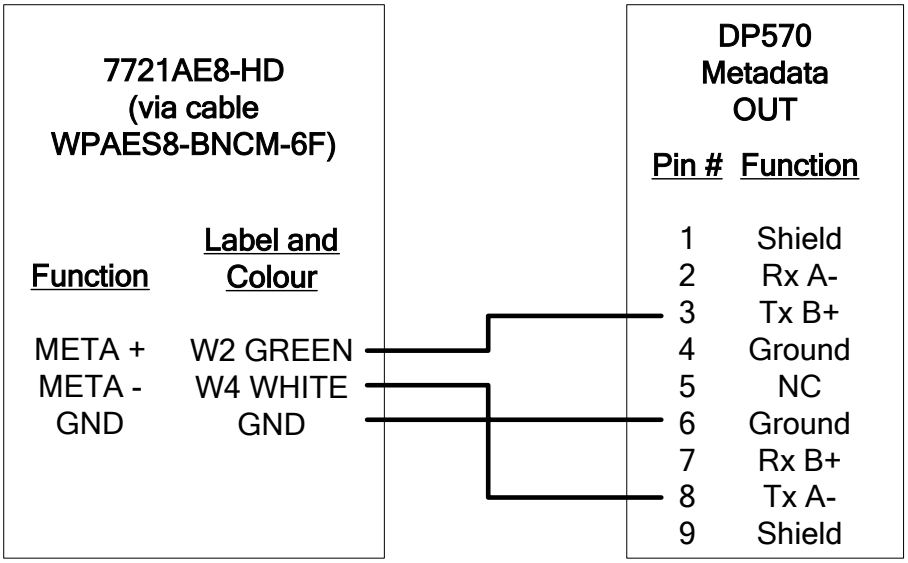

Figure 2-2: Connecting to a Dolby DP570

3. SPECIFICATIONS

3.1. SERIAL DIGITAL VIDEO INPUTS

Standards: Auto detectable and user settable.
SMPTE 292M (1.5Gb/s), 1080i/60, 1080i/59.94, 1080i/50, 1080p/30, 1080p/30(sF), 1080p/29.97, 1080p/29.97(sF), 1080p/25, 1080p/25(sF), 1080p/24, 1080p/24(sF), 1080p/23.98, 1080p/23.98(sF), 720p/60, 720p/59.94, 720p/50, 1035i/60, 1035i/59.94
SMPTE 259M-C (270 Mb/s) 525 or 625 line component
Number of Inputs: 1
Connector: BNC per IEC 61169-8 Annex A
Input Equalization:
SD Standards: Automatic to 300m @ 270Mb/s with Belden 1694 or equivalent cable.
HD Standards: Automatic to 125m @ 1.5Gb/s with Belden 1694 or equivalent cable.
Return Loss:
SD Standards: <-15 dB up to 270Mb/s
HD Standards: <-15 dB up to 1. 5Gb/s

3.2. SERIAL DIGITAL VIDEO OUTPUTS WITH EMBEDDED AUDIO

Standard: Same as input
Embedded Audio:
SD Standards: SMPTE 272M – 20-bit 48 kHz synchronous
HD Standards: SMPTE 299M – 24-bit 48 kHz synchronous
Number of Outputs: 2 (1 output bypass relay protected)
Connector: BNC per IEC 61169-8 Annex A
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time:
SD Standards: 740ps nominal
HD Standards: 200ps nominal
Overshoot: <10% of amplitude
Wide Band Jitter:
SD Standards: < 0.1UI
HD Standards: < 0.28UI

3.3. AES AUDIO INPUTS

Standard: SMPTE 276M, single ended synchronous AES
Number of Outputs: 8 unbalanced
Connectors: Female High Density DB-15, breakout cable to BNC connectors supplied
Input Level: 0.1 to 2.5 Vp-p (5Vp-p tolerant)
Return Loss: >25 dB 100 kHz to 6 MHz
Equalization: Automatic to 1000m with Belden 1694 or equivalent cable @ 48 kHz AES signal
Sampling Rate: 48 kHz $\pm$ 100 ppm
Impedance: 75 Ω
Resolution: Up to 24-bit

3.4. METADATA INPUT

Type: DOLBY E Metadata as per SMPTE RDD6
Connector: 2 pins plus ground on female high density DB-15
Baud Rate: 115,200 baud

3.5. DELAY

Embedding Latency:
SD Standards: 140 µs nominal
HD Standards: 80 µs nominal

3.6. ELECTRICAL

Voltage: +12VDC
Power: 6.75 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.7. PHYSICAL

Number of slots:
7700 frame mounting: 1
7701 frame mounting: 1

4. STATUS INDICATORS

The 7721AE8-HD has 12 LED Status indicators on the front card edge to show operational status of the card at a glance. Figure 4-1 shows the location of the LEDs and card edge controls.

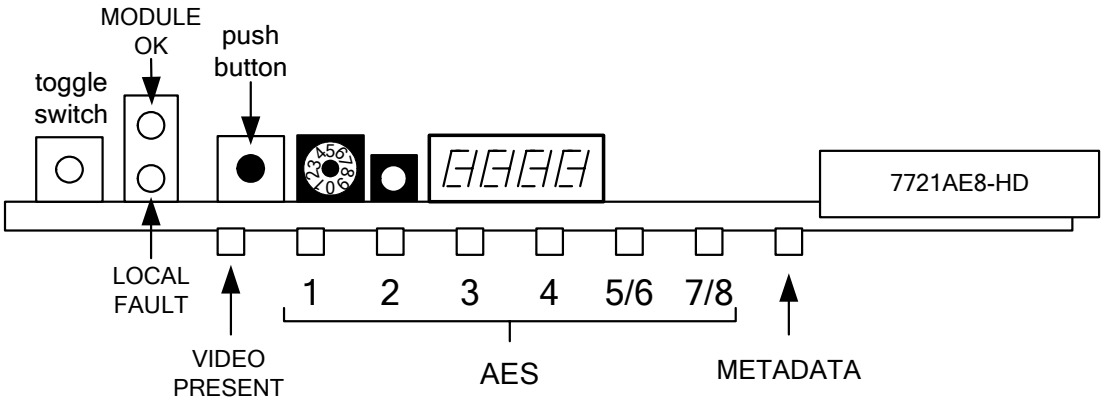

Figure 4-1: Status LED Locations

Two large LEDS on the front of the main board indicate the general health of the module

LOCAL FAULT: This Red LED indicates poor module health or if a local input power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be ON when the board power is good.

The remaining LEDs include:

VIDEO PRESENT: This Green LED will be ON when there is a valid Video signal present. The LED is Red when the input Video is missing. The LED will be a blinking Green if the Video Input standard does not match the selected standard specified by *VIDE->VOFM*.

METADATA: This LED will be GREEN and ON to indicate that the Metadata is passing through error-free. The LED will be flashing RED and ON if there is an error with Metadata. The module will verify checksum and perform sanity checks on the syntax of the Metadata. Any errors will cause the LED to flash RED.

4.1. AUDIO STATUS LEDS

The six green LEDs located in between the Video Present and Metadata LEDs indicate the status of the 8 AES channels.

AES LED	LED Behaviour	AES Channel Status
1	OFF	There is no input AES 1 present.
	ON (solid)	AES 1 is present
2	OFF	There is no input AES 2 present.
	ON (solid)	AES 2 is present
3	OFF	There is no input AES 3 present.
	ON (solid)	AES 3 is present
4	OFF	There is no input AES 4 present.
	ON (solid)	AES 4 is present and PCM audio is detected
5/6	OFF	There is no input AES 5 or 6 present.
	ON (solid)	AES 5 and 6 are both present
	ON (blinking)	Either AES 5 or 6 is present
7/8	OFF	There is no input AES 7 or 8 present
	ON (solid)	AES 7 and 8 are both present
	ON (blinking)	Either AES 7 or 8 is present

Table 4-1: AES Channel Status LEDs

4.2. DOT-MATRIX DISPLAY

Additional signal status monitoring of the card's parameters is provided via the 4-character alphanumeric display located on the card edge. What is displayed is determined by where you are in the menu system. See section 5 for information on operating the menu system.

5. CARD EDGE MENU SYSTEM

5.1. NAVIGATING THE MENU SYSTEM

The card edge rotary switch, toggle switch and pushbutton are used to navigate through the menu system to monitor or set various parameters for the module. The Dot Matrix Display is used to display the menu options to the user. The menu system is organized into ten top level menus. Turn the rotary switch to select one of the top-level menus, and then press the pushbutton to enter that menu. You can use the toggle switch to move up and down the list of available sub-menu items. Once the desired sub-menu name is displayed, press the pushbutton to select the bottom menu level. The dot matrix display will be dimmed when you are in the bottom level of the menu tree.

If you are in one of the status menus the selected parameter value will be displayed. If you are in one of the control menus, use the toggle switch to adjust the parameter to its desired value. If the parameter is a numerical value, the number will increase if you push up on the toggle switch and decrease if you push down on the toggle switch. If the parameter contains a list of choices, you can cycle through the list by pressing the toggle switch in either direction.

When you have stopped at the desired value, depress the pushbutton. This will update the parameter to the selected value and return to the sub-menu items (the display shows the menu item names). To change another parameter, use the toggle switch to find another parameter in that menu or turn the rotary knob to select another top level menu and continue selecting and adjusting other parameters.

Throughout the descriptions of the Menu items, default values are shown in <u>underlined</u> text.

The parameter adjustments are REAL TIME ADJUSTMENTS and will affect the output audio immediately. These settings should not be adjusted when the output audio is in the broadcast chain.

5.2. TOP LEVEL MENU STRUCTURE

Table 5-1 gives a brief description of the top level of the menu tree that appears when you enter the card edge menu system. Selecting one of these items will take you down into the next menu level to set the value of that parameter. The details of the each of the menu items are described in sections 5.3 to 5.8.

MONI	Monitor Controls	Status displays showing audio signal peak levels.
STAT	Status	Status displays showing signal input status items.
AMUX	Audio Channel Routing	Control menu to set parameters relating to the audio channel routing.
META	Metadata	Control menu to set parameters relating to the Metadata.
EAUD	Embedded Audio	Control menu to set parameters relating to audio embedder.
HEAD	Headphone Jack	Control menu to set the card edge headphone interface.
UTIL	Miscellaneous	Control menu to set miscellaneous parameters.
VIDE	Video	Control menu to set parameters related to the video.
----	Unused	Reserved for future use.

Table 5-1: Top Level Menu Structure

5.3. MONITORING THE PEAK AUDIO LEVELS

The *MONI* menu is used to show the peak values for each of the audio channels. When the *MONI* menu is entered the active display name will be shown for about 1 second, and then the value will be shown. To display the display name again press the pushbutton. The chart below shows the items available in the *MONI* menu. Sections 5.3.1 to 5.3.2 give detailed information about each of the menu items.

1234	Displays the bar graphs for peak values of discrete output channels 1, 2, 3, & 4. (i.e. OP1A, OP1B, OP2A, and OP2B)
5678	Displays the bar graphs for peak values of discrete output channels 5, 6, 7, & 8. (i.e. OP3A, OP3B, OP4A, and OP4B)
9ABC	Displays the bar graphs for peak values of discrete output channels 9, 10, 11, & 12. (i.e. OP5A, OP5B, OP6A, and OP6B)
DEFG	Displays the bar graphs for peak values of discrete output channels 13, 14, 15, & 16. (i.e. OP7A, OP7B, OP8A, and OP8B)
1to8	Displays the bar graphs for peak values of output pairs: 1+2, 3+4, 5+6, and 7+8. (I.e. AES1, AES2, AES3, and AES4)
9toG	Displays the bar graphs for peak values of output pairs: 9+10, 11+12, 13+14, and 15+16. (I.e. AES5, AES6, AES7, and AES8)
1toG	Displays the bar graphs for peak values of output groups: 1+2+3+4, 5+6+7+8, 9+10+11+12, and 13+14+15+16.
dB 1	Displays the peak value for output channel 1 (AES1 left sub-frame) in dBFS.
dB 2	Displays the peak value for output channel 2 (AES1 right sub-frame) in dBFS.
dB 3	Displays the peak value for output channel 3 (AES2 left sub-frame) in dBFS.
…	…
dB G	Displays the peak value for output channel 16 (AES8 right sub-frame) in dBFS.

Table 5-2: Monitor Menu

5.3.1. Displaying the Peak Output Audio Values as Bar Graphs

Each of the 4 sections of the dot-matrix display can show a bar graph representation of the peak level for the selected channel or the average of peaks of multiple channels. Each section of the display is comprised of a 5 x 5 array of dots. Diagonal rows of dots represent one of 9 different signal peak levels as shown in Figure 5-1 and Table 5-3.

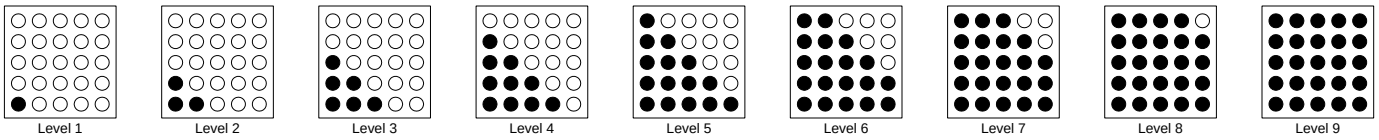

Figure 5-1: Peak Level Bar Graph Displays

Bar Graph Level	dBFS
Level 1	-60
Level 2	-36
Level 3	-30
Level 4	-24
Level 5	-21
Level 6	-18
Level 7	-15
Level 8	-12
Level 9	-6

Table 5-3: Bar Graph Peak Levels

Table 5-3 allows you to correlate the dot-matrix display levels to the peak levels in dBFS units. The ballistics of all bar graphs follow the AES/EBU guidelines and have the attack time constant set to 0 seconds, and the decay time constant set to 1.5 seconds / 20 dB.

Since this module deals with up to 16 different audio channels and the display is limited to showing only 4 miniature bar graphs at a time, 7 different channel groupings are available to select which channels activity is presented: “1234”, “5678”, “9ABC”, “DEFG”, “1to8”, “9toG”, “1toG”.

MONI
1234
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 1 to 4 (OP1A through OP2B). Channel 1 (OP1A) is shown on the left (top) section and channel 4 (OP2B) is shown on the right (bottom) section.

MONI
5678
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 5 to 8 (OP3A through OP4B). Channel 5 is shown on the left (top) section and channel 8 is shown on the right (bottom) section.

MONI
9ABC
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 9 to 12 (OP5A through OP6B). Channel 9 is shown on the left (top) section and channel 12 is shown on the right (bottom) section.

MONI
DEFG
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 13 to 16 (OP7A through OP8B). Channel 13 is shown on the left (top) section and channel 16 is shown on the right (bottom) section.

MONI
1to8
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for pairs of channels 1 to 8 (OP1A through OP4B). Channel (1+2) is shown on the left (top) section and channel (7+8) is shown on the right (bottom) section.

The peak values are an average of the pair.

MONI
9toG
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 9 to 16 (OP5A through OP8B). Channel (9+10) is shown on the left (top) section and channel (15+16) is shown on the right (bottom) section.

The peak values are an average of the pair.

MONI
1toG
See Figure 5-1 *&* Table 5-3

With this display you can simultaneously and graphically show the peak values for discrete channels 1 to 16 (OP1A through OP8B). Channel (1+2+3+4) is shown on the left (top) section and channel (13+14+15+16) is shown on the right (bottom) section.

The peak values are an average of the group.

5.3.2. Displaying the Peak Audio Values as Numerical Values

There are 16 display items to show the peak values for each of the 16 audio output channels. For the sake of simplicity in the manual only the display for channel 1 will be shown below.

MONI
DB 1
e.g.: "1-18"

With this display you show the peak values for channel 1 in dBFS.
In the example on the left "1-18", the leading "1" stands for channel 1, and the "-18" stands for peak value detected of -18 dBFS.

The numerical peak values decay around 20 dB per 1.5 second.

5.4. DISPLAYING THE SIGNAL INPUT STATUS

The *STAT* menu is used to show the status of various input signals. When the *STAT* menu is entered the active status display name will be shown for about 1 second, and then the value will be shown. To display the status display name again, press the pushbutton. To select other status items, use the toggle switch. The chart below shows the items available in the *STAT* menu. Sections 5.4.1 to 5.4.4 below give detailed information about each menu items.

AES1	Displays the AES 1 (1st pair of audio group 1) Input status
AES2	Displays the AES 2 (2nd pair of audio group 1) Input status
AES3	Displays the AES 3 (1st pair of audio group 2) Input status
AES4	Displays the AES 4 (2nd pair of audio group 2) Input status
AES5	Displays the AES 5 (1st pair of audio group 3) Input status
AES6	Displays the AES 6 (2nd pair of audio group 3) Input status
AES7	Displays the AES 7 (1st pair of audio group 4) Input status
AES8	Displays the AES 8 (2nd pair of audio group 4) Input status
VIFM	Displays the video input format
IGRP	Displays input embedded audio groups status
EXMT	Displays the Metadata input status

5.4.1. Displaying the Status of the AES Inputs

There are 8 menu items to cover 8 AES channel pairs embedded in video. AES1 in this context refers to the first channel pair in audio group 1. Consequently, AES8 refers to the second channel pair in audio group 4. For the sake of simplicity only the menu item for AES input 1 will be shown.

STAT
  AES1
  PCM
  DLBE
  DLBD
  n/a
	With this display you show the status of the AES1 (1st pair of audio group 1) input.
	PCM stands for linear (“normal”) audio,
	DLBE stands for Dolby E has been detected,
	DLBD stands for Dolby Digital (AC3) has been detected,
	“n/a” is displayed when the relevant (here group 1) packets do not exist or the channel pair is marked as invalid in HD audio packets.

5.4.2. Displaying the Video Input Format

STAT	With this display you can show the type of the video input.
VIFM	
None	No video present
PALB	PAL-B
NTSC	NTSC-M
3i59	1035i/59.94
3i60	1035i/60
1s23	1080p/23.98sF
1s24	1080p/24sF
1i50	1080i/50
1i59	1080i/59.94
1i60	1080i/60
7p59	720p/59.94
7p60	720p/60
7p50	720p/50
1p23	1080p/23.98
1p24	1080p/24
1p25	1080p/25
1p29	1080p/29.97
1p30	1080p/30

5.4.3. Displaying the Status of the Input Embedded Audio Groups

STAT	With this display you can show which embedded audio groups are present on the input video. The corresponding digit is shown for each audio group present. Blinking digit indicates errors in the corresponding audio group packets. A missing group is indicated by a small dot in the bottom-left corner of corresponding group.
IGRP	
1234	

5.4.4. Displaying the Metadata Input Status

STAT	With this display you can show the status of the Metadata input. *OK* represents that Metadata is present. "*n/a*" represents no Metadata is present.
EXMT	
OK	
n/a	

5.5. CONFIGURING THE AUDIO CHANNEL ROUTING

The *AMUX* menu is used to control the internal routing of the audio channels shown in Figure 1-1. When the *AMUX* menu is entered, the active menu item name will be shown.

The module has four embedders (1, 2, 3, and 4) each dedicated to embed one fixed audio group (respectively group 1, 2, 3, and 4). Table 5-4 shows the output channel names for each embedder. These channel names are used throughout the *AMUX* menu items. Sections 5.5.1 to 5.5.2 below give detailed information about each menu item.

Embedded Channel			Channel/Pair Mode		Default Channel Source
			Chan	Pair	
Output channels	Embedder 1 channel	1A	OP1A	OP1	IP1A
		1B	OP1B		IP1B
		2A	OP2A	OP2	IP2A
		2B	OP2B		IP2B
	Embedder 2 channel	1A	OP3A	OP3	IP3A
		1B	OP3B		IP3B
		2A	OP4A	OP4	IP4A
		2B	OP4B		IP4B
	Embedder 3 channel	1A	OP5A	OP5	IP5A
		1B	OP5B		IP5B
		2A	OP6A	OP6	IP6A
		2B	OP6B		IP6B
	Embedder 4 channel	1A	OP7A	OP7	IP7A
		1B	OP7B		IP7B
		2A	OP8A	OP8	IP8A
		2B	OP8B		IP8B

Table 5-4: Audio Routing Matrix Input and Output Channel Names

There are identical menu items that control the routing for each discrete (mono) channel (when the *UTIL / 2CHA* menu item is set to *CHAN*) or for each stereo pair (when the *UTIL / 2CHA* menu item is set to *PAIR*). See the block diagram in Figure 1-1 to identify where the signals are being used.

5.5.1. Configuring the Audio Routing – Discrete Channel Control Mode

For the sake of simplicity, only the menu item for audio input channel 1A (left sub frame of AES1 IN) will be shown.

- *AMUX*
  - *OP1A*
    - *IP1A*
    - *IP1B*
    - *IP2A*
    - *IP2B*
    - *IP3A*
    - *IP3B*
    - *IP4A*
    - *IP4B*
    - *IP5A*
    - *IP5B*
    - *IP6A*
    - *IP6B*
    - *IP7A*
    - *IP7B*
    - *IP8A*
    - *IP8B*

When the *UTIL / 2CHA* menu item is set to *CHAN,* this menu item is used to set the input source for the discrete output channel 1A (left sub frame of AES1 OUT).

Refer to Table 5-4 to clarify the meaning of the listed input choices.

5.5.2. Configuring the Audio Routing – Stereo Pair Control Mode

For the sake of simplicity only the menu item for audio output stereo pair 1 (AES1 OUT) will be shown.

- *AMUX*
  - *OP1*
    - *IP1*
    - *IP2*
    - *IP3*
    - *IP4*
    - *IP5*
    - *IP6*
    - *IP7*
    - *IP8*

When the *UTIL / 2CHA* menu item is set to *PAIR,* this menu item is used to set the input source for the stereo output pair 1 (AES1 output).

Refer to Table 5-4 to clarify the meaning of the listed input choices.

5.6. CONFIGURING THE DOLBY METADATA EMBEDDER

The *META* menu is used to configure parameters related to the Dolby Metadata embedder. When the *META* menu is entered the active menu item name will be shown. To select other menu items, use the toggle switch. The chart below shows the items available in the *META* menu. Sections 5.6.1 to 5.6.3 below give detailed information about each menu item.

VAEL	Selects the output VANC line for embedding
VAEI	Selects the output VANC Data ID (DID)
VAES	Selects the output VANC Secondary Data ID (SDID)
VAEN	Enables or disables VANC embedding on the output video

5.6.1. Selecting VANC line for Embedding

META
- *VAEL*
  - *EL10*
  - *EL1 to EL31*

With this control you can set the line for embedding VANC Metadata packets onto the output video.

5.6.2. Selecting the Output VANC Data ID (DID)

META
- *VAEI*
  - *EI45*
  - *EI50 to EI5F*
  - *EIC0 to EICF*

With this control you can set the Data ID for embedding VANC Metadata packets.

Normally you should not have to change this from the default value. The values shown are expressed as hexadecimal numbers.

The default value of data ID 45 corresponds to the latest proposals of SMPTE RP291.

5.6.3. Selecting the Output VANC Secondary Data ID (SID)

META
- *VAES*
  - *ES01*
  - *ES01 to ESFF*

With this control you can set the Secondary Data ID for embedding VANC Metadata packets.

Normally you should not have to change this from the default value. The values shown are expressed as 2 digit hexadecimal numbers. When the *VAEI* menu item is set to values in the range of *C0 to CF*, type 1 Metadata packets will be de-embedded and the *VAES* menu item is not relevant as dictated by SMPTE 291M.

5.6.4. Enabling VANC Embedding

META
VAEN
ENBL
OFF

With this control you can select whether the VANC packets will be embedded onto the output video or not.

Select *ENBL* to insert VANC Metadata packets on the output video.
Select *OFF* to disable VANC insertion.

5.7. CONFIGURING THE AUDIO EMBEDDERS

The *EAUD* menu is used to configure parameters related to the audio embedders. When the *EAUD* menu is entered the active menu item name will be shown. To select other menu items, use the toggle switch. The chart below shows the items available in the *EAUD* menu. Section 5.7.1 and 5.7.2 give detailed information about the menu items.

IG1K	Selects whether to delete incoming audio group 1 from input video
IG2K	Selects whether to delete incoming audio group 2 from input video
IG3K	Selects whether to delete incoming audio group 3 from input video
IG4K	Selects whether to delete incoming audio group 4 from input video
EM1E	Selects whether audio group 1 embedder is enabled
EM2E	Selects whether audio group 2 embedder is enabled
EM3E	Selects whether audio group 3 embedder is enabled
EM4E	Selects whether audio group 4 embedder is enabled

5.7.1. Configuring the Incoming Audio Packet Stripper

The SMPTE 299M and SMPTE 272M standards permit up to 4 groups of 4 discrete audio channels each to be embedded respectively into the 1.5 Gb/s and 270 Mb/s video bitstream. In order to help with the control of what audio groups end up on the outputs of the 7721AE8-HD, there are four menu items controlling removal of the incoming audio groups. For simplicity only the menu items to control removal of audio group 1 will be shown.

EAUD
IG1K
KILL
PASS

With this control you can set whether the audio group 1 packets will be removed from the video or passed through to the output.

Select *KILL* to remove the group 1 audio packets.

Select *PASS* to pass the group 1 packets through to the output video. Note that if a conflicting audio group is set to embed on the output, then the conflicting incoming audio packets will be removed, regardless.

5.7.2. Enabling Specific Audio Group Embedding

The SMPTE 299M and SMPTE 272M standards permit up to 4 groups of 4 discrete audio channels each to be embedded respectively into the 1.5 Gb/s and 270 Mb/s video bitstreams.

The 7721AE8-HD has four embedders (1, 2, 3, and 4) each dedicated to embed one audio group (group 1, 2, 3, and 4 respectively). There is one menu item used to enable each of the audio embedders. For simplicity only the menu item for audio embedder 1 will be shown.

EAUD *EM1E* *ENBL* *OFF*	With this control you can select whether the audio group 1 embedder will be enabled or not. Select *ENBL* to enable audio group 1 embedder. The source of audio for audio group 1 embedder is selected by the menu items in Audio Mux controls O*P1A, OP1B, OP2A* and O*P2B*. Select *OFF* to disable Audio Group 1 Embedder.

5.8. CONFIGURING THE HEADPHONE PARAMETERS

The *HEAD* menu is used to set the headphone parameters. When the HEAD menu is entered the active status display name will be shown. To select other menu items, use the toggle switch. The chart below shows the items available in the *HEAD* menu. Section 5.8.1 gives detailed information about each menu item.

HVOL	Sets the headphone volume
HPML	Assigns the channel that will be monitored on the Left headphone
HPMR	Assigns the channel that will be monitored on the Right headphone

5.8.1. Setting the Headphone Volume

HEAD *HVOL* *HV00 to HV15*	With this control you can set the headphone volume to one of 16 levels. Total adjustment range is over 50 dB. Level 00 is the lowest volume and is effectively mute.

5.8.2. Selecting the Channels to Monitor with the Headphones

The *HMPL* and *HMPR* menu items are used to control which channel will be monitored by the left and right headphones respectively. There are two identical menu items for each headset channel, when the *UTIL / 2CHA* menu item is set to *CHAN*: one for the left and one for the right channel. When the *UTIL / 2CHA* menu item is set to *PAIR,* there is only one menu item selecting the source audio as a stereo pair. For the sake of simplicity only the menu item for the left headphone channel will be shown.

- *HEAD*
  - *HMPL*
    - *IP1A*
    - *IP1B*
    - *IP2A*
    - *IP2B*
    - *IP3A*
    - *IP3B*
    - *IP4A*
    - *IP4B*
    - *IP5A*
    - *IP5B*
    - *IP6A*
    - *IP6B*
    - *IP7A*
    - *IP7B*
    - *IP8A*
    - *IP8B*

When the *UTIL / 2CHA* menu item is set to *CHAN,* this menu item selects the channel monitored by the left headphone channel.

AES 1	IP1A
	IP1B
AES 2	IP2A
	IP2B
AES 3	IP3A
	IP3B
AES 4	IP4A
	IP4B
AES 5	IP5A
	IP5B
AES 6	IP6A
	IP6B
AES 7	IP7A
	IP7B
AES 8	IP8A
	IP8B

5.9. CONFIGURING MISCELLANEOUS PARAMETERS

The *UTIL* menu is used to configure miscellaneous parameters and to view and upgrade the card firmware. When the *UTIL* menu is entered the active menu item name will be shown. To select other menu items, use the toggle switch. The chart below shows the items available in the *UTIL* menu. Sections 5.9.1 to 5.9.6 below give detailed information about the menu items.

2CHA	Selects whether audio routing, delay and voice over controls apply to individual channels or stereo pairs.
SRC1	Selects whether the sample rate converter can be used with AES1
SRC2	Selects whether the sample rate converter can be used with AES2
…	…
SRC8	Selects whether the sample rate converter can be used with AES8
DISP	Selects the orientation of the dot-matrix display
FRST	Resets the card to its factory default condition.
VERS	Displays the firmware version of the card
UPGR	Initiates firmware upgrade for the card

5.9.1. Configuring the Audio Channel Control Mode

UTIL
- *2CHAN*
  - *CHAN*
  - *PAIR*

With this control you can control whether the audio mux, delay and voice over controls operate on individual channels or on stereo pairs.

Select *CHAN* to process the audio as individual channels. (e.g.: OP1A, OP1B, IP5A, etc.).

Select *PAIR* to control the audio processing (like routing) as stereo pairs. (Pair OP1 consisting of channels OP1A and OP1B.)

NOTE: this is the only control that modifies the layout and contents of the menus.

5.9.2. Controlling the Sample Rate Converters

The 7721AE8-HD module has an audio Sample Rate Converter for each AES input that can be independently enabled or disabled. For simplicity only the menu items for the AES 1 input sample rate converter will be shown.

UTIL
SRC1
OFF
AUTO

With this control you can select whether the sample rate converter on the AES input 1 is enabled or not.

When the Sample Rate Converter is set to *OFF* the content of the AES input is preserved without any change. The AES input must be synchronous to the video source. If the input is asynchronous, samples will be dropped or repeated as required by the rate difference.

When the Sample Rate Converter is set to *AUTO* the AES input is sample rate converted to 48 kHz that is synchronous to the input video. The AES input can be either synchronous or asynchronous to the video source. The appropriate conversion method is automatically selected based on recognized contents of the AES inputs:

- PCM contents is converted using linear techniques
- Dolby E / AC3 are converted by adjusting length of inter-packets gap

The result of sample rate conversion of an asynchronous AC3 (Dolby Digital) signal is not suitable for further distribution, at least with the current generation of Dolby decoders. Make sure that your source of AC3 is synchronous with video. The sample rate conversion of PCM or Dolby E is always OK and effectively lossless.

5.9.3. Configuring the Dot-Matrix Display Orientation

UTIL
DISP
HORZ
VERT

With this control you can select a horizontal or vertical orientation for the displays to accommodate mounting the module in the 3RU or 1RU frames.

5.9.4. Displaying the Firmware Version

UTIL
VERS
v1.0
b21
f037
hw 1

With this control you can display the firmware version and build number of the module.

The first set of characters (prefixed with ‘v’) represents the firmware version number.
The second set of characters (prefixed with ‘b’) represents the firmware build number.
The third set of characters (prefixed with ‘f’) represents the FPGA revision
The last set of characters (prefixed with ‘hw’) represents the hardware build identification number.

5.9.5. Resetting the Module to its Factory Defaults

UTIL
FRST
NO
YES

With this control you can reset the module to its factory default condition.

Select *NO* to return back to the upper menu item without affecting the presets.

Select *YES* to return the module to its factory default condition. Factory defaults are shown underlined in the menu descriptions in section 5.

5.9.6. Upgrading the Module Firmware

UTIL
UPGR
NO
YES

With this control you can initiate and upgrade of the module firmware.

Select *NO* to return back to the upper menu item without upgrading.

To upgrade the firmware, install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the COM header J16 at the front edge of the card. Select *YES* to initiate the firmware upgrade. The module application will terminate and the boot monitor will start.

Run the upgrade as described in part 2 and part 3 of the *Upgrading Firmware* chapter in the front of the binder. Once the upgrade is complete, the card will reboot. Remove the upgrade cable. The module is now ready for normal operation.

See section 6.2 for information on upgrading the firmware when the application firmware is not running.

The Upgrade baud rate for the 7721AE8-HD series modules is 115,200 baud.

5.10. CONFIGURING THE VIDEO PARAMETERS

The *VIDE* menu is used to configure the output video parameters. When the *VIDE* menu is entered the active menu item name will be shown. To select other menu items, use the toggle switch. The chart below shows the items available in the *VIDE* menu. Sections 5.10.1 to 5.10.3 give detailed information about the menu items.

VOFM	Selects the output video format
COLR	Selects the default screen colour to be used when there is no video input
VOUT	Selects the behaviour of the video output when there is no video input

5.10.1. Selecting the Output Video Format

VIDE	
VOFM	
Auto	Select *Auto* to let the module auto detect the video format.
PALB	PAL-B
NTSC	NTSC-M
3i59	1035i/59.95
3i60	1035i/60
1s23	1080p/23.98sF
1s24	1080p/24sF
1i50	1080i/50 (1080p/25sF)
1i59	1080i/59.94 (1080p/29.97sF)
1i60	1080i/60 (1080p/30sF)
7p59	720p/59.94
7p60	720p/60
7p50	720p/50
1p23	1080p/23.98
1p24	1080p/24
1p25	1080p/25
1p29	1080p/29.97
1p30	1080p/30

With this control you can select the output video format.

Note: when the device powers up in Auto mode, the default output format is 720p/59.94 until a valid input signal is applied.

5.10.2. Selecting the Default Output Screen Colour

VIDE	
COLR	
BLUE	With this control you can set the video output when there is no input video and the *VOUT* menu item is set to *AUTO*.
BLAK	This menu setting is also used when the *VOUT* menu item is set to *COLR.*

5.10.3. Configuring the Video Output in Absence of Valid Video Input

VIDE	
VOUT	
AUTO	Select *AUTO* to output the input video when it is present and switch to the default screen colour when there is no video.
COLR	Select *COLR* to force the output video to either black or blue screen as configured in *COLR* menu item. With this control you can force the default video output for test purposes.
PASS	Select *PASS* to pass the input to the output regardless.

6. JUMPERS

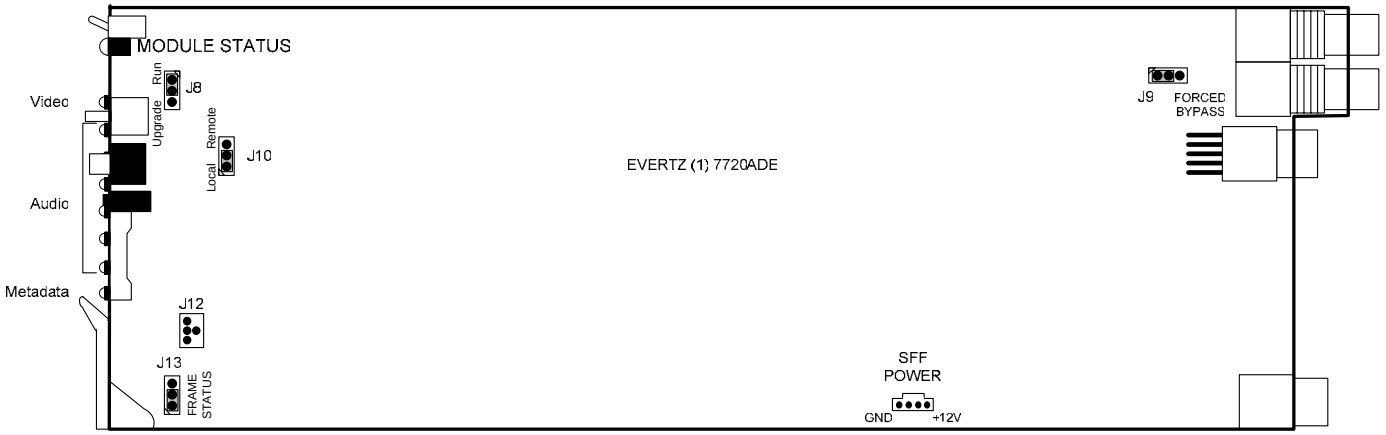

Figure 6-1: Location of Jumpers

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

FRAME STATUS: The FRAME STATUS jumper J13 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 switch is located at J8 jumper location on the front side of the main module and is used when firmware upgrades are being done to the module. For normal operation it should be switched to the *RUN* position as shown in the diagrams above. See the *Upgrading Firmware* chapter in the front of the binder for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J8 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J12 at the card edge near the card extractor. Re-install the module into the frame. Run the upgrade as described in *Upgrading Firmware* chapter. Once the upgrade is complete, remove the module from the frame, move J8 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

The Upgrade baud rate for the 7721AE8-HD module is 115,200 baud.

7. VISTALINK® REMOTE MONITORING/CONTROL

7.1. WHAT IS VISTALINK®?

VistaLINK® is Evertz's remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through VistaLINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VistaLINK® Pro Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled fiber optic products.

2. Managed devices (such as 7721AE8-HD), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC VistaLINK® frame controller module, which serves as the Agent.

3. A virtual database, known as the Management Information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

For more information on connecting and configuring the VistaLINK® network, see the 7700FC Frame Controller chapter.

8. MENU QUICK REFERENCE

Monitor (MONI)

- Discrete Output Channels 1, 2, 3, and 4
- Discrete Output Channels 5, 6, 7 and 8
- Discrete Output Channels 9, 10, 11 and 12
- Discrete Output Channels 13, 14, 15 and 16
- Output Pairs AES1, AES2, AES3 and AES4
- Output Pairs AES5, AES6, AES7 and AES8
- Output Groups AES1+2, AES3+4, AES5+6 and AES7+8
- Peak Value for Output Channel 1
- Peak Value for Output Channel 2
- Peak Value for Output Channel 3
- Peak Value for Output Channel 4
- Peak Value for Output Channel 5
- Peak Value for Output Channel 6
- Peak Value for Output Channel 7
- Peak Value for Output Channel 8
- Peak Value for Output Channel 9
- Peak Value for Output Channel 10
- Peak Value for Output Channel 11
- Peak Value for Output Channel 12
- Peak Value for Output Channel 13
- Peak Value for Output Channel 14
- Peak Value for Output Channel 15
- Peak Value for Output Channel 16

Status (STAT)

- AES1 Input Status
- AES2 Input Status
- AES3 Input Status
- AES4 Input Status
- AES5 Input Status
- AES6 Input Status
- AES7 Input Status
- AES8 Input Status
- Video Input Format
- Input Embedded Audio Group Status
- Metadata Input Status

Audio Embedders (EAUD)

- Input Embedded Audio Group 1
- Input Embedded Audio Group 2
- Input Embedded Audio Group 3
- Input Embedded Audio Group 4
- Embedder 1 Enable
- Embedder 2 Enable
- Embedder 3 Enable
- Embedder 4 Enable

Audio Channel Routing (AMUX)

- Output Channel 1 A
- Output Channel 1 B
- Output Channel 2 A
- Output Channel 2 B
- Output Channel 3 A
- Output Channel 3 B
- Output Channel 4 A
- Output Channel 4 B
- Output Channel 5 A
- Output Channel 5 B
- Output Channel 6 A
- Output Channel 6 B
- Output Channel 7 A
- Output Channel 7 B
- Output Channel 8 A
- Output Channel 8 B

Metadata (META)

- Output VANC Line
- Output VANC DID
- Output VANC Secondary Data ID
- VANC Embedding on Output

Utilities (UTIL)

- Individual Channels or Pairs
- SRC Enable for AES1
- SRC Enable for AES2
- SRC Enable for AES3
- SRC Enable for AES4
- SRC Enable for AES5
- SRC Enable for AES6
- SRC Enable for AES7
- SRC Enable for AES8
- Display Orientation
- Firmware Version
- Factory Reset
- Upgrade

Video (VIDE)

- Output Video Format
- Default Screen Colour
- Loss of Video Mode

Headphone Monitor (HEAD)

- Volume
- Monitored Channel for Left headphone
- Monitored Channel for Right headphone

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