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Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release Corrected DIP switch setting for 1080i/50, sense of GPO	Oct 00
1.1	Added features for AES Option	Apr 01
1.2	Removed references to Bulkhead panel	May 01
1.3	Updated features for support of 1080p/24sF, and Freeze Frame modes	May 02
1.4	Updated features for support of 480p/60	Jun 02
2.0	Added 7745FS-EAES4-HD	Jul 02
2.1	Minor typographical changes	Aug 02
2.2	Removed references to Gen-Lock Loop on EAES version. Gen-Lock and DARS Reference BNCs Standard	Oct 02
2.3	Added information for additional 7 frame delay in EAES4 version Added Sample Rate converter Disable to AES version	Nov 02
2.3.1	Minor Corrections	Nov 02
2.3.2	Added information for Processing Functions (+PH Option)	Jun 03
2.3.3	Added Freeze Frame Pass Mode	Jul 03
2.4	Added information for VistaLINK™ Control Added section on resetting module to Factory Defaults	Aug 03
2.4.1	Fixed description of Genlock LED	Dec 03
2.4.2	VistaLINK™ only on +PH option installed. Specifications updated	Jan 04
2.5	Added VistaLINK™ Traps	Apr 04

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1. OVERVIEW

The 7745FS-HD series HDTV Frame Synchronizers are designed to retime a SMPTE 292M (1080i/60, 1080i/59.94, 1080i/50, 1080p/24sF, 1080p/23.98sF, 720p/60, 720p/59.94 or 480p/59.94) input to a local reference tri-level or composite sync signal. When necessary, frames are repeated or dropped to maintain synchronization. During the synchronizing process the video delay varies from 3 lines through to 1 frame plus 3 lines. Additional delay can be added to the synchronizing process in 1 frame increments.

The 7745FS-HD is currently available in two versions to suit various application requirements. The 7745FS-HD-AES version is no longer available but is included in this manual for those who have existing units.

	Synchronizes			AES Audio	
Model	**Video**	**Embedded Audio**	**AES Audio**	**Inputs**	**Outputs**
7745FS-HD	Yes	Removes	No	--	--
7745FS-HD-AES (discontinued)	Yes	Removes	2	2	2
7745FS-EAES4-HD	Yes	Demux and mux 2 groups	4	4	4

On the 7745FS-HD version only the video signal is synchronized, and any audio present at the video input will be removed. On the 7745FD-HD-AES version, two channels of AES are synchronized and output in time with the video. On the 7745FS-EAES4-HD version, the user can choose to have either 2 groups from the upstream embedded audio or audio from the 4 AES inputs embedded on the output video and output as AES. The 7745FS-EAES4-HD can also pass all VANC data. When the input video is lost, it will either mute or pass the input AES. The 7745FS-EAES4-HD also has the ability to set the audio delay independently from the video delay.

When the Processing (+PH) option is added, the frame synchronizer has the ability to adjust video parameters such as brightness, contrast and saturation, and audio parameters such as gain, mixing stereo pairs into monaural and reassignment of audio channels within the groups. These parameters are controlled through the VistaLINK™ interface.

Features:

- Synchronizes 1080i/60, 1080i/59.94, 1080i/50, 1080p/24sF, 1080p/23.98sF, 720p/60, 720p/59.94 or 480p/59.94
- Minimum video input to output delay - 3 lines
- Maximum video input to output delay - 1 frame plus 3 lines
- Additional frames of delay can be added (3 frames on standard and AES versions, 7 frames on EAES4 version)
- Program Video output bypass relay protected on power loss or GPI (GPI not available on EAES4 version)
- Programmable output phase with respect to reference input
- Freeze on last good frame, or field, or go to black on loss of video
- Front panel LEDs indicate: module fault, video, audio and genlock present
- GPI Input control of Relay Bypass and Freeze (not available on EAES4 version)
- GPO Output indicating Loss of Input Video (not available on EAES4 version)

- Serial remote data logging

Additional Features for AES version: (this model has been discontinued)

- Synchronizes two external AES signals to the video
- AES outputs bypass relay protected on power loss or GPI
- Minimum audio input to output delay – 98 samples when video delay is less than 64 lines
- Maximum audio input to output delay – same as video delay
- Audio Sample Rate Converters can be disabled

Additional Features for EAES4 version:

- Synchronizes four external AES signals or 2 groups of embedded audio to the video
- Synchronized audio is output as 4 AES signals
- AES outputs bypass relay protected on power loss
- Minimum audio input to output delay – 98 samples when video delay is less than 64 lines
- Maximum audio input to output delay – 7 frames
- Separate control of video and audio delay
- Audio Sample Rate Converters can be disabled
- Synchronizes VANC data starting after switch line
- Synchronizes RP188 time codes

Additional Features when +PH option added (available on EAES4 version):

- Adjustable video black level (brightness), Y level (contrast) and chroma level (saturation)
- Independently adjustable audio levels on all channels
- Ability to combine stereo pairs to monaural
- Reassignment of audio channels within the embedded groups
- VistaLINK™ - enabled offering remote control and configuration capabilities via SNMP (using VistaLINK™ PRO or 9000NCP Network Control Panel) is available when modules are used with the 3RU 7700FR-C frame and a 7700FC VistaLINK™ Frame Controller module in slot 1 of the frame

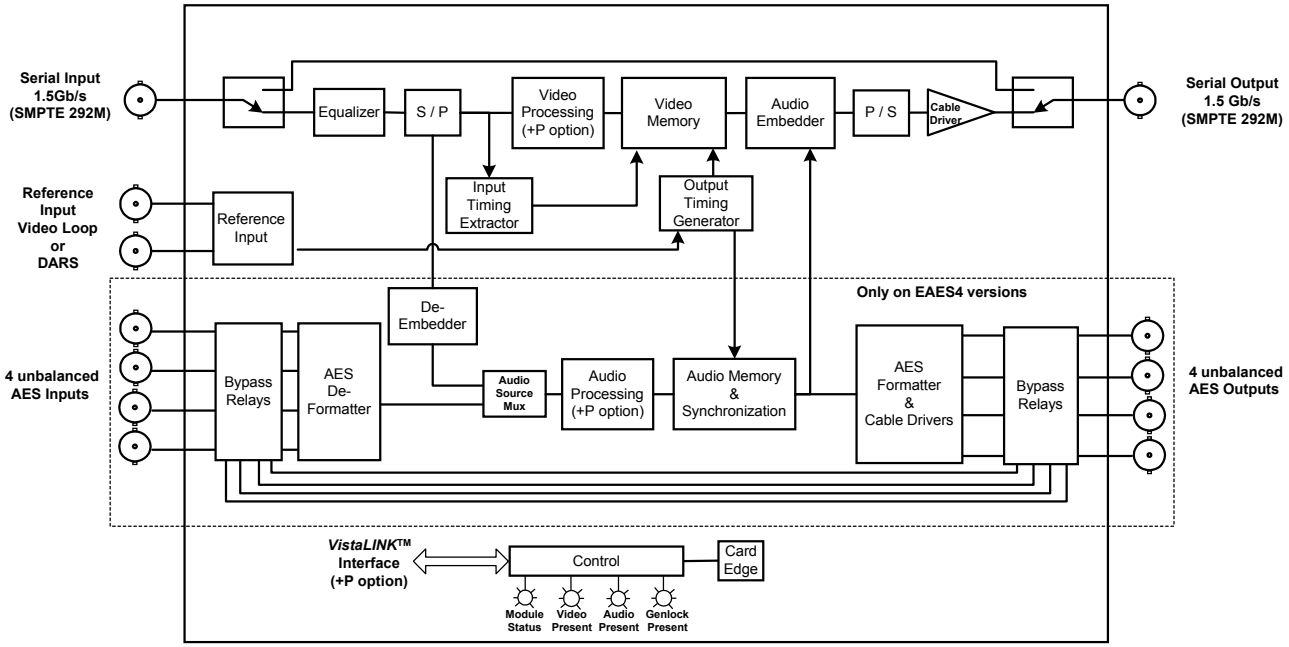


Figure 1: 7745FS-HD Block Diagram

2. INSTALLATION

The 7745FS-HD and 7745FS-HD-AES versions come with a companion rear plate that has 3 BNC connectors and a female 15 pin high density D connector and occupy one and two slots in the 3RU 7700FR frame respectively. The 7745FS-EAES4-HD version comes with a companion rear plate that has 12 BNC connectors and occupies two slots in the 3RU 7700FR frame. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

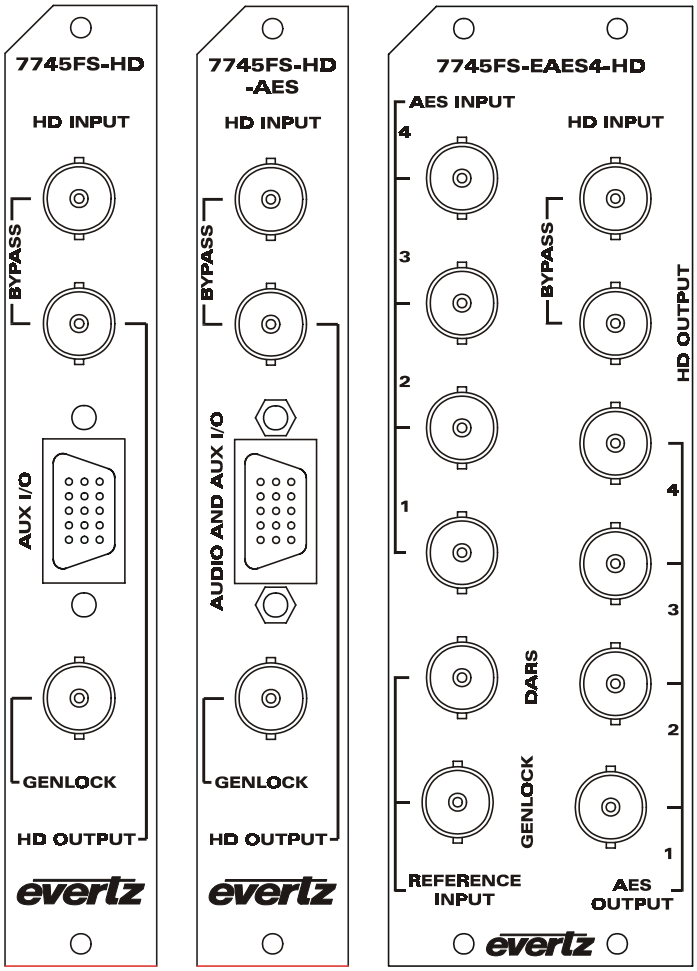


Figure 2: 7745FS-HD Rear Panels

2.1. HD VIDEO INPUTS AND OUTPUTS

HD INPUT Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 292M standard. The video standard must be set to match the input video format. See section 5.7 or 6.3.

HD OUTPUT Output BNC connector with serial component video, compatible with the SMPTE 292M standard. This output contains the input video synchronized to the Genlock input video or to the free running internal oscillator if Genlock is not present. This output is protected by a bypass relay, which will activate in the event of power loss to the module, or an external GPI contact closure.

2.2. GENLOCK REFERENCE

For proper synchronization of the output video, the frame synchronizer must be locked to a genlock signal.

GENLOCK There is an input BNC for connecting an analog Genlock reference. The genlock signal may be tri-level sync, NTSC or PAL, and is auto-detected by the module. On the 7745FS-HD and 7745FS-HD-AES versions jumper J2 on the 7700REF submodule selects whether the reference input is terminated to 75 ohms or high impedance. (See section 8.3) On the 7745FS-EAES4-HD version jumper J3 on the 7700-AES4 submodule selects whether the reference input is terminated to 75 ohms or high impedance (default). (See section 8.3)

DARS On the 7745FS-EAES4-HD version there is an input BNC for connecting a DARS reference. Jumper J5 on the 7700-AES4 submodule selects whether the reference input is terminated to 75 ohms or high impedance (default). The DARS input is currently not used.

2.3. AUDIO AND AUX I/O CONNECTIONS

On the 7745FS-HD and 7745FS-HD-AES versions, general purpose inputs and outputs are available on a female HD DB-15 connector labeled **AUXI/O.** The **AUX I/O** connector also contains an RS-232 port for logging status messages from the 7745FS-HD. On the 7745FS-HD-AES the DB-15 connector is labeled **AUDIO AND AUXI/O** and also has the audio inputs and outputs. Table 1 shows the pinout of the connector. On the 7745FS-EAES4-HD version the Audio inputs and outputs are in 8 BNC connectors.

Name	Description	DB-15 Pin
GPI2	GPI 2: Freeze Output on last good frame of input video when pulled low	1
Tx	RS-232 (output)	2
GPO1	GPO: Low when input video is missing	3
	Reserved for Future Use	4
	Reserved for Future Use	5
Rx	RS-232 (input)	6
AES In 2	AES Input 2 *	7
GPI1	GPI 1: Activate Bypass Relay when pulled low	8
AES Out 2	AES Output 2 *	9
AES Out 1	AES Output 1 *	10
AES In 1	AES Input 1 *	11
	Reserved for Future Use	12
	Reserved for Future Use	13
	Reserved for Future Use	14
	Reserved for Future Use	15
	Ground	Shell

* 7745FS-HD-AES Only

Table 1: Audio and Aux I/O Connector Pinout

2.3.1. AES Audio Connections (7745FS-HD-AES version)

Two unbalanced AES inputs and outputs are provided on the HD DB-15 connector. These inputs and outputs are for unbalanced AES signals conforming to SMPTE 276M. The two channels of AES audio input are synchronized and output in time with the output video. The AES outputs are protected by bypass relays, which will activate in the event of power loss to the module, or an external GPI contact closure. The AES outputs will be muted on loss of input video, or when the output video is frozen by activating the Freeze GPI. See Table 2 for information about minimum and maximum audio delays possible.

2.3.2. AES Audio Connections (7745FS-EAES4-HD version)

Four unbalanced AES inputs and outputs are provided on BNC connectors. These inputs and outputs are for unbalanced AES signals conforming to SMPTE 276M. The user can select whether audio from the four channels of AES audio input, or from 2 groups of embedded audio is synchronized and output embedded on the output video. The synchronized audio is also output as four AES channels. The AES outputs are protected by bypass relays, which will activate in the event of power loss to the module. See Table 2 for information about minimum and maximum audio delays possible.

2.3.3. General Purpose Inputs and Outputs (7745FS-HD and 7745FS-HD-AES versions)

The GPI's are active low with internal pull up resistors (2k 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. Figure 3 shows the input circuit for the General purpose inputs.

The GPO is active low with internal pull up (10k Ohm) resistors to +5V. 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.** Figure 4 shows the circuit for the general purpose output.

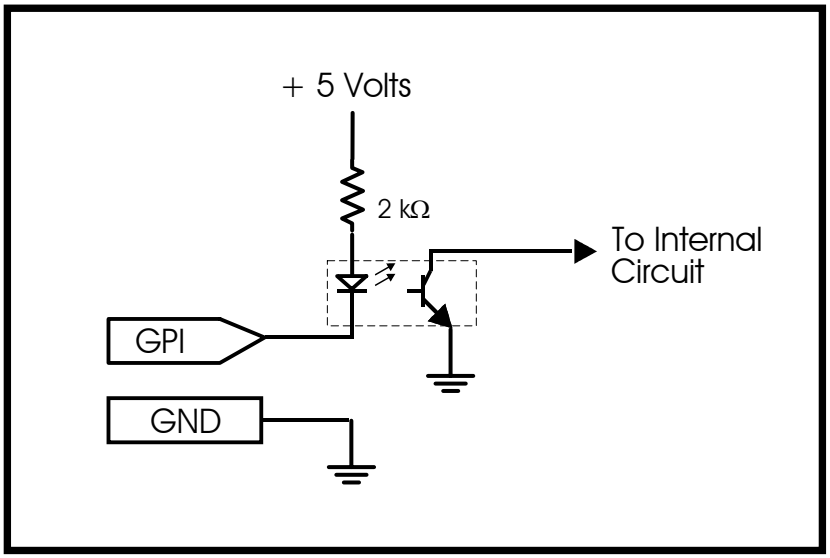


Figure 3: GPI Input Circuitry

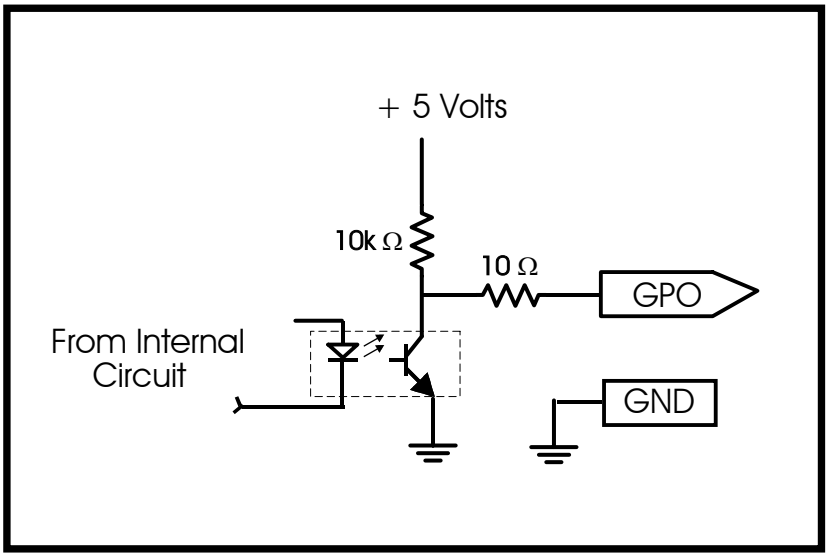


Figure 4: GPO Output Circuitry

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standard:	1.485 Gb/sec SMPTE 292M - DIP switch selectable. SMPTE 274M, SMPTE 296M, SMPTE 349M (See Table 10 for supported video Standards)
Connector:	BNC per IEC 60169-8 Ammendment 2.
Input Equalization:	Automatic to 75m @ 1.5Gb/s with Belden 1694 or equivalent cable.
Return Loss:	>10 dB up to 1.5 GHz

3.2. SERIAL VIDEO OUTPUT

Number of Outputs:	1
Connectors:	BNC per IEC 60169-8 Ammendment 2.
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	200ps nominal
Overshoot:	<10% of amplitude
Wide Band Jitter:	< 0.15 UI

3.3. GENLOCK INPUT

Type:	HD Tri-level Sync, (See Table 7) NTSC or PAL Colour Black 1 V p-p, or Composite bi-level sync (525i/59.94 or 625i/50) 300 mV
Connector:	BNC per IEC 60169-8 Ammendment 2.
Termination:	75 ohm (jumper selectable)

3.4. DARS REFERENCE (7745FS-EAES4-HD VERSION ONLY – CURRENTLY NOT USED)

Type: Digital Audio Signal with 48KHz sample rate.
Standard: SMPTE 276M-1995 single ended AES
Connectors: BNC per IEC 60169-8 Ammendment 2.
Termination: 75 ohm (jumper selectable)

3.5. AES AUDIO INPUTS AND OUTPUTS (7745FS-HD-AES AND 7745FS-EAES4-HD VERSIONS)

Number of Inputs:
- **7745FS-HD-AES** 2
- **7745FS-EAES4-HD** 4

Number of Outputs:
- **7745FS-HD-AES** 2
- **7745FS-EAES4-HD** 4

Standard: SMPTE 276M, single ended synchronous or asynchronous AES
Connectors:
- **7745FS-HD-AES** High-density female DB-15
- **7745FS-EAES4-HD** BNC per IEC 60169-8 Ammendment 2.

Resolution: 24 bits
Sampling Rate: 48 kHz
Impedance: 75 Ohms unbalanced
Signal Level: 1 V p-p nominal

3.6. PROCESSING FUNCTIONS (7745FS-EAES4-HD WITH +PH OPTION ONLY)

Video:
- **Black Level:** +/- 7%
- **Luminance Gain:** +/- 6dB
- **Chrominance Gain:** +/- 6dB

Audio Gain: +/- 24dB

3.7. INPUT TO OUTPUT PROCESSING DELAY

3.7.1. Video Processing Delay

Minimum Delay Mode: 3 lines to 1 frame plus 3 lines
Additional Delay Mode:
- **7745FS-HD** up to 3 frames of additional delay (1 frame increments)
- **7745FS-HD-AES** up to 3 frames of additional delay (1 frame increments)
- **7745FS-EAES4-HD** up to 7 frames of additional delay (1 frame increments)
  up to 1 frame on early builds

3.7.2. Audio Processing Delay (7745FS-HD-AES and 7745FS-EAES4-HD Only)

Video Standard	Video Delay	Min Audio Delay
1080i/60	< 69 lines	98 samples
1080i/59.94	< 69 lines	98 samples
1080i/50	< 57 lines	98 samples
1080p/24sF	< 55 lines	90 samples
1080p/23.98sF	< 55 lines	90 samples
720p/60	< 92 lines	98 samples
720p/59.94	< 92 lines	98 samples
480p/59.94	< 69 lines	98 samples

Video Standard	Video Delay	Audio Delay
1080i/60	> 69 lines	Video (Audio*) Delay plus 98 samples
1080i/59.94	> 69 lines	Video (Audio*) Delay plus 98 samples
1080i/50	> 57 lines	Video (Audio*) Delay plus 98 samples
1080p/24sF	> 55 lines	Video (Audio*) Delay plus 98 samples
1080p/23.98sF	> 55 lines	Video (Audio*) Delay plus 98 samples
720p/60	> 92 lines	Video (Audio*) Delay plus 98 samples
720p/59.94	> 42 lines	Video (Audio*) Delay plus 98 samples
480p/59.94	> 69 lines	Video (Audio*) Delay plus 98 samples

Table 2: Audio Processing Delay

* On the 7745FS-EAES4-HD the audio delay can be set to follow video delay set independently

3.8. GENERAL PURPOSE IN/OUT (7745FS-HD and 7745FS-HD-AES Only)

GP Inputs: GPI1: Activate Bypass Relay when pulled low
GPI2: Freeze Output on last good frame of input video when pulled low
GP Output: GPO1: Low when video input is missing
Type: Opto-isolated, active low with internal pull-ups to +5V
Connector: Female High Density DB-15
Signal Level: +5V nominal

3.9. DATA LOGGING SERIAL PORT

Standard: RS 232
Connector: Female High Density DB-15 (7745FS-HD and 7745FS-HD-AES only)
or software upgrade cable female DB-9 (all versions)
Baud Rate: 57600
Format: 8 bits, no parity, 2 stop bits

3.10. ELECTRICAL

Voltage: + 12VDC
Power:
7745FS-HD 12 Watts.
7745FS-HD-AES 15.5 Watts.
7745FS-EAES4-HD 15 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.11. PHYSICAL

7700 or 7701 frame mounting:

Number of slots: 1 for 7745FS-HD and 7745FS-HD-AES
2 for 7745FS-EAES4-HD

4. STATUS LEDS

4.1. MODULE STATUS LEDS

There are 5 LED status indicators at the front card edge as shown in Figure 8.

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 or genlock input is missing or there is a fault in the module power supply.

VIDEO PRESENT This Green LED will be ON when there is a valid video signal present at the module input.

REFERENCE This Green LED will be ON when there is a valid genlock signal appropriate for the current video format present at the module genlock input. Refer to table 4 for valid Video format and input Genlock combinations.

AUDIO PRESENT This green LED indicates the presence of audio. On the 7745FS-HD-AES version, the LED will be Off, as they do not process audio.

On the 7745FS-HD-AES version, the LED will be On when there is a valid AES audio signal present at one of the AES inputs. This LED will be Off when there is no video input or there is no AES audio on either input.

On the 7745FS-EAES4-HD version, the LED will be On when there is a valid AES audio signal present at one of the AES inputs and the audio source is set to AES. The LED will also be On when there is a valid audio in one of the groups selected for de-embedding and the audio source is set to the de-embedders. This LED will be Off when there is no video input or the above conditions are not met.

On the 7745FS-EAES4-HD and 7745FS-HD-AES versions there are four small LEDs located on the lower half (opposite the DIP switch). These LEDs (called Function LEDs) are used in conjunction with the toggle switch and DIP switch to program various operational modes of the module. LED 1 is located near the center of the printed circuit board. For more information see section 6.1.

5. CARD EDGE CONTROLS (7745FS-HD and 7745FS-HD-AES versions)

The 7745FS-HD and 7745FS-HD-AES versions are equipped with an 8 position DIP switch and toggle switch to allow the user to select various functions. DIP switch 1 is located at the top of the DIP switch (farthest from to the card ejector). Table 3 gives an overview of the DIP switch functions. Sections 5.1 to 5.6 give a detailed description of each of the DIP switch functions. The On position is down, or closest to the printed circuit board. DIP switches 1 and 2 configure the use of the toggle switch.

DIP Switch	Function
1	Toggle switch function for phasing of output video, disabling the sample rate converters and setting the Freeze mode
2	
3	Sets Additional Frame Delay
4	
5	Loss of Video Mode Selection
6	Video Standard Select
7	
8	

Table 3: DIP Switch Functions (7745FS-HD and 7745FS-HD-AES versions)

5.1. SELECTING THE TOGGLE SWITCH FUNCTION

The toggle switch on the card edge is used to set various operational modes. DIP switches 1 and 2 control select the Toggle switch function.

DIP 1	DIP 2	DESCRIPTION
Off (default)	Off (default)	Set Video Freeze mode (Full frame, field 1 or field 2)
Off	On	7745FS-HD: Reserved 7745FS-HD-AES: Sample Rate Converter Control
On	Off	Adjust V phase of output video to the genlock reference.
On	On	Adjust H phase of output video to the genlock reference.

Table 4: Toggle Switch Function Selection

5.2. SELECTING THE FREEZE MODE

When DIP switches 1 and 2 are Off, the toggle switch is used to set the Video Freeze mode. The Freeze mode determines whether the synchronizer will display the last full frame, field 1 or field 2 of the video when there is no video input. This setting is only applicable for interlaced video formats and will be used when DIP switch 5 is set to Off. See section 5.6. Each time the toggle switch is pressed up or down the freeze mode will change.

To aid in setting the Freeze mode, the Function LEDS on the front of the card (See Figure 7) are used to indicate the Freeze mode. The current freeze mode setting is also logged to the serial port on the rear DB15 auxiliary connector (see section 2.2 for connector pin definitions). The same serial port is also accessible from the Card Edge Upgrade header J24 using the standard 7700 upgrade cable. You can use any standard terminal program such as HyperTerminal to monitor the output on the serial port. The required port settings are 57600 baud, No parity, 8 data bits, 2 stop bits, and no flow control.

The following messages will be output on the serial port as you operate the toggle switch.

DIP	FUNCTION LEDS					
5	1	2	3	4	FREEZE MODE	SERIAL PORT MESSAGE
On	Off	Off	Off	Off	Black	
Off	On	On	On	On	Last Frame	LOV will Freeze on frame
Off	On	On	Off	Off	Last Field 1	LOV will Freeze on field 1
Off	Off	Off	On	On	Last Field 2	LOV will Freeze on field 2
Off	On	Off	Off	On	Pass Input Signal	LOV has been disabled(Pass)

Table 5: Freeze Mode Settings

Example:
To set the freeze mode to Full Frame, first set DIP 1 and 2 Off. This will set the module into Video Freeze Frame select mode. Use the toggle switch to select the Freeze Frame mode until the Function LEDS are all On. Note that DIP switch 5 must be Off for the Freeze mode to be active. The logged message on the terminal reads:

```
LOV will Freeze on frame
```

5.3. SELECTING SAMPLE RATE CONVERSION FOR AES INPUTS (7745FS-HD-AES VERSION)

When DIP switch 1 is off, and DIP switch 2 is on, pressing the toggle up or down enables or disables the sample rate converters as indicated on the function LEDs (See Figure 7)

FUNCTION LEDS				
1	2	3	4	SAMPLE RATE CONVERTER MODE
Off	Off	Off	Off	The content of the audio is preserved without any loss, and directly embedded into the input video. Audio must be synchronous to the video source. This setting is required for Dolby E.
On	On	On	On	Audio is sample rate converted at 48 kHz that is synchronous to the input video. Audio can be either synchronous or asynchronous to the video source.

Table 6: Sample Rate Conversion Settings

5.4. ADJUSTING THE OUTPUT VIDEO PHASE

The 7745FS-HD can be genlocked to either a composite or tri-level sync. The module will auto-detect the presence and format of the genlock signal. Valid video standard and input sync combinations are listed in the table below:

Standard	Composite Genlock	Tri-level Genlock
1080i/60	525/60	1080i/60
1080i/59.94	525/59.94 (NTSC)	1080i/59.94
1080i/50	625/50 (PAL)	1080i/50
1080p/24sF	625/48	1080p/24sF
1080p/23.98sF	625/47.96	1080p/23.98sF
720p/60	525/60	720p/60
720p/59.94	525/59.94 (NTSC)	720p/59.94
480p/59.94	525/59.94 (NTSC)	1080i/59.94

Table 7: Valid Standard and Genlock Combinations

When DIP switch 1 is On, the toggle switch is used to set the V phase (DIP switch 2 Off) or the H phase (DIP switch 2 On) of the output video relative to the Genlock reference. Pressing the toggle Up increments the value and pressing it Down will decrement the value.

The V phase adjustment provides a coarse adjustment of timing and sets the number of lines that the out is delayed with respect to genlock input. The H phase adjustment provides fine adjustment of timing and sets the number of samples that the output is delayed with respect to the input genlock.

Figure 5 and Figure 6 show the relationship of the analog tri-level and bi-level inputs to the digital line structure when there is no horizontal phase delay between the genlock and the output video. This alignment is specified in SMPTE 274M and 296M.

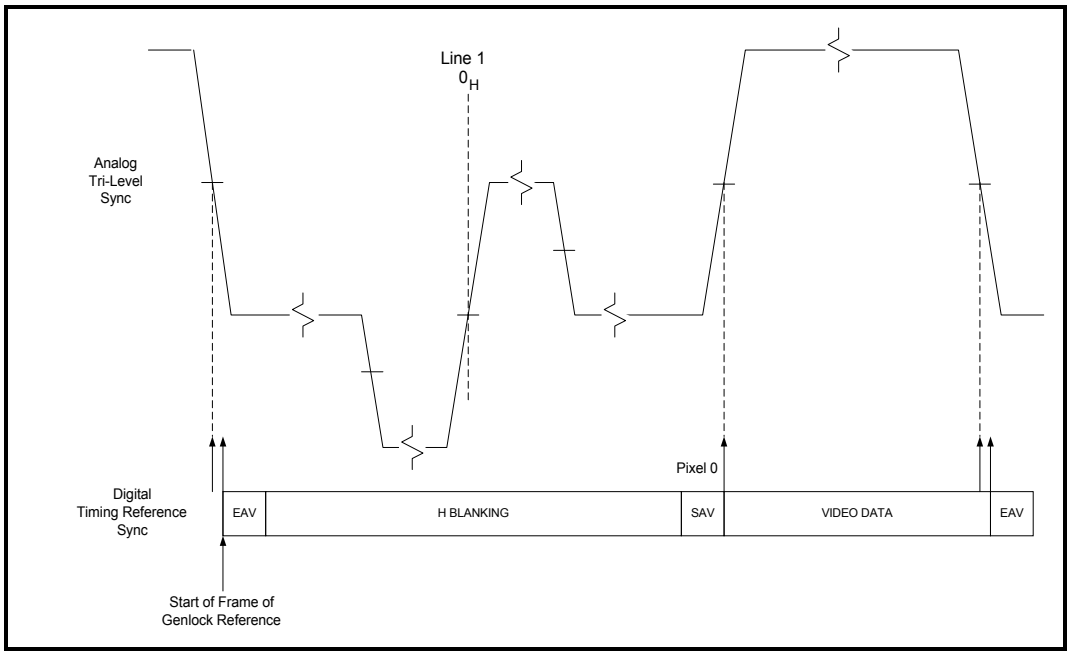


Figure 5: Tri-Level Reference Timing

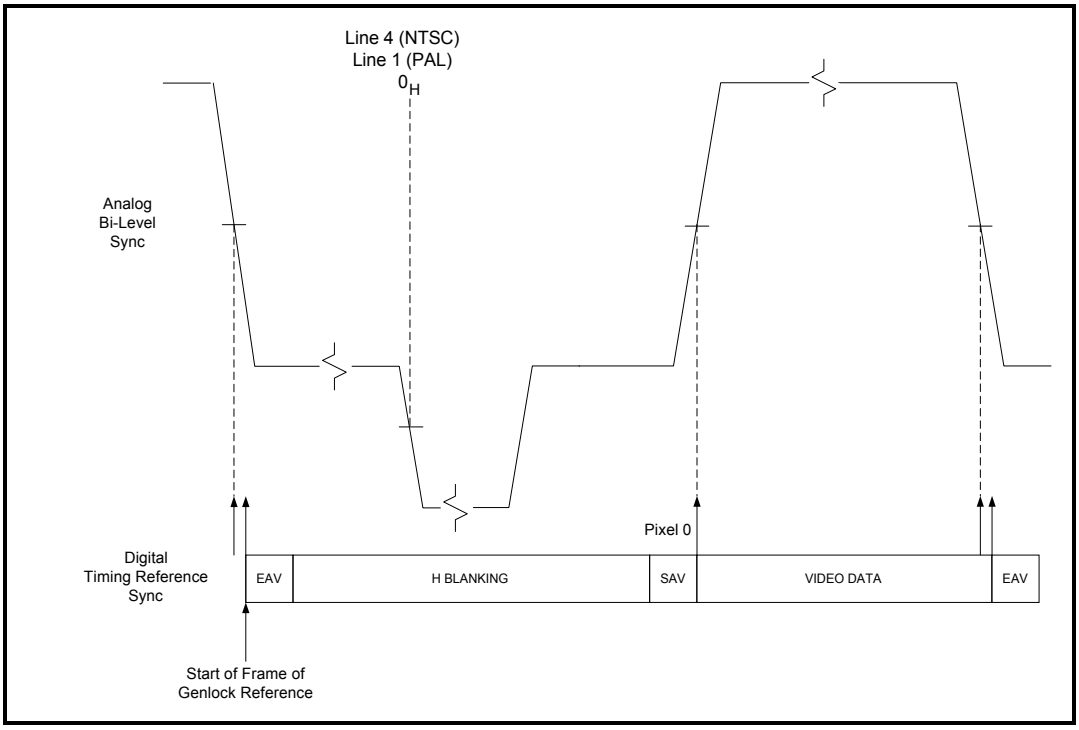


Figure 6: Bi-Level Reference Timing

To aid in setting the Genlock phasing, the lines and samples of delay are logged to the serial port on the rear DB15 auxiliary connector (see section 2.2 for connector pin definitions). The same serial port is also accessible from the Card Edge Upgrade header J24 using the standard 7700 upgrade cable. You can use any standard terminal program such as HyperTerminal to monitor the output on the serial port. The required port settings are 57600 baud, No parity, 8 data bits, 2 stop bits, and no flow control.

Example:
To delay the output video 2 lines and 2 samples with respect to the input Genlock, first set DIP 1 On and DIP 2 Off. This will set the module into V phase adjust mode. Use the toggle switch to adjust the V phase until the logged message on the terminal reads:

```
V2 Hxxx
```

Every time the output phase delay is changed a new message will be logged to the screen.

Next set DIP 1 On and DIP 2 On. This will set the module into H phase adjust mode. Use the toggle switch to adjust the H phase until the logged message on the terminal reads:

```
V2 H2
```

This setting will be saved to non-volatile memory approximately 30 seconds after the last change has been made.

The factory default is to align the EAV of Line 1 of the output video with the beginning of the reference frame.

5.5. SETTING ADDITIONAL FRAMES OF SYNCHRONIZER DELAY

The 7745FS-HD can add additional frames of delay to the **minimum** delay required to synchronize the video. DIP switches 3 and 4 are used to select how much additional delay will be added. On modules fitted with the AES option this delay will be applied to both the video and audio.

DIP 3	DIP 4	Additional Delay (frames)
Off	Off	0 (default)
Off	On	1
On	Off	2
On	On	3

Table 8: Frame Delay Switch Settings

5.6. CONTROLLING THE ACTION ON LOSS OF VIDEO

DIP switch 5 controls the behaviour of the frame synchronizer when there is no input video.

DIP 5	FUNCTION	DESCRIPTION
Off	Freeze	Freeze video on loss of input video.
On	Black	Output black on loss of input video.

Table 9: Freeze Mode Switch Settings

For interlaced video formats, the user can use the toggle switch (with DIP switches 1 and 2 set to Off) to select whether the *Freeze mode* will display the last full frame, field 1 or field 2 of the video. See section 5.2.

5.7. SELECTING THE VIDEO FORMAT

DIP switches 6, 7 and 8 are used to select one of seven video formats.

DIP 6	DIP 7	DIP 8	DESCRIPTION
Off	Off	Off	1080p/23.98sF
On	Off	Off	1080p/24sF
Off	On	Off	Future Use
On	On	Off	1080i/50
Off	Off	On	1080i/59.94 480p/59.94 (SMPTE 349M)
On	Off	On	1080i/60
Off	On	On	720p/59.94
On	On	On	720p/60

Table 10: Video Standard Switch Settings

6. CARD EDGE CONTROLS (7745FS-EAES4-HD version)

The 7745FS-EAES4-HD version is equipped with an 8 position DIP switch, a toggle switch and four function LEDs to allow the user to select various functions as shown in Figure 7. Table 11 gives an overview of the DIP switch functions. Sections 6.1 to 6.3 give a detailed description of each of the DIP switch functions. The On position is down, or closest to the printed circuit board.

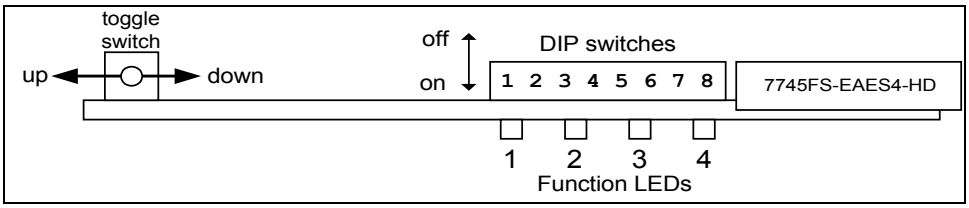


Figure 7: 7745FS-EAES4-HD Card Edge Controls

DIP Switch	Function
1	Select toggle switch function for programming operation modes.
2	
3	
4	
5	Audio Input Select
6	Video Standard Select
7	
8	

Table 11: DIP Switch Functions (7745FS-EAES4-HD version)

6.1. SETTING OPERATIONAL MODES USING THE TOGGLE SWITCH FUNCTIONS

The toggle switch on the card edge is used to set various operational modes of the synchronizer. DIP switches 1 to 4 are used to select the Toggle switch function. Table 12 shows the various modes and the DIP switch settings used to select them. When you have selected the mode you want to change using the DIP switches, operating the toggle switch selects different values for that mode.

MODE	DIP 1	DIP 2	DIP 3	DIP 4	FUNCTION
0	Off	Off	Off	Off	Help / Module Status Display
1	On	Off	Off	Off	Adjust V phase of output video to the genlock reference.
2	Off	On	Off	Off	Reserved
3	On	On	Off	Off	Adjust H phase of output video to the genlock reference.
4	Off	Off	On	Off	Set additional video delay
5	On	Off	On	Off	Set video freeze mode (black, frame, field 1 or field 2)
6	Off	On	On	Off	Enable/disable audio sample rate converter
7	On	On	On	Off	Set audio breakout mode
8	Off	Off	Off	On	De-embedder 1 group select
9	On	Off	Off	On	De-embedder 2 group select
10	Off	On	Off	On	Enable/disable embedder 1
11	On	On	Off	On	Embedder 1 group select
12	Off	Off	On	On	Enable/disable embedder 2
13	On	Off	On	On	Embedder 2 group select
14	Off	On	On	On	Adjust Audio Delay
15	On	On	On	On	Card configuration control through VistaLINK™

Table 12: Toggle Switch Function Selection

6.1.1. Displaying the Module Status

When DIP switches 1 to 4 are set in mode 0 (all Off), the toggle switch is used to send a small help menu and module status report to the serial port accessible from the Card Edge Upgrade header J24 using the standard 7700 upgrade cable. You can use any standard terminal program such as HyperTerminal to monitor the output on the serial port. See the *Upgrading Firmware* section of this manual for information on connecting your computer to the module using the upgrade cable. The required port settings are 57600 baud, No parity, 8 data bits, 2 stop bits, and no flow control.

Pressing the toggle switch once displays the following help display:

(*) Indicates that these messages are not available in the early 7745FS-EAES4-HD versions
(**) Indicates that these messages are available only on 7745FS-EAES4-HD versions with the +PH option installed

```
====================================
DIP switch settings UP=off=0 DOWN=on=1
------------------------------------
1-2-3-4
1 0 0 0 = V phase
1 1 0 0 = H phase
0 0 1 0 = Additional Video Delay
1 0 1 0 = Freeze Mode
0 1 1 0 = SRC Bypass
1 1 1 0 = Breakout Audio Enable
0 0 0 1 = Demux 1 Group Select
1 0 0 1 = Demux 2 Group Select
0 1 0 1 = Embedder 1 Enable
1 1 0 1 = Embedder 1 Group Select
0 0 1 1 = Embedder 2 Enable
1 0 1 1 = Embedder 2 Group Select
0 1 1 1 = Audio Delay adjust*
1 1 1 1 = VistaLINK Control**
```

Pressing the toggle switch again displays the card status, and current card settings. The card status reports the hardware build and software version and build numbers. Audio and video delays are approximate measurements of delay and may be off by a few milliseconds.

```
Current Status:
    H/W : build #
    S/W : v#.# build #
    Video Delay (approximate) = ### ms
    Audio Delay (approximate) = ### ms

Current Settings:
    V phase (#### lines)
    H phase (#### samples)
    Additional Video Delay (# frames)
    Freeze Mode (freeze to frame)
    SRC Bypass (SRCs are enabled)
    Breakout Audio Enable (normal audio mode)
    Demux 1 Group Select (group #)
    Demux 2 Group Select (group #)
    Embedder 1 Enable (disabled)
    Embedder 1 Group Select (group #)
    Embedder 2 Enable (disabled)
    Embedder 2 Group Select (group #)
    Additional audio delay = # video frames.*
```

Pressing the toggle switch a third time displays the following small reminder:

```
Use DIPs to set toggle switch behaviour
```

6.1.2. Adjusting The Output Video Phase

The synchronizer can be genlocked to either a composite or tri-level sync. The module will auto-detect the presence and format of the genlock signal. Valid video standard and input sync combinations shown in Table 7.

When DIP switches 1 to 4 are set in mode 1 or 3, the toggle switch is used to set the V phase (mode 1) or H phase (mode 3) of the output video relative to the Genlock reference. Pressing the toggle Up increments the value and pressing it Down will decrement the value.

The V phase adjustment provides a coarse adjustment of timing and sets the number of lines that the out is delayed with respect to genlock input. The H phase adjustment provides fine adjustment of timing and sets the number of samples that the output is delayed with respect to the input genlock.

Figure 5 and Figure 6 show the relationship of the analog tri-level and bi-level inputs to the digital line structure when there is no horizontal phase delay between the genlock and the output video. This alignment is specified in SMPTE 274M and 296M.

To aid in setting the Genlock phasing, the lines and samples of delay are logged to the serial port accessible from the Card Edge Upgrade header J24 using the standard 7700 upgrade cable. You can use any standard terminal program such as HyperTerminal to monitor the output on the serial port. The required port settings are 57600 baud, No parity, 8 data bits, 2 stop bits, and no flow control.

When DIP switches 1 to 4 are set in mode 15 the V phase and H phase are set using VistaLINK™ control.

Example:
To delay the output video 2 lines and 2 samples with respect to the input Genlock, first set the DIP switches to mode 1. This will set the module into V phase adjust mode. Use the toggle switch to adjust the V phase until the logged message on the terminal reads:

```
V=0002 H=xxx
```

Every time the output phase delay is changed a new message will be logged to the screen.

Next set the DIP switches to mode 3. This will set the module into H phase adjust mode. Use the toggle switch to adjust the H phase until the logged message on the terminal reads:

```
V=0002 H=0002
```

This setting will be saved to non-volatile memory approximately 30 seconds after the last change has been made.

The factory default is to align the EAV of Line 1 of the output video with the beginning of the reference frame.

6.1.3. Setting Additional Frames Of Synchronizer Delay for the Video

The 7745FS-EAES4-HD can add up to 7 additional frames of video delay to the **minimum** delay required to synchronize the video. The delay added to the audio can be set to be equal to the video delay or can be independently set. (See section 6.1.9 for information on setting the audio delay.)

When DIP switches 1 to 4 are set in mode 4 the toggle switch is used to select how much additional delay will be added to the video. Pressing the toggle up or down changes the delay value which will be indicated on the function LEDs.

FUNCTION LEDS				ADDITIONAL DELAY
1	2	3	4	
Off	Off	Off	Off	0 frames
On	Off	Off	Off	1 frames
Off	On	Off	Off	2 frames
On	On	Off	Off	3 frames
Off	Off	On	Off	4 frames
On	Off	On	Off	5 frames
Off	On	On	Off	6 frames
On	On	On	Off	7 frames

Table 13: Video Frame Delay Settings

When DIP switches 1 to 4 are set in mode 15 the amount of additional delay added to the video is set using VistaLINK™ control. The range of values is 0 to 7 frames.

6.1.4. Setting The Action On Loss Of Video (Freeze Mode)

When DIP switches 1 to 4 are set in mode 5 the toggle switch is used to select the action on loss of input video. This mode determines whether the synchronizer will display black or the last full frame,

field 1 or field 2 of the video when there is no video input. Pressing the toggle up or down changes the freeze mode which will be indicated on the function LEDs.

FUNCTION LEDS				FREEZE MODE
1	2	3	4	
Off	Off	Off	Off	Black
On	On	On	On	Last Frame
On	On	Off	Off	Last Field 1
Off	Off	On	On	Last Field 2
On	Off	Off	On	Pass Input Signal

Table 14: Freeze Mode Settings

When the Pass input signal mode is selected, the frame synchronizer will pass whatever signal is present on the video input, even though it may not be a valid video signal.

When DIP switches 1 to 4 are set in mode 15 the action on loss of input video is set using VistaLINK™ control.

6.1.5. Setting The Audio Sample Rate Converter Mode

When DIP switches 1 to 4 are set in mode 6 the toggle switch is used to select whether sample rate conversion is enabled or not. Pressing the toggle up or down enables or disables the sample rate converters as indicated on the function LEDs.

FUNCTION LEDS				SAMPLE RATE CONVERTER MODE
1	2	3	4	
Off	Off	Off	Off	The content of the audio is preserved without any loss, and directly embedded into the input video. Audio must be synchronous to the video source. This setting is required for Dolby E.
On	On	On	On	Audio is sample rate converted at 48 kHz that is synchronous to the input video. Audio can be either synchronous or asynchronous to the video source.

Table 15: Sample Rate Conversion Settings

When DIP switches 1 to 4 are set in mode 15 the audio sample rate converter mode is set using VistaLINK™ control.

6.1.6. Setting The Audio Breakout Mode

When “Audio Breakout” mode is enabled, the audio de-embedder’s outputs are routed directly to the AES outputs, bypassing any rate conversion or synchronization. When audio breakout mode is disabled, the synchronized audio input is presented to the AES outputs. Regardless of whether the *Audio breakout mode* is enabled or not, the audio input for synchronization is always selected by the “audio input” DIP switch, and the audio embedder always receives the synchronized audio input. (See section 6.2 for information on selecting the audio source)

When DIP switches 1 to 4 are set in mode 7 the toggle switch is used to select the audio breakout mode. Pressing the toggle up or down enables or disables audio breakout mode as indicated on the function LEDs.

FUNCTION LEDS				AUDIO BREAKOUT MODE
1	2	3	4	
Off	Off	Off	Off	Audio breakout mode disabled.
On	On	On	On	Audio breakout mode enabled.

Table 16: Audio Breakout Mode Settings

When DIP switches 1 to 4 are set in mode 15 the audio breakout mode is set using VistaLINK™ control.

6.1.7. Selecting The Audio Groups That Will Be De-Embedded

The SMPTE 299M standard permits up to 4 groups of 4 audio channels to be embedded into the 1.5 Gb/s video bitstream. The EAES4 version of the synchronizer de-embed two groups of audio that can be selected as the source for synchronization and embedding on the output video. (See section 6.2 for information on selecting the audio source). When DIP switches 1 to 4 are set in mode 8 or 9, the toggle switch is used to set the group for de-embedder 1 (mode 8) or de-embedder 2 (mode 9). Pressing the toggle up or down changes the group as indicated on the function LEDs.

FUNCTION LEDS				DEEMBEDDER AUDIO GROUP
1	2	3	4	
On	Off	Off	Off	1
Off	On	Off	Off	2
Off	Off	On	Off	3
Off	Off	Off	On	4

Table 17: Audio De-Embedder Group Settings

When DIP switches 1 to 4 are set in mode 15 the audio de-embedder groups are set using VistaLINK™ control.

6.1.8. Selecting The Audio Groups That Will Be Embedded

The SMPTE 299M standard permits up to 4 groups of 4 audio channels to be embedded into the 1.5 Gb/s video bitstream. The EAES4 version of the synchronizer has two embedders that each embed one group of audio from the source selected for synchronization. (See section 6.2 for information on selecting the audio source).

When DIP switches 1 to 4 are set in mode 10 or 12, the toggle switch is used to enable or disable embedder 1 (mode 10) or embedder 2 (mode 12). Pressing the toggle up or down enables or disables respective audio embedder as indicated on the function LEDs.

FUNCTION LEDS				EMBEDDER MODE
1	2	3	4	
Off	Off	Off	Off	Embedder disabled.
On	On	On	On	Embedder enabled.

Table 18: Audio De-Embedder Group Settings

When DIP switches 1 to 4 are set in mode 11 or 13, the toggle switch is used to set the group where audio will be placed for embedder 1 (mode 11) or embedder 2 (mode 13). Pressing the toggle up or down changes the group as indicated on the function LEDs.

FUNCTION LEDS				EMBEDDER AUDIO GROUP
1	2	3	4	
On	Off	Off	Off	1
Off	On	Off	Off	2
Off	Off	On	Off	3
Off	Off	Off	On	4

Table 19: Audio Embedder Group Settings

When DIP switches 1 to 4 are set in mode 15 the audio embedder groups are set using VistaLINK™ control. The audio embedders are may also be disabled using VistaLINK™ control.

6.1.9. Setting Additional Frames Of Synchronizer Delay for the Audio (not available on early 7745FS-EAES4-HD units)

The 7745FS-EAES4-HD can add up to 7 additional frame of delay to the audio. The audio delay can be set to follow the video delay setting or it can be independently set. When DIP switches 1 to 4 are set in mode 14 the toggle switch is used to select how much additional audio delay will be added. Pressing the toggle up or down changes the delay value which will be indicated on the function LEDs.

FUNCTION LEDS				ADDITIONAL AUDIO DELAY (measured in video frames)
1	2	3	4	
Off	Off	Off	Off	0 frames
On	Off	Off	Off	1 frames
Off	On	Off	Off	2 frames
On	On	Off	Off	3 frames
Off	Off	On	Off	4 frames
On	Off	On	Off	5 frames
Off	On	On	Off	6 frames
On	On	On	Off	7 frames
On	On	On	On	Audio Delay follows Video Delay setting

Table 20: Audio Delay Settings

When DIP switches 1 to 4 are set in mode 15 the additional audio delay is set using VistaLINK™ control.

6.1.10. Enabling VistaLINK™ Control of the Frame Synchronizer (7745FS-EAES4-HD with the PH option installed)

The 7745FS-EAES4-HD with the PH option installed can be controlled using the card edge DIP switches and toggle switch or remotely via SNMP (using VistaLINK™ PRO or the model 9000NCP Network Control Panel). When DIP switches 1 to 4 are set in mode 0 to 14 the module will be controlled using the DIP switches and toggle switch functions described elsewhere in section 6. When DIP switches 1 to 4 are set in mode 15 the module will be controlled remotely through SNMP. See section 10 for a full description of the parameters that can be monitored or controlled using VistaLINK™. VistaLINK™ control is only available on cards with the processing option (+PH) installed, and when the card is installed in the #RU 7700FR-C frame and a 7700FC VistaLINK™ Frame Controller card is installed in slot 1 of the frame.

6.2. SELECTING THE AUDIO SOURCE

DIP switch 5 controls whether the audio for synchronization will be taken from the AES inputs or the de-embedders. When the de-embedders are selected as the source, the audio group must be selected using the toggle switch function modes 8 and 9. (See section 6.1.7 for information on selecting the de-embedder groups.) The embedders can be individually enabled or disabled and the user can select the embedding group for each of the embedders. (See section 6.1.8 for information on controlling the embedders.) Normally the audio selected as the source is synchronized along with the video, re-embedded on the outputs and output as AES. When *Audio Breakout mode* is enabled audio from the de-embedders bypasses the synchronization and is output without delay on the AES outputs. (See section 6.1.6 for information about audio breakaway mode.)

	SOURCE FOR	
DIP 5	**Embedder 1 & AES 1 and AES 2 Outputs**	**Embedder 2 & AES 3 and AES 4 Outputs**
Off	AES 1, AES 2 Inputs	AES 3, AES 4 Inputs
On	De-embedder 1 group	De-embedder 2 group

Table 21: Audio Source Switch Settings

When DIP switches 1 to 4 are set in mode 15 the audio embedder sources are set using VistaLINK™ control.

6.3. SELECTING THE VIDEO FORMAT

DIP switches 6, 7 and 8 are used to select one of five video formats as shown in Table 22

DIP 6	DIP 7	DIP 8	DESCRIPTION
Off	Off	Off	1080p/23.98sF
On	Off	Off	1080p/24sF
Off	On	Off	Future Use
On	On	Off	1080i/50
Off	Off	On	1080i/59.94 480p/59.94 (SMPTE 349M)
On	Off	On	1080i/60
Off	On	On	720p/59.94
On	On	On	720p/60

Table 22: Video Standard Switch Settings

When DIP switches 1 to 4 are set in mode 15 the video format is set using VistaLINK™ control.

6.4. CONFIGURING THE VIDEO PROCESSING FUNCTIONS (7745FS-EAES4-HD with +PH option installed only)

When DIP switches 1 to 4 are set in mode 15 the *Video Processing* controls used, to configure parameters associated with the component video processing video, can be controlled and monitored using VistaLINK™ control.

6.4.1. Setting the Video Black Level (Brightness)

The black level (DC offset of Y channel) may be adjusted with this control. For no offset of the black level, set this control to 0. The adjustment range is +/- 7 IRE with ½ IRE resolution.

It's better to set/calibrate this black level control before the video level control is adjusted. If the video level is adjusted first, and you need to adjust this black level control, you will have to go back and correct the video level slightly.

6.4.2. Setting the Video Luminance Level (Contrast)

The gain of the luminance channel of the video (contrast) may be adjusted with this control. For unity gain, set this value to 0. The adjustment range is +/- 6dB.

It is better to calibrate the black level control before setting this control.

6.4.3. Setting the Video Chroma Level (Saturation)

The gain on the Cb and Cr channels of the video (saturation) may be adjusted with this control. For unity gain, set this value to 0. The adjustment range is +/- 6dB.

6.5. CONFIGURING THE AUDIO PROCESSING FUNCTIONS (7745FS-EAES4-HD with +PH option installed only)

When DIP switches 1 to 4 are set in mode 15 the *Audio Processing* controls, used to configure parameters associated with the manipulation of the audio content, can be controlled and monitored using VistaLINK™ control. There are similar control items to adjust the routing and processing of each of the 8 audio channels (4 AES pairs). For simplicity only the control items for channel 1 will be shown in the manual.

6.5.1. Remapping the Audio Channels

The Channel Processing controls permit basic audio channel routing and manipulation.

Any single input channel can be routed to any output channel. The default is to route the input channel corresponding to the output (e.g. input channel 1 to output channel 1)

A mono mix of any L/R input pair can also be output on any channel (e.g. a mono mix of input channels 1 and 2 to output channel 1).

Output channels can also be muted.

6.5.2. Setting the Audio Levels

The audio gain controls are used to adjust the level of the respective audio channel. The gain controls have a range of +/-24 dB with 1/10 dB resolution. The displayed value is the amount of gain (+ve), or attenuation (-ve), in decibels, where 0dB corresponds to unity gain.

Whenever +ve gain is configured, there is the possibility of distortion due to clipping. If the input audio level is increased to greater than 0dB FS, by adding gain, then the output audio will be limited at 0dB FS.

7. EVENT LOGGING

To assist in system verification, events are logged by the 7745FS-HD and 7745FS-HD-AES to the serial port on the rear DB15 auxiliary connector (see Table 1 for connector pin definitions). The same serial port is also accessible from the Card Edge Upgrade header J24 on all versions using the standard 7700 upgrade cable. You can use any standard terminal program such as HyperTerminal to monitor the output on the serial port. See the *Upgrading Firmware* section of this manual for information on connecting your computer to the module using the upgrade cable. The required port settings are 57600 baud, No parity, 8 data bits, 2 stop bits, and no flow control.

This feature is not available on firmware versions prior to V 2.1 build 111 for the 7745FS-HD-AES. To find out the version of your firmware, connect a computer as described below, and then reboot the frame synchronizer card. The firmware version will be displayed during the boot up sequence.

Tables 21 to 24 list the messages that are logged by the frame synchronizer under normal operation. Some messages are not supported in all versions of the synchronizer

Logged Message	Event Description
Genlock present	Output video is genlocked
Free running	Output video is free running
Input switch	Change in Input video detect
Video ON	Input video is present
Loss of Video	Input video is lost
Phase Line/Sample delay loaded from presets	Preset V and H phase delay values loaded
Changing video freeze mode enabled	DIP switch change detected. Adjusting Video freeze mode enabled
Freeze to last good frame	DIP switch change detected. Upon loss of video, video will be frozen
Freeze to output black	DIP switch change detected. Upon loss of video, output video will be black
Repeat	Output video frame was repeated
Drop	Input video frame was dropped
Video standard detected	Valid input video standard detected

Table 23: Common Logged Event Messages

Logged Message	Event Description
Changing video line delay enabled	DIP switch change detected. Adjusting V phase of output video to the genlock reference enabled
Changing video sample delay enabled	DIP switch change detected. Adjusting H phase of output video to the genlock reference enabled
Ext. bypass ON	External GPI contact closure to trigger Relay Bypass Detected
Ext. bypass OFF	External GPI contact closure to trigger Relay Bypass released. Relay Bypass disabled
Ext. force freeze ON	External GPI contact closure to trigger a force freeze on output video detected
Ext. force freeze OFF	External GPI contact closure to trigger a force freeze on output video released. Force freeze is disabled.
Extra frames of Delay = #	Number of frames of video delay added to the minimum synchronizer delay (also added to audio on AES version)

Table 24: Logged Event Messages only on FS-HD and AES versions

Logged Message	Event Description
AES1 unlocked	AES1 input not present or invalid
AES1 locked	AES1 input present
AES2 unlocked	AES2 input not present or invalid
AES2 locked	AES2 input present
LOV will Freeze on frame	Toggle switch change detected – Freeze mode select – Freeze on last good frame
LOV will Freeze on field 1	Toggle switch change detected – Freeze mode select – Freeze on last good field1
LOV will Freeze on field 2	Toggle switch change detected – Freeze mode select – Freeze on last good field 2
Changing SRC mode.	SRC mode control selected
SRCs bypassed	Sample Rate Converters are disabled
SRCs enabled	Sample Rate Converters are enabled

Table 25: Logged Event Messages only on AES and EAES4 versions

Logged Message	Event Description
AES3 unlocked	AES 3 input not present or invalid
AES3 present	AES 3 input present
AES4 unlocked	AES 4 input not present or invalid
AES4 present	AES 4 input present
Changing video line delay.	V adjustment control selected
Changing video sample delay.	H adjustment control selected
Changing Additional Video delay.	Additional video delay control selected
Changing video freeze mode.	Video freeze control selected
Changing Audio Mode.	Audio Source control selected
Changing Audio Demux 1 Group Selection	Audio demux 1 group selection control selected
Changing Audio Demux 2 Group Selection	Audio demux 2 group selection control selected
Changing Audio Embedder 1 Enable.	Audio embedder 1 enable control selected
Changing Audio Embedder 1 Group Selection.	Audio embedder 1 group selection control selected
Changing Audio Embedder 2 Enable.	Audio embedder 2 enable control selected
Changing Audio Embedder 2 Group Selection.	Audio embedder 2 group selection control selected
Normal Audio Mode: Audio Demux inputs selected as audio source.	Audio De-embedder outputs have been selected for audio input source, this control also informs the user of the status of breakout audio mode
Normal Audio Mode: AES inputs selected as audio source.	AES inputs have been selected for audio input source, this control also informs the user of the status of breakout audio mode
Breakout Mode: Audio Demux inputs selected as audio source. AES outputs are direct from audio demuxes.	Audio Demux inputs have been selected for audio input source, this control also informs the user of the status of breakout audio mode
Breakout Mode: AES inputs selected as audio source. AES outputs are direct from audio demuxes.	AES inputs have been selected for audio input source, this control also informs the user of the status of breakout audio mode
Breakout Audio mode enabled.	Audio breakout mode selected. Audio demux will be routed directly to AES outputs bypassing audio delay matching
Normal Audio mode enabled.	Audio breakout mode disabled. Audio input delayed matched is routed to AES outputs
Audio Demux 1 group = ##	Audio de-embedder 1 group selection has been changed to group ## (1, 2, 3, or 4)
Audio Demux 2 group = ##	Audio de-embedder 2 group selection has been changed to group ## (1, 2, 3, or 4)
Audio Embedder 1 enabled.	Audio embedder 1 has been enabled
Audio Embedder 1 disabled.	Audio embedder 1 has been disabled
Audio Embedder 2 enabled.	Audio embedder 2 has been enabled
Audio Embedder 2 disabled.	Audio embedder 2 has been disabled
Audio Embedder 1 group = ##	Audio embedder 1 group selection has been changed to group ## (1, 2, 3, or 4)
Audio Embedder 2 group = ##	Audio embedder 2 group selection has been changed to group ## (1, 2, 3, or 4)
Additional frames of delay = ##	Number of additional frames of delay added to the frame synchronizer's output (
LOV has been disabled(Pass)	Loss of video will pass input even if no valid video is present
LOV will Freeze on full frame.	loss of video will freeze on last good frame
LOV will Freeze on field 1.	loss of video will freeze on field 1 of last good frame
LOV will Freeze on field 2.	loss of video will freeze on field 2 of last good frame
LOV will go to black.	loss of video will go to black
Additional frames of Delay = #	Number of frames of video delay added to the minimum synchronizer delay (also added to audio on EAES4 version)
Changing Audio delay adjustment.	Additional audio delay control selected
Audio delay is the same as additional video delay (# frames)	Audio delay will automatically track the extra video delay added by the 'additional video delay' control
Additional audio delay = # video frames	Number of frames of audio delay added to the minimum synchronizer delay on EAES4 version
AES3 unlocked	AES 3 input not present or invalid
AES3 present	AES 3 input present

Table 26: Logged Event Messages only on EAES4 version

8. JUMPERS

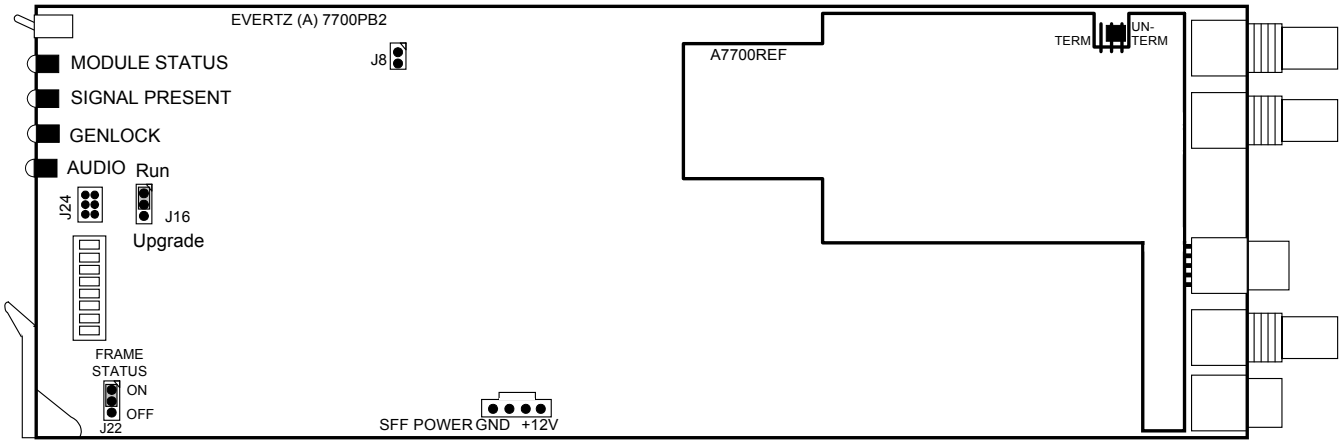


Figure 8: Location of Jumpers on 7745FS-HD

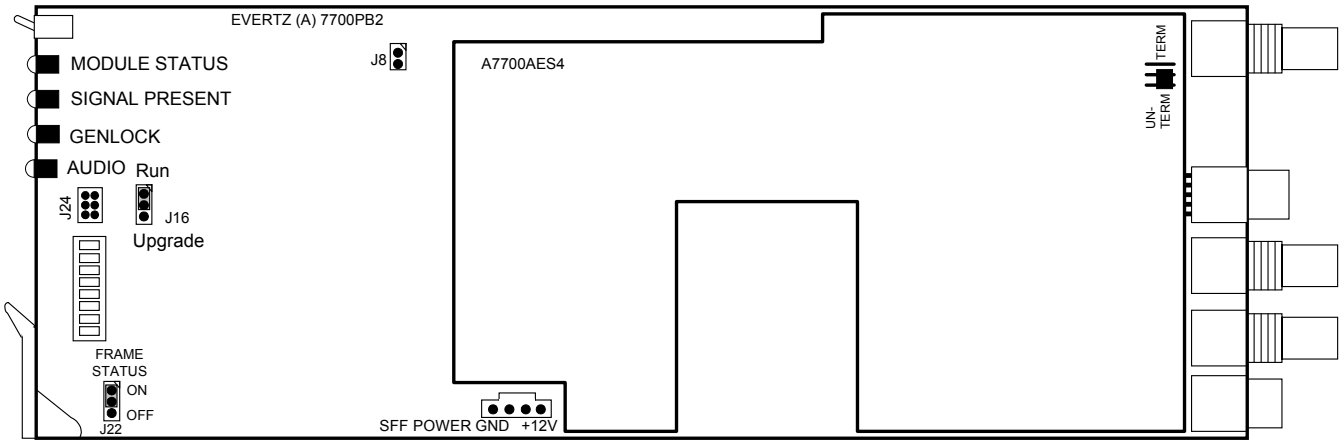


Figure 9: Location of Jumpers on 7745FS-HD-AES

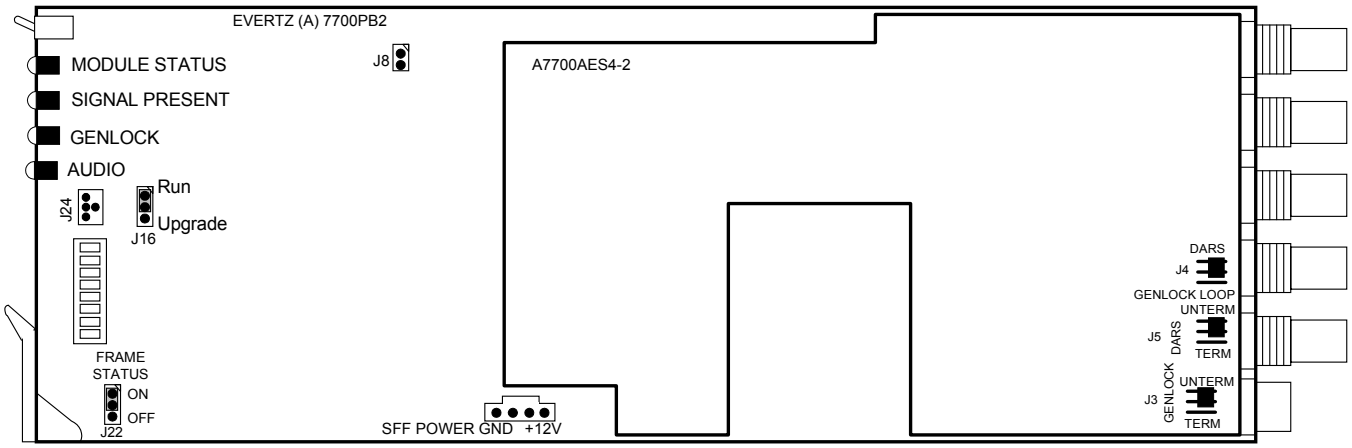


Figure 10: Location of Jumpers on 7745FS-EAES4-HD

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

FRAME STATUS The FRAME STATUS jumper 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.

8.2. 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.

8.3. SELECTING WHETHER THE GENLOCK REFERENCE INPUT IS TERMINATED

TERM/UNTERM The GENLOCK TERM/UNTERM jumper is used to terminate the genlock input. When it is in the TERM position a 75 ohm terminating resistor will be connect the input to ground. When it is in the UNTERM position the genlock input will be high impedance. The jumper is located in different places depending on the version of the frame synchronizer.

On the 7745FS-HD versions jumper J2 located on the A7700REF genlock sub-module is used to terminate the genlock input.

On the 7745FS-HD-AES version jumper J2 located on the A7700-AES4 Audio submodule is used to terminate the genlock input.

On the 7745FS-EAES4-HD version jumper J3 located on the A7700-AES4-2 submodule is used to terminate the genlock input.

8.4. SELECTING WHETHER THE DARS REFERENCE INPUT IS TERMINATED (7745FS-EAES4-HD)

DARS The DARS jumper J5 located on the A7700-AES4-2 submodule is used to terminate the DARS input. When it is in the TERM position a 75 ohm terminating resistor will be connect the DARS input to ground. When it is in the UNTERM position the DARS input will be high impedance. The DARS input is currently not used.

8.5. RESETTING THE MODULE TO ITS FACTORY DEFAULT CONDITION

This operation will completely reset the module and all user settings will be erased. Make sure you want to reset the module before you proceed.

Occasionally users want to reset the module to its factory default condition. The following procedure allows you to erase all user settings and restore the factory settings.

You will need the following equipment in order to reset the card to its factory defaults

- PC with available communications port.
- Terminal program that is capable of Xmodem file transfer protocol (such as HyperTerminal).
- Special Serial Upgrade cable supplied with the 7700FR-C frame. This cable is normally in the vinyl pouch at the front of this manual. (Evertz part #WA-76). A “Straight-thru” serial extension cable (DB9 female to DB9 male) may be required if you need to extend the length of the WA-S76 serial upgrade cable

Reset Procedure:

1. Remove the module from the frame.

2. Move the UPGRADE jumper into the *UPGRADE* position.

3. Connect the 7700PB Serial Upgrade cable to the 2 row x 3 pin header labelled J24. Install the cable with the ribbon cable towards the front of the board.

4. Connect the 9 pin connector on the end of the Serial Update cable to the PCs’ RS-232 communications port.

5. Start the terminal program.

6. Configure the port settings of the terminal program as follows:

Baud	**57600**
Parity	**no**
Data bits	**8**
Stop bits	**2**
Flow Control	**None**

7. Install the module into the frame. After the module powers up, a banner with the boot code version information should appear in the terminal window.

For example:

```
EVERTZ MFC5407 MONITOR 2.1.3
COPYRIGHT 1997, 1998, 1999, 2000, 2001, 2002 EVERTZ MICROSYSTEMS LTD.
UPGRADE JUMPER INSTALLED

UPLOAD FILE NOW, CONTROL-X TO CANCEL
```

8. The following is a list of possible reasons for failed communications:

   - Defective Evertz Serial Upgrade cable.
   - Wrong communications port selected in the terminal program.
   - Improper port settings in the terminal program. (Refer to step 5 for settings).

9. Press the <CTRL> and <X> keys. This will bring you to the boot prompt "7700 Boot>

10. Type the word “reset”, without quotes, and hit the <ENTER> key once. The boot code will ask `Are you sure?` Type "y", without quotes.

11. Wait one minute, power down the module. Remove the module from the frame and disconnect the Serial Upgrade cable from the module. Restore the UPGRADE jumper to the *RUN* position. Reinsert the module into the frame.

12. You can now close the terminal program and disconnect the RS-232 serial cable from the PC.

The module is now set to factory defaults**.**

9. TYPICAL CONFIGURATIONS

9.1. SYNCHRONIZE VIDEO WITH EMBEDDED AUDIO (UNCOMPRESSED)

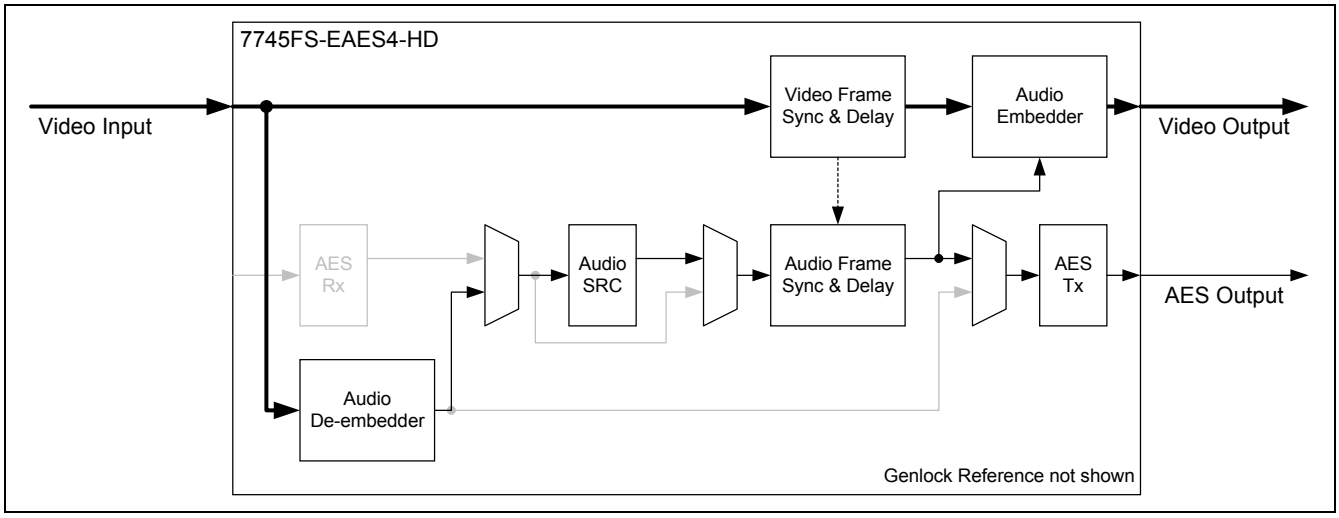


Figure 11: Synchronize Video with Embedded Audio (Uncompressed)

Video input = video with embedded audio (uncompressed PCM) in Group 1 & 2

Video output = synchronized video with synchronized audio re-embedded into Group 1 & 2
AES output = synchronized audio from embedded group 1 & 2

Control Settings:

DIP switch 5	Audio Source = ON (audio demux)
Toggle switch mode 6	SRC Bypass = off
Toggle switch mode 7	Breakout Audio = normal audio mode
Toggle switch mode 8	DMX1 Group = 1
Toggle switch mode 9	DMX2 Group = 2
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2

9.2. SYNCHRONIZE VIDEO WITH SEPARATE AES AUDIO

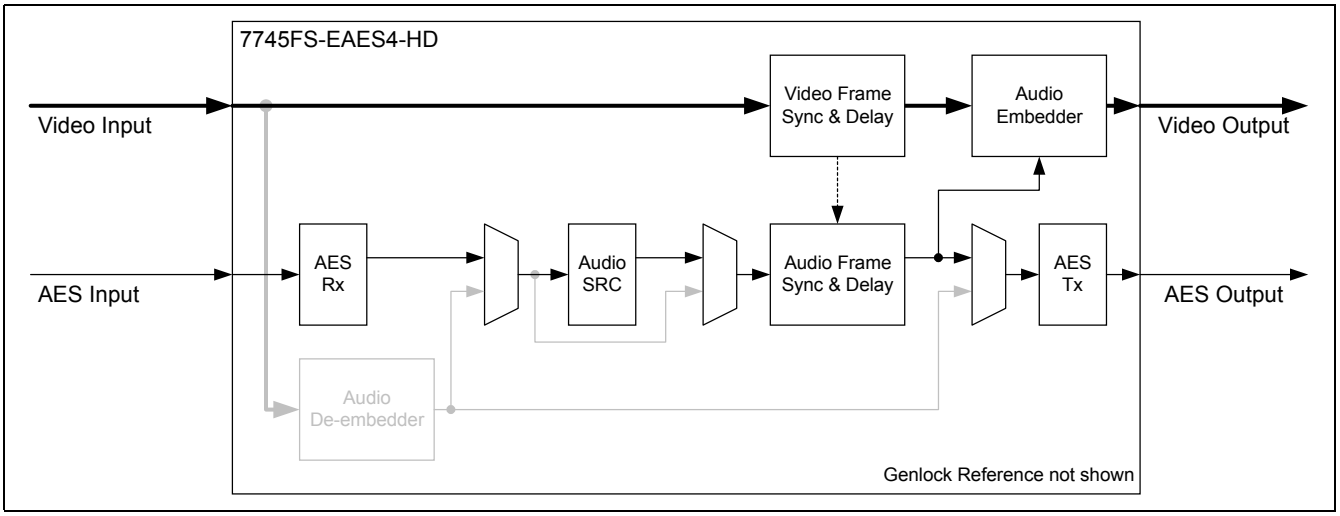


Figure 12: Synchronize Video with Separate AES Audio

Video input = video with embedded audio (uncompressed PCM) in Group 1 & 2
Audio Input = 4 AES

Video output = synchronized video with synchronized audio into Group 1 & 2
AES output = synchronized audio

Control Settings:

DIP switch 5	Audio Source = off (AES input)
Toggle switch mode 6	SRC Bypass = off
Toggle switch mode 7	Breakout Audio = normal audio mode
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2

9.3. DELAY VIDEO AND EMBED COMPRESSED AUDIO FROM AES

Video input = video that is synchronous to genlock reference
Audio Input = synchronous AES input with compressed audio
Video output = delayed video with audio embedded into Group 1 & 2
AES output = delayed audio output

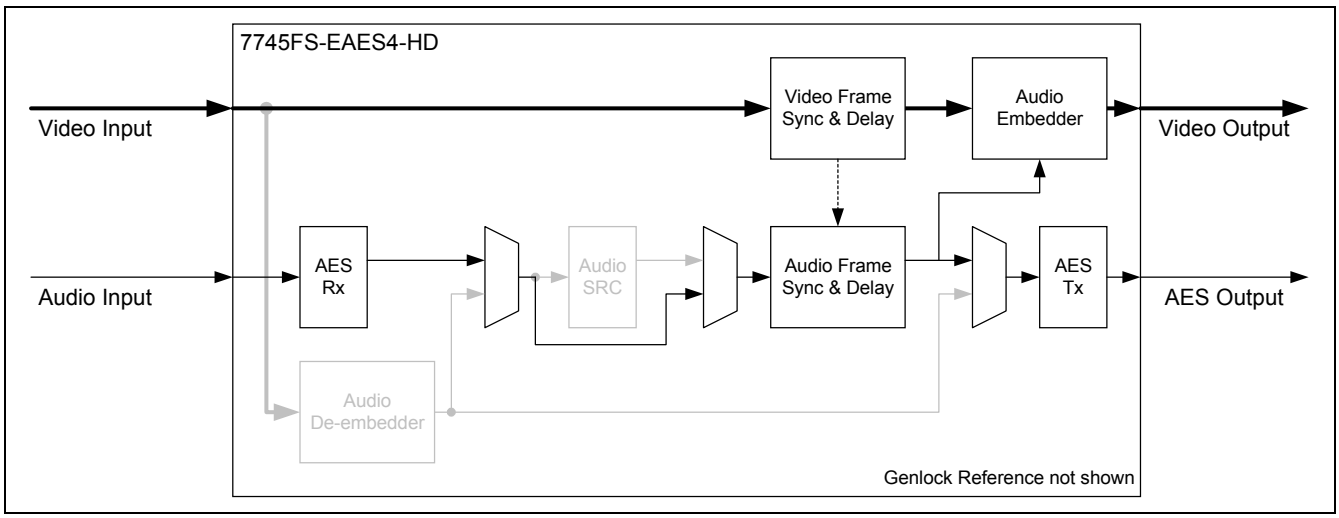


Figure 13: Delay Video and Embed Compressed Audio from AES

Control Settings:

DIP switch 5	Audio Source = off (AES input)
Toggle switch mode 6	SRC Bypass = SRC bypassed
Toggle switch mode 7	Breakout Audio = normal audio mode
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2

9.4. SYNCHRONIZE VIDEO WITH EMBEDDED COMPRESSED AUDIO, OUTPUT THE AUDIO TO EXTERNAL DECOMPRESSOR AND THEN SYNCHRONIZE AND EMBED THE UNCOMPRESSED AUDIO

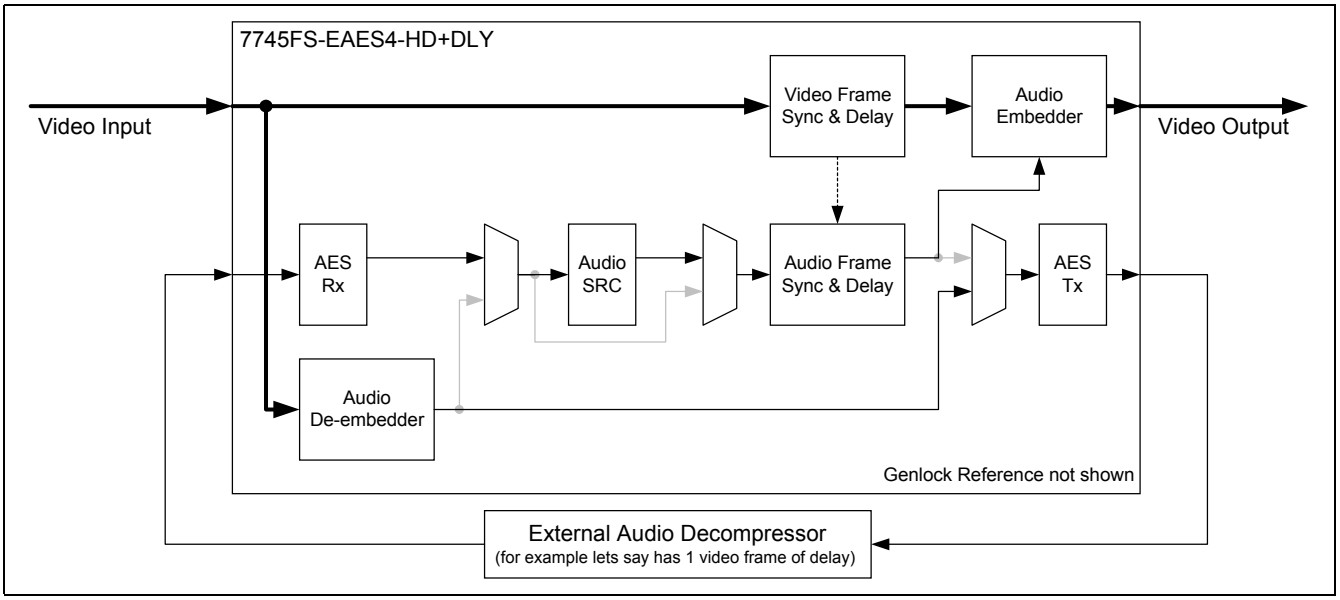


Figure 14: Synchronize Video with Embedded Compressed Audio, Output the Audio to External Decompressor and Then Synchronize and Embed the Uncompressed Audio

Video input = video with compressed embedded audio
Audio Input = from an external audio decompressor

Video output = synchronized video with embedded and synchronized uncompressed audio
AES output = compressed audio

Control Settings:

DIP switch 5	Audio Source = off (AES input)
Toggle switch mode 4	extra video delay = +1 frames
Toggle switch mode 6	SRC Bypass = off
Toggle switch mode 7	Breakout Audio = breakout mode
Toggle switch mode 8	DMX1 Group = 1
Toggle switch mode 9	DMX2 Group = 2
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2
Toggle switch mode 14	extra audio delay = 0 frames

9.5. DELAY VIDEO WITH EMBEDDED UNCOMPRESSED AUDIO, OUTPUT THE AUDIO TO EXTERNAL COMPRESSOR AND THEN EMBED THE UNCOMPRESSED AUDIO

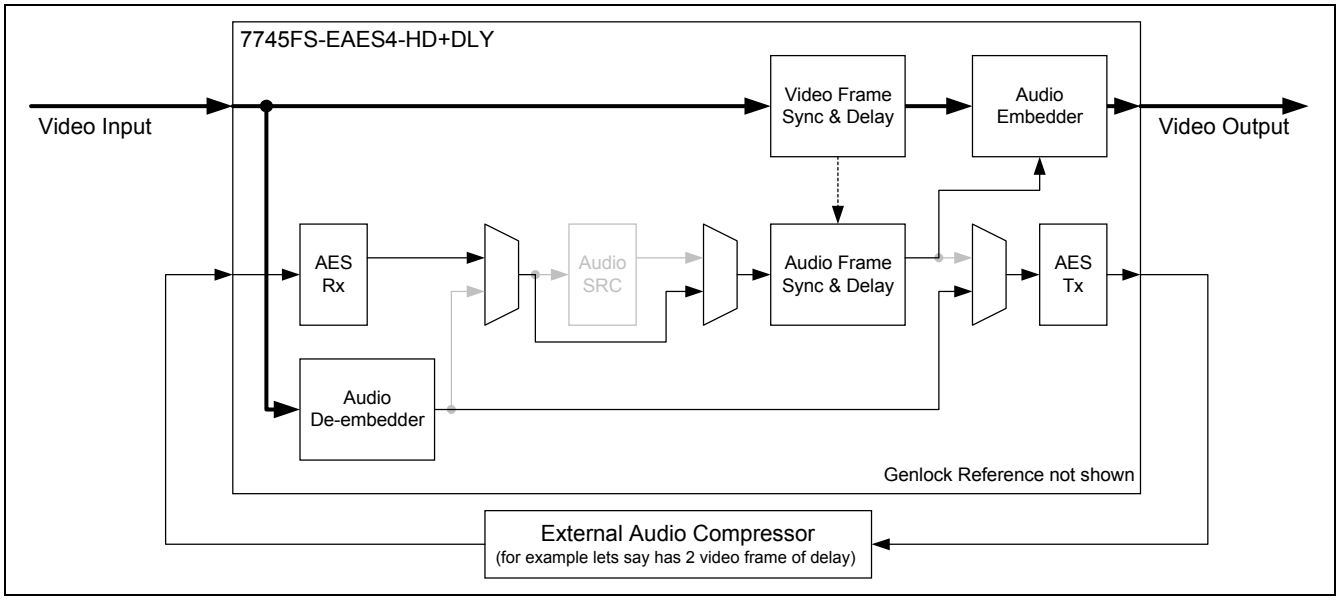


Figure 15: Delay Video With Embedded Uncompressed Audio, Output The Audio To External Compressor And Then Embed The Uncompressed Audio

Video input = video with compressed embedded audio
Audio Input = from an external audio decompressor
Video output = synchronized video with embedded and synchronized uncompressed audio
AES output = compressed audio

Control Settings:

DIP switch 5	Audio Source = off (AES input)
Toggle switch mode 4	extra video delay = +2 frames
Toggle switch mode 6	SRC Bypass = bypassed
Toggle switch mode 7	Breakout Audio = breakout mode
Toggle switch mode 8	DMX1 Group = 1
Toggle switch mode 9	DMX2 Group = 2
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2
Toggle switch mode 14	extra audio delay = 0 frames

9.6. SYNCHRONIZE VIDEO AND DEMUX AUDIO TO AES OUTPUTS, AND EMBED NEW AUDIO FROM AES INPUTS

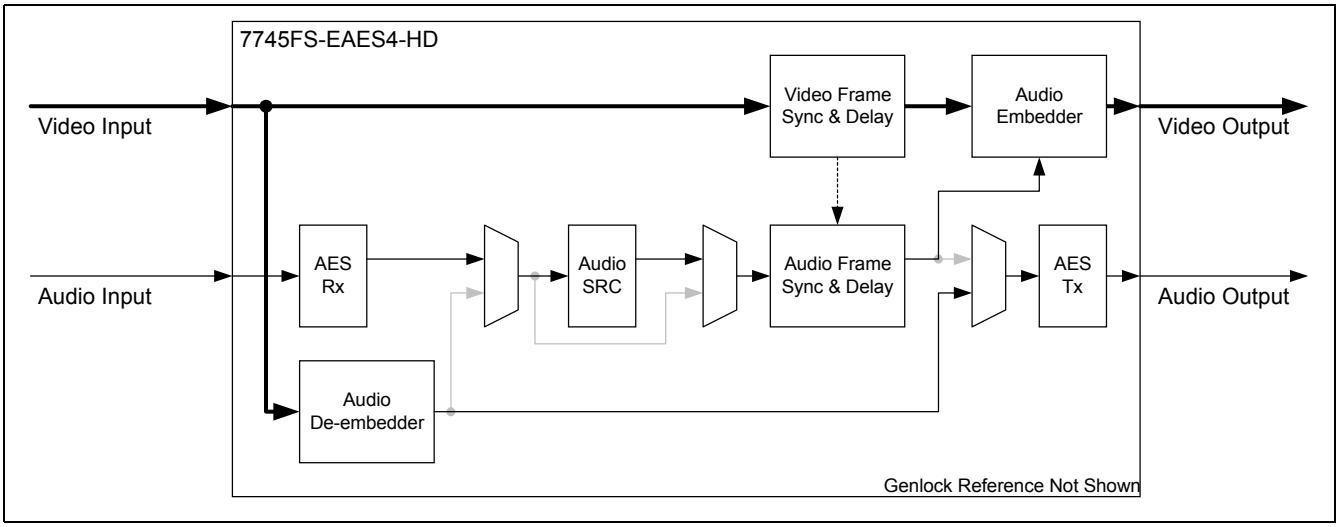


Figure 16: Synchronize Video and Demux Audio to AES Outputs, And Embed New Audio from AES Inputs

Video input = video with compressed embedded audio
Audio Input = from an external audio decompressor
Video output = synchronized video with embedded and synchronized uncompressed audio
AES output = compressed audio

Control Settings:

DIP switch 5	Audio Source = off (AES input)
Toggle switch mode 6	SRC Bypass = off
Toggle switch mode 7	Breakout Audio = breakout mode
Toggle switch mode 8	DMX1 Group = 1
Toggle switch mode 9	DMX2 Group = 2
Toggle switch mode 10	Embedder1 enable = enable
Toggle switch mode 11	Embedder1 Group = 1
Toggle switch mode 12	Embedder2 enable = enable
Toggle switch mode 13	Embedder2 Group = 2

10. *Vista*LINK™ REMOTE MONITORING/CONTROL (7745FS-EAES4-HD WITH THE PH OPTION INSTALLED)

10.1. What is *Vista*LINK™?

*Vista*LINK™ is Evertz's remote monitoring and control capability 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. For monitoring there needs to be a detecting device that automatically reports all errors to a central alarm and error logging station. We also need to be able to interrogate individual detector devices from the central station to determine the status of individual channels. Finally, we need to be able to configure devices in the network from the 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 *Vista*LINK™ Pro Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz *Vista*LINK™ enabled products.

2. Managed devices (such as 7745FS-EAES4-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 and 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 *Vista*LINK™ network, see the 7700FC Frame Controller chapter.

10.2. *Vista*LINK™ MONITORED PARAMETERS

The following parameters can be remotely monitored through the *Vista*LINK™ interface.

Parameter	Description
Input Video Type	Indicates the video type (SD or HD)
Input Video Present	Indicates the presence of a valid video input signal. (the state of the VIDEO PRESENT LED)
Input Video Standard	Indicates video standard of input signal
Genlock Present	Indicates the presence of a valid video input signal. (the state of the REFERENCE LED)
Audio Present	Indicates the presence of a valid video input signal. (the state of the AUDIO LED)
Audio Group 1 Present	Indicates the presence of embedded audio in group 1. (the state of the Group 1 present LED)
Audio Group 2 Present	Indicates the presence of embedded audio in group 2. (the state of the Group 2 present LED)
Audio Group 3 Present	Indicates the presence of embedded audio in group 3. (the state of the Group 3 present LED)
Audio Group 4 Present	Indicates the presence of embedded audio in group 4. (the state of the Group 4 present LED)

Table 27: *Vista*LINK™ Monitored Parameters

10.3. *Vista*LINK™ CONTROLLED PARAMETERS

Parameter	Description
Video Standard	Sets the video standard
V Phase	Sets the vertical phase with respect to the genlock reference
H Phase	Sets the horizontal phase with respect to the genlock reference
Additional Video Delay	Sets additional Video Delay
Video Freeze Mode	Sets action on loss of input video
Sample Rate Converter Enable	Enables and disables the sample rate converters
Audio Breakout Mode	Enables and disables audio breakout mode
Audio De-embedder 1 Source	Sets source group for de-embedder 1
Audio De-embedder 2 Source	Sets source group for de-embedder 2
Audio Embedder 1 Group	Sets destination group for embedder 1 or disable embedder 1
Audio Embedder 2 Group	Sets destination group for embedder 2 or disable embedder 2
Additional Audio Delay	Sets additional audio delay
Video Black Level	Sets the black level (DC Offset) of the video
Video Luminance gain	Sets the luminance gain of the video
Video Chroma gain	Sets the chroma gain of the video
Audio Ch1 processing	Sets what audio will be output on channel 1
Audio Ch2 processing	Sets what audio will be output on channel 2
Audio Ch3 processing	Sets what audio will be output on channel 3
Audio Ch4 processing	Sets what audio will be output on channel 4
Audio Ch5 processing	Sets what audio will be output on channel 5
Audio Ch6 processing	Sets what audio will be output on channel 6
Audio Ch7 processing	Sets what audio will be output on channel 7
Audio Ch8 processing	Sets what audio will be output on channel 8
Audio Ch1 Gain	Sets the gain of Audio channel 1
Audio Ch2 Gain	Sets the gain of Audio channel 2
Audio Ch3 Gain	Sets the gain of Audio channel 3
Audio Ch4 Gain	Sets the gain of Audio channel 4
Audio Ch5 Gain	Sets the gain of Audio channel 5
Audio Ch6 Gain	Sets the gain of Audio channel 6
Audio Ch7 Gain	Sets the gain of Audio channel 7
Audio Ch8 Gain	Sets the gain of Audio channel 8

Table 28: *Vista*LINK™ Controlled Parameters

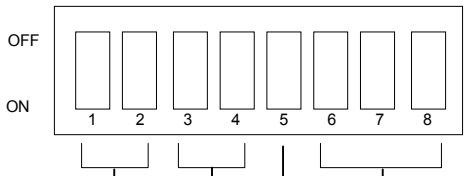
10.4. *Vista*LINK™ TRAPS

Trap	Description
Video Present	Triggers when video is present/missing
Video Input Switch	Triggers when video is interrupted
Genlock Present	Triggers when genlock is present/missing
AES 1 Present	Triggers when AES 1 audio is present/missing
AES 2 Present	Triggers when AES 2 audio is present/missing
AES 3 Present	Triggers when AES 3 audio is present/missing
AES 4 Present	Triggers when AES 4 audio is present/missing
Demux 1 Group Present	Triggers when the Demux 1 group audio is present/missing
Demux 2 Group Present	Triggers when the Demux 2 group audio is present/missing

Table 29: *Vista*LINK™ Traps

11. DIP SWITCH QUICK REFERENCE

11.1. DIP SWITCH QUICK REFERENCE (7745FS-HD AND 7745FS-HD-AES)



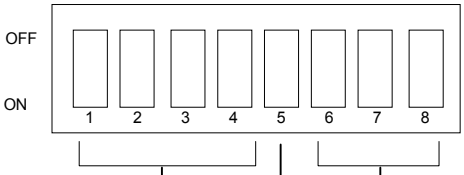
DIP 6	DIP 7	DIP 8	Video Format
Off	Off	Off	1080p/23.98sF
On	Off	Off	1080p/24sF
Off	On	Off	Future Use
On	On	Off	1080i/50
Off	Off	On	1080i/59.94 or 480p/59.94
On	Off	On	1080i/60
Off	On	On	720p/59.94
On	On	On	720p/60

DIP 5	Output on Loss of Input Video
Off	Freeze video (uses Freeze Mode setting).
On	Output black.

DIP 3	DIP 4	Additional Video Delay
Off	Off	0 frames
Off	On	1 frames
On	Off	2 frames
On	On	3 frames

DIP 1	DIP 2	Toggle Switch Select Mode
Off	Off	Freeze mode (Frame, field 1 or field 2)
Off	On	Reserved for future use
On	Off	Adjust output V phase
On	On	Adjust output H phase

11.2. DIP SWITCH QUICK REFERENCE (7745FS-EAES4-HD)



DIP 6	DIP 7	DIP 8	Video Format
Off	Off	Off	1080p/23.98sF
On	Off	Off	1080p/24sF
Off	On	Off	Future Use
On	On	Off	1080i/50
Off	Off	On	1080i/59.94 or 480p/59.94
On	Off	On	1080i/60
Off	On	On	720p/59.94
On	On	On	720p/60

DIP 5	Audio Source
Off	AES Inputs.
On	Embedded Audio

DIP				TOGGLE SWITCH FUNCTION
1	2	3	4	
Off	Off	Off	Off	Help / Module Status
On	Off	Off	Off	Adjust V phase of output video to the genlock reference.
Off	On	Off	Off	Reserved
On	On	Off	Off	Adjust H phase of output video to the genlock reference.
Off	Off	On	Off	Set additional video delay
On	Off	On	Off	Set video freeze mode (black, frame, field 1 or field 2)
Off	On	On	Off	Enable/disable audio sample rate converter
On	On	On	Off	Set audio breakout mode
Off	Off	Off	On	De-embedder 1 group select
On	Off	Off	On	De-embedder 2 group select
Off	On	Off	On	Enable/disable embedder 1
On	On	Off	On	Embedder 1 group select
Off	Off	On	On	Enable/disable embedder 2
On	Off	On	On	Embedder 2 group select
Off	On	On	On	Adjust Audio Delay
On	On	On	On	VistaLINK™ Control

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