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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Separated 7710XUC-AES4-HD and 7710XUDC-AES4-HD into own manual.	Oct 05
0.2	Updated Noise Reduction section.	Dec 05
0.3	Added 7710XUC-HD.	Feb 06
1.0	Full Release of manual	Jul 06

1. OVERVIEW

The 7710XUC series of products is designed to solve the problems of adapting to different SD and HD formats, while also offering high quality up-, cross-, and down-conversion.

There is an input BNC, an output BNC, an output BNC with an on-screen display, and a BNC that can be configured as either an input or an output. All output BNCs contain the same video. When the input/output BNC is an input, the video source BNC is configurable (see section 6.3.4).

On the 7710XUDC-AES4-HD, there are four additional output BNCs. Two of these BNCs are for SD serial digital outputs, and the other two are for SD composite analog video outputs. These BNCs are on the down-converter area of the card.

The versions available are displayed in the table below:

Model	Conversion			Audio Processing	
	Input	Output		Embedded	AES
7710XUC-HD	HD	HD	1080 ⇔ 720	2 groups	-
		SD	1080/720 ⇒ 525/625		
	SD	HD	525/625 ⇒ 1080/720		
		SD	525/625 ⇔ 525/625 (ARC)		
7710XUC-AES4-HD	HD	HD	1080 ⇔ 720	2 groups	4
		SD	1080/720 ⇒ 525/625		
	SD	HD	525/625 ⇒ 1080/720		
		SD	525/625 ⇔ 525/625 (ARC)		
7710XUDC-AES4-HD	HD	HD & SD	1080 ⇔ 720 & 1080/720 ⇒ 525/625	2 groups	4
	SD	HD & SD	525/625 ⇒ 1080/720 & 525/625 ⇔ 525/625 (ARC)		

The 7710XUC-HD and 7710XUC-AES4-HD provide a single video format conversion. This can be an up-conversion, a down-conversion, or a cross-conversion. It can also be used to provide an SD-to-SD conversion. When using SD input, noise reduction can be applied. Detail enhancement and gamma correction are available on all conversions.

HD video formats are 1.5Gb/s video formats defined by SMPTE292M, and SD video formats are defined by SMPTE 296M.

The 7710XUC-HD has 10-bit processing plus external Genlock. The 7710XUC-AES4-HD has the same outputs and Genlock, but also provides two composite analog video outputs. The composite analog video outputs are only valid with SD output.

The 7710XUDC-AES4-HD High-Definition Format Up/Down/Cross Converter is similar to the 7710XUC-HD but provides *simultaneous* cross- and down-conversion.

All the modules accept two groups of embedded audio on the input and re-embed them into the serial video outputs. The "-AES4" versions also accept four external discrete unbalanced AES inputs and provide four AES outputs with the same audio that is being embedded. In the case of the 7710XUDC-AES4-HD, the four AES outputs with the same audio are embedded on the output SD video signals, since they share one common audio processor. The 7710XUC-AES4-HD has a separate audio processor for the four AES outputs.

The re-embedded audio normally has the appropriate delay added to compensate for video delay incurred by the conversion process, thus avoiding the need for external de-embedding and re-embedding of audio. An additional audio delay adjustment can also be made for lip sync correction.

The units also transfer the closed caption and time code information from input to output performing all necessary HD-to-SD and SD-to-HD translation and time code recalculations.

The 7710XUC-HD and 7710XUC-AES4-HD occupies two card slots in the 3RU frame (7700FR-C), which will hold up to fifteen 1-slot modules, or one slot in the 1RU frame (7701FR), which will hold up to three modules.

The 7710XUDC-AES4-HD occupies three card slots in a 3RU frame (7700FR-C), which will hold up to fifteen 1-slot modules.

The units also provide card edge LEDs to indicate signal present, Genlock present, and audio groups present.

Features:

- High quality HD -> HD cross-conversion
- High quality SD -> HD up-conversion with Noise Reduction
- High quality HD -> SD down-conversion (*simultaneous* cross- and down-conversion with 7710XUDC-AES4-HD)
- Image Enhancement for HD and SD
- Supports standard aspect ratio conversions plus all user definable
- Support all necessary colour space conversions (ITU rec. 601 to ITU rec.709) and SMPTE 240M (for 1035i)
- Full video processing functions: RGB gain, YCrCb gain and offset, hue adjustment, RGB gamma correction, and RGB colour limiter
- Reference input allows for phasing of output video
- Module supports minimum delay or variable delay for video output without reference
- Module supports video output referenced to Genlock with variable delay
- Output on-screen display (OSD) used to configure the operating modes
- De-embeds Audio from HD/SD video input and embeds into HD/SD video output (two groups)
- Supports retimed external four AES inputs and outputs (on "-AES4" versions only)
- Moves VITC time code and Line 21 captions from the SD video into the HD video ancillary data
- Moves RP-188 VITC and LTC from HD input to HD output, recalculated for frame rate changes
- Moves HD closed captions from HD input to HD output

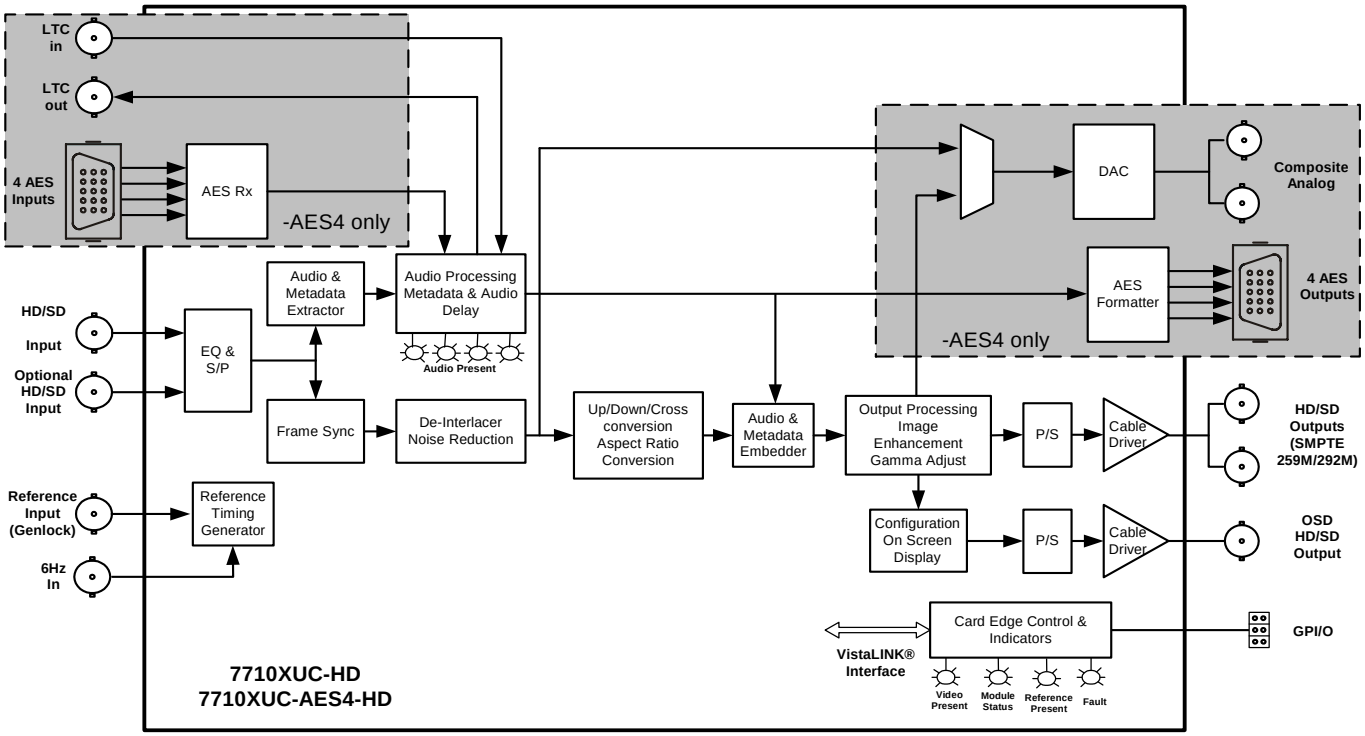


Figure 1: 7710XUC-HD and 7710XUC-AES4-HD Block Diagram

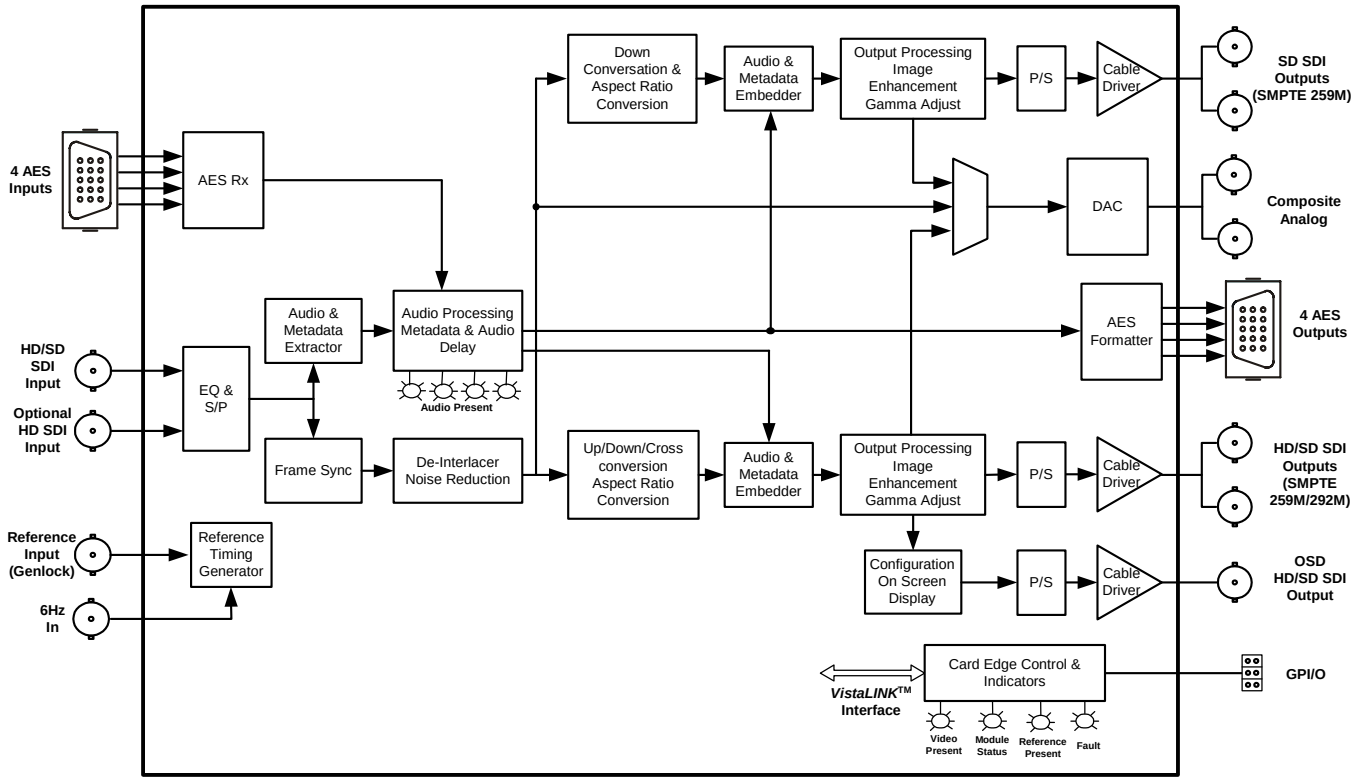


Figure 2: 7710XUDC-AES4-HD Block Diagram

2. INSTALLATION

The 7710XUC-HD and 7710XUC-AES4-HD modules come with a companion rear plate that occupies two slots in the frame. The 7710XUDC-AES4-HD also comes with a companion rear plate that occupies three slots in the frame. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.

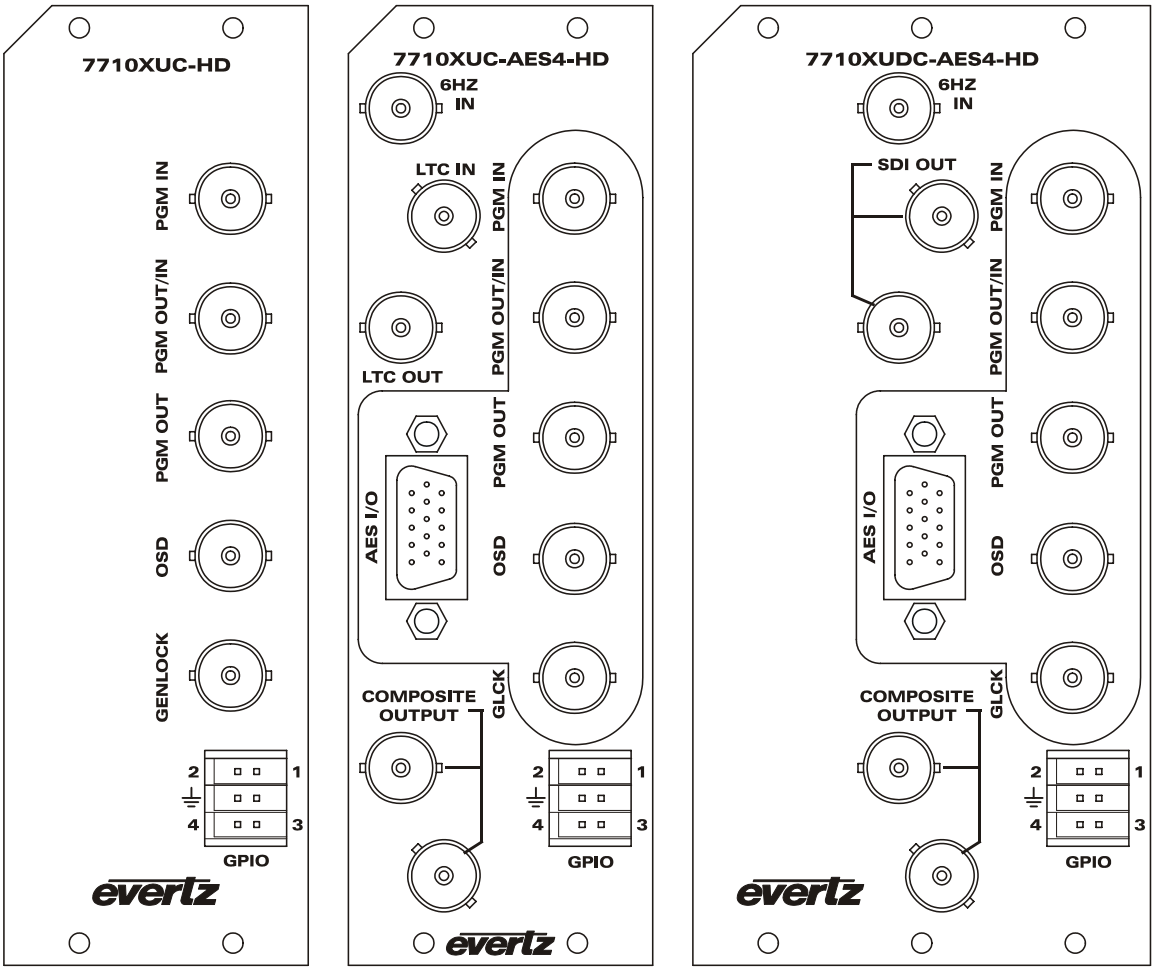


Figure 3: Rear Panels

2.1. VIDEO CONNECTIONS

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

PGM OUT/IN This BNC connector is used to output the converted input video as serial component video, compatible with the SMPTE 292M standard (i.e. HD only). It can also be configured as an alternate video input compatible with SMPTE 292M standard using menu system. Only the 7710XUC-HD supports both HD and SD (SMPTE 259M) as an alternate video input.

PGM OUT This BNC connector is used to output the converted input video as serial component video, compatible with the SMPTE 292M or SMPTE 259M standard.

OSD This BNC connector is used to output the converted input video as serial component video compatible with the SMPTE 292M standard and has on-screen display menus (OSD) superimposed over the video. When the 7710XUC-HD or 7710XUC-AES4-HD is operated in a down-conversion mode, the OSD output will be compatible with the SMPTE 259M standard.

COMPOSITE These BNC connectors (only on "-AES4" versions) are used to output the down-converted or aspect ratio converted SD video as composite analog video.

2.1.1. 7710XUDC-AES4-HD

SDI OUT These BNC connectors are used to output the down-converted input video as serial component video, compatible with the SMPTE 259M standard.

2.2. GENLOCK REFERENCE

For proper synchronization of the output video, the Format Translator/Cross Converter must be locked to a Genlock signal of the output video format.

GENLOCK This BNC is used to connect a bi-level or tri-level sync reference and is auto-detected by the module. Jumper J21 selects whether the reference input is terminated to 75 ohms or high impedance (default). See section 7.3 for further information about jumpers. The output video can be timed with respect to the Genlock video using the *H Phase Offset* and *V Phase Offset* menu items (See section 6.3.1). When no Genlock is provided, the output video is timed with respect to the input video.

6Hz IN This BNC connector is used to input a 6Hz reference for the A-frame controller used for 3:2 pulldown. This BNC connector only appears on the "-AES4" versions. On the non "-AES4" versions, GPI4 can be used as the 6Hz reference. To do so, the jumper settings must be configured as in Section 7.6 below.

AUX SDI IN On older versions of the 7710XUDC-AES4-HD, there was an AUX SDI IN instead of a 6Hz IN. The AUX SDI IN does not have any functionality. If 6Hz IN support is required, the module needs to be returned to the Evertz facility for modifications.

2.3. TIME CODE (7710XUC-AES4-HD ONLY)

LTC IN This BNC connector is used to input Time Code.

LTC OUT This BNC connector is used to output Time Code.

2.4. AES INPUT AND OUTPUT AUDIO CONNECTIONS ("-AES4" VERSIONS ONLY)

Four unbalanced AES inputs and outputs are provided on eight BNC connectors on the HD DB-15 connector labeled **AES I/O** on the 7710XUC-AES4-HD and 7710XUDC-AES4-HD. These inputs and outputs are for unbalanced AES signals conforming to SMPTE 276M. The user can select whether audio from the four AES input pairs, or from two groups of embedded audio, is re-embedded on the output video. The transferred audio is also output as four AES pairs. Table 1 shows the DB15 connector pinout.

Name	Description	DB-15 Pin
GPI2	Reserved for Future Use	1
LTC Out	LTC output (7710XUDC only)	2
GPO1	Reserved for Future Use	3
	Reserved for Future Use	4
	Reserved for Future Use	5
LTC In	LTC input (7710XUDC only)	6
AES In 2	AES Input 2 - Unbalanced	7
GPI1	Reserved for Future Use	8
AES Out 2	AES Output 2 – Unbalanced	9
AES Out 1	AES Output 1 – Unbalanced	10
AES In 1	AES Input 1 - Unbalanced	11
AES Out 4	AES Output 4 – Unbalanced	12
AES Out 3	AES Output 3 – Unbalanced	13
AES In 4	AES Input 4- Unbalanced	14
AES In 3	AES Input 3- Unbalanced	15
GND	Ground	Shell

Table 1: AES Audio Connector Pinout

Both the 7710XUC-AES4-HD and 7710XUDC-AES4-HD are shipped with a breakout cable for the 15 pin D connector (Evertz Part # WA-1XY-R or WPAES8-BNCM-6F), which can be used to facilitate wiring the audio and GPI connections. The pinout of the cables are shown in Table 2 and Table 3.

High Density DB-15 PIN (male)	Wire	Ground/Shield Connection	Labeled Name	Connector Type	7710XUC-AES4-HD Connection Map	7710XUDC-AES4-HD Connection Map
1	Black		GPI 2	WIRE	GPI 1	GPI 1
2	Black		Tx	WIRE		LTC Out
3	Black		GPO 1	WIRE	GPO 1	GPO 1
4	Black		(not used)			
5	Black		(not used)			
6	Black		Rx	WIRE		LTC In
7	Black	Soldered to Shell	AES A2	BNC MALE	AES In 2	AES In 2
8	Black		GPI 1	WIRE	GPI 1	GPI 1
9	Black	Soldered to Shell	AES B2	BNC MALE	AES Out 2	AES Out 2
10	Black		AES B1	BNC MALE	AES Out 1	AES Out 1
11	Coax	Soldered to Shell	AES A1	BNC MALE	AES In 1	AES In 1
12	Coax	Soldered to Shell	AES B4	BNC MALE	AES Out 4	AES Out 4
13	Coax	Soldered to Shell	AES B3	BNC MALE	AES Out 3	AES Out 3
14	Coax	Soldered to Shell	AES A4	BNC MALE	AES In 4	AES In 4
15	Coax	Soldered to Shell	AES A3	BNC MALE	AES In 3	AES In 3
Shell	Black		GND	WIRE	GND	GND

Table 2: AES Audio Breakout Cable (Evertz Part # WA-1XY-R)

High Density DB-15 PIN (male)	Wire	Ground/Shield Connection	Labeled Name	Connector Type	7710XUC-AES4-HD Connection Map	7710XUDC-AES4-HD Connection Map
1	Red		W1 RED	WIRE	GPI 1	GPI 1
2	Green		W2 GREEN	WIRE		LTC Out
3	Blue		W3 BLUE	WIRE	GPO 1	GPO 1
4	(not used)		(not used)			
5	(not used)		(not used)			
6	White		W4 WHITE	WIRE		LTC In
7	Black	Soldered to Shell	AES A2	BNC MALE	AES In 2	AES In 2
8	Yellow		W5 YELLOW	WIRE	GPI 1	GPI 1
9	Coax	Soldered to Shell	AES B2	BNC MALE	AES Out 2	AES Out 2
10	Coax	Soldered to Shell	AES B1	BNC MALE	AES Out 1	AES Out 1
11	Coax	Soldered to Shell	AES A1	BNC MALE	AES In 1	AES In 1
12	Coax	Soldered to Shell	AES B4	BNC MALE	AES Out 4	AES Out 4
13	Coax	Soldered to Shell	AES B3	BNC MALE	AES Out 3	AES Out 3
14	Coax	Soldered to Shell	AES A4	BNC MALE	AES In 4	AES In 4
15	Coax	Soldered to Shell	AES A3	BNC MALE	AES In 3	AES In 3
Shell	Black		GND	WIRE	GND	GND

Table 3: AES Audio Breakout Cable (Evertz Part # WPAES8-BNCM-6F)

2.5. GENERAL PURPOSE INPUTS AND OUTPUTS

On all versions of the module, a 6-pin connector labeled **GPIO** contains four GPI/O inputs.

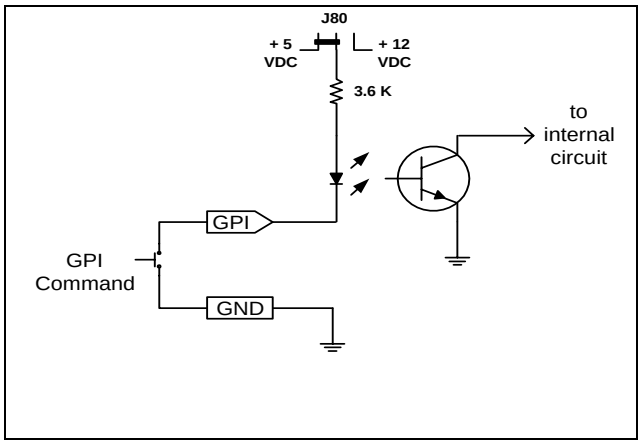


Figure 4: GPI Input Circuitry

The GPO is active low with internal pull up (10k Ohm) resistors to +5 V. When the output goes low, it is able to sink up to 10 mA. When the output is high, the signal will go high (+5V). **Do not draw more than 100μA from the output.** Figure 5 shows the circuit for the general-purpose output. The GPO output is not used at this time.

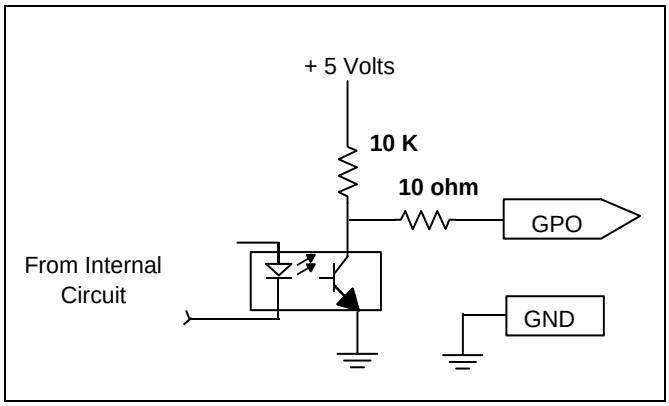


Figure 5: GPO Output Circuitry

3. SPECIFICATIONS

3.1. SERIAL DIGITAL VIDEO INPUTS

Standards: 270Mb/sec SMPTE 259M or 1.485 Gb/sec SMPTE 292M – menu selectable.
SMPTE 260M, SMPTE 274M, SMPTE 296M, SMPTE 349M
Number of Inputs: 1 or 2 (optional based on PGM IN/OUT configuration)
Connector: BNC per IEC 60169-8 Amendment 2
Input Equalization: Automatic to 100m @ 1.5Gb/s with Belden 1694 or equivalent cable
Return Loss:
SD Standards: >15 dB up to 540Mb/s
HD Standards: >15 dB up to 1. 5Gb/s

3.1. SERIAL DIGITAL VIDEO OUTPUTS

Standard: 270Mb/s SMPTE 259M. or 1.485 Gb/s SMPTE 292M.
Number of Outputs: 3 Per Card (or 2 based on PGM IN/OUT configuration)
2 Per Card SD Only (7710XUDC-AES4-HD only)
Connector: BNC per IEC 60169-8 Amendment 2
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
Return Loss:
SD Standards: > 15 dB at 540MHz
HD Standards: > 15 dB at 1.5 GHz

3.2. ANALOG COMPOSITE VIDEO OUTPUT

Standard: SMPTE 170M (NTSC), ITU-R BT470-6 (PAL)
Number of Inputs: 2 (only on "-AES4" versions)
Connector: BNC per IEC 60169-8 Amendment 2
Signal Level: 1V nominal
Output Impedance: 75 Ohm
DC Offset: 0V +/- 50mV
Return Loss: >45dB to 10MHz
Frequency Response: <+/- 0.1dB to 4 MHz (response will depend on selected filtering)
Differential Phase: < 0.5° (< 0.3° typical)
Differential Gain: < 0.5% (< 0.3% typical)
SNR: >75dB (black video, 100kHz to 5MHz)
Output level control range: ±10%
Black level control range: ±7.5 IRE
Chroma level control range: ±10%
Hue control range: ±15 deg. (NTSC only)

3.3. GENLOCK INPUT

Type: HD Tri-Level sync, NTSC or PAL Colour Black 1 V p-p
Connector: BNC per IEC 60169-8 Amendment 2
Termination: 75 ohm (jumper selectable)

3.4. 6Hz INPUT

Standard: 6Hz TTL Pulse
Number of Inputs: 1 (only on "-AES4" versions)
Connector: BNC per IEC 60169-8 Amendment 2
Termination: 75 ohm (jumper selectable)

3.5. LTC INPUT

Standard: SMPTE 12M
Number of Inputs: 1 (7710XUC-AES4-HD only)
Connector: BNC per IEC 60169-8 Amendment 2
Termination: 75 ohm (jumper selectable)

3.6. LTC OUTPUT

Standard: SMPTE 12M
Number of Inputs: 1 (7710XUC-AES4-HD only)
Connector: BNC per IEC 60169-8 Amendment 2
Termination: 75 ohm (jumper selectable)

3.7. AES AUDIO INPUTS

Number of Inputs: 4 (only on "-AES4" versions)
Standard: SMPTE 276M, single ended synchronous or asynchronous AES
Connectors: DB15
Resolution: 24 bits
Sampling Rate: 48 kHz
Impedance: 75 Ω
Signal Level: 1 V p-p nominal

3.8. AES AUDIO OUTPUTS

Number of Outputs: 4 (only on "-AES4" versions)
Standard: SMPTE 276M, single ended synchronous AES
Connectors: DB15
Resolution: 24 bits
Sampling Rate: 48 kHz
Impedance: 75 Ω
Signal Level: 1 V p-p nominal

3.9. GENERAL PURPOSE INPUTS AND OUTPUTS

Number: 4 (configurable as inputs or outputs)
Type: Opto-isolated, active low with internal pull-ups to +5 or +12V (jumper settable)
Connector: 6 pin removable terminal block
Signal Level: closure to ground
Function:
Inputs: User Preset select
Outputs:

3.10. ELECTRICAL

Voltage: +12VDC
Power: 26 Watts. (7710XUC-HD and 7710XUC-AES4-HD)
35 Watts (7710XUDC-AES4-HD)
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.11. PHYSICAL

Number of slots:
7700 frame mounting: 2 (7710XUC-HD and 7710XUC-AES4-HD)
3 (7710XUDC-AES4-HD)
7701 frame mounting: 1 (7710XUC-HD and 7710XUC-AES4-HD)

4. STATUS INDICATORS

The 7710XUC-HD modules have a number of LED Status indicators on the card edge of the main and sub board modules to show operational status of the card at a glance. Figure 6 and Figure 7 show the locations of the LEDs and card edge controls.

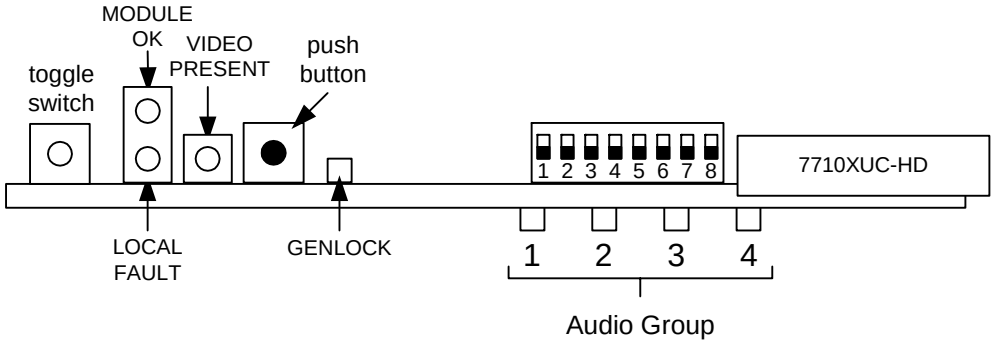


Figure 6: LED Status Indicators: 7710XUC-HD

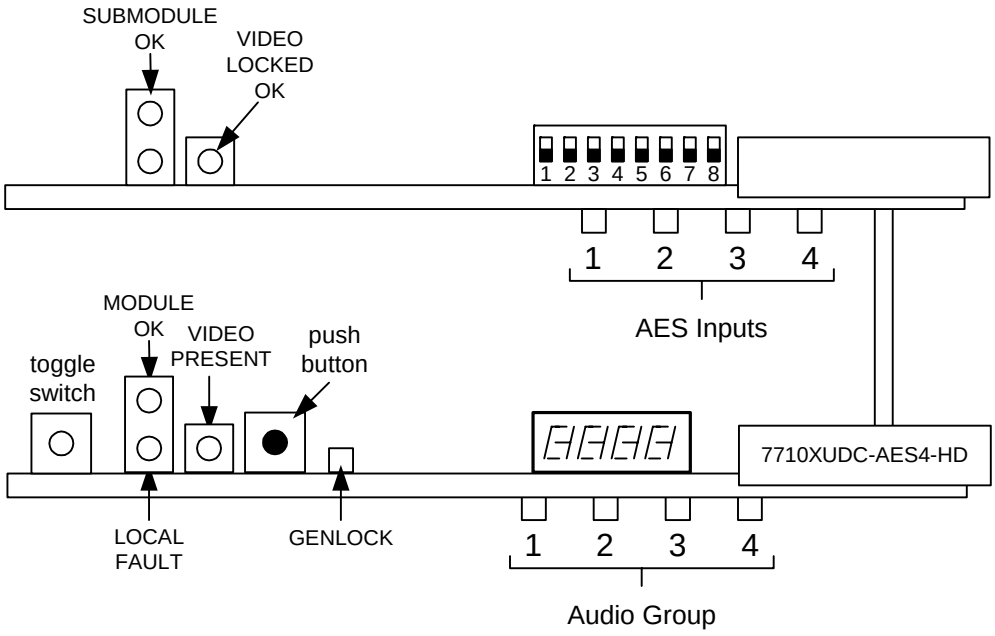


Figure 7: LED Status Indicators: "-AES4" Versions

Four 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 and will be on during the absence of a valid input signal or if a local input power fault exists (i.e.: a blown fuse). The red LED will also turn on if there is no valid video signal present at the module input or if the board is not locked to the genlock source. 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 a valid input signal is present, the board is locked to the genlock source, and the board power is good.

VIDEO PRESENT This green LED will be on when there is a valid video signal present at the module input, depending on the module configuration. For example, if the video input source is Main PGM, then the LED will indicate a signal presence on that input. The same applies if PGM IN/OUT is configured as the video input source.

GENLOCK This green LED will be on when there is a signal present at the module Genlock input. This LED will blink to indicate that an improper signal for the current video format is present.

The large LEDs on the sub board of the module (only on "-AES4" versions) indicate the following:

SUBMODULE OK: This green LED indicates good module health. On the 7710XUDC-AES4-HD, it will be on when a valid input signal is present on the sub board, and the board power is good. On the 7710XUC-AES4-HD, it is identical to the MODULE OK LED on the main board.

VIDEO LOCKED This green LED will be on when there is a down-converted video signal on the sub board.

4.1. AUDIO STATUS LEDS

Four LEDs located on the main board on the lower end of the module (near the card extractor) indicate which audio groups are present in the input video. Audio group LED 1 is located closest to the center of the module.

Audio Group LED	Colour	Audio Group Status
1	Off	No group 1 present on input video
	Green	Group 1 present on input video
2	Off	No group 2 present on input video
	Green	Group 2 present on input video
3	Off	No group 3 present on input video
	Green	Group 3 present on input video
4	Off	No group 4 present on input video
	Green	Group 4 present on input video

Table 4: Audio Group Status LEDs

On the sub board, the four LEDs located on the lower end of the module (near the card extractor) indicate which discrete AES channels are present in the input video. Audio group LED 1 is located closest to the center of the module.

Audio Group LED	Colour	AES Input Status
1	Off	No signal on AES 1 input
	Green	Audio signal present on AES 1 input
2	Off	No signal on AES 2 input
	Green	Audio signal present on AES 2 input
3	Off	No signal on AES 3 input
	Green	Audio signal present on AES 3 input
4	Off	No signal on AES 4 input
	Green	Audio signal present on AES 4 input

Table 5: AES Input Status LEDs

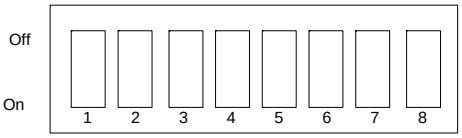
5. CARD EDGE CONTROLS

The 7710XUC-HD modules are equipped with an eight-position DIP switch to allow the user to select various functions. Figure 6 and Figure 7 show the locations of the DIP switch on the modules.

On the "-AES4" versions, there is a second set of DIP switches that are on the main board. **These switches have no functionality and should be left in factory settings.**

All positions are assigned sequentially such that the DIP switch 1 is located at the top of the DIP switch (farthest from the card ejector). Table 6 gives an overview of the DIP switch functions. Sections 5.1 to 5.2 describe the DIP switch functions. The on (closed) position is down, or closest to the printed circuit board.

The off (open) position is up, or farthest from the printed circuit board. There is also a toggle switch and pushbutton which are used to navigate the on screen menu (see section 0).



DIP Switch	Function
1	Output Video Standard
2	
3	
4	
5	
6	Frame Rate Selection
7	
8	Unused

Table 6: Overview of DIP Switch Functions

5.1. SETTING THE OUTPUT VIDEO FRAME RATE

DIP switches 6 and 7 are used to set the frame rate frequency of operation.

DIP 6	DIP 7	FRAME RATES
Off	Off	Set by Menu or VistaLINK™
On	Off	59.94/29.97/23.98
Off	On	50/25

Table 7: Frame Rate Divisor DIP Switch Settings

When DIP switches 6 and 7 are both off, the frame rate and video standard can be set by either the menu system or VistaLINK™ only (i.e.: they cannot be set by the DIP switches). **The other two settings of DIP switches 6 and 7** allow setting of the frame rate and video standard manually using the DIP switches only (i.e.: they cannot be set by the menu system or VistaLINK™).

5.2. SETTING THE OUTPUT VIDEO STANDARD

DIP switches 1 to 5 set the output video standard. DIP switches 6 and 7 set the exact frame rate.
For example to select 1080i/59.94 as the output format set switches 6 and 7 to the on and off position (select 59.94) and set switches 1 to 5 to the off position. Interlaced video formats are shown with the number of fields per second. Progressive and segmented frame formats are shown with the number of frames per second.

#	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	OUTPUT VIDEO FORMAT
0	Off	Off	Off	Off	Off	1080i/59.94
1	On	Off	Off	Off	Off	1080p/29.97
2	Off	On	Off	Off	Off	1080p/29.97sF
3	On	On	Off	Off	Off	1080p/23.98
4	Off	Off	On	Off	Off	1080p/23.98sF
5	On	Off	On	Off	Off	1035i/59.94
6	Off	On	On	Off	Off	720p/59.94
7	On	On	On	Off	Off	720p/29.97
8	Off	Off	Off	On	Off	Future Use
9	On	Off	Off	On	Off	525i/59.94
10	Off	On	Off	On	Off	1080p/25
11	On	On	Off	On	Off	1080p/25sF
12	Off	Off	On	On	Off	1080i/50
13	On	Off	On	On	Off	720p/50
14	Off	On	On	On	Off	625i/50

Table 8: Output Video Switch Settings

Note: Other DIP switch combinations are reserved for future use.

6. ON-SCREEN MENUS

6.1. NAVIGATING THE ON-SCREEN MENU SYSTEM

A toggle switch and pushbutton allow card edge navigation of a set of on-screen menus used to configure the card. To enter the on-screen menu system, press the pushbutton. This will bring you to the main Setup menu where you can use the toggle switch to move up and down the list of available sub menus. An arrow (➔) moves up and down the left hand side of the menu items to indicate which item you are currently choosing. When the arrow is at the desired item, press the pushbutton to select the next menu level.

On all menus, there are two other selectable items: *Back* and *Exit*. Selecting *Back* will take you to the previous menu (the one that was used to access the current menu) while *Exit* will return the display to its normal operating mode. On the main menu, BACK and EXIT will both take you to the normal operating mode.

Once in a sub menu, there may be another menu layer, or there may be a list of parameters to adjust. If there is another set of menu choices, use the toggle switch to select the desired menu item and press the pushbutton.

To adjust any parameter, use the toggle switch to move up or down to the desired parameter and press the pushbutton. The arrow will move to the right hand side of the line (🡄) indicating that you can now adjust the parameter. Using the toggle switch, adjust the parameter to its desired value. If the parameter is a numerical value, the number will increase if you lift the toggle switch and decrease if you push down on the toggle switch.

When you have reached the desired value, press the pushbutton. This will update the parameter to the selected value and move the arrow back to the left side of the parameter list (🡆). Continue selecting and adjusting other parameters or use the BACK or EXIT commands.

6.2. ON SCREEN DISPLAY – MAIN MENU

The OSD menu is arranged in a layered structure that groups similar configuration items together. The following section gives a brief description of the first level of menus that appear when you enter the OSD screens. Selecting one of these items will take you to the next menu level. Sections 6.3 to 6.12 provide detailed descriptions of each of the sub menus. The tables in sections 6.3 to 6.12 are arranged in an indented structure to indicate the path taken to reach the control. Menu items or parameters that are underlined indicate the factory default values.

Note: Some menu items don't appear on all models.

Video	Sets the frame rate, input and output video standards, pull down references, caption blanking, action on loss of input, timing reference select, and timing offset for the video output
Scaler	Configuration of the main output picture aspect ratio presets. Configuration of the main scaler filter sharpness, panel colors, user cropping and output picture window size
Scaler –Down Converter	Configuration of the down converter output picture aspect ratio presets. Configuration of the down converter scaler filter sharpness, panel colors, user cropping and output picture window size (XUDC version only)
Deinterlacer	Configuration of the de-interlacer frame or field mode, motion-detect thresholds
Proc Functions	Control the main video proc amp functions and image enhancement
Proc Functions Down Converter	Control the down converter video proc amp functions and image enhancement (XUDC version only)
Noise Reducer	Control application of the noise reducer
Audio	Sets the main audio groups and delay
Audio DC	Sets the down converter audio groups and delay (XUDC version only)
Audio Process Embedded	Controls embedded audio processing (7710XUC-AES4-HD version only)
Audio Process External	Controls the external AES audio processing (7710XUC-AES4-HD version only)
Audio Process	Controls up-converter audio processing (XUDC version only)
Audio Process Embedded Down Converter	Controls down-converter and external AES audio processing (XUDC version only)
Closed Captioning	Controls the closed captioning of the HD or SD signal
Composite Output	Controls composite output settings (“-AES4” options only)
Utilities	Card preset management and various debug and maintenance features

6.3. CONFIGURING THE VIDEO CONTROLS

The *Video* menus are used to configure parameters associated with the input and output video standards and output video timing. The chart below shows the items available in the *Video* menu. Sections 6.3.1 to 6.3.14 provide detailed information about each of the menu items.

Video Frame Rate	Selects the video input and output frame rate
Video Standard Input	Selects the video input standard
Video Standard Output	Selects the video output standard
Video Input Source	Selects video input from PGM IN or PGM OUT/IN BNC
Pgm Out/In Mode	Sets input or output mode of PGM OUT/IN BNC
Pulldown Reference	Selects the 3:2 pulldown reference source
A Frame Offset	Sets the offset of the A Frame from the Pulldown Referenc
SD Blanking	Selects upper lines as video or blank (525 input only)
VITC Read Select	Selects line for VITC reader (SD input formats only)
VITC Write Select	Selects line for VITC generator (SD output formats only)
Time Code Source	Selects the source of Time Code.
Loss of Video	Selects the action to take when the input video is missing
Force Minimum Delay	Set the H and V phase such that the path delay in minimized
Reference Select	Selects external or video locking reference
V Phase Offset	Sets the vertical phase of the output signal to the Genlock reference input
H Phase Offset	Sets the horizontal phase of the output signal to the Genlock reference input

6.3.1. Setting the Video Input and Output Frame rate

Video *Frame Rate* *59.94/29.97/23.98* *50/25*	This control selects the group of video standards that are available on the *Input Standard* menu item. The card does not do temporal processing, so converting from one frame rate to another is not possible.

6.3.2. Setting the Input Video Standard

- *Video*
  - *Input Standard*
    - *Auto*
    - *1080i/59.94*
    - *1080p/29.97*
    - *1080p/29.97sF*
    - *1080p/23.98*
    - *1080p/23.98sF*
    - *1035i/59.94*
    - *720p/59.94*
    - *720p/29.97*
    - *525i/59.94*
    - *1080p/25*
    - *1080p/25sF*
    - *1080i/50*
    - *720p/50*
    - *625i/50*

This control selects the input video standard being used. The choice of input standards available depends on the *Frame Rate* menu setting. For example, to select 1080i/59.94 as the output format, set the *Frame Rate* menu to *59.94/29.97/23.98,* and then set this menu item (i.e.: the Input Standard) to *1080i59.94*. Interlaced video formats are shown with the number of fields per second. Progressive formats are shown with the number of frames per second.

The module is not capable of temporal processing, so it will not convert between 59.94 and 60 or between 50 and the 60 related frame rates. The card will add or remove 3:2 pulldown when converting between nominal 24Hz and 30/60 Hz, but will not do a temporal frame conversion.

When the input standard is set to *Auto*, the module will auto-detect the video standard.

6.3.3. Setting the Output Video Standard

- *Video*
  - *Output Standard*
    - *1080i/59.94*
    - *1080p/29.97*
    - *1080p/29.97sF*
    - *1080p/23.98*
    - *1080p/23.98sF*
    - *1035i/59.94*
    - *720p/59.94*
    - *720p/29.97*
    - *525i/59.94*
    - *1080p/25*
    - *1080p/25sF*
    - *1080i/50*
    - *720p/50*
    - *625i/50*

This control selects the output standard. The choice of output standards available is dependent upon the *Frame Rate* menu setting.

The module is not capable of temporal processing, so it will not convert between 59.94 and 60 or between 50 and the 60 related frame rates. The card will add or remove 3:2 pulldown when converting between nominal 24Hz and 30/60 Hz, but will not do a temporal frame conversion.

The standard-definition output video formats are always available on the XUDC versions and therefore are not available for selection. When the input standard is one of the HD 59.94 Hz related frame rates, the standard-definition output of the XUDC will be *525i59.94.* When the input standard is one of the HD 50 Hz related frame rates, the standard-definition output of the XUDC will be *625i50.*

6.3.4. Selecting The Video Input Source

- *Video*
  - *Video Input Source*
    - *PGM IN*
    - *PGM OUT/IN*
    - *Auto*

This control selects whether the source of input video will be the **PGM IN** BNC or the **PGM OUT/IN** BNC. In order for this menu item to be enabled, the **PGM OUT/IN** Mode must be set to *Video Input.*

When set to *Auto*, the module will select the BNC with a valid video input.

6.3.5. Select the Video Mode on PGM OUT/IN

Video
PGM OUT/IN Mode
Video Output
Video Input

This control determines the whether the **PGM OUT/IN** BNC will be used as an input or output.

When it is set to *Video Output,* the **PGM OUT/IN** BNC is used as a second output with the same content as is available on the **PGM OUT** BNC.

When it is set to *Video Input,* the *Video Input Source* menu item is enabled and is used to select the source of the input video.

6.3.6. 3:2 Pulldown Processing

When using a 1080i/59.94 input video feed containing 3:2 pulldown, the 7710XUC-HD must be operated in *Field Mode* in order to minimize motion artifacts. In *Field mode,* each field of the incoming image will be converted to one field of output image, so there will be no pulldown-related de-interlacing artifacts on film-originated material with 3:2 pulldown, or video-originated material acquired at a nominal 24 frames per second.

When using a 720p/59.94 input video feed, the 7710XUC-HD will operate in *Frame Mode,* where each frame of the incoming image will be converted to one field of output image, so there will be no pulldown-related artifacts on film-originated material with 3:2 pulldown, or video-originated material acquired at a nominal 24 frames per second.

When using a 1080p/23.98sF input video feed, the 7710XUC-HD operates in *Frame Mode,* where each segment of the incoming image is combined back to a progressive frame before conversion. After conversion, extra fields are inserted to create a 3:2 pulldown at the output. The *Pulldown Reference* menu is used to determine the cadence of the 3:2 output.

6.3.7. Selecting the 3:2 Pulldown Reference with 1080p/23.98sF Input Video

This menu setting is ***only*** used when converting from a 23.98 Hz frame rate to a 59.94 Hz field or frame rate, or when converting from a 59.94 Hz field or frame rate to a 23.98 Hz frame rate. **It is not applicable in any other input to output combination.**

Video
- *Pulldown Reference*
  - *Auto*
  - *RP 188*
  - *6 Hz Input*
  - *Free Run*

When performing a 24 to 60 Hz, or a 60 to 24 Hz conversion, the *Pulldown Reference* menu is used to identify the input frame that will become an A frame at the output. This frame is called the *A frame candidate* (see Figure 8). The output of the *A frame candidate* frame will consist of two video fields, and will normally be in time with the Genlock input (see sections 6.3.1 and 6.3.14.5 for information on phasing of the output video with respect to the Genlock). The input to output delay of the A frame candidate frame is variable, and depends on the type of conversion being performed, and the relative timing between when an input frame is received and when an output frame is transmitted. Additionally, an offset can be added to the A Frame reference using the *A Frame Offset* control to accommodate situations where the A frames are not in time with the A Frame reference (see section 6.3.8).

When you select *Auto,* the card will auto-detect the pulldown reference according to the following priority:

- 6 Hz pulse, if present
- RP188 ancillary time code, if present
- Free Run pulldown (when neither 6 Hz pulse nor RP188 is present)

Select *RP 188* when the embedded ancillary time code present on the input video is used to determine the pulldown. The input frames with time code frame numbers that are divisible evenly by four (24 to 60 Hz conversion) or by five (60 to 24 Hz conversion) will normally identify the input A frame candidates.

Select *6 Hz Input* when a 6 Hz pulse connected to the 6Hz source card input (see IO Control section) and is used to determine the pulldown. The 6 Hz pulse should be a 1/30th second wide, TTL level, active high pulse, occurring six times per second, and must be coincident with the start of an input frame. The 6 Hz pulse with normally identify the A frame candidates.

Select *Free Run* when you want a continuous 3:2 pulldown on the output, but do not care if it matches specific frames of the input video.

6.3.8. Accommodating Non-Standard 3:2 Sequences

This menu setting is ***only*** used when converting from a 23.98 Hz frame rate to a 59.94 Hz field or frame rate, or when converting from a 59.94 Hz field or frame rate to a 23.98 Hz frame rate. **It is not applicable in any other input to output combination.**

Video
A Frame Offset
0
1
2
3

This control allows the user to select other frames as the A Frame.

Figure 9 shows how this control defines the A frame candidate when the 6 Hz pulse is present. Figure 10 shows how this control defines the A frame when RP188 Ancillary data is used to control the 3:2 pulldown.

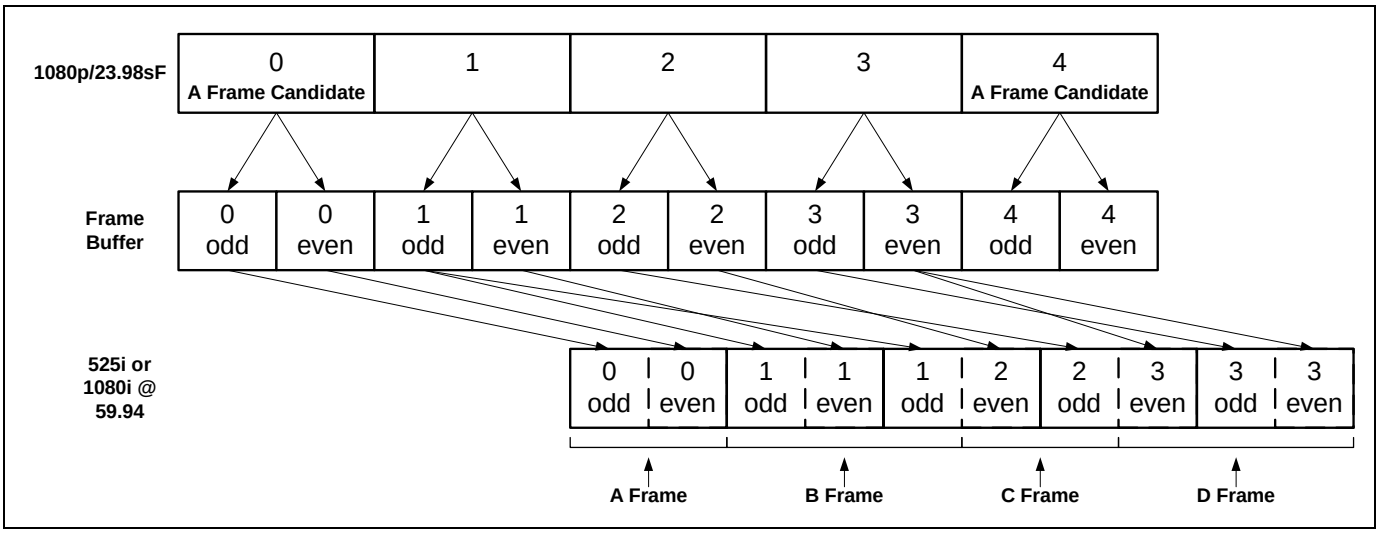


Figure 8: 3:2 Pulldown Sequence Insertion – 1080p/23.98sF Input Video

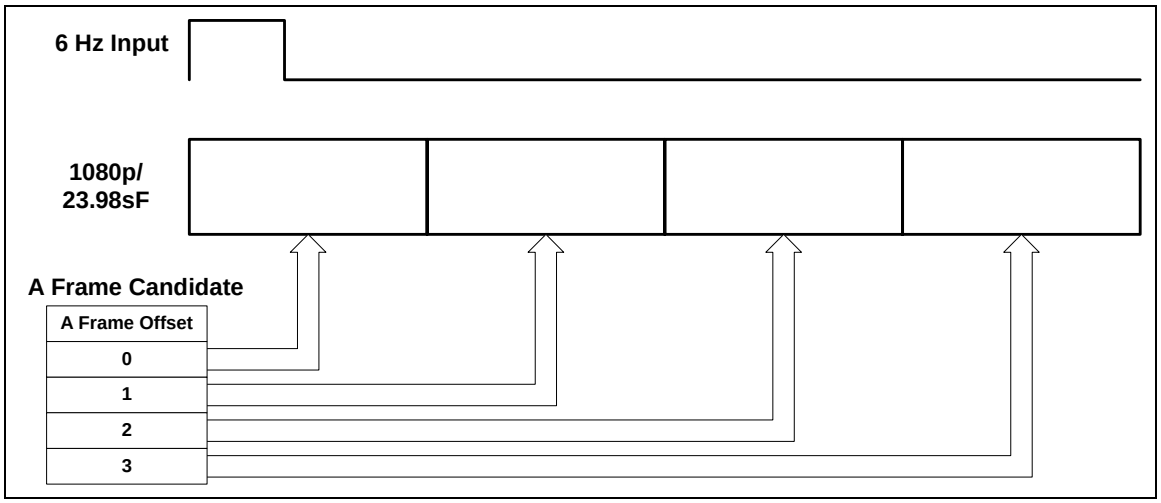


Figure 9: 6 Hz Pulldown Sequence A Frame Alignment – 1080p/23.98sF Input Video

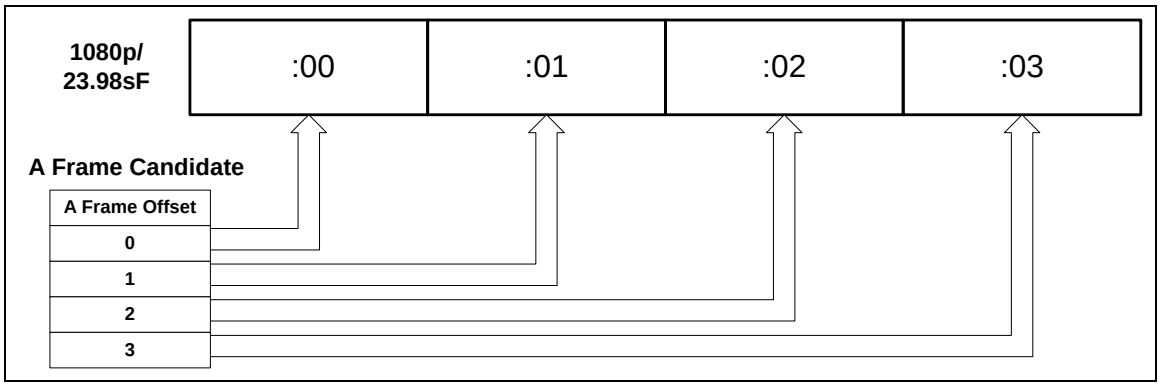


Figure 10: RP188 Pulldown Sequence A Frame Alignment – 1080p/23.98sF Input Video

6.3.9. Blanking Line 21 Captions for SD Video Inputs

This menu setting is ***only*** used when the input video is 525i/59.94. **It is not applicable in any other input video formats.**

Video
SD Blanking
21
19-23

With this control, you can adjust which lines will be blanked prior to up-converting the signal. All active video lines up to and including the selected line number will be blanked. Normally line 21 (where closed caption information may be present) is blanked.

Captioning will still be processed normally; this control prevents caption waveforms from being processed as video.

Selecting line 19 turns the blanking off.

6.3.10. Setting the VITC Reader Line for SD Video Inputs

Video
VITC Read Select
10 - 18 for 525
6 - 21 for 625
10

With this control, you can select the line number where VITC will be read on the standard-definition input video.

6.3.11. Setting the VITC Writer Line for SD Video Inputs

Video
VITC Write Select
10 - 18 for 525
6 - 21 for 625
10

With this control, you can select the line number where VITC will be written on standard-definition output video.

6.3.12. Setting the source of Time Code

Video
Time Code Source
Embedded
External LTC
Off

This control selects the time code source: *Embedded* or *External LTC* input (if available).

Select *embedded* to use RP188 ancillary time code (ATC) as the source for high-definition video formats or vertical interval time code (VITC) as the source for standard-definition video formats.

When *off* is selected, there will be no time code on the output video.

Also, note that if no time code is detected, time code will not be embedded on the output video.

Note: The *External LTC* option is not available on the 7710XUC-HD.

6.3.13. Setting the Action to Take when Input Video Is Missing

Video
Loss of Video
Black
Blue
Pass

The user can set the output to go to black, go to blue, or pass the input with this control.

When set to *Pass,* the output video will be incoherent when the video input is missing.

6.3.14. Setting up the Video Output Timing

The output stage of the Format Translator/Cross Converter contains a frame buffer so that the output video can be timed with respect to the reference applied to the **GENLOCK** input when the *Reference Select* menu item is set to *External*. In the absence of a Genlock signal, or when the *Reference Select* menu item is set to *Video,* the output video will be timed with respect to the incoming Video.

The *V Phase Offset* and *H Phase Offset* adjustments are **real-time adjustments,** and will **affect the output video timing immediately**.

These settings MUST NOT be adjusted when the output video is in the broadcast chain.

6.3.14.1. Selecting the Video Reference Source

Video
Reference Select
Video
External

With this control the reference source of video locking is set.

Select *External* to lock the output video to the reference video applied to the **GENLOCK** BNC. If the Genlock reference disappears or is not valid, the card will lock to the incoming video.

Select *Video* to lock the output video to the input video. When there is no input video, the output video will free run.

If the frame rate of the module is set to 50Hz, then only 1080i/50 or 625i/50 will be recognized as valid Genlock.

6.3.14.2. Calculating the Delay through the Format Translator/Cross Converter.

The delay through the Format Translator/Cross Converter is dependent on the video input format, the Format Translator/Cross Converter processing mode, and the *V Phase* and *H Phase Offset* settings. There are separate settings of *H and V phase* offset for each output video type.

To achieve the minimum delay, use the control *Force Minimum Delay*. The status screen will report the current true delay of the system.

6.3.14.3. Force Minimum Delay

Video
- *Force Minimum Delay*

This control sets the *H Phase Offset* and *V Phase Offset* menu settings such that the card has the minimum possible input-to-output delay.

6.3.14.4. Setting the Vertical Phase of the Output Video

Video
- *V Phase Offset*
  - *0 to Max Lines*
  - *0*

With this control, you can set the vertical timing of the output video with respect to the reference input set by the *Reference Select* menu item. There are separate settings of *V phase offset* for each output video type. Setting this control to 0 keeps the output video frame aligned with the Genlock reference, or with the incoming video if Genlock is missing.

Increasing the value will delay the output video in one-line increments of the output video standard. In order to advance the vertical timing of the output video with respect to the Genlock video, set the control to the maximum total number of lines of the output video minus the number of lines that you wish to advance the output video (e.g.: for 1080i/59.94 output video the total number of lines is 1125, so to advance the output video 5 lines, set the value to 1120).

When increasing the *V Phase Offset* value causes it to go beyond the limit of the frame buffer, the *V Phase Offset* will wrap to the beginning of the frame buffer, resulting in a change of one frame of throughput delay between the video input and the video output.

6.3.14.5. Setting the Horizontal Phase of the Output Video

Video
H Phase Offset
0 to Max samples
0

With this control, you can set the horizontal timing of the output video with respect to the reference input set by the *Reference Select* menu item. There are separate settings of H phase offset for each input video type. Setting this control to 0 keeps the output video line aligned with the Genlock reference.

Increasing this value will delay the output video in one-sample increments. In order to advance the horizontal timing of the output video with respect to the Genlock video, set the control to the maximum number of samples per line for the output video standard minus the number of samples that you wish to advance the output video.

E.g.: For 1080i/59.94 input video, the total number of samples per line is 2200, so to advance the output video 5 samples set the value to 2195.

6.4. CONFIGURING THE SCALER

The cross-converter scaler uses a process of filtering to increase or reduce the resolution during up-conversion or down-conversion. The *Scaler* menus are used to configure the cut-off frequencies of the filters associated with the scaler hardware. The chart below outlines the items available in the *Scaler* menu. Sections 6.4.1 to 6.4.4 give detailed information about the menu items. The 7710XUDC-AES4-HD offers simultaneous cross-conversion and down-conversion, and has an identical set of menu items (the *Scaler-DC* menu items) for its down converter. For the sake of brevity only the main Scaler menus will be described in this manual.

H Filter Cutoff	Sets the type of the horizontal filter in the scaler
V Filter Cutoff	Sets the type of the vertical filter in the scaler
AR	Selects the aspect ratio conversion to be performed
Panel Colors Red	Sets the color of the letterbox panels
Panel Colors Green	Sets the color of the letterbox panels
Panel Colors Blue	Sets the color of the letterbox panels.
Input H Start	Sets the left side crop position for custom aspect ratios
Input H Stop	Sets the right side crop position for custom aspect ratios
Input V Start	Sets the top crop position for custom aspect ratios
Input V Stop	Sets the bottom crop position for custom aspect ratios
Output H Start	Sets the left side of the output image for custom aspect ratios
Output H Stop	Sets the right side of the output image for custom aspect ratios
Output V Start	Sets the top of the output image for custom aspect ratios
Output V Stop	Sets the bottom of the output image for custom aspect ratios

6.4.1. Setting the Scaler Filter Sharpness

There are two controls that adjust the horizontal and vertical filters for the scaler.

Scaler *H Filter Cutoff* *Auto* *1 to 64*	With this control, you can set the cutoff frequency of the horizontal filter. Set to either *Auto,* or select 1 of 64 filters 1 thru 64, which are full bandwidth to 1/64th the bandwidth of the input signal. If *Auto* is selected, the module will select the appropriate filter for conversion.
Scaler *V Filter Cutoff* *Auto* *1 to 64*	With this control, you can set the cutoff frequency of the vertical filter. Set to either *Auto*, or select 1 of 64 filters 1 thru 64, which are full bandwidth to 1/64th the bandwidth of the input signal. The user can adjust the filtering to soften the image, or let more aliasing through for a sharper effect. **Note:** Aliasing will cause diagonal edges to become jagged.

6.4.2. Setting the Aspect Ratio of the Output Picture

The *Aspect Ratio* menu sets the user image conversion parameters to pre-defined values. Once selected, the user can fine-adjust the picture parameters via the input and output H and V start and stop menus.

Note: In order to modify the user image conversion parameters, the *Aspect Ratio* needs to be set to *User Aspect*.

Scaler	
AR	
Full raster	*Full Raster* - converts the full input raster to full output raster. If the input and output aspect ratios are not equivalent there will be aspect distortion.
User Aspect	*User Aspect* – converts the region of the input raster defined by the *Input H & V Start* and *Stop* values to the region of the output raster defined by the *Output H & V Start* and *Stop* values with colored side panels.
4:3 Side Panel to 16:9 TB Cut *13:9 Letter Box to 16:9 TB Cut* *14:9 Letter Box to 16:9 TB Cut* *13:9 Stretch to 16:9 TB Cut* *14:9 Stretch to 16:9 TB Cut* *16:9 Stretch to 16:9 TB Cut*	These settings convert the input picture to 16:9 top and bottom cuts.
13:9 Stretch to 4:3 Side Panel *14:9 Stretch to 4:3 Side Panel* *16:9 Stretch to 4:3 Side Panel*	These settings squeeze common stretched input video back to 4:3 side panel images on a 16:9 aspect raster.
4:3 to 4:3 Side Panel on 16:9 *4:3 to 13:9 Stretch on 16:9* *4:3 to 14:9 Stretch on 16:9* *4:3 to 16:9 Stretch on 16:9* *4:3 to 13:9 Crop on 16:9* *4:3 to 14:9 Crop on 16:9* *4:3 to 16:9 Crop on 16:9*	These settings are common up-converter settings for converting 4:3 aspect ratio images to common 16:9 formats. These settings are not appropriate for cross- or down-conversion.
16:9 to 16:9 Letter Box on 4:3 *16:9 to 14:9 Letter Box on 4:3* *16:9 to 13:9 Letter Box on 4:3* *16:9 to 4:3 Side Cut on 4:3* *16:9 to 4:3 Squeeze on 4:3*	These settings are common down-converter settings for converting 16:9 aspect ratio images to common 4:3 formats. These settings are not appropriate for cross- or up-conversion.

6.4.3. Set the Colour of the Letterbox Panels.

There are three menu items used to set the panel colour. The menu item for each colour component works in the same way, so for the sake of brevity, only the menu item for the *Red* component will be included in this manual.

Scaler
Panel Colour Red
0 to 255

This control defines one of the component colours for the colour of the side panels. Set the R, G or B value for the side panel colour that you want.

Hint: You can use a standard colour picker such as is available in Microsoft Paint to determine the colour values that you want to use.

6.4.4. User aspect ratio setting

There are four parameters for each input video standard that set the portion of the input picture that will be converted. These parameter settings do not have any effect when the pre-defined aspect ratios are used.

Scaler
Input H Start
Input H Stop

The *Input H Start* and *Input H Stop* define the horizontal portion of the input image to process to the output

Scaler
Input V Start
Input V Stop

The *Input V Start* and *Input V Stop* define the vertical portion of the input image to process to the output

There are four parameters for each output video standard that define the size of the output image and how to place the resulting image on the output video raster.

Scaler
Output H Start
Output H Stop

The *Output H Start* and *Output H Stop* define how to scale the cropped input image horizontally and where to place it horizontally on the output raster. The image will be stretched to fill the width.

For example, for 1080i the range of values is 0 to 1919. The range of values for 720p output is 0 to 1279.

Scaler
Output V Start
Output V Stop

The *Output V Start* and *Output V Stop* define how to scale the cropped input image vertically and where to place it vertically on the output raster. The image will be stretched to fill the height.

For example, for 1080i, the range of values is 0 to 1079. The range of values for 720p output is 0 to 719.

Changes to any vertical aspect parameters will cause the video output to be interrupted momentarily. To achieve minimum process delay, the internal timing is automatically adjusted to achieve the desired aspect settings.

6.5. CONFIGURING THE DE-INTERLACER

The *De-interlacer* menus are used to configure parameters associated with the de-interlacer hardware. The chart below shows the items available in the *De-interlacer* menu. Sections 6.5.1 to 6.5.4 give detailed information about each of the menu items.

Deinterlacer Mode	Selects the whether the module will perform field or frame-based conversion
Freeze Frame Threshold	Sets number of frames before frozen video is detected
Motion Detection Threshold	Set Detection threshold for determining when motion occurs for de-interlacing
Interfield Weighting Factor	Sets the Interfield Weighting factor used by the de-interlacer

6.5.1. Setting the De-interlacer Mode

This menu setting is ***only*** used when the input video is 1080i/59.94, 1035i/59.94, or 1080i/50. **It is not applicable in any other input video formats.**

De-interlacer
- *De-interlacer Mode*
  - *Field*
  - *Frame*

With this control, you can set whether the module will perform field- or frame-based conversion.

In *Field* mode, the format translator/cross-converter works on a field-by-field basis. This mode is recommended for 3:2 pulldown content on interlaced input video formats. It gives a softer vertical up-conversion.

In *Frame* mode the format translator/cross-converter works on a complete frame basis thus providing a crisper image. It is a good choice for interlaced input images that do not contain 3:2 pulldown

Note: When the input is SD, this control is ignored, and the de-interlacer is forced to frame mode. For all other input formats, except 1080i/59.94, 1035i/59.94, and 1080i/50, this control is ignored, and the de-interlacer is forced to field mode.

6.5.2. Setting the Freeze Frame Threshold

De-interlacer
- *Freeze Frame Threshold*
  - *0*
  - *0 to 31*

With this control, you can set the number of frames before frozen/missing video is detected.

6.5.3. Setting the Motion Detection Controls

De-interlacer Motion Detection Threshold *4* *0 to 15*	With this control, you can change the threshold of what is deemed motion by the de-interlacer.

6.5.4. Setting the Interfield Weighting Factor

De-interlacer *Interfield Weighting Factor* *40* *0 to 255*	With this control, you can set the *Interfield Weighting Factor* control.

6.6. CONFIGURING THE VIDEO PROCESSING FUNCTIONS

The *Proc Func* menus are used to configure parameters associated with the video processing functions of the converter. The chart below shows the items available in the *Proc Func* menu. Sections 6.6.1 to 6.6.12 give detailed information about each of the menu items. The 7710XUDC-AES4-HD offers simultaneous up-/cross-conversion and down-conversion, and has another set of identical menu items (the *Proc Func - DC* menu items) for its down-converter. For the sake of brevity only the main *Proc Func* menus will be described in this manual.

RGB Clip	Enables RGB Clipping
Gamma Adjust	Enables Gamma Adjust
Y Gain	Sets the Source Y Gain
Y Offset	Sets the Source Y Offset
Cr Gain	Sets the Source Cr Gain
Cr Offset	Sets the Source Cr Offset
Cb Gain	Sets the Source Cb Gain
Cb Offset	Sets the Source Cb Offset
Hue	+/- 10 degrees 0.1 degree steps
R Gain	Sets the Gain in RGB Domain
G Gain	Sets the Gain in RGB Domain
B Gain	Sets the Gain in RGB Domain
Gamma Level	Sets the gamma correction factor
Luma Floor	Sets the darkest luma value that will be enhanced
Detail Noise Floor	Sets the minimum level of detail required before the enhancer is enabled
Enhancement Limit	Sets the maximum enhancement allowed
Horizontal Band	Sets the horizontal frequency band
Vertical Intensity	Sets the intensity of the vertical enhancement process
Detail Gain	Sets the gain for detail

All of these parameters affect the video in real-time. H&V frequency bands will cause hits to the video while a new filter is loaded.

6.6.1. Enabling RGB Clipper

Proc Func
RGB Clip
Disable
Enable

This enables the RGB clipper. When enabled, the module will clip any illegal levels of R, G, and B (individually) to black and white levels. If disabled, then the illegal values are passed unmodified.

This control is normally set to *Disable* in order to allow for super black or other test patterns to pass through the module.

6.6.2. Enabling Gamma Adjust

Proc Func
Gamma Adjust
Disable
Enable

This enables the Gamma Adjust. When enabled, the module will allow the user to adjust the gamma level (see section 6.6.6). If disabled, then the gamma level is set to 0.

6.6.3. Setting the Gain Levels

There are six controls that set the gain of the video. For the sake of brevity, only one control will be included in this manual.

Proc Func
Y Gain
0%
-10% to 10%

With these controls, the user can adjust the gain of the three components in either the Y Cr Cb domain or the RGB domain over a range of +/-10% in 0.1% steps.

Gain adjustments in the Y Cb Cr domain are made first, then gain adjustments in the RGB domain. Illegal values are clipped after gain adjustments.

6.6.4. Setting the DC Offset

There are three controls that set the DC Offset of each component of the video. For the sake of brevity, only one control will be included in this manual.

Proc Func
Y Offset
0
-100 to 100

With these controls, the user can adjust the DC offset of the three components in the Y Cr Cb domain in +/- 100 quantizations levels.

6.6.5. Setting the Hue

Proc Func
Hue
0 *-30 to 30*

With this control, the user can adjust the Hue or color of components +/- 30 degrees in 0.1 degree steps.

6.6.6. Setting the Gamma Level

Proc Func
Gamma Level
0 *-128 to 127*

With this control, the user can adjust the Gamma correction factor.

6.6.7. Setting the Luma Floor

Proc Func
Luma Floor
1 *0 to 15*

Selects the minimum Luma value that will be enhanced. Pixels with a value below this floor will remain untouched.

6.6.8. Setting the Detail Noise Floor

Proc Func
Detail Noise Floor
2 *0 to 15*

When the image detail has a value that is below this floor it will be deemed to consist mostly of noise. As such, the pixel associated with that detail level will remain untouched.

6.6.9. Setting the Enhancement Limit

Proc Func
Enhancement Limit
16 *0 to 63*

Selects the largest detail value to be added back into the signal. Detail that has a value larger than this value will be clipped.

6.6.10. Setting the Horizontal Band

Proc Func
Horizontal Band
15 *0 to 20*

Selects the horizontal frequency band to be enhanced.

The horizontal band is adjusted in increments of five, where 0 selects the lowest frequency band available and 20 the highest.

6.6.11. Setting the Vertical Intensity

Proc Func
Vertical Intensity
100%
0-100%

Selects the intensity of the vertical enhancement process, as a percentage of the horizontal enhancement.

The range is 0 to 100% in steps of 25%, where 0% refers to no vertical enhancement, and 100% provides a vertical intensity that is equivalent to the horizontal.

6.6.12. Setting the Detail Gain

Proc Func
Detail Gain
24
0-127

Selects the level of the detail gain.

The range is 0 to 127, where 0 refers to no increase in detail gain.

6.7. CONFIGURING THE VIDEO NOISE REDUCER

The *Noise Reducer* menus are used to configure parameters associated with the video noise reduction processing. The noise reduction processing consists of five distinct filters and a complex adaptive algorithm to combine and control the filtered results based on two motion sensors. It is designed to remove random “Gaussian” (or similar band-limited) noise, impulsive “salt & pepper” noise, and other temporal varying artifacts like low level “piano-keying”. The motion sensors are used to seamlessly vary between the different filters. Simple user controls allow customization of the amount of expected noise and sensitivity of the motion detectors.

Noise Reduction will be applied to SD input signals only. Noise reduction is not performed on HD input signals.

The chart below shows the items available in the *Noise Reducer* menu. Sections 6.7.1 to 6.7.2 give detailed information about each of the menu items.

Noise Reduction	Sets the level of noise reduction to apply based on expected noise
Side-by-side	Turns on the side-by-side comparison mode

Turning off the noise reducer removes it from the video-processing path. **There will be a momentary interruption to the output video signal.**

6.7.1. Turning on the Noise Reduction

- *Noise Reducer*
  - *Noise Reduction*
    - *Off*
    - *Light*
    - *Medium*
    - *Heavy*

This menu item controls the various levels of noise reduction to apply to the video signal. The different levels will set the motion detection threshold and the aggressiveness of the filters to remove noise.

When the control is set to *Off*, there is no noise reduction. The input video is left untouched.

When the control is set to *Light*, the noise reducer will have a lower motion detection threshold and a less aggressive filter. This level of noise reduction is used for video that has low random noise, where removal of low-level details is minimized.

When the control is set to *Medium*, the noise reducer will have an average threshold set for the motion detection threshold and aggressive filters. This level of noise reduction is used for video that has typical amounts of random noise, where the module will remove random noise and affect low-level details, more so than a *Light* setting.

When the control is set to *Heavy*, the noise reducer will have a high motion detection threshold and a very aggressive filter. This level of noise reduction is used for video that has high level of random noise, where the filters will remove the random noise, but will soften the low-level details.

Note: Setting the value **higher** than needed to remove the noise present, will **over-soften areas of low amplitude, fine details**.

Note: Setting the value **too low** may cause the circuitry to **leave random noise that it could remove**. However, removal of low-level details will be minimized.

6.7.2. Turning on the Side-by-Side Comparison Window

- *Noise Reducer*
  - *Side-by-side*
    - *On*
    - *Off*

This control allows the user to compare the input video before noise reduction (left-hand side) and after noise reduction (right-hand side).

The separation line for the side-by-side comparison will also appear on the active output video. **This setting should be used with care, and only during the setup process and not during a live broadcast.**

6.8. CONFIGURING THE AUDIO SETTINGS

The SMPTE 272M and 299M standards permit up to four groups of four audio channels to be embedded into the serial digital video bitstream. The card de-embeds two groups of audio from the serial digital input video, and uses them as the source for re-embedding on the serial digital output video. The "-AES4" versions of the card also have four discrete AES inputs that can be selected as the source for re-embedding. The *Audio* menu items are used to configure the de-embedder and embedder groups, sample rate converters, and to adjust the audio throughput delay. The chart below shows the items available in the *Audio* menu. Sections 6.8.1 to 6.8.8 provide detailed information about each of the menu items. The 7710XUDC-AES4-HD offers simultaneous up-/cross-conversion and down-conversion, and has a subset of identical menu items (the *Audio - DC* menu items) for its down-converter. For the sake of brevity, only the main *Audio* menus will be included in this manual.

De-embedder A	Sets the audio group destined for de-embedder A
De-embedder B	Sets the audio group destined for de-embedder B
Embedder A	Sets the audio group destination for embedder A
Embedder B	Sets the audio group destination for embedder B
Audio Delay	Adjusts the audio delay from the nominal video delay
SRC Mode	Adjusts the mode for the audio sample rate converters
Input Ch 1&2 Source	Sets the source for audio channels 1 and 2 (Not available on the 7710XUC-HD)
Input Ch 3&4 Source	Sets the source for audio channels 3 and 4 (Not available on the 7710XUC-HD)
Input Ch 5&6 Source	Sets the source for audio channels 5 and 6 (Not available on the 7710XUC-HD)
Input Ch 7&8 Source	Sets the source for audio channels 7 and 8 (Not available on the 7710XUC-HD)

Any changes to the audio settings will cause a momentary interruption on the output audio.

6.8.1. Selecting The Audio Groups Destined for the De-embedders

The module has two de-embedders that will de-embed one group of audio from the serial digital video input. There is one set of controls for each de-embedder. For the sake of brevity, only one control will be included in this manual.

- *Audio*
  - *De-embedder A*
    - *Group 1*
    - *Group 2*
    - *Group 3*
    - *Group 4*

Important: Under normal conditions the settings for de-embedder A and B should be different, otherwise the audio will be repeated from the video input.

6.8.2. Selecting The Audio Groups That Will Be Embedded

The module has two embedders that each inserts one group of audio on the serial digital video output. There are two controls that set the audio groups where the embedders will put the audio on the serial digital output. For the sake of brevity, only one control will be included in this manual.

- *Audio*
  - *Embedder A*
    - *Off*
    - *Group 1*
    - *Group 2*
    - *Group 3*
    - *Group 4*

With these controls, you can set the destination group for Embedder A and B.

When set to *Off*, the embedder will be disabled.

Otherwise, the embedder destination can be set to a specific group.

The group for Embedder A *must* be different from Embedder B.

6.8.3. Selecting The Audio Delay

- *Audio*
  - *Audio Delay*
    - *0ms*
    - *-100ms to 100 ms*

This control adjusts the audio delay +/- 4800 samples from the nominal delay necessary to match the card's video processing delay.

Note: Negative values are limited to the amount that causes the delay to reach the video processing delay, as the card does not have negative delay ability.

6.8.4. Configuring the SRC Mode

- *Audio Settings*
  - *SRC Mode*
    - *Enable*
    - *Bypass*
    - *Auto*

This control allows the user to adjust the mode for the sample rate converters.

Enable – Enables the SRC for PCM audio.
Bypass – Bypass the SRC. Should be used for non-PCM audio.
Auto – The module will automatically select enable or bypass on a per-stereo-pair basis.

6.8.5. Configuring the Audio Source for Input Channel 1 and 2

Audio Settings
Input ch 1&2 source
DMX A1
AES1

This control allows the user to configure the source for input channels 1 and 2 of the sample rate converters.

For channels 1 and 2, only the first output pair from De-embedder A or external discrete AES 1 is valid.

This control is not available on the 7710XUC-HD.

6.8.6. Configuring the Audio Source for Input Channel 3 and 4

Audio Settings
Input ch 3&4 source
DMX A2
AES2

This control allows the user to configure the source for input channels 3 and 4 of the sample rate converters.

For channels 3 and 4, only the second output pair from De-embedder A or external discrete AES 2 is valid.

This control is not available on the 7710XUC-HD.

6.8.7. Configuring the Audio Source for Input Channel 5 and 6

Audio Settings
Input ch 5&6 source
DMX B1
AES3

This control allows the user to configure the source for input channels 5 and 6 of the sample rate converters.

For channels 5 and 6, only the first output pair from De-embedder B or external discrete AES 3 is valid.

This control is not available on the 7710XUC-HD.

6.8.8. Configuring the Audio Source for Input Channel 7and 8

Audio Settings
Input ch 7&8 source
DMX B2
AES4

This control allows the user to configure the source for input channels 7 and 8 of the sample rate converters.

For channels 7 and 8, only the second output pair from De-embedder B or external discrete AES 4 is valid.

This control is not available on the 7710XUC-HD.

6.9. CONFIGURING THE AUDIO PROCESSING FUNCTIONS

The *Audio Proc Embedded* and *Audio Proc External* menus are used to configure parameters associated with the audio processing functions of the 7710XUC-AES4-HD modules. The chart below shows the items available in the *Audio Proc* menus. Sections 6.9.1 to 0 give detailed information about each of the menu items. The 7710XUDC-AES4-HD offers simultaneous up-/cross-conversion and down-conversion, and has another set of identical menu items (the *Audio Proc - DC* menu item) for its down-converter. The 7710XUC-AES4-HD has a separate audio processor for the external four AES outputs (the *Audio Proc External* menu items). For the sake of brevity, only the main *Audio Proc* menus will be included in this manual. The 7710XUC-HD has neither external AES outputs, nor a down-converter output (i.e.: it only has an "Audio Process" menu).

Output Channel 1	Sets the source of audio that will be output on channel 1
Output Channel 2	Sets the source of audio that will be output on channel 2
Output Channel 3	Sets the source of audio that will be output on channel 3
Output Channel 4	Sets the source of audio that will be output on channel 4
Output Channel 5	Sets the source of audio that will be output on channel 5
Output Channel 6	Sets the source of audio that will be output on channel 6
Output Channel 7	Sets the source of audio that will be output on channel 7
Output Channel 8	Sets the source of audio that will be output on channel 8
Input Channel 1 Gain	Sets the gain of input channel 1
Input Channel 2 Gain	Sets the gain of input channel 2
Input Channel 3 Gain	Sets the gain of input channel 3
Input Channel 4 Gain	Sets the gain of input channel 4
Input Channel 5 Gain	Sets the gain of input channel 5
Input Channel 6 Gain	Sets the gain of input channel 6
Input Channel 7 Gain	Sets the gain of input channel 7
Input Channel 8 Gain	Sets the gain of input channel 8

6.9.1. Configuring the Output Audio Channel Sources

There are eight controls that select the source of the eight audio channels being processed. For the sake of brevity, only the selection control for channel 1 will be included in this manual.

Audio Proc
Output Channel 1
Input channel 1
Input channel 2
Input channel 3
Input channel 4
Input channel 5
Input channel 6
Input channel 7
Input channel 8
Mono mix 1 & 2
Mono mix 3 & 4
Mono mix 5 & 6
Mono mix 7 & 8
Mute

This control selects the source of audio for the output channel 1. The output can be taken from any of the input channels or a mono mix of pairs. The output can also be muted.

The default is that the input channel will be the same as the output channel (i.e. output channel 1 will come from input channel 1).

6.9.2. Setting Gain for Each Audio Channel

There are eight controls that set the gain of the eight audio channels being processed. For the sake of brevity, only the gain control for input channel 1 will be included in this manual.

Audio Proc
Input Channel 1 Gain
0 dB
-24dB to 24dB

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

6.10. CONFIGURING CLOSED CAPTIONING

The 7710XUC series handles closed captioning transparently. The modules will transcode any captions in the input SD video signal to the output HD signal The *Closed Captioning* menus are used to configure parameters associated with the closed caption handling. The chart below shows the items available in the *Closed Captioning* menu. Sections 6.10.1 to 6.10.3 give detailed information about each of the parameters.

Main Captions	Turns closed caption handling on or off
DC Captions	Turns closed caption handling on or off on the down converter (7710XUDC only)
HD Write Line	Selects the HD line number where the HD VANC captions are inserted on the output video
CC1 to 708 Service	Sets what caption service in EIA708 that CC1 will be mapped to
CC2 to 708 Service	Sets what caption service in EIA708 that CC2 will be mapped to
CC3 to 708 Service	Sets what caption service in EIA708 that CC3 will be mapped to
CC4 to 708 Service	Sets what caption service in EIA708 that CC4 will be mapped to
T1 to 708 Service	Sets what caption service in EIA708 that T1 will be mapped to
T2 to 708 Service	Sets what caption service in EIA708 that T2 will be mapped to
T3 to 708 Service	Sets what caption service in EIA708 that T3 will be mapped to
T4 to 708 Service	Sets what caption service in EIA708 that T4 will be mapped to

Any changes to the closed captioning settings can cause a momentary interruption.

6.10.1. Enabling Closed Captioning

There are two controls that enable closed caption handling for the 7710XUDC-AES4-HD. For the other modules, only one control exists for closed caption handling. For the sake of brevity, only the selection control for the main card will be shown included in this manual.

Closed Captioning
- *Main Caption*
  - *Off*
  - *On*

This parameter will enable closed caption handling for the module. When turned on, any closed captioning will be mapped to line 21 if the output video is SD, or to the designated HD write line (see 6.10.2) if the output video is HD.

When turned off, no closed captioning is encoded in the VANC of the output video.

6.10.2. Setting the HD Write Line

Closed Captioning
HD Write Line
9 *7 to 24*

This parameter will set the HD line where the HD VANC captions are inserted on the output HD video as per SMPTE 334M.

When setting the HD Write Line, be aware of the Start of Active Video Line in 1080i and 720p. **If HD VANC captions are inserted past Start of Active Video, most HD devices will drop the HD captions.**

6.10.3. Setting the Caption Services in EIA708

There are eight controls that will map closed caption and text channels into EIA708 caption services. For the sake of brevity, only the selection control for the main card will be included in this manual.

Closed Captioning
CC1 to 708 Service
1 to 16 *1*

This parameter will map CC1 into an EIA708 Caption Service. Currently, the modules only support 16 services (1 to 16).

When set to off, the CC1 is not mapped to any EIA708 Caption Service.

6.11. CONFIGURING THE ANALOG VIDEO OUTPUT PARAMETERS

The 7710XUC series provides a broadcast composite analog standard-definition video output in addition to the standard serial digital output. The *Composite Output* menus are used to configure parameters associated with the composite analog video output. The chart below shows the items available in the *Composite Output* menu. Sections 6.11.1 to 6.11.10 give detailed information about each of the parameters.

Note: The 7710XUC-HD does not support composite analog SD video outputs.

The 7710XUC series will broadcast composite analog **only** if the module is down-converting an HD signal or if the input video is SD. If the module is performing an HD cross-conversion, a colour bars test pattern will be output on the composite analog.

NTSC setup pedestal	Selects whether the NTSC 7.5 IRE pedestal will be added to the composite analog output video
Colour Bars	Turns on internally generated colour bar test signal
Composite display mode	Selection of colour or B/W modes
Video level	Controls the output video level
Hue	Controls the output video hue
H blanking	Controls the width of horizontal blanking
VBI processing	Either passes or blanks the vertical blanking interval lines
Y Filter Selection	Selects either standard composite filtering or adjustable filtering is selectable
Wideband Freq	Controls the frequency response with the wideband filter selected
Chroma Filter	Various chroma bandwidths are available with this control

6.11.1. Adding the NTSC Setup Pedestal

Composite Output *NTSC setup pedestal* *Off* *<u>On</u>*	Composite NTSC analog video may have a 7.5 IRE pedestal while 4:2:2 SDI video does not. This control, when set to *On*, will add the pedestal and re-scale the video accordingly. **Note:** The setup pedestal should not be present on composite video when operating in Japan.

6.11.2. Colour Bars

Composite Output *Colour bars* *On,* *<u>Off</u>*	This control enables and disables an internally generated colour bars signal to aid in video level calibration.

6.11.3. Setting the Composite Display Mode – Colour or Monochrome

Composite Output *Composite display mode* *<u>Colour</u>* *B/W*	If monochrome operation is desired on the composite output, colour may be turned off with this control.

6.11.4. Setting the Video Level

Composite Output
Video Processing
Video level
-64 to 64,
0

This control allows the user to adjust the output level of the analog video (including sync). When set to 0, the nominal output video level will be 140 IRE.

6.11.5. Setting the Hue

Composite Output
Hue
-22.5 to 22.5
0.0

This control allows the user to adjust the Hue of the analog video in steps of 0.1 degrees.

6.11.6. Setting the Horizontal Blanking

Composite Output
Video Processing
H Blanking
Wide,
Narrow

When set to *Narrow*, the H blanking will be 10.7µsec wide. When set to Wide, the H blanking will be 11.2µsec.

6.11.7. Configuring the VBI Processing

Composite Output
VBI Processing
Blank,
Pass

The Vertical Blanking Interval may be passed to the output, or may be blanked (removed) to prevent interference with the display of the image.

6.11.8. Selecting the Y Filter

Composite Output
Y Filter Selection
Wide bandwidth,
Composite

The Y channel may be filtered with a standard composite filter or may be wideband. When *Wide bandwidth* is selected, the following control allows the frequency response to be adjusted.

6.11.9. Setting the Wideband Y Frequency Response

Composite Output
Wideband Freq.
-6 to 6
0

When the above parameter is set to *Wide bandwidth*, this controls a set of high frequency response curves with +/- 4dB range.

6.11.10. Setting the Chroma Filter Bandwidth

Composite Output Chroma Filter Selection *650kHz,* *1.0Mhz,* *1.3MHz,* *2.0MHz,* *3.0MHz*	The Cb and Cr channels may be filtered with any of these bandwidths.

6.12. UTILITIES

The *Utilities* menus are used to list the module firmware version, upgrade the firmware, and manage the user presets. The chart below shows the items available in the *Utilities* menu. Sections 0to 6.12.7 give detailed information about each of the parameters.

Load Preset	Recalls the current module configuration from one of the user presets, to reset the module to its default factory condition, or to configure the module to a pre-defined factory condition.
Store Preset	Stores the current module configuration to one of the user presets.
Auto Recall Presets	Enables or disables the abilitity of the module to recall a configuration based on an input video standard – output video standard combination.
GPI 1	Selects the function of GPI1 - Recall Preset 1-10/OFF
GPI 2	Selects the function of GPI2 - Recall Preset 1-10/OFF
GPI 3	Selects the function of GPI3 - Recall Preset 1-10/OFF
GPI 4	Selects the function of GPI4 - Recall Preset 1-10/OFF
GPI 4 Function	Configures the function of GPI 4 (7710XUC-HD only)
Upgrade	Upgrades the firmware in the module
Status Window	Enable or Disable display of the status screen
About…	Shows the firmware version of the module

6.12.1. Storing and Recalling Configurations to the User Presets or the Factory Preset

The converter modules provide ten user preset areas to store the complete set of controls from the on screen menu.

There will be a slight disturbance in the operation of the card and the on-screen display while the new preset is being recalled.

6.12.1.1. Recalling Configurations from the User Presets

Utilities
- *Load Preset*
  - *Cancel*
  - *Default*
  - *User1 to 10*
  - *525-1080i TB Cut*
  - *525-1080i 4:3 Side*
  - *525-720p TB Cut*
  - *525-720p 4:3 Side*
  - *720p-1080i Full*
  - *720p-1080i 4:3 Side*
  - *720p-1080i 16:9–4:3*
  - *1080i-720p Full*
  - *1080i-720p 4:3 Side*
  - *1080i-720p 16:9–4:3*
  - *1080i-525 16:9 LB*
  - *1080i-525 4:3 Side*
  - *720p-525 16:9 LB*
  - *720p-525 4:3 Side*
  - *625-1080i TB Cut*
  - *625-1080i 4:3 Side*
  - *625-720p TB Cut*
  - *625-720p 4:3 Side*
  - *720p-1080i 50 Full*
  - *720p-1080i 50 4:3 Side*
  - *720p-1080i 50 16:9–4:3*
  - *1080i-720p 50 Full*
  - *1080i-720p 50 4:3 Side*
  - *1080i-720p 50 16:9–4:3*
  - *1080i-625 16:9 LB*
  - *1080i-625 4:3 Side*
  - *720p-625 16:9 LB*
  - *720p-625 4:3 Side*

This control is used to initiate a recall of the current card configuration from one of the user presets.

Use the toggle switch to select the preset location where you want to recall the module configuration. After selecting the preset, you must press the pushbutton before the recall will take place. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

There are a number of factory-installed presets that may be recalled as well. These are pre-defined and cannot be overwritten by the user. The factory presets are:

525i/59.94 ⇒ 1080i/59.94 TB Cut
525i/59.94 ⇒ 1080i/59.94 4:3 Side Panel
525i/59.94 ⇒ 720p/59.94 TB Cut
525i/59.94 ⇒ 720p/59.94 4:3 Side Panel
720p/59.94 ⇒ 1080i/59.94 full raster
720p/59.94 ⇒ 1080i/59.94 4:3 Side Panel to TB Cut
720p/59.94 ⇒ 1080i/59.94 16:9 stretch to 4:3 side panel
1080i/59.94⇒ 720p/59.94 full raster
1080i/59.94⇒ 720p/59.94 4:3 Side Panel to TB Cut
1080i/59.94⇒ 720p/59.94 16:9 stretch to 4:3 side panel
1080i/59.94⇒ 525i/59.94 16:9 letterbox
1080i/59.94⇒ 525i/59.94 4:3 Side Cut
720p/59.94 ⇒ 525i/59.94 16:9 letterbox
720p/59.94 ⇒ 525i/59.94 4:3 Side Cut
625i/50 ⇒ 1080i/50 TB Cut
625i/50 ⇒ 1080i/50 4:3 side panel
625i/50 ⇒ 720p/50 TB Cut
625i/50 ⇒ 720p/50 4:3 side panel
720p/50 ⇒ 1080i/50 full raster
720p/50 ⇒ 1080i/50 4:3 side panel to TB Cut
720p/50 ⇒ 1080i/50 16:9 stretch to 4:3 side panel
1080i/50 ⇒720p/50 full raster
1080i/50 ⇒720p/50 4:3 side panel to TB Cut
1080i/50 ⇒720p/50 16:9 stretch to 4:3 side panel
1080i/50⇒625i/50 16:9 letterbox
1080i/50⇒625i/50 4:3 side cut
720p/50⇒625i/50 16:9 letterbox
720p/50⇒625i/50 4:3 side cut

These presets are available as starting points for configuring the module. They can be stored as user presets and modified accordingly.

6.12.1.2. Storing Configurations from the User Presets

- *Utilities*
  - *Store Preset*
    - *Cancel*
    - *1 to 10*

This control is used to initiate a store of the current card configuration into one of the user presets.

Use the toggle switch to select the preset location where you want to store the module configuration. After selecting the preset, you must press the pushbutton before the store will take place. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

6.12.2. Disabling Preset Recall when the Video Input/Output Standards Change

- *Utilities*
  - *Auto Recall Presets*
    - *Enable*
    - *Disable*

This control is used to enable or disable the recall of parameter store with each input and output combination. Each input and output combination stores all the card parameters. During any standard change, the set is recalled.

6.12.3. Recall presets via GPIs

The converter modules provide ten user preset areas, which can be recalled via external GPI inputs. There are four controls that are used to set functions of the GPI inputs. For the sake of brevity, only one control will be included in this manual.

- *Utilities*
  - *GPI 1*
    - *OFF*
    - *Recall User Preset 1*
    - *Recall User Preset 2*
    - *Recall User Preset 3*
    - *Recall User Preset 4*
    - *Recall User Preset 5*
    - *Recall User Preset 6*
    - *Recall User Preset 7*
    - *Recall User Preset 8*
    - *Recall User Preset 9*
    - *Recall User Preset 10*

This control is used to set which preset will be recalled when the respective GPI input is closed to ground. To disable a GPI input set it to *Off.*

GPI settings are also stored in the User Presets in addition to the other settings. If the GPI settings are not the same when a configuration is recalled using a GPI, unexpected results may occur. **In other words, make sure your GPI settings are the same for each User Preset.**

6.12.4. Setting the Function of GPI 4 (7710XUC-HD only)

Utilities
GPI 4 Function
GPI
6Hz Source

On the 7710XUC-HD, the user can configure the function of GPI 4. The GPI can be set to recall presets or as a 6Hz source for 3:2 pulldown.

In order to use it as a 6Hz source, the user will also have to set a jumper on the Rear I/O plate. See 7.6 for setting the jumper for GPI4. Also, be sure to set GPI4 to off (i.e. do not configure GPI4 to recall a preset).

6.12.5. Displaying the Status Window on the OSD Output

Utilities
Status Window
Disable
Enable

This control is used enable the active display of various video and audio parameters on the OSD output when the menus are not being displayed.

The Status Window also displays the closed captioning information regarding EIA-608 or EIA-708 presence. There is a status field for the Caption Data Packet (CDP) Parser. This field reports the state of the CDP Parser. It will report *Ok,* if functioning properly.

6.12.6. Initiating a Software Upgrade

Utilities
Upgrade
Cancel
Upgrade

This control is used to initiate an upgrade of the module software.

In addition to the software upgrade support detailed in the *Upgrading Firmware* chapter in the front of the binder, you can initiate an upgrade with this control. This will allow you to upgrade the software without unplugging the card and changing the upgrade jumper.

After selecting the upgrade operation, you must change the command to *Upgrade,* and press the pushbutton before the upgrade can take place. Follow the remainder of the instructions in the *Upgrading Firmware* chapter. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

After the upgrade has finished, the unit will automatically restart and run in normal operating mode.

The Upgrade baud rate for the 7710XUC-HD series modules is 115,200 baud.

6.12.7. Accessing Information About this Module and its Firmware

Utilities
About…

This control lists the particulars about this module and the firmware residing within it. It provides quick access to information about revisions that can be used to determine when upgrades are required.

7. JUMPERS

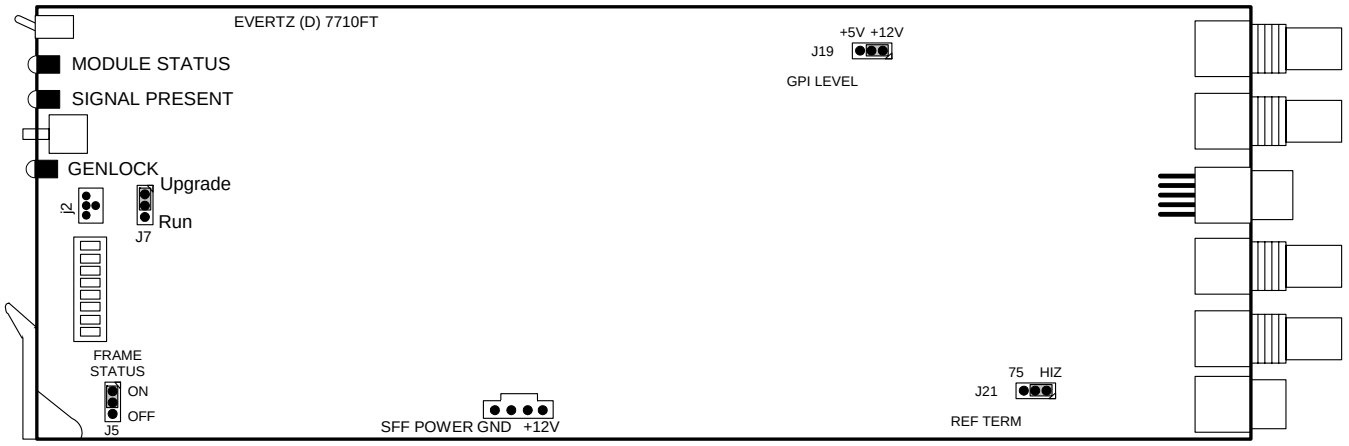


Figure 11: Location of Jumpers – Rev D Main Module

On most Rev D Main Modules, the jumper J7 has been replaced by a slide switch on the bottom of the module for easy access.

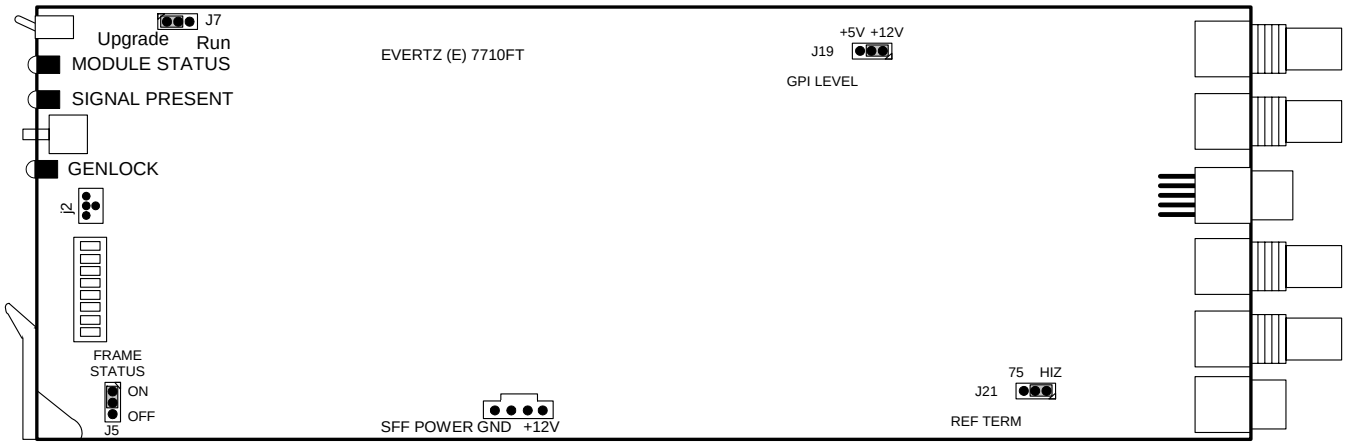


Figure 12: Location of Jumpers – Rev E Main Module

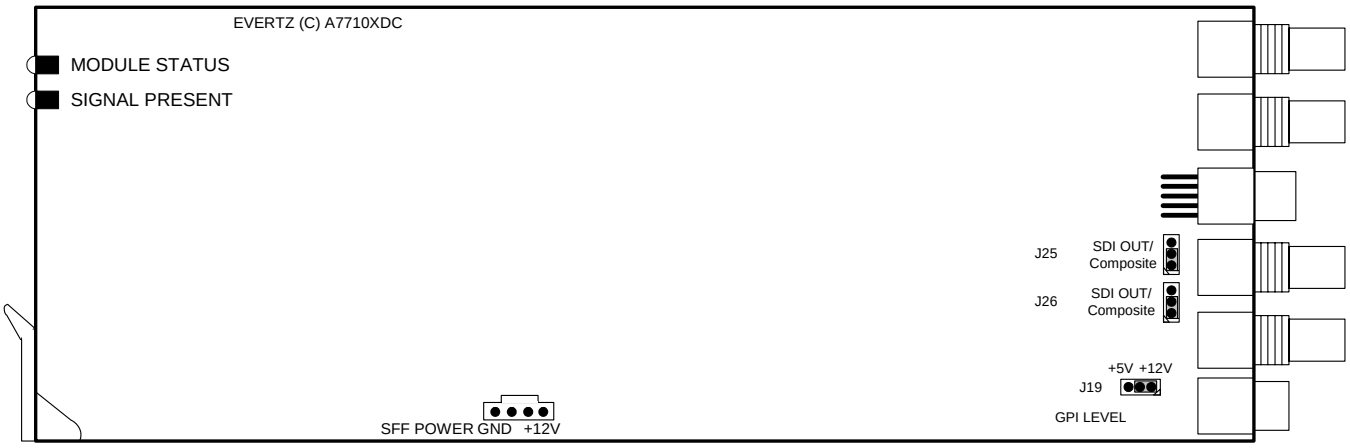


Figure 13: Location of Jumpers – Sub Module for 7710XUDC-AES4-HD

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

FRAME STATUS The FRAME STATUS jumper J5 located at the front of the main 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 LEDs 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.

7.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

Firmware updates can be performed using the *Upgrade* menu item on the *Utilities* menu (see section 6.12.5) or using the **UPGRADE** jumper.

UPGRADE The UPGRADE switch is located on the back of the main module (on the rear of the J7 jumper location near the front card edge) 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.

The silkscreen on the front side of the board for J7 is incorrect. The correct orientation of the switch is shown in Figure 11 and Figure 12

To upgrade the firmware in the module unit:

1. Pull the module out of the frame.

2. Move Jumper J7 into the *UPGRADE* position.

3. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J2 at the card edge.

4. Re-install the module into the frame.

5. Run the upgrade as described in *Upgrading Firmware* chapter.

6. When the upgrade is completed, remove the module from the frame, move J7 into the *RUN* position, and remove the upgrade cable and re-install the module.

The module is now ready for normal operation.

The Upgrade baud rate for the 7710XUC-HD series modules is 115,200 baud.

7.3. SELECTING WHETHER THE GENLOCK REFERENCE INPUT IS TERMINATED

TERM The TERM jumper J21 located at the rear of the module is used to terminate the genlock loop input. Then it is in the 75R position a 75 ohm terminating resistor will connect the input to ground. When it is in the HI-Z position the genlock input will be high impedance.

7.4. SELECTING THE GPI PULLUP VOLTAGE

The GPI jumper J19, located near the rear of the module, selects whether the general-purpose inputs will be pulled up to +5 volts or +12 Volts. Figure 14 shows the jumper configuration and the GPI input schematic.

GPI LEVEL To set the pull-up voltage to +5 volts set the jumper to the +5V position.

To set the pull-up voltage to +12 volts set the jumper to the +12V position.

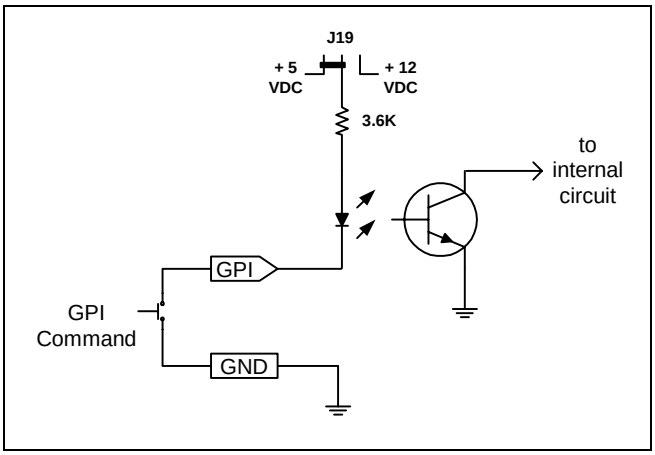


Figure 14: Setting the GPI Input Pullup Voltage

7.5. SELECTING COMPOSITE OR SDI OUTPUT

The 7710XUDC sub-module can output either analog composite video or SDI via jumper selections J25 and J26 illustrated in Figure 13: Location of Jumpers – Sub Module for 7710XUDC-AES4-HD above.

7.6. SELECTING GPI 4 for 6HZ SOURCE (7710XUC-HD Only)

The 7710XUC-HD module can set the functionality of GPI 4 (see section 6.12.4). However, the user will also have to change a jumper on the Rear I/O plate to ensure proper functionality. The location of the jumper shown in Figure 15 will configure the Rear I/O. The jumper settings are shown in Figure 16.

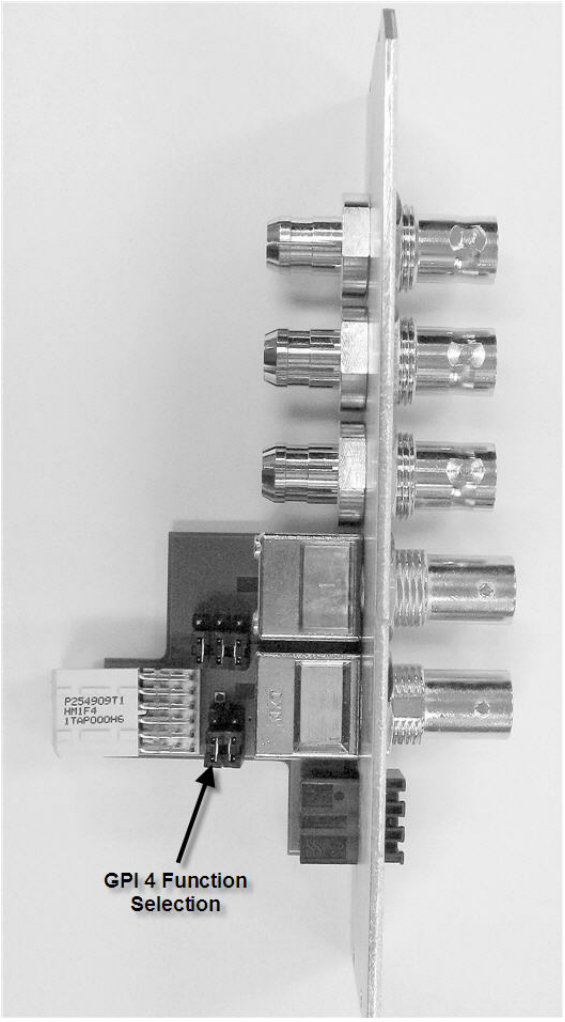


Figure 15: GPI 4 Function Selection Jumper

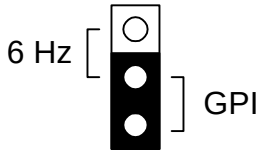


Figure 16: Jumper settings

8. VISTALINK™ REMOTE MONITORING/CONTROL

8.1. WHAT IS VISTALINK™?

VistaLINK™ 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 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 7710XUC-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 that 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.

8.2. VISTALINK™ MONITORED PARAMETERS

The following parameters can be remotely monitored through the VistaLINK™ interface.

Parameter	Description
Input Video Present	Indicates the presence of a valid video input signal on the PGM IN BNC
Input Video Standard	Indicates video standard of input signal on the PGM IN BNC
Input2 Video Present	Indicates the presence of a valid video input signal on the PGM IN/OUT BNC
Input2 Video Standard	Indicates video standard of input signal on the PGM IN/OUT BNC
Genlock Present	Indicates the presence of an external genlock reference signal (the state of the GENLOCK LED)
Genlock Standard	Indicates video standard of external genlock reference signal
GPI1 State	Indicates the state of the GPI1 input
GPI2 State	Indicates the state of the GPI2 input
GPI3 State	Indicates the state of the GPI3 input
GPI4 State	Indicates the state of the GPI4 input
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)
AES 1 Present	Indicates the presence of AES 1
AES 2 Present	Indicates the presence of AES 2
AES 3 Present	Indicates the presence of AES 3
AES 4 Present	Indicates the presence of AES 4
Time Code Present	Indicates the presence of RP188 or VITC time code on the input video
Closed Captions Present	Indicates the presence of EIA-608 or EIA-708 closed captions on the input video
Delay Audio	Audio Delay
Video Delay	Video Delay

Table 9: VistaLINK™ Monitored Parameters

8.3. *VISTA*LINK™ CONTROLLED PARAMETERS

Parameter	Description
Video Frame Rate	Select the video input frame rate
Video Standard Input	Selects the video input standard.
Video Standard Output	Selects the video output standard.
Video Input Source	Select source of video input
Pgm Out/In Mode	Select mode of Pgm Out/In
Pulldown Reference	Selects 3:2 pulldown reference.
A Frame Offset	Sets the offset of the A Frame
SD Blanking	Last line of blanking in SD (SD input only)
VITC Read Select	Select decode line for VITC (SD input only)
VITC Write Select	Select line for VITC insert (SD output only)
Loss of Video	Selects the action to take when the input video is missing
Force Minimum Delay	Set the H and V phase such that the path delay in minimized
Reference Select	Set video or external genlock for card locking
V Phase Offset	Sets the vertical phase
H Phase Offset	Sets the horizontal phase
H Filter Cutoff	Sets the type of the horizontal filter in the scaler
V Filter Cutoff	Sets the type of the vertical filter in the scaler
Aspect Ratio	Selects the image conversion type
Panel Colours Red	Sets the Red colour of the panels
Panel Colours Green	Sets the Green colour of the panels
Panel Colours Blue	Sets the Blue colour of the panels
Input H Start	Sets the left side crop positions
Input H Stop	Sets the right side crop position
Input V Start	Sets the top crop position
Input V Stop	Sets the bottom crop position
Output H Start	Sets the left side of the output
Output H Stop	Sets the right side of the output
Output V Start	Sets the top of the output image
Output V Stop	Sets the bottom of the output image
RGB Clip	Enable RGB clipper
Gamma Adjust	Enable gamma adjust
Y Gain	Varies the Source Y
Y Offset	Varies the Source Y
Cr Gain	Varies the Source Cr
Cr Offset	Varies the Source Cr
Cb Gain	Varies the Source Cb
Cb Offset	Varies the Source Cb
Hue	+/- 10 degrees 0.1 degree steps
R Gain	Varies the Gain in RGB Domain
G Gain	Varies the Gain in RGB Domain
B Gain	Varies the Gain in RGB Domain
Gamma Level	Sets the gamma correction level
Luma Floor	Sets the minimum luma value that will be enhanced
Detail Noise Floor	Sets the minimum level of detail required before the enhancer is enabled
Enhancement Limit	Sets the maximum enhancement allowed
Horizontal Band	Sets the horizontal frequency band
Vertical Intensity	Sets the intensity of vertical enhancement

Detail Gain	Sets the level for the detail gain
H Filter Cutoff DC	Sets the type of the horizontal filter in the scaler
V Filter Cutoff DC	Sets the type of the vertical filter in the scaler
Aspect Ratio DC	Selects the aspect ratio of the output picture
Panel Colours Red DC	Sets the Red colour of the panels
Panel Colours Green DC	Sets the Green colour of the panels
Panel Colours Blue DC	Sets the Blue colour of the panels
Input H Start DC	Sets the left side crop positions
Input H Stop DC	Sets the right side crop position
Input V Start DC	Sets the top crop position
Input V Stop DC	Sets the bottom crop position
Output H Start DC	Sets the left side of the output
Output H Stop DC	Sets the right side of the output
Output V Start DC	Sets the top of the output image
Output V Stop DC	Sets the bottom of the output image
RGB Clip DC	Enable RGB clipper
Gamma Adjust DC	Enable gamma adjust
Y Gain DC	Varies the Source Y
Y Offset DC	Varies the Source Y
Cr Gain DC	Varies the Source Cr
Cr Offset DC	Varies the Source Cr
Cb Gain DC	Varies the Source Cb
Cb Offset DC	Varies the Source Cb
Hue DC	+/- 10 degrees 0.1 degree steps
R Gain DC	Varies the Gain in RGB Domain
G Gain DC	Varies the Gain in RGB Domain
B Gain DC	Varies the Gain in RGB Domain
Gamma Level DC	Sets the gamma correction level
Luma Floor DC	Sets the minimum luma value that will be enhanced
Detail Noise Floor DC	Sets the minimum level of detail required before the enhancer is enabled
Enhancement Limit DC	Sets the maximum enhancement allowed
Horizontal Band DC	Sets the horizontal frequency band
Vertical Intensity DC	Sets the intensity of vertical enhancement
Detail Gain DC	Sets the level for the detail gain
De-interlacer Mode	Sets the mode of the de-interlacer to field or frame based processing
Freeze Frame Threshold	Sets the number of frames before frozen/missing video is detected
Motion Detection Threshold	Sets the threshold for motion detection on the de-interlacer
Interfield Weighting Factor	Sets the interfiled weighting factor
Noise Reduction	Sets the level of noise reduction
Side-by-side mode	Sets the side-by-side comparison mode for noise reduction
De-embedder A	Sets the audio group source for de-embedder A
De-embedder B	Sets the audio group source for de-embedder B
Embedder A	Sets the audio group destination for embedder A
Embedder B	Sets the audio group destination for embedder B
Audio Delay	Adjusts the audio delay from the card nominal
SRC Mode	Sets mode of sample rate converter
Input Ch 1&2 Source	Sets the source for input channel 1 and 2 of the SRC
Input Ch 3&4 Source	Sets the source for input channel 3 and 4 of the SRC
Input Ch 5&6 Source	Sets the source for input channel 5 and 6 of the SRC

Input Ch 7&8 Source	Sets the source for input channel 7 and 8 of the SRC
Embedder A DC	Sets the audio group destination for embedder A
Embedder B DC	Sets the audio group destination for embedder B
Output Ch1	Sets the source of audio that will be output on channel 1
Output Ch2	Sets the source of audio that will be output on channel 2
Output Ch3	Sets the source of audio that will be output on channel 3
Output Ch4	Sets the source of audio that will be output on channel 4
Output Ch5	Sets the source of audio that will be output on channel 5
Output Ch6	Sets the source of audio that will be output on channel 6
Output Ch7	Sets the source of audio that will be output on channel 7
Output Ch8	Sets the source of audio that will be output on channel 8
Input Ch1 gain	Sets the gain of input channel 1
Input Ch2 gain	Sets the gain of input channel 2
Input Ch3 gain	Sets the gain of input channel 3
Input Ch4 gain	Sets the gain of input channel 4
Input Ch5 gain	Sets the gain of input channel 5
Input Ch6 gain	Sets the gain of input channel 6
Input Ch7 gain	Sets the gain of input channel 7
Input Ch8 gain	Sets the gain of input channel 8
Output Ch1 DC	Sets the source of audio that will be output on channel 1
Output Ch2 DC	Sets the source of audio that will be output on channel 2
Output Ch3 DC	Sets the source of audio that will be output on channel 3
Output Ch4 DC	Sets the source of audio that will be output on channel 4
Output Ch5 DC	Sets the source of audio that will be output on channel 5
Output Ch6 DC	Sets the source of audio that will be output on channel 6
Output Ch7 DC	Sets the source of audio that will be output on channel 7
Output Ch8 DC	Sets the source of audio that will be output on channel 8
Input Ch1 gain DC	Sets the gain of input channel 1
Input Ch2 gain DC	Sets the gain of input channel 2
Input Ch3 gain DC	Sets the gain of input channel 3
Input Ch4 gain DC	Sets the gain of input channel 4
Input Ch5 gain DC	Sets the gain of input channel 5
Input Ch6 gain DC	Sets the gain of input channel 6
Input Ch7 gain DC	Sets the gain of input channel 7
Input Ch8 gain DC	Sets the gain of input channel 8
Captions	Enables closed captioning handling
Captions DC	Enables closed captioning handling on down-converter
HD Write Line	Selects the HD line number for HD VANC captions
CC1 to 708 Service	Selects which EIA708 caption service to map CC1 to
CC2 to 708 Service	Selects which EIA708 caption service to map CC2 to
CC3 to 708 Service	Selects which EIA708 caption service to map CC3 to
CC4 to 708 Service	Selects which EIA708 caption service to map CC4 to
T1 to 708 Service	Selects which EIA708 caption service to map T1 to
T2 to 708 Service	Selects which EIA708 caption service to map T2 to
T3 to 708 Service	Selects which EIA708 caption service to map T3 to
T4 to 708 Service	Selects which EIA708 caption service to map T4 to
NTSC setup pedestal	Selects whether the NTSC 7.5 IRE pedestal will be added to the composite analog output video
Colour Bars	Turn on internally generated colour bar test signal
Composite display mode	Selection of colour or B/W modes

Video level	Controls the output video level
Hue	Controls the output video hue
H blanking	Controls the width of horizontal blanking
VBI processing	Either pass or blank the vertical blanking interval lines
Y Filter Selection	Standard composite filtering or adjustable filtering is selectable
Wideband Frequency.	Controls the frequency response with the wideband filter selected
Chroma Filter	Various chroma bandwidths are available with this control
Load Preset	Used to recall the current module configuration
Store Preset	Used to store the current module configuration
Auto Recall Presets	Enables automatic preset recall when input or output changes
GPI 1	Selects the function of GPIO1
GPI 2	Selects the function of GPIO2
GPI 3	Selects the function of GPIO3
GPI 4	Selects the function of GPIO4
GPI4 function	Determines whether GPI4 is used as a GPI or the 6Hz source

Table 10: VistaLINK™ Controlled Parameters

8.4. VISTALINK™ TRAPS

The 7710XUC-HD modules will raise a VistaLINK™ trap if the temperature of the main or sub cards rises above 100 °F.

9. MENU QUICK REFERENCE

Video
- Video Frame Rate
- Video Standard Input
- Video Standard Output
- Video Input Source
- Pgm Out/In Mode
- Pulldown Reference
- A Frame Offset
- SD Blanking
- VITC Read Select
- VITC Write Select
- Time Code Source
- Loss of Video
- Force Minimum Delay
- Reference Select
- V Phase Offset
- H Phase Offset

Scaler
- H Filter Cutoff
- V Filter Cutoff
- Aspect Ratio
- Panel Colours Red
- Panel Colours Green
- Panel Colours Blue
- Input H Start
- Input H Stop
- Input V Start
- Input V Stop
- Output H Start
- Output H Stop
- Output V Start
- Output V Stop

Scaler DC
(XUDC only)
- H Filter Cutoff
- V Filter Cutoff
- Aspect Ratio
- Panel Colours Red
- Panel Colours Green
- Panel Colours Blue
- Input H Start
- Input H Stop
- Input V Start
- Input V Stop
- Output H Start
- Output H Stop
- Output V Start
- Output V Stop

Deinterlacer
- De-interlacer Mode
- Freeze FrameThreshold
- Motion Detection Threshold
- Interfield Weighting Factor

Composite Output
- NTSC setup pedestal
- Colour Bars
- Composite display mode
- Video level
- Hue
- H blanking
- VBI processing
- Y Filter Selection
- Wideband Frequency.
- Chroma Filter

Video Proc Main
- RGB clip
- Gamma adjust
- Y Gain
- Y Offset
- Cr Gain
- Cr Offset
- Cb Gain
- Cb Offset
- Hue
- R Gain
- G Gain
- B Gain
- Gamma Level
- Luma Floor
- Detail Noise Floor
- Enhancement Limit
- Horizontal Band
- Vertical Intensity
- Detail Gain

Video Proc DC
(XUDC only)
- RGB clip
- Gamma adjust
- Y Gain
- Y Offset
- Cr Gain
- Cr Offset
- Cb Gain
- Cb Offset
- Hue
- R Gain
- G Gain
- B Gain
- Gamma Level
- Luma Floor
- Detail Noise Floor
- Enhancement Limit
- Horizontal Band
- Vertical Intensity
- Detail Gain

Noise Reduction
- Noise Reduction
- Side-by-side

Closed Captioning
- Captions
- Captions DC
- HD Write Line
- CC1 to 708 Service
- CC2 to 708 Service
- CC3 to 708 Service
- CC4 to 708 Service
- T1 to 708 Service
- T2 to 708 Service
- T3 to 708 Service
- T4 to 708 Service

Audio Settings Main
- De-embedder A
- De-embedder B
- Embedder A
- Embedder B
- Audio Delay
- SRC Mode
- Input Ch1&2 source
- Input Ch3&4 source
- Input Ch5&6 source
- Input Ch7&8 source

Audio Settings DC
(XUDC only)
- Embedder A
- Embedder B

Audio Proc Embedded Main
- Output Ch1
  …
- Output Ch8
- Input Ch1 gain
  …
- Input Ch8 gain

Audio Proc Embedded DC
(XUDC only)
- Output Ch1
  …
- Output Ch8
- Input Ch1 gain
  …
- Input Ch8 gain

Audio Proc External
(XUC only)
- Output Ch1
  …
- Output Ch8
- Input Ch1 gain
  …
- Input Ch8 gain

Utilities
- Load Preset
- Store Preset
- Auto Recall Presets
- GPI 1
- GPI 2
- GPI 3
- GPI 4
- 6Hz Ref
- Upgrade
- Status WIndow
- About…