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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Jun 04
0.2	Updated Block Diagram	Aug 04
0.3	Added info on 7710XUDC-AES-HD version	Nov 04
0.4	Changed DIP switch Definitions for Video standard and Frame Rate selection	Dec 04

1. OVERVIEW

The 7710XC series of products is designed to solve the problems of adapting to different HDTV formats, at the same time as offering high quality UP and DOWN conversion.

Four versions are available as shown in the table below:

Model	Input	Outputs		Conversion	Audio Processing	
		Pgm	OSD		Embedded	AES
7710XC-HD	HD	2 HD	1 HD	1080 ⇔ 720	2 groups	---
7710XC-AES4-HD	HD	2 HD	1 HD	1080 ⇔ 720	2 groups	4
7710XUC-AES4-HD	HD	2 HD	1 HD	1080 ⇔ 720	2 groups	4
		2 SD	1 SD	1080/720 ⇒ 525/625	2 groups	4
	SD	2 HD	1 HD	525/625 ⇒ 1080/720	2 groups	4
		2 SD	1 SD	525/625 ⇔ 525/625 (ARC)	2 groups	4
7710XUDC-AES4-HD	HD	2 HD & 2 SD & 2 NTSC/ PAL	1 HD	1080 ⇔ 720 & 1080/720 ⇒ 525/625	2 groups	4
					2 groups	4
	SD	2 HD & 2 SD & 2 NTSC/ PAL	1 HD	525/625 ⇔ 525/625 (ARC) & 525/625 ⇒ 1080/720	2 groups	4
					2 groups	4

The 7710XC-HD High Definition Format Translator/Cross Converter provides high quality conversion of your high definition SMPTE 292M signals to other common 1.5 Gb/s high definition (SMPTE 292M) video formats. The 7710XC-HD has 10-bit processing, and 2 HD Serial Digital outputs and 1 OSD output, plus external genlock.

The 7710XC-AES4-HD High Definition Format Translator/Cross Converter with external AES is similar to the 7710XC-HD but also provides 4 AES inputs and outputs to handle either embedded or discrete audio.

The 7710XUC-AES4-HD High Definition Format Up/Cross Converter is re-configurable to provide high quality up conversion of your standard definition signals with noise reduction to common 1.5 Gb/s high definition (SMPTE 292M) video formats, high quality conversion of your high definition (SMPTE 292M) signals to other common 1.5 Gb/s high definition (SMPTE 292M) video formats, or high definition (SMPTE 292M) to standard definition (SMPTE 296M) down conversion with detail enhancement and gamma correction. The 7710XUC-HD has 10-bit processing, and 2 HD Serial Digital outputs and 1 OSD output, plus external genlock.

The 7710XUDC-AES4-HD High Definition Format Up/Down/Cross Converter is similar to the 7710XUC-HD but provides simultaneous cross conversion & downconversion. It also has 2 SD Serial Digital outputs and 2 composite analog video outputs.

The modules accept 2 groups of embedded audio on the input and re-embeds them into the serial video outputs. The AES4 versions also accept 4 discrete unbalanced AES inputs and provides 4 AES outputs with the same audio that is being embedded. 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 units occupy two card slots in the 3 RU frame, which will hold up to 15 modules 1 slot modules or one slot in the 1RU frame, which will hold up to three 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 (not all models)
- High quality HD -> SD down conversion with Image enhancement (not all models)
- Supports standard aspect ratio conversions plus all user definable
- Support all necessary colour space conversions (ITU rec. 601 to ITU rec.709)
- Full video processing functions, GBR gain YCrCb gain and offset, hue adjustment and RGB colour limiter.
- Image Detail Enhancement on Down Conversion with RGB gamma correction
- Reference input allows for phasing of output video
- Module supports min. delay or variable delay for video output without reference
- Module supports video output referenced to genlock with variable delay
- Output on screen display used to configure the operating modes
- De-embeds Audio from HD video input and embeds into HD video output(2 groups)
- Supports retimed external 4 AES inputs and outputs
- 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.

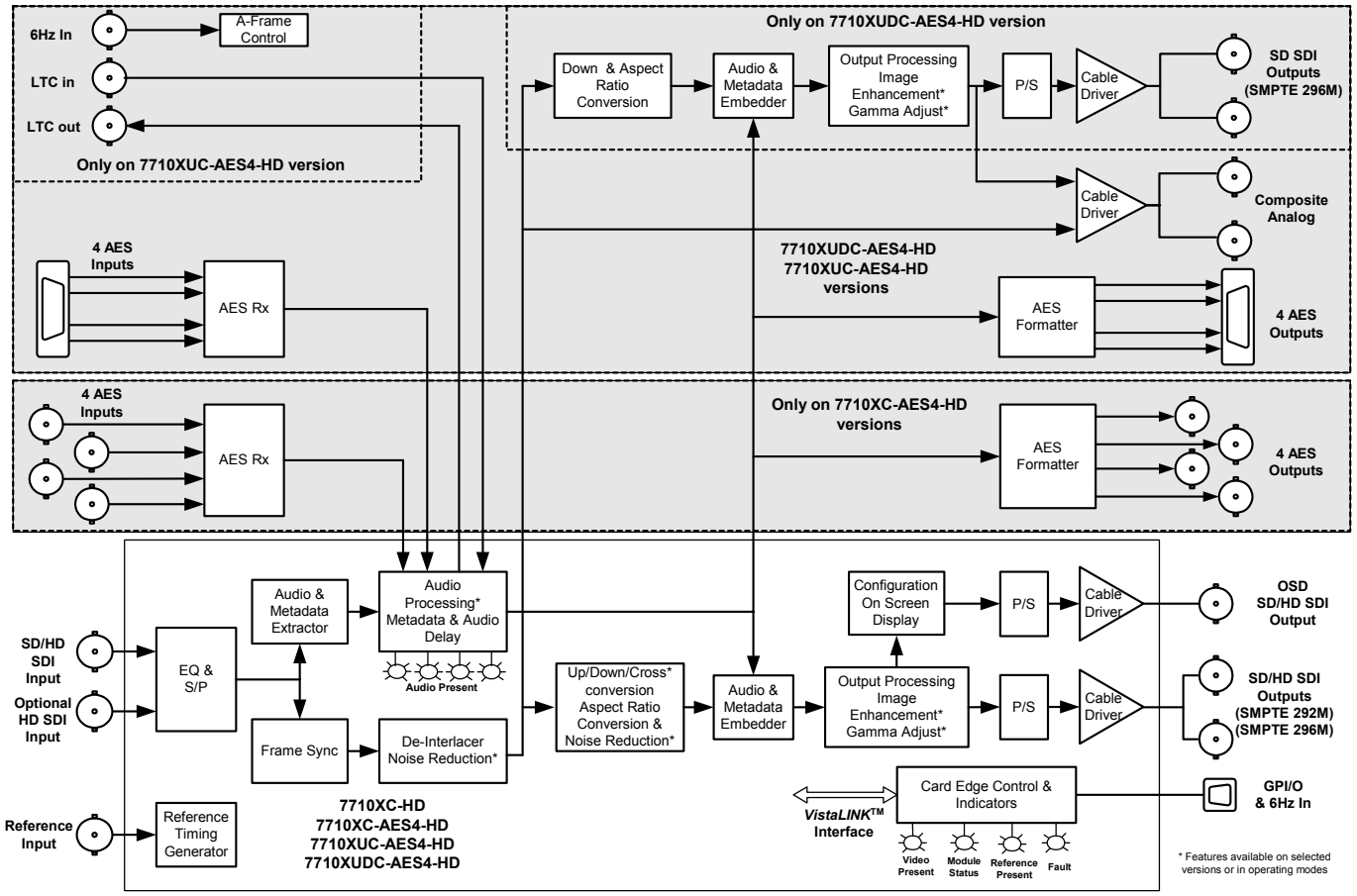


Figure 1: Block Diagram

2. INSTALLATION

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

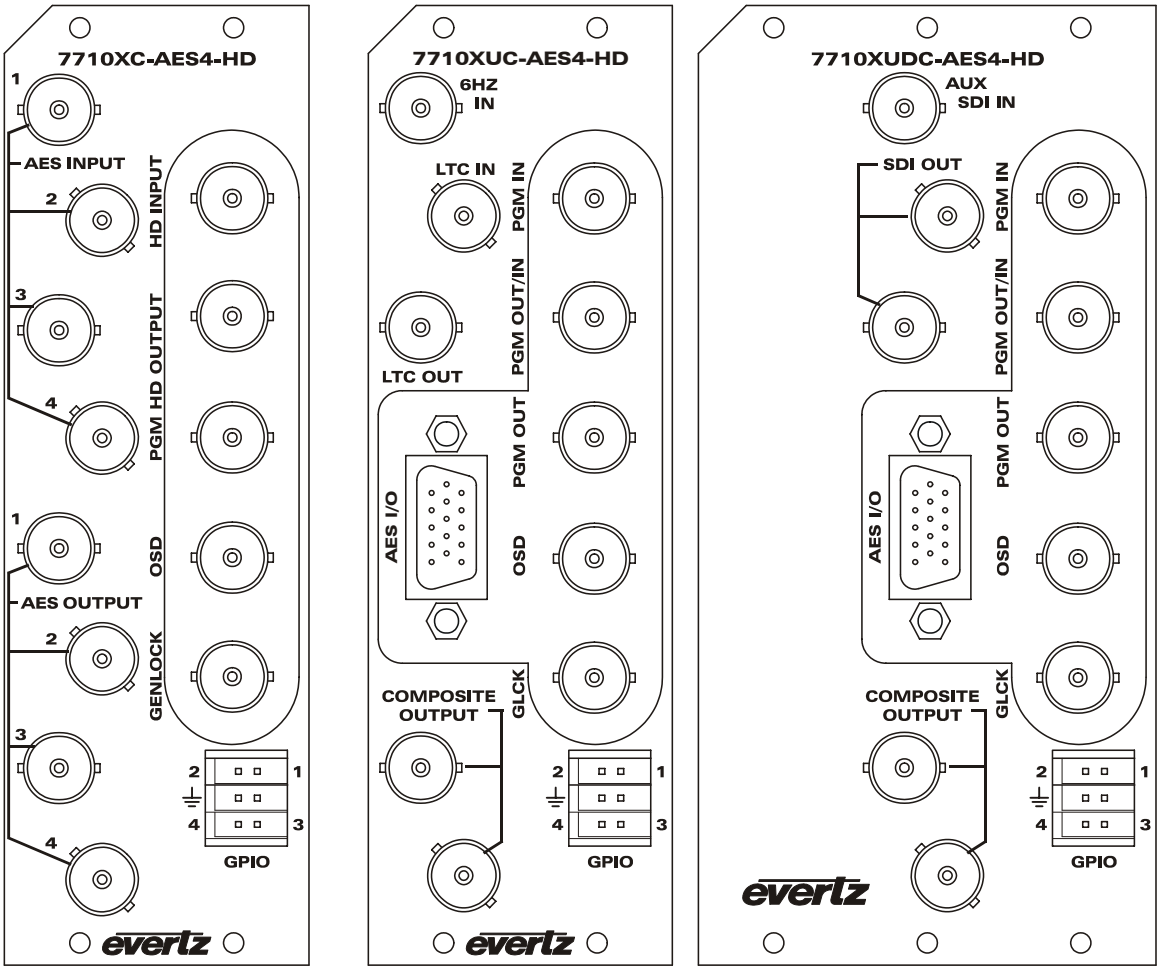


Figure 2: Rear Panels

2.1. VIDEO CONNECTIONS

2.1.1. 7710XC-HD and 7710XC-AES4-HD

HD INPUT Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 292M standard. The module needs to be set to a specific video input standard using the on screen menu at this current time. See Table 7 for a list of the video standards supported.

PGM HD OUTPUT These two BNC connectors are used to output the converted input video as serial component video, compatible with the SMPTE 292M standard. The top PGM HD OUTPUT can be configured as a 6Hz input for 3:2 pull down reference using the menu system.

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. The module needs to be set to a specific video output standard using the on screen menu at this time.

2.1.2. 7710XUC-AES4-HD and 7710XUDC-AES4-HD

PGM IN Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 292M or SMPTE 259M standard. The module needs to be set to a specific video input standard using the on screen menu at this current time. See Table 7 for a list of the video standards supported.

PGM OUT/IN This BNC connector is used to output the converted input video as serial component video, compatible with the SMPTE 292M or SMPTE 259M standard. It can also be configured as an alternate video input, or a 6Hz input for 3:2 pull down reference using menu system.

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-AES4-HD is operated in a down conversion mode the OSD output will be compatible with the SMPTE 259M standard. The module needs to be set to a specific video output standard using the on screen menu at this time.

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 for connecting a video 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). The *Reference* menu item is used to select the correct type of video reference being used. 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.

2.3. AES INPUT AND OUTPUT AUDIO CONNECTIONS

Four unbalanced AES input and outputs are provided on 8 BNC connectors on the 7710XC-AES4-HD or on a 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 2 groups of embedded audio is re-embedded on the output video. The transferred audio is also output as four AES pairs.

Name	Description	DB-15 Pin
GPI2	Reserved for Future Use	1
LTC Out	LTC output	2
GPO1	Reserved for Future Use	3
	Reserved for Future Use	4
	Reserved for Future Use	5
LTC In	LTC input	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 shows the pinout of the DB-15 connector.

Name	Description	DB-15 Pin
GPI2	Reserved for Future Use	1
LTC Out	LTC output	2
GPO1	Reserved for Future Use	3
	Reserved for Future Use	4
	Reserved for Future Use	5
LTC In	LTC input	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

2.4. GENERAL PURPOSE INPUTS AND OUTPUTS

On the 7710XC-HD a 6 pin connector labeled **AUX I/O** contains 4 GPI/O inputs. The pin for GPIO4 can be jumpered to act as the 6Hz 3:2 pull down reference. See section 7.4 and 7.5 for information about configuring the GPIO configuration.

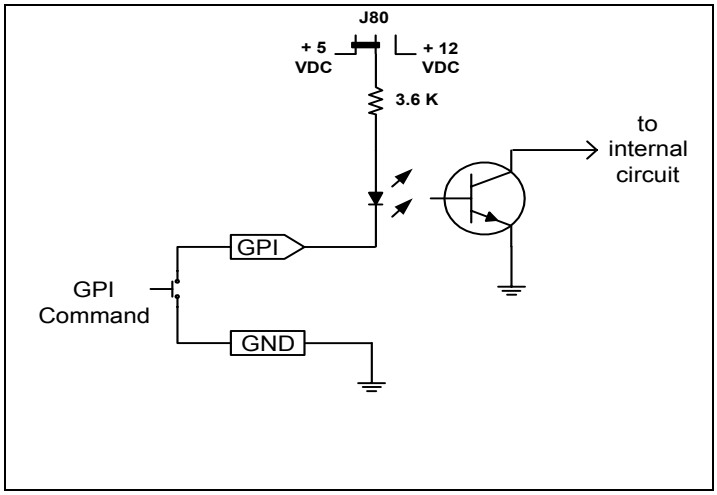


Figure 3: GPI Input Circuitry

The GPO is active low with internal pull up (10k Ohm) resistors to +5V. When the output goes low it is able to sink up to 10mA. When high, the signal will go high (+5V). **Do not draw more than 100µA from the output.** Figure 4 shows the circuit for the general purpose output. The GPO output is not used at this time.

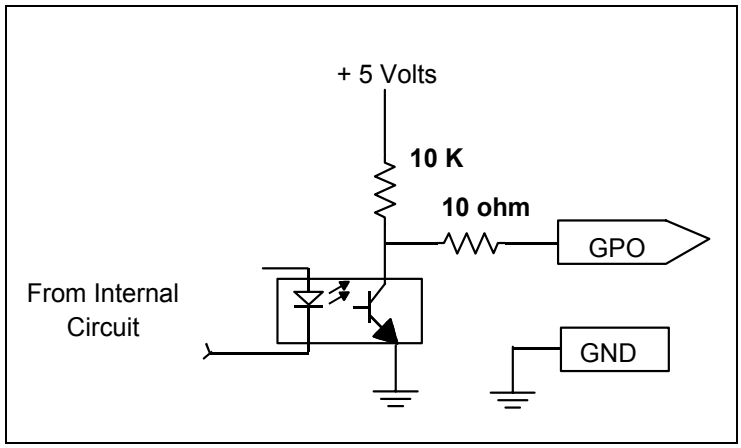


Figure 4: GPO Output Circuitry

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
(See Table 7 for supported video standards on specific models)
Number of Inputs: 1
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
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
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. AES AUDIO INPUTS

Number of Inputs: 4
Standard: SMPTE 276M, single ended synchronous or asynchronous AES
Connectors: BNC per IEC 60169-8 Amendment 2
Resolution: 24 bits
Sampling Rate: 48 kHz
Impedance: 75 Ω
Signal Level: 1 V p-p nominal

3.5. AES AUDIO OUTPUTS

Number of Outputs: 4
Standard: SMPTE 276M, single ended synchronous AES
Connectors: DB15 or BNC per IEC 60169-8 Amendment 2
Resolution: 24 bits
Sampling Rate: 48 kHz
Impedance: 75 Ω
Signal Level: 1 V p-p nominal

3.6. 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:

3.7. ELECTRICAL

Voltage: +12VDC
Power: 26 Watts. XC and XUC, 35 Watts XUDC
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.8. PHYSICAL

Number of slots:
7700 frame mounting: 2
7701 frame mounting: 1

4. STATUS INDICATORS

The 7710XC-HD has 3 LED Status indicators on the main circuit board front card edge to show operational status of the card at a glance. Figure 8 shows the location of the LEDs and card edge controls.

Two large LEDS on the front of the 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 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, and the board power are good.

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

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 incorrect signal appropriate for the current video format is present.

4.1. AUDIO STATUS LEDS

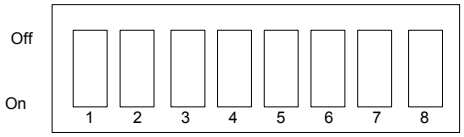
Four LEDs located on the lower end of the module (near the card extractor) indicate which audio groups are present in the input video. Audio group LED 1 is located closest to the center of the module.

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 2: Audio Group Status LEDs

5. CARD EDGE CONTROLS

The 7710XC-HD series modules are equipped with an 8 position DIP switch to allow the user to select various functions. 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 3 gives an overview of the DIP switch functions. Sections 5.1 to 5.3 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 Divisor Selection
7	
8	VistaLINK™ Control Enable

Table 3: 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
On	On	60.00/30.00/24.00

Table 4: Frame Rate Divisor DIP Switch Settings

The 60.00/30.00/24.00 frame rates are not supported at the time of writing.

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 (they cannot be set by the DIP switches). The other three settings of DIP switches 6 and 7 allow setting of the frame rate and video standard manually using the DIP switches only (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 divisor. For example to select 1080i/59.94 as the output format set switches 6 and 7 to the Off position (select 59.94) and set switches 1 to 5 to the Off position to select nominal 1080i/60. Interlaced video formats are shown with the number of fields per second. Progressive formats are shown with the number of framers per second.

#	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	OUTPUT VIDEO FORMAT
0	Off	Off	Off	Off	Off	1080i/59.94 or 1080i/60
1	On	Off	Off	Off	Off	1080p/29.97 or 1080p/30
2	Off	On	Off	Off	Off	1080p/29.97 or 1080p/30sF
3	On	On	Off	Off	Off	1080p/23.98 or 1080p/24
4	Off	Off	On	Off	Off	1080p/23.98 or 1080p/24sF
5	On	Off	On	Off	Off	1035i/59.94 or 1080i/60
6	Off	On	On	Off	Off	720p/59.94 or 720p/60
7	On	On	On	Off	Off	720p/29.97 or 720p/30
8	Off	Off	Off	On	Off	480p/59.94 or 480p/60
9	On	Off	Off	On	Off	525i/59.94 or 525i/60
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 5: Output Video Switch Settings

Note other DIP switch combinations are reserved for future use.

5.3. SELECTING WHETHER MODULE WILL BE CONTROLLED FROM THE LOCAL CONTROLS OR THROUGH THE *VISTA*LINK™ INTERFACE

DIP switch 8 selects whether the module will be controlled from the local user controls or through the *Vista*LINK™ interface.

DIP 8	VistaLINK™ CONTROL
Off	The card functions are controlled through the local menus and DIP switches only
On	The card functions are controlled through the *Vista*LINK™ interface (see section 8), the local menus and DIP switches

Table 6: VistaLINK™ Control Switch Settings

6. ON SCREEN MENUS

6.1. NAGIVATING 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, hold the toggle switch in the up or down position and then press and hold the pushbutton for 3 seconds. 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. Once the arrow is on the desired item, press the pushbutton to select the next menu level.

On all menus, there are two extra selectable items: *Back* and *Exit*. Selecting *Back* will take you to the previous menu (the one that was used to get into 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 stopped at the desired value, depress 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 0 provide detailed descriptions of each of the sub menus. The tables in sections 6.3 to 0 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 - DC	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 deinterlacer frame or field mode, image enhancement motion detect thresholds.
Video Proc	Control the main video proc amp functions
Video Proc DC	Control the down converter video proc amp functions (XUDC version only)
Noise Reducer	Control application of the noise reducer
Audio Settings	Sets the main audio groups and delay
Audio Settings DC	Sets the down converter audio groups and delay (XUDC version only)
Audio Proc	Controls main audio processing
Audio Proc DC	Controls down converter audio processing (XUDC version only)
Composite Output	Control composite output settings
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 6.3.16 give detailed information about each of the menu items.

Video Frame Rate	Select the video input frame rate
DIP Frame Rate	Displays the video input frame rate set by the DIP switches
Video Standard Input	Selects the video input standard.
Video Standard Output	Selects the video output standard.
DIP Video Out	Displays the video output format set by the DIP switches
Video Input Source	Selects video input from PGM IN or PGM OUT/IN BNC
PGM OUT/IN Mode	Set input or output mode of PGM OUT/IN BNC
Output Pulldown Reference	Selects the reference source when 3:2 pulldown is being added on the output.
A Frame Offset	Sets the offset of the A Frame from the Pulldown Reference when 3:2 pulldown is being added on the output
SD Blanking	Selects upper lines as video or blank. SD input only.
VITC Reader Line	Select line for VITC reader - SD input formats only
VITC Generator Line	Select 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
Reference Select	Selects internal or video and locking reference
Force Minimum Phase	Set the H and V phase such that the path delay in minimized
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
60/30/24
50/25

This control selects the group of frame rates 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.

Grayed out frame rates are currently unavailable in this release.

6.3.2. Displays the Video Input and Output Frame rate set by the DIP switches

Video
DIP Frame Rate
59.94/29.97/23.98
60/30/24
50/25

This menu item displays the group of frame rates set by DIP switches 6 and 7. Table 4 shows the DIP switch settings to select each of the frame rates.

When DIP switches 6 and 7 are set to the OFF position, the frame rate is set by the *Output Standard Menu* item if DIP switch 8 is set to Off or by VistaLINK™ if DIP switch 8 is set to On.

Grayed out frame rates are currently unavailable in this release

6.3.3. Setting the Input Video Standard

Video
Input Standard
Auto
1080i59.94/60
1080p29.97/30
1080p29.97/30sF
1080p23.98/24
1080p23.98/24sF
1035i59.94/60
720p59.94/60
720p29.97/30
480p59.94/60
525i59.94/60
1080p25
1080p25sF
1080i50
720p50
625i50

This control selects the input video standard being used. The choice of input standards available is dependent upon 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 set this menu item to *1080i59.94/60*. Interlaced video formats are shown with the number of fields per second. Progressive formats are shown with the number of framers 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.

The standard definition input video formats are not available on the XC versions.

Table 7 shows the combinations of input and output formats supported.

6.3.4. Setting the Output Video Standard

Video
Output Standard
1080i59.94/60
1080p29.97/30
1080p29.97/30sF
1080p23.98/24
1080p23.98/24sF
1035i59.94/60
720p59.94/60
720p29.97/30
480p59.94/60
525i59.94/60

1080p25
1080p25sF
1080i50
720p50
625i50

This control selects the output standard desired. 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 not available on the XC versions.

The standard definition output video formats are always available on the XUDC versions and are therefore not available for selection. When the input standard is one of the HD 59.94 or 60 Hz related frame rates, the standard definition output of the XUDC will be *525i59.94/60.* When the input standard is one of the HD 50 Hz related frame rates, the standard definition output of the XUDC will be *625i50.*

Table 7 shows the combinations of input and output formats supported.

6.3.5. Displaying the Output Video Standard set by the DIP switches

Video
DIP Output Standard
1080i59.94/60
1080p29.97/30
1080p29.97/30sF
1080p23.98/24
1080p23.98/24sF
1035i59.94/60
720p59.94/60
720p29.97/30
480p59.94/60
525i59.94/60

1080p25
1080p25sF
1080i50
720p50
625i50

This menu item displays the output standard set by the DIP switches. Table 5 shows the DIP switch settings to select each of the video output formats.

When DIP switches 6 and 7 are set to the OFF position, the output video standard is set by the *Output Standard Menu* item if DIP switch 8 is set to Off or by VistaLINK™ if DIP switch 8 is set to On.

<-Input	Output->	1080													1035		720							480	SD	
	Frame rate: p=progessive I=interlaced sF=segmented	p30	p30sF	i30	p29.97	p29.97sF	i29.97	p25	p25sF	i25	p24	p24sF	p23.98	p23.98sF	i30	i29.97	p60	p59.94	p50	p30	p29.97	p24	p23.98	p59.94	i29.97/525	i25/625
1080	p30	■	Φ	Φ	.	.	.	.	.	.	.	.	.	.	Φ	.	Φ	.	.	Φ	.	.	.	.	.	.
	p30sF	Φ	■	Φ	.	.	.	.	.	.	.	.	.	.	Φ	.	Φ	.	.	Φ	.	.	.	.	.	.
	i30	Φ	Φ	■	.	.	.	.	.	.	Φ	Φ	.	.	Φ	.	Φ	.	.	Φ	.	Φ	.	.	.	.
	p29.97	.	.	.	■	√	√	.	.	.	.	.	.	.	.	√	.	√	.	.	√	.	.	√	√	.
	p29.97sF	.	.	.	√	■	√	.	.	.	.	.	.	.	.	√	.	√	.	.	√	.	.	√	√	.
	i29.97	.	.	.	√	√	■	.	.	.	.	.	√	√	.	√	.	√	.	.	√	.	√	√	√	.
	p25	.	.	.	.	.	.	■	√	√	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	√
	p25sF	.	.	.	.	.	.	√	■	√	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	√
	i25	.	.	.	.	.	.	√	√	■	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	√
	p24	.	.	√	.	.	.	.	.	.	■	√	.	.	Φ	.	Φ	.	.	.	.	√	.	.	.	.
	p24sF	.	.	√	.	.	.	.	.	.	√	■	.	.	Φ	.	Φ	.	.	.	.	√	.	.	.	.
	p23.98	.	.	.	.	.	√	.	.	.	.	.	■	√	.	√	.	√	.	.	.	.	√	√	√	.
	p23.98sF	.	.	.	.	.	√	.	.	.	.	.	√	■	.	√	.	√	.	.	.	.	√	√	√	.
1035	i30	Φ	Φ	Φ	.	.	.	.	.	.	Φ	Φ	.	.	■	.	Φ	.	.	Φ	.	Φ	.	.	.	.
	i29.97	.	.	.	√	√	√	.	.	.	.	.	√	√	.	■	.	√	.	.	√	.	√	√	√	.
720	p60	Φ	Φ	Φ	.	.	.	.	.	.	Φ	Φ	.	.	Φ	.	■	.	.	Φ	.	Φ	.	.	.	.
	p60_30	Φ	Φ	Φ	.	.	.	.	.	.	.	.	.	.	Φ	.	Φ	.	.	Φ	.	.	.	.	.	.
	p60_25	.	.	.	.	.	.	√	√	√	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	√
	p60_24	.	.	.	.	.	.	.	.	.	√	√	.	.	Φ	.	Φ	.	.	.	.	√	.	.	.	.
	p59.94	.	.	.	√	√	√	.	.	.	.	.	√	√	.	√	.	■	.	.	√	.	√	√	√	.
	p59.94_29.97	.	.	.	√	√	√	.	.	.	.	.	.	.	.	√	.	√	.	.	√	.	.	√	√	.
	p59.94_23.98	.	.	.	.	.	√	.	.	.	.	.	√	√	.	√	.	√	.	.	.	.	√	√	√	.
	p50	.	.	.	.	.	.	√	√	√	.	.	.	.	.	.	.	.	■	.	.	.	.	.	.	√
	p30	Φ	Φ	Φ	.	.	.	.	.	.	.	.	.	.	Φ	.	Φ	.	.	■	.	.	.	.	.	.
	p29.97	.	.	.	√	√	√	.	.	.	.	.	.	.	.	√	.	√	.	.	■	.	.	√	√	.
	p24	.	.	.	.	.	.	.	.	.	√	√	.	.	Φ	.	Φ	.	.	.	.	■	.	.	.	.
	p23.98	.	.	.	.	.	√	.	.	.	.	.	√	√	.	√	.	√	.	.	.	.	■	√	√	.
480	p59.94	.	.	.	√	√	√	.	.	.	.	.	√	√	.	√	.	√	.	.	√	.	√	■	√	.
SD rates	i29.97/525	.	.	.	*	*	*	.	.	.	.	.	*	*	.	*	.	*	.	.	*	.	*	*	■	.
	i25/625	.	.	.	.	.	.	*	*	*	.	.	.	.	.	.	.	.	*	.	.	.	.	.	.	■

Note: p60_30, _25, _24 are similar to p60 but with different shutter speeds, the same applies to p59.94_…
The different shutter speeds formats are never outputted.
Note: no temporal translation is provided.
Note: 480 is on a 74.25/1.001 MHz transport

Table 7: Valid Input/Output Conversion Combinations

6.3.6. Selecting The Video Input Source (XUC and XUDC versions only)

Video
- *Video Input Source*
  - *Pgm In*
  - *PGM OUT/IN*

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.*

The **PGM IN** BNC can handle either SD or HD input video and the **PGM OUT/IN** BNC currently can only handle HD inputs. Therefore system wiring must be planned accordingly.

6.3.7. Select the Video Mode on PGM OUT/IN (XUC and XUDC versions only)

Video
- *PGM OUT/IN Mode*
  - *Video Output*
  - *Video Input*

This control controls 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.

6.3.8. 3:2 Pulldown Processing

When using a 1080i/59.94 input video feed containing 3:2 pulldown, the 7710XC-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 7710XC-HD will operates 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 7710XC-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.

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

This menu setting is only used when the input video is 1080p/23.98sF. In other input video formats it is not applicable

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

On 1080p/23.98sF video inputs 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 5). The output of the *A frame candidate* frame will delayed by 2 frames, will consist of two video fields and will normally be in time with the genlock input. (See sections 6.3.1 and 6.3.16.5 for information on phasing of the output video with respect to the genlock.) 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 6.3.10)

When you select *Auto* the card will auto detect the pulldown reference according to the following priority:
- 6 Hz pulse if present
- RP188 ancillary timecode if present
- Free Run pulldown if neither 6 Hz pulse or RP188 is present

Select *RP 188* when the embedded ancillary timecode present on the input video is used to determine the pulldown. The input frames with time code frame numbers divisible evenly by 4 will normally identify the input A frame candidates.

Select *6 Hz Input* when a 6 Hz pulse connected to pin 6 of the **AUXILIARY I/O** connector or on a BNC (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 6 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.

6.3.10. Accommodating Non-Standard 3:2 Sequences

This menu setting is only used when the input video is 1080p/23.98sF. In other input video formats it is not applicable

Video
A Frame Offset
0
1
2
3

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

Figure 6shows how this control defines the A frame candidate when the 6 Hz pulse is present. Figure 7 shows how this control defines the A frame when RP188 Ancillary data is used to control the 3:2 pulldown.

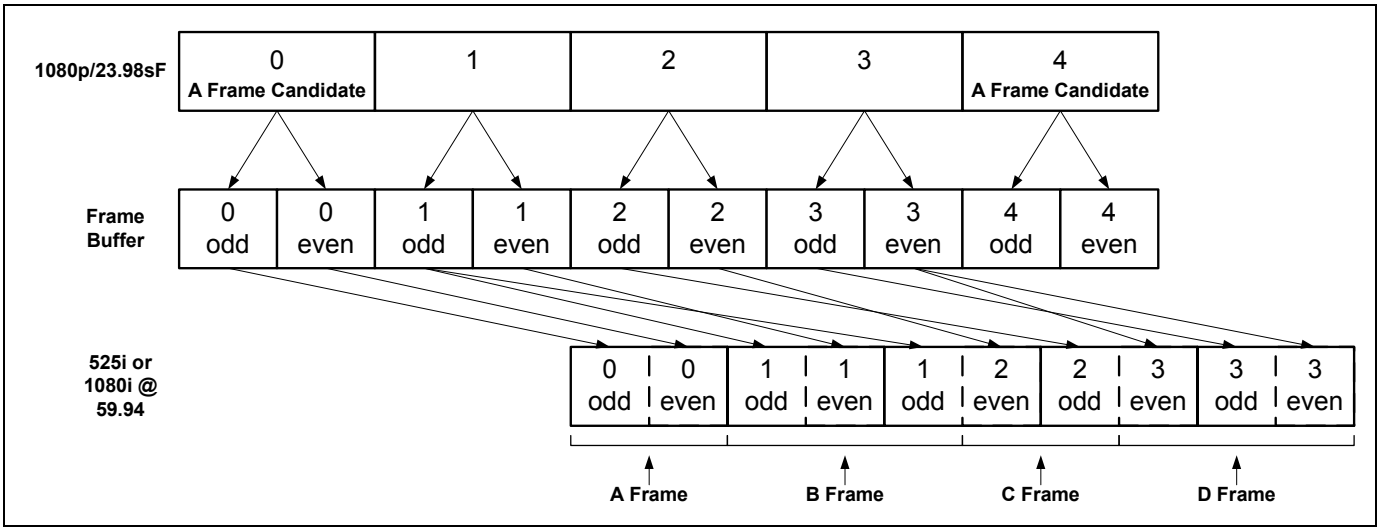


Figure 5: 3:2 Pulldown Sequence Insertion – 1080p/23.98sF Input Video

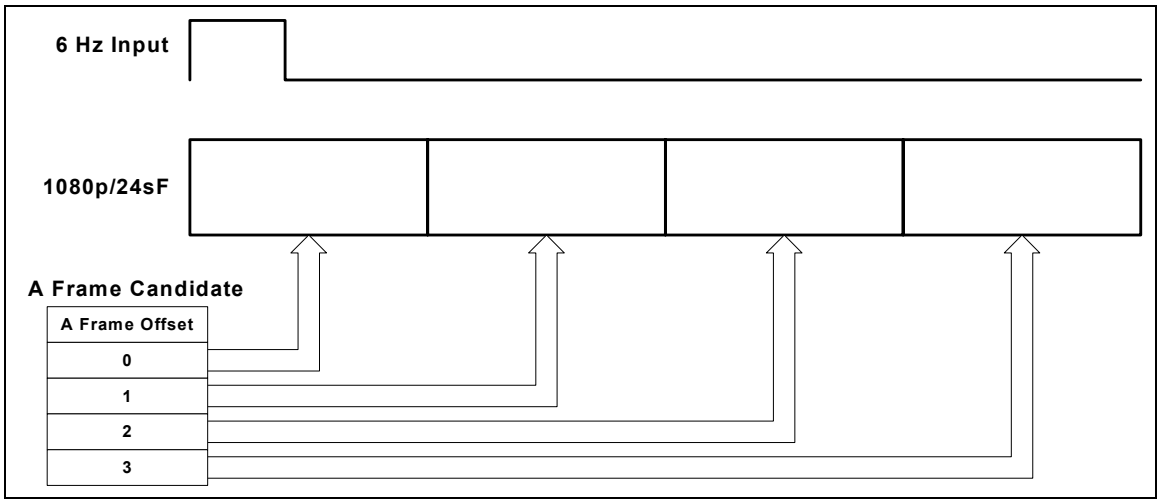


Figure 6: 6 Hz Pulldown Sequence A Frame Alignment – 1080p/23.98sF Input Video

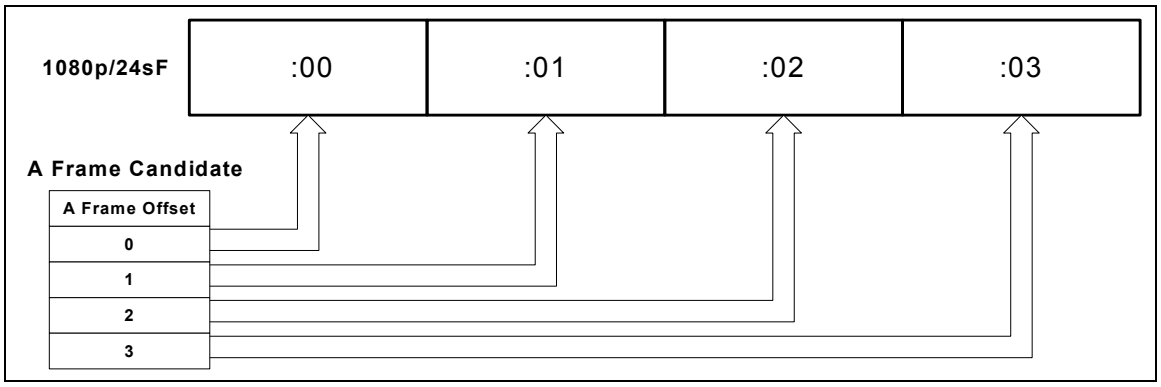


Figure 7: RP188 Pulldown Sequence A Frame Alignment – 1080p/23.98sF Input Video

6.3.11. Blanking Line 21 Captions for SD Video Inputs

Video
SD Blanking
21
19-23
n/a

With this control, you can adjust which standard definition lines will be blanked prior to up converting the signal. Normally line 21 where closed caption information may be present is blanked.

The value shown is *n/a* when this menu item does not apply to the input standard.

6.3.12. Setting the VITC Reader Line for SD Video Inputs

Video
VITC Reader Line
14 for 525
19 for 625
n/a

With this control, you can select the line number where VITC will be read on the standard definition input video. The valid range is *10 to 20 for 525i/59.94* inputs*, 6 to 22 for 625i/50* inputs.

The value shown is *n/a* when this menu item does not apply to the input standard.

6.3.13. Setting the VITC Writer Line for SD Video Inputs

Video
VITC Generator Line
14 for 525
19 for 625
n/a

With this control, you can select the line number where VITC will be written on standard definition output video. The valid range is *10 to 20 for 525i/59.94* inputs*, 6 to 22 for 625i/50* inputs.

The value shown is *n/a* when this menu item does not apply to the input standard.

6.3.14. Setting the source of Time Code

Video
Time Code Source
Embedded
External LTC
off

This control selects the source of Timecode. Either Embedded or The 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.

The value shown is *off* when this menu item does not apply to the input standard.

6.3.15. 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.

6.3.16. 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 should not be adjusted when the output video is in the broadcast chain.

6.3.16.1. 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 incoming video.

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

Note you need external audio option AES4 if the input video does not have a stable time base to the external reference and audio frame syncing is required.

6.3.16.2. 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 Offset* and *H Phase Offset* settings. There are separate settings of *H and V phase* offset for each output video type. Table 8 shows the default and maximum and minimum delays for each video standard.

To achieve the minimum delay use the control Force Minimum Phase. Otherwise the status screen will report the current true delay of the system.

The delay is counted in the lines and pixels of the output standard and is calculated from input field 0 start to output field 0 start.

	Default Delay	Maximum Delay			Minimum Video Delay		
	Frames	Frames	Lines	Samples	Frames	Lines	Samples

Table 8: 7710XC-HD Video Delay

6.3.16.3. Force minimum Phase.

Video
- *Force minimum Phase*

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.

6.3.16.4. 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 in time with the Genlock reference or 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 SD input and the video output. See Table 8 for the minimum and maximum delays possible.

6.3.16.5. 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 V phase offset for each input video type. Setting this control to 0 keeps the output video in time with the Genlock reference.

Increasing the 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.) See Table 8 for the minimum and maximum delays possible.

6.4. CONFIGURING THE SCALER

The cross converter scaler uses a process of filtering to in order 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 shows the items available in the *Scaler* menu. Sections 6.4.1 to 6.4.5 give detailed information about the menu items. The 7710XUDC-HD offers simultaneous cross conversion and down conversion and has another set of identical menu items (the *Scaler-DC* menu items) for its down converter. For the sake of simplicity in the manual only the main Scaler menus will be described.

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
H Rate Limit	Enable a rate limit on the horizontal edges.
V Rate Limit	Enable a rate limit on the vertical edges.
ARC	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. For the sake of clarity only the menu item for the horizontal filter control is shown in the manual.

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.

Scaler *V 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.

6.4.2. Setting The Rate Limit Contols

There are two controls that adjust the horizontal and vertical rate limit pre-processors for the scaler. Some video content has excessive edge rates that do not conform to bandwidth limits so these control will apply

a rate limit to edges it detects exceed the normal bandwidth so that the scaling filters will not ring excessively.

Scaler
H Rate Limit
Disable
Enable

With this control, you can enable or disable the horizontal rate limit function.

Scaler
V Rate Limit
Disable
Enable

With this control, you can enable or disable the vertical rate limit function.

6.4.3. Setting the Aspect Ratio of the Output Picture

The *Aspect Ratio* menu presets the user image conversion parameter to build it presets. Once selected the user can fine adjust the picture parameters via the input and output H and V stop and stop menus. Note: In order to save any modified state as a preset the *Aspect Ratio* needs to be set to *User Aspect*.

Scaler	
ARC	
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. **Note:** For 1080i/1035i inputs these functions only work in field mode.
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 downconverter settings for converting 16:9 aspect ratio images to common 4:3 formats. These settings are not appropriate for cross or up conversion

6.4.4. 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 simplicity only the menu item for the *Red* component will be shown in the 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.

6.4.5. User aspect ratio setting.

There are four registers for each input video standard that set the portion of the input picture that will be converted. These register 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 registers 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. The range of values for 1080i output 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. The range of values for 1080i output is 0 to 539. The range of values for 720p output is 0 to 719.

6.5. CONFIGURING THE DEINTERLACER

The *Deinterlacer* menus are used to configure parameters associated with the deinterlacer hardware. The chart below shows the items available in the *Deinterlacer* 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 down conversion.
Freeze Frame Threshold	Sets number of frames before frozen video is detected
Detail Enhancement Resolution	Sets resolution of the Detail Enhancement control.
Detail Enhancement Level	Sets level of the Detail Enhancement control.
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 deinterlacer.

6.5.1. Setting the Deinterlacer Mode

Deinterlacer *Deinterlacer Mode* *Field* *Frame*	With this control, you can set whether the module will perform field or frame based down 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 video formats but gives a softer vertical up conversion. This mode is applicable to interlaced input video formats only. If *Field* mode is selected for progressive input video formats the up-converter will operate in *Frame* mode. Currently *Field* mode is not supported 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 images that do not contain 3:2 pulldown or for progressively scanned video. This mode is the only mode available for progressive input video formats. For interlaced images the converter cannot increase the size of the image for HD video inputs, one must use Field mode.

6.5.2. Setting the Freeze Frame Threshold

Deinterlacer *Freeze Frame Threshold* *16* *0 to 31*	With this control, you can set the number of frames before frozen/missing video is detected.

6.5.3. Setting the Detail Enhancement

Two controls allow you to control the deinterlacer detail enhancement.

Deinterlacer
Detail Enhancement Resolution
1 *0 to 5*

With this control, you can set the resolution for the *Detail Enhancement Level* control. Larger numbers mean coarser steps in the level control.

Deinterlacer
Detail Enhancement Level
0 *0 to 31*

With this control, you can set *Detail Enhancement Level* control. Larger numbers mean more detail enhancement will be applied. The step sizes for the level control are set using the *Detail Enhancement Resolution* control.

6.5.4. Setting the Motion Detection Controls

Deinterlacer
Motion Detection Threshold
0 to 15

With this control, you can change the threshold of what is deemed motion for the deinterlacer.

6.5.5. Setting the Interfield Weighting Factor

Deinterlacer
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 (NOT IMPLEMENTED AT THE TIME OF WRITING)

The *Video Proc* menus are used to configure parameters associated with the video processing functions of the cross converter. The chart below shows the items available in the *Video Proc* menu. Sections 6.6.1 to 6.6.9 give detailed information about each of the menu items. The 7710XUDC-HD offers simultaneous cross conversion and down conversion and has another set of identical menu items (the *Video Proc - DC* menu items) for its down converter. For the sake of simplicity in the manual only the main *Video Proc* menus will be described.

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.

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 gain for vertical enhancements.

6.6.1. Setting the Gain Levels

There are six controls that set the gain of the video. For simplicity, only one control will be shown in the manual.

Video Proc *Y Gain* *+/- 30%*	With these controls the user can adjust the gain of the 3 components in either the Y Cr Cb domain or the R G B 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

6.6.2. Setting the DC Offset

There are three controls that set the DC Offset of each component of the video. For simplicity, only one control will be shown in the manual.

Video Proc
Y Offset
+/- 100

With these controls the user can adjust the DC offset of the 3 components in the Y Cr Cb domain in +/- 100 quantizations levels.

6.6.3. Setting the Hue

Video Proc
Hue
+/- 10

With this control the user can adjust the Hue or color of components +/- 10 degrees

6.6.4. Setting the Gamma Level

Video Proc
Gamma Level
+/- 128

With this control the user can adjust the Gamma correction factor by +/- 128 in steps of 1.

6.6.5. Setting the Luma Floor

Video Proc
Luma Floor
0 to 15

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

6.6.6. Setting the Detail Noise Floor

Video Proc
Detail Noise Floor
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 be left untouched.

6.6.7. Setting the Enhancement Limit

Video Proc
Enhancement Limit
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.

6.6.8. Setting the Horizontal Band

Video Proc
Horizontal Band
0 to 3

Selects the Horizontal frequency band to be enhanced.

Where 0 selects the lowest frequency band available and 3 the highest.

6.6.9. Setting the V Enhancement

Video Proc *Vertical Inensity* *0-100%*	Selects the intensity of the vertical enhancement process, as a ratio 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.

6.7. CONFIGURING THE VIDEO NOISE REDUCER (XUC AND XUDC VERSIONS ONLY)

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.

The chart below shows the items available in the *Noise Reducer* menu. Sections 6.7.1 to 6.7.4 give detailed information about each of the menu items.

The *Noise Reducer* menu only applies when the card is in up conversion mode. E.g. from SD input ⇒ HD output

Noise Reduction	On/Off control of noise reduction
Frame Filter	Turn on frame processing
Noise Level	Tell the noise reducer process how much noise to expect
Motion Sensitivity	Adjust the threshold where temporal processing is transitioned to spatial processing

6.7.1. Turning on the Noise Reduction

Noise Reducer *Noise Reduction* *On* *Off*	This control is a global on/off switch for the noise reducer.

6.7.2. Turning on the Median Filter

Noise Reducer *Frame Filter* *On* *Off*	This control allows the frame filter to be turened on an off. The frame filter removes individual events like SDI bit errors or RF dropouts.

6.7.3. Set the Amount of Random Noise

Noise Reducer
Noise Level
0 to 63
0

This control allows you to tell the noise reducer how much random noise to expect. Higher numbers configure the noise reducer to remove higher amounts of random noise.

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

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.

6.7.4. Set the Motion Sensitivity

Noise Reducer
Motion Sensitivity
0 to 3
1

This control allows you to tell the noise reducer when to switch between temporal and spatial processing.

Higher numbers configure the noise reducer to move from temporal processing to spatial processing with smaller amounts of detected motion (i.e. more sensitive to motion).

Setting the value too low may cause the circuitry to leave a small trail of moving content when the moving object and the background are similar brightness and/or color. However, removal of random noise will be maximized.

Setting the value higher than needed will cause the shift to spatial processing, reducing the effectiveness offered by the temporal processing.f

6.8. CONFIGURING THE AUDIO SETTINGS

The SMPTE 272M and 299M standards permit up to 4 groups of 4 audio channels to be embedded into the serial digital video bitstream. The cross converter card de-embeds two groups of audio from the serial digital input video that are the source for re-embedding on the serial digital output video. AES4 versions of the card also have 4 discrete AES inputs that can be selected as the source for re-embedding. The *Audio Settings* 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 6.8.2 give detailed information about each of the menu items. The 7710XUDC-HD offers simultaneous cross conversion and down conversion and has another set of identical menu items (the *Audio Settings - DC* menu items) for its down converter. For the sake of simplicity in the manual only the main *Audio Settings* menus will be described.

Source A	Sets the source for embedder A
Source B	Sets the source for embedder B
Embedder Group A	Sets the audio group destination for embedder A
Embedder Group B	Sets the audio group destination for embedder B
Delay	Adjusts the audio delay from the nominal video delay
Dolby E	Sets card for Dolby E operation

6.8.1. Selecting The Source of Audio for the Embedders

There are two controls that set the sources of audio to process with the card delays. For simplicity, only one control will be shown in the manual.

Audio Settings *Source A* *Group 1* *Group 2* *Group 3* *Group 4* *AES 1&2* *AES 3&4*	Under normal conditions the settings for source A and source B should be different otherwise the audio will be repeated on the HD SDI output. The default for Source A is group 1 and the default group for Source B is group 2. On the AES4 versions of the card you can also select pairs of external AES inputs as the source of audio to process with the card delays.

6.8.2. Selecting The Audio Groups That Will Be Embedded

The cross converter card has two embedders that each insert one group of audio on the serial digital video output. The source for Embedder A is the audio selected by the *Source A* menu item and the source for Embedder B is *Source B* menu item. There are two controls that set the audio groups where the embedders will put the audio on the serial digital output. For simplicity, only one control will be shown in the manual.

Audio Settings
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. If the user sets them the same then the next higher group number will be used for Embedder B..

6.8.3. Selecting The Audio Delay

Audio Settings
Audio Delay
+/- 100

This control adjusts the audio delay +/- 100 ms from the nominal delay necessary to match the card's video processing delay.

Note: Negative values are limited to the amount that cause the delay to be only the audio processing delay, the card does not have negative delay ability.

6.8.4. Configuring the Card to pass Dolby E

Audio Settings
Dolby E
Disable
Enable

This control is used to configure the card to handle non-pcm audio such as Dolby E.

Select *Disable* for normal audio synchronization and sample rate conversion functions. This mode can not be used when passing non-pcm audio such as Dolby E.

Select *Enable* to bypass all audio synchronization and sample rate conversion functions to enables the converter to correctly function in a Dolby E environment.

6.9. CONFIGURING THE AUDIO PROCESSING FUNCTIONS

The *Audio Proc* menus are used to configure parameters associated with the audio processing functions of the cross converter. The chart below shows the items available in the *Audio Proc* menu. Sections 6.9.1 to 6.9.2 give detailed information about each of the menu items. The 7710XUDC-HD offers simultaneous cross conversion and down conversion and has another set of identical menu items (the *Audio Proc - DC* menu items) for its down converter. For the sake of simplicity in the manual only the main *Audio Proc* menus will be described.

Channel A1 sel	Sets what audio will be output on channel 1 of group A
Channel A2 sel	Sets what audio will be output on channel 2 of group A
Channel A3 sel	Sets what audio will be output on channel 3 of group A
Channel A4 sel	Sets what audio will be output on channel 4 of group A
Channel B1 sel	Sets what audio will be output on channel 1 of group B
Channel B2 sel	Sets what audio will be output on channel 2 of group B
Channel B3 sel	Sets what audio will be output on channel 3 of group B
Channel B4 sel	Sets what audio will be output on channel 4 of group B
Channel A1 gain	Sets the gain of Audio channel 1 of group A
Channel A2 gain	Sets the gain of Audio channel 2 of group A
Channel A3 gain	Sets the gain of Audio channel 3 of group A
Channel A4 gain	Sets the gain of Audio channel 4 of group A
Channel B1 gain	Sets the gain of Audio channel 1 of group B
Channel B2 gain	Sets the gain of Audio channel 2 of group B
Channel B3 gain	Sets the gain of Audio channel 3 of group B
Channel B4 gain	Sets the gain of Audio channel 4 of group B

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 simplicity, only the selection control for channel A1 will be shown in the manual.

Audio Proc
Channel A1 sel
Channel 1A
channel 2A
channel 3A
channel 4A
channel 1B
channel 2B
channel 3B
channel 4B
Mono mix 1A & 2A
Mono mix 3A & 4A
Mono mix 1B & 2B
Mono mix 3B & 4B
Mute

This control selects the source of audio for the A1 output channel. 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 A1 will come from input channel A1)

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 simplicity, only the gain control for channel A1 will be shown in the manual.

Audio Proc
Channel A1 gain
0 dB
+/1 24 dB

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

6.10. CONFIGURING THE ANALOG VIDEO OUTPUT PARAMETERS (XUDC VERSION ONLY

The 7710XUDC-AES4-HD 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 6.10.1 to 6.10.11 give detailed information about each of the parameters.

NTSC setup pedestal	Selects whether the NTSC 7.5 IRE pedestal will be added to the composite analog output video
Line 21 setup	Controls line 21 processing
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 Y Freq. Resp.	Controls the frequency response with the wideband filter selected
Chroma Filter Selection	Various chroma bandwidths are available with this control

6.10.1. Adding the NTSC Setup Pedestal

Composite Output *NTSC setup pedestal* *Off* *On*	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. The setup pedestal should not be present on composite video when operating in Japan.

6.10.2. Line 21 Processing

Composite Output
Line 21 setup
Off,
On,
Blank

Closed captioning has been defined to NOT have a 7.5 IRE pedestal, but it is placed on the first active line of video where there may be a pedestal. The upstream closed captioning encoder should not have generated a setup pedestal. When encoding composite video with properly keyed captioning, a pedestal must not be generated.

This control, when set to *Off*, will not create the 7.5 IRE pedestal on line 21. This is the default state for properly generated captioning.

When set to *On*, the 7.5 IRE pedestal will be generated on line 21. Use this state when there are no input captions.

Note: The *On* condition will only take effect if the *NTSC Setup Pedestal* control is set to *On*.

Blank is used to remove captioning from line 21.

Note: The captions are *Blank*ed from the main, high quality, output only. This will allow the monitoring of upstream captioning on the *monitoring output* even when it is not desirable to have them passed downstream on the program video.

6.10.3. Colour Bars

Composite Output
Colour bars
On,
Off

This control enables and disables an internally generated colour bars signal to aid in video level calibration.

6.10.4. Setting the Composite Display Mode – Colour or Monochrome

Composite Output
Composite display mode
Colour
B/W

If monochrome operation is desired on the composite output, colour may be turned off with this control.

6.10.5. 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.

Warning: The brightness and contrast controls will also affect video level. Set this control by measuring sync level rather than video level. After calibrating the brightness and contrast, come back to this control and verify the video level.

6.10.6. 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.

6.10.7. 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.

6.10.8. Configuring the VBI Processing

Composite Output
VBI Processing
Blank, *Pass*

The Vertical Blanking Interval may be passed to the component outputs or may be blanked (removed) to not interfere with display of the image.

6.10.9. 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.

6.10.10. Setting the Wideband Y Frequency Response

Composite Output
Wideband Y Freq. Resp.
-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.

Note: If you want to observe the filtering, supply a component multiburst or H sweep test signal and configure the card to output a YPbPr signal.

6.10.11. 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. Note: If you want to observe the filtering, supply a component multiburst or H sweep test signal and configure the card to output a YPbPr signal.

6.11. 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 6.11.1 to 6.11.7 give detailed information about each of the parameters.

Recall Preset	Used to recall the current module configuration from one of the user presets or to reset the module to its factory preset condition.
Store Preset	Used to store the current module configuration to one of the user presets.
Auto Std Recall	Used to enable or disable the default parameter recall
GPIO 1	Selects the function of GPIO1 - Recall Preset 1-10/OFF
GPIO 2	Selects the function of GPIO2 - Recall Preset 1-10/OFF
GPIO 3	Selects the function of GPIO3 - Recall Preset 1-10/OFF
GPIO 4	Selects the function of GPIO4 - 6Hz source/Recall Preset 1-10/OFF
6Hz Ref	Selects the source of the 6Hz reference - OFF/BNC2/Terminal Block
Upgrade	Used to upgrade the firmware in the module.
Status WIndow	Enable or Disable display of the status screen
About…	Shows the firmware version of the module.

6.11.1. 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.

The current state of the card will be forgotten if it has not been saved to a preset before a recall is performed.

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

6.11.1.1. Recalling Configurations from the User Presets

Utilities
- *Recall Preset*
  - *Cancel*
  - *Factory*
  - *1 to 10*

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 store will take place. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

6.11.1.2. 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.

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

Utilities
- *Auto Std Recall*
  - *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. For a preset recall this causes a conflict is which parameter sets have priority. Disabling this ensure all the preset recall parameters take effect.

6.11.3. 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 simplicity, only one control will be shown in the manual.

Utilities
GPIO 1
OFF
1-10
6Hz

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

In addition to the preset recall functions, GPI4 can also be configured as active 6Hz input for 3:2 pull down for 24sF to 60Hz inputs

6.11.4. Setting 6Hz location

Utilities
6Hz
OFF
BNC2
Term

This control sets the location of the 6Hz reference used for 3:2 pull down. The 6 Hz reference pulse is an active high (TTL level) pulse that starts at the beginning of the A frame sequence and lasts for one field (1`6.6 ms). When the input video standard is 1080p/23.98 this pulse identified the frame that will become the A frame of the output video. When the input video has a 2:3 picture content this pulse identified the A frame in the incoming 2:3 sequence.

The 6 Hz reference pulse may be applied to BNC adjacent to the HD input BNC, or GPI4 on the terminal block. The 6 Hz function may also be disabled using this control.

6.11.5. Displaying the Status Window on the OSD Output

Utilities
Status Window
Disable
Enable

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

6.11.6. 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 7710XC-HD series modules is 115,200 baud.

6.11.7. 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 gives quick access to information about revisions that can be used to determine when upgrades are required.

7. JUMPERS

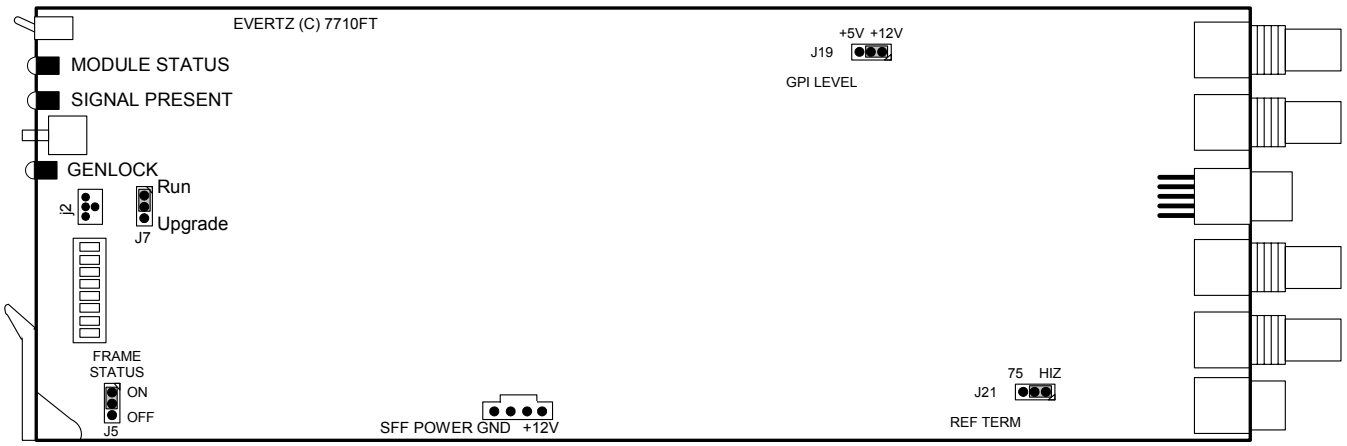


Figure 8: Location of Jumpers – Rev C Main Module

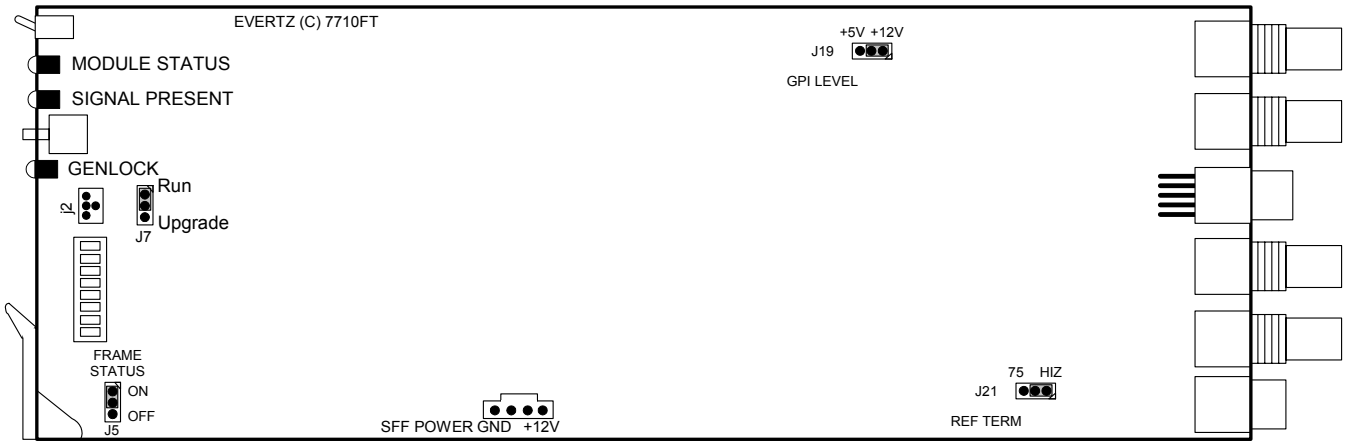


Figure 9: Location of Jumpers – Rev D Main Module

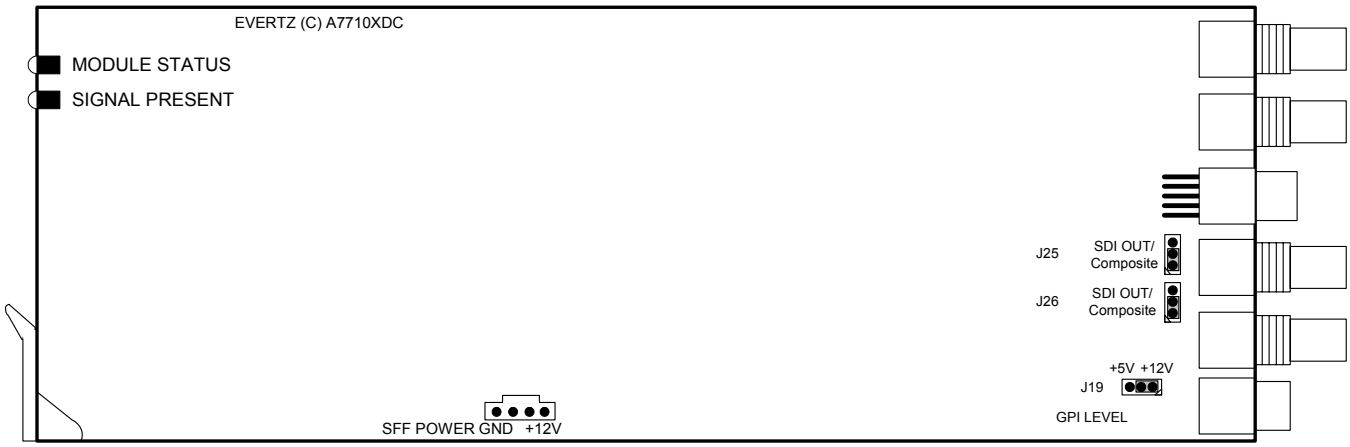


Figure 9: Location of Jumpers – Sub Module for 7710XUDC-AES40-HD

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 LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

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

7.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

Firmware updates can be performed using the *Upgrade* menu item on the *Utilities* menu (see section 6.11.5) or using the **UPGRADE** jumper.

UPGRADE The UPGRADE switch is located on the back side 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 8 and Figure 9

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J7 into the *UPGRADE* position. (Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J2 at the card edge. Re-install the module into the frame. Run the upgrade as described in *Upgrading Firmware* chapter. Once the upgrade is completed, remove the module from the frame, move J7 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

The Upgrade baud rate for the 7710XC-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 10 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,

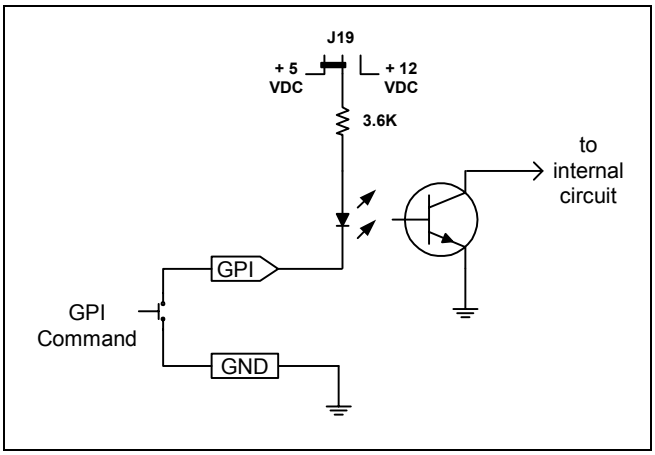


Figure 10: Setting the GPI Input Pullup Voltage

7.5. SELECT GPI AND 6HZ JUMPER

The rear terminal jack is default setup for 4 GPI inputs. Other positions are for future use.

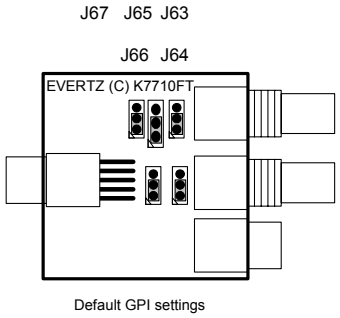


Figure 11: Setting the Jumpers for 6Hz Operation

7.6. 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 9 above.

8. *VISTA*LINK™ REMOTE MONITORING/CONTROL

8.1. WHAT IS *VISTA*LINK™?

*Vista*LINK™ is Evertz's remote monitoring and control capability over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. For monitoring there needs to be a detecting device that automatically reports all errors to a central alarm and error logging station. We also need to be able to interrogate individual detector devices from the central station to determine the status of individual channels. Finally, we need to be able to configure devices in the network from the central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

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

2. Managed devices (such as 7710XC-HD), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK™ enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC VistaLINK™ frame controller module, which serves as the Agent.

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

For more information on connecting and configuring the *Vista*LINK™ network, see the 7700FC Frame Controller chapter.

8.2. *VISTA*LINK™ MONITORED PARAMETERS

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

Parameter	Description
Input Video Present	Indicates the presence of a valid video input signal. (the state of the VIDEO PRESENT LED)
Input Video Standard	Indicates video standard of input signal
Input2 Video Present	Indicates the presence of a valid video input signal. (the state of the VIDEO PRESENT LED)
Input2 Video Standard	Indicates video standard of input signal
Gen Lock Present	Indicates the presence of a valid genlock reference signal. (the state of the GENLOCK LED)
Gen Lock Standard	Indicates video standard of 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 GPI1 input
GPI4 State	Indicates the state of the GPI2 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&2 Present	Indicates the presence of AES 1&2
AES 3&4 Present	Indicates the presence of AES 3&4
Time Code Present	Indicates the presence of VITC time code on the input video
Closed Captions Present	Indicates the presence of EIA-608 closed captions on the input video
Delay Audio	Audio Delay
Video Delay	Video Delay
Local Remote Mode	Indicates the whether the 7710XC-HD is under local control or *Vista*LINK™ control (. (the state of DIP switch 8)

Table 9: *Vista*LINK™ 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
Video Output Mode	*Select mode of BNC #2*
Output 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 Line Read	Select decode line for VITC. SD input only
VITC Line Write	Select line for VITC insert. SD output only
Loss of Video	Selects the action to take when the input video is missing
Force Minimum Phase	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	Sets the type of the horizontal filter in the scaler
V Filter	Sets the type of the vertical filter in the scaler
H Rate Limit	Enable a rate limit on the horizontal edges.
V Rate Limit	Enable a rate limit on the vertical edges.
Aspect Ratio	Selects the aspect ratio of the output picture.
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

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
H Filter DC	Sets the type of the horizontal filter in the scaler
V Filter DC	Sets the type of the vertical filter in the scaler
H Rate Limit DC	Enable a rate limit on the horizontal edges.
V Rate Limit DC	Enable a rate limit on the vertical edges.
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
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
De-embedder A	Sets the audio group source for de-embedder A
De-embedder B	Sets the audio group source for de-embedder B
Gamma Level	Gamma correction Level
Luma Floor	Sets the gamma correction factor
Crisp	Sets the darkest luma value that will be enhanced.
Enhancement Limit	Sets the minimum level of detail required before the enhancer is enabled.
Horizontal Band	Sets the maximum enhancement allowed.
V Enhancement	Sets the horizontal frequency band.
Noise Reduction	On/Off control of noise reduction
Frame Filter	Turn on frame processing
Noise Level	Tell the noise reducer process how much noise to expect
Motion Sensitivity	Adjust the threshold where temporal processing is transitioned to spatial processing

Embedder A	Sets the audio group destination for embedder A
Embedder B	Sets the audio group destination for embedder B
Delay	Adjusts the audio delay from the card nominal
Dolby E	Enables Dolby E operations
Embedder A DC	Sets the audio group destination for embedder A
Embedder B DC	Sets the audio group destination for embedder B
Channel A1 sel	Sets what audio will be output on channel 1 of group A
Channel A2 sel	Sets what audio will be output on channel 2 of group A
Channel A3 sel	Sets what audio will be output on channel 3 of group A
Channel A4 sel	Sets what audio will be output on channel 4 of group A
Channel B1 sel	Sets what audio will be output on channel 1 of group B
Channel B2 sel	Sets what audio will be output on channel 2 of group B
Channel B3 sel	Sets what audio will be output on channel 3 of group B
Channel B4 sel	Sets what audio will be output on channel 4 of group B
Channel A1 gain	Sets the gain of Audio channel 1 of group A
Channel A2 gain	Sets the gain of Audio channel 2 of group A
Channel A3 gain	Sets the gain of Audio channel 3 of group A
Channel A4 gain	Sets the gain of Audio channel 4 of group A
Channel B1 gain	Sets the gain of Audio channel 1 of group B
Channel B2 gain	Sets the gain of Audio channel 2 of group B
Channel B3 gain	Sets the gain of Audio channel 3 of group B
Channel B4 gain	Sets the gain of Audio channel 4 of group B
Channel A1 sel DC	Sets what audio will be output on channel 1 of group A
Channel A2 sel DC	Sets what audio will be output on channel 2 of group A
Channel A3 sel DC	Sets what audio will be output on channel 3 of group A
Channel A4 sel DC	Sets what audio will be output on channel 4 of group A
Channel B1 sel DC	Sets what audio will be output on channel 1 of group B
Channel B2 sel DC	Sets what audio will be output on channel 2 of group B
Channel B3 sel DC	Sets what audio will be output on channel 3 of group B
Channel B4 sel DC	Sets what audio will be output on channel 4 of group B
Channel A1 gain DC	Sets the gain of Audio channel 1 of group A
Channel A2 gain DC	Sets the gain of Audio channel 2 of group A
Channel A3 gain DC	Sets the gain of Audio channel 3 of group A
Channel A4 gain DC	Sets the gain of Audio channel 4 of group A
Channel B1 gain DC	Sets the gain of Audio channel 1 of group B
Channel B2 gain DC	Sets the gain of Audio channel 2 of group B
Channel B3 gain DC	Sets the gain of Audio channel 3 of group B
Channel B4 gain DC	Sets the gain of Audio channel 4 of group B
NTSC setup pedestal	Selects whether the NTSC 7.5 IRE pedestal will be added to the composite analog output video
Line 21 setup	Controls line 21 processing
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
Saturation	Controls the output video saturation
Contrast	Controls the output video white level
Brightness	Controls the output video black level
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 Y Freq. Resp.	Controls the frequency response with the wideband filter selected
Chroma Filter Selection	Various chroma bandwidths are available with this control
Recall Preset	Used to recall the current module configuration.
Store Preset	Used to store the current module configuration
GPIO 1	Selects the function of GPIO1
GPIO 2	Selects the function of GPIO2
GPIO 3	Selects the function of GPIO3
GPIO 4	Selects the function of GPIO4
6Hz Ref	Selects the source of the 6Hz ref

Table 10: *Vista*LINK™ Controlled Parameters

8.4. *VISTA*LINK™ TRAPS

There are currently no traps for the 7710XC-HD.

9. MENU QUICK REFERENCE

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

Scaler
- H Filter Cutoff
- V Filter Cutoff
- H Rate Limit
- V Rate Limit
- 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
- H Filter Cutoff
- V Filter Cutoff
- H Rate Limit
- V Rate Limit
- 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
- Detail Enhancement Resolution
- Detail Enhancement Level
- Motion Detection Threshold
- Interfield Weighting Factor

Video Proc Main
- 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
- V Enhancement

Video Proc DC
- 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
- V Enhancement

Noise Reduction
- Noise Reduction
- Median Filter
- Motion Sensitivity

Audio Settings Main
- De-embedder A
- De-embedder B
- Embedder A
- Embedder B
- Delay
- Dolby E

Audio Settings DC
- Embedder A
- Embedder B

Audio Proc Main
- Channel A1 sel
- …
- Channel B4 sel
- Channel A1 gain
- …
- Channel B4 gain

Audio Proc DC
- Channel A1 sel
- …
- Channel B4 sel
- Channel A1 gain
- …
- Channel B4 gain

Composite Output
- NTSC setup pedestal
- Line 21 setup
- Colour Bars
- Composite display mode
- Video level
- Hue
- H blanking
- VBI processing
- Y Filter Selection
- Wideband Y Freq. Resp.
- Chroma Filter Selection

Utilities

- Recall Preset
- Store Preset
- GPIO 1
- GPIO 2
- GPIO 3
- GPIO 4
- 6Hz Ref
- Upgrade
- Status WIndow
- About…

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