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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First version	Dec 04
1.1	Updated for Rev A boards	Feb 05
1.2	Typos fixed, updated Genlock jumper info, and VistaLINK® Traps	Mar 05
1.3	Revised Block Diagram	July 05
1.4	Updated Block Diagram and Detail Enhancement. Added WSS and Markers.	Jan 06
2.0	Updated menu descriptions and VistaLINK® parameters. Minor corrections throughout the manual.	Jul 07

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1. OVERVIEW

The 7713HDC is a superior multifaceted device used in down conversion and distribution amplification. More specifically, it is a reclocking high definition serial digital video distribution amplifier and a high quality downconverter for 1.5 Gb/s HDTV signals. It can also function as a monitoring distribution amplifier for standard definition 270 Mb/s signals. The 7713HDC can provide up to 4 reclocked DA outputs and 3 downconverted SDI or composite analog NTSC/PAL outputs (selectable). For enhanced functionality, the module also transfers the closed caption and timecode information from input to output performing all necessary HD to SD conversion and time code recalculations. Furthermore, the 7713HDC accepts all the popular international SMPTE 292M video formats. When the 7713HDC down converts 23.98/24 Hz video input to 525i/59.94 with a 3:2 pulldown, the 3:2 pulldown cadence can be free running and locked to an embedded RP188 time code or an external 6Hz input.

The 7713HDC is an extremely flexible downconverter. The 7713HDC will down convert using various methods such as 16:9 letterbox, 14:9 letterbox, 13:9 letterbox, 4:3 center crop, and 4:3 anamorphic squeeze. The 7713HDC provides On Screen 4:3 aspect ratio markers (or indicators). Furthermore, the 7713HDC supports Wide-Screen Signaling (WSS) on the output, which allows downstream equipment to properly respond to various aspect ratios of program material.

The 7713HDC enables precise management of the audio parameters. The 7713HDC de-embeds two groups of audio and re-embeds the audio on the SDI output in time with the video. The re-embedded audio 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. The superior functionality of the 7713HDC enables the user to reassign audio channels within the audio groups.

The user maintains exclusive control over the configuration of the video parameters via the video processing functions. The 7713HDC incorporates Evertz proprietary detail enhancement algorithms and gamma correction to improve picture output. For enhanced control over the picture quality, the 7713HDC enables the adjustment of video parameters such as brightness, hue and saturation. It supports colour space conversion from ITU rec. 709 to ITU rec. 601. The parameters can be controlled through the use of the On Screen display menu or through VistaLINK® PRO.

The 7713HDC's design is superior in quality and functionality. The 7713HDC provides card edge LEDs to indicate signal presence and audio group presence, which can also be tracked in the Status Window on the OSD. The 7713HDC occupies one card slot in the 3 RU frame which will hold up to 15 modules or, the 1RU frame which will hold up to three modules.

Features:

- Serial digital 1.5 Gb/s HD input per SMPTE 292M
- Supports most international standards including 1080i/60, 1080i/59.94, 1080i/50, 1080p/24, 1080p/23.98, 1080p/24sF, 1080p/23.98sF, 720p/60, 720p/59.94, 720p/50, 480p/60, and 480p/59.94
- Will also accept 270 Mb/s SD input SDI per SMPTE 259M-C in a pass through mode – auto senses HD or SD inputs
- 4 Reclocked DA outputs (HD if HD inputs applied, SD if SD inputs applied)
- 3 Selectable SDI or Composite Outputs (Downconverted from HD if HD input applied. Downconverted from reclocked SD if SD input applied)
- High quality monitoring HD -> SD down conversion
- Detail enhancement provided on SDI or composite outputs
- Supports 16:9 letterbox, 14:9 letterbox, 13:9 letterbox, 4:3 center crop, and 4:3 anamorphic squeeze aspect ratio conversions

- 23.98/24 Hz video conversion to 525i/59.94 with 3:2 pulldown sequence – time code or 6 Hz Reference
- HD to SD colour space conversion (SMPTE 240M and ITU rec. 709 to ITU rec. 601)
- Reference input from card or 7700FR-G Frame reference allows for phasing of output video
- On Screen display used to configure the operating modes
- De-embeds Audio from HD video and embeds into standard definition SDI video (2 groups)
- Moves ANC data (e.g. captioning, time code) from HD video to standard definition SDI video
- Line buffer on input to allow clean switching between Genlocked video sources that have a phase offset of +/- ¼ line
- Support for Wide-Screen Signaling (WSS) on output
- On Screen 4:3 aspect ratio marker
- Card Edge LEDs for signal presence, Genlock presence, equalization warning, audio groups present, module status
- VistaLINK® - enabled offering remote monitoring, control and configuration capabilities via SNMP VistaLINK® is available when modules are used with the 3RU 7700FR-C frame and a 7700FC VistaLINK® Frame Controller module in slot 1 of the frame using the model 9000NCP Network Control Panel or Evertz VistaLINK® PRO or other third party SNMP manager software.

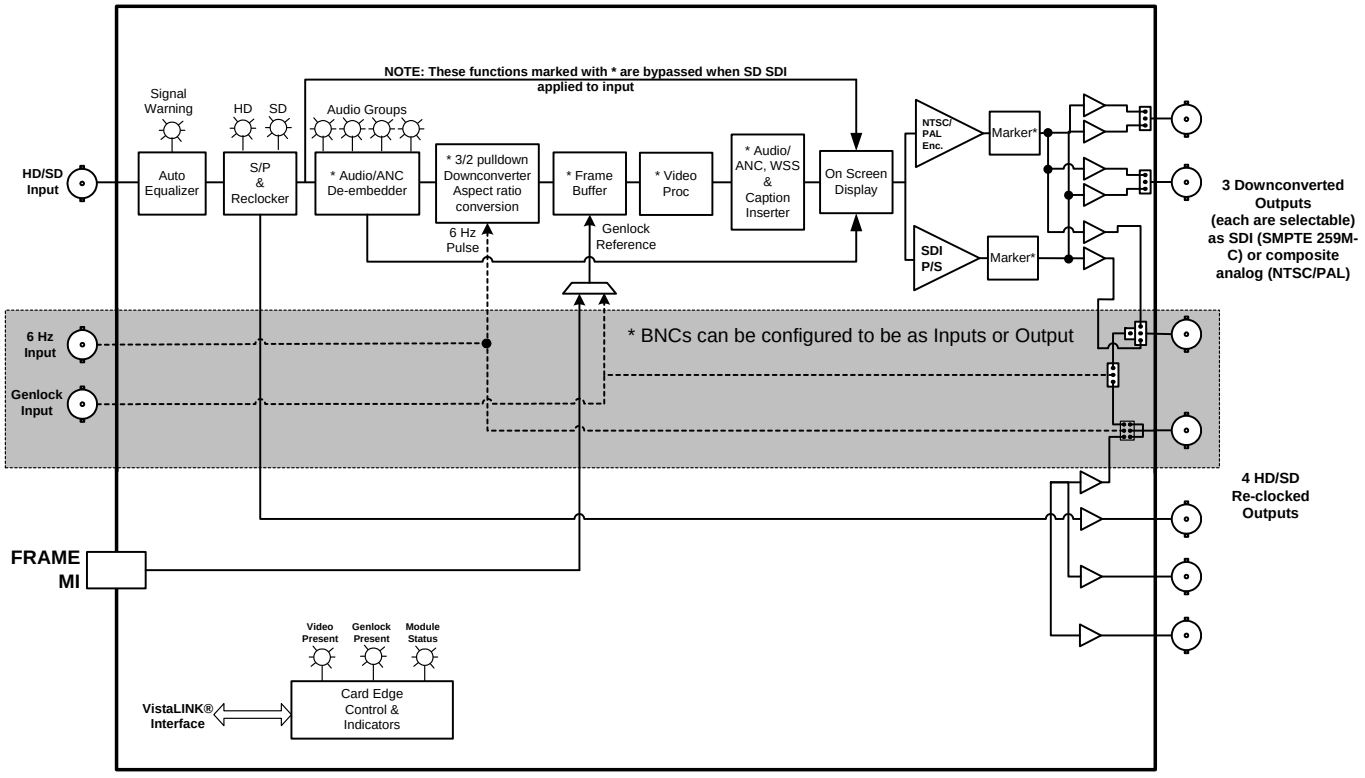

Figure 1-1: 7713HDC Block Diagram

2. INSTALLATION

The 7713HDC comes with a companion rear plate that occupies one slot in the frame. For information on inserting the module into the frame see section 3 of the 7700FR chapter.

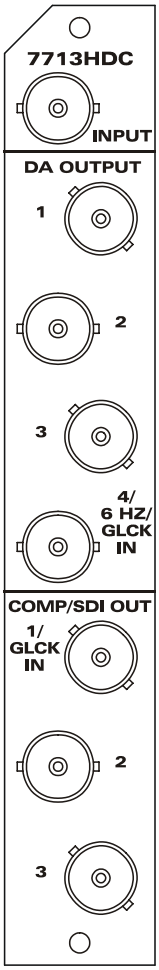

Figure 2-1: 7713HDC Rear Panel Overlay

2.1. VIDEO CONNECTIONS

INPUT Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 292M or SMPTE 259M-C standards.

DA OUTPUT 1 to 4 These four BNC connectors are used to output reclocked serial component video in the same standard as the video input. **DA OUTPUT 4** can also be used as a 6 Hz or Genlock input by reconfiguring jumpers on the main circuit board. See section 6.6 and 6.7 for information on configuring this BNC.

COMP/SDI OUT 1 to 3 These three BNC connectors can be individually configured either as downconverted SDI video outputs compatible with the SMPTE 259M-C standard, or as composite analog (NTSC/PAL) video outputs. See section 0 for information on selecting the output type. **COMP/SDI OUT 1** can also be used as a Genlock input by reconfiguring jumpers on the main circuit board. See section 6.7 for information on selecting the Genlock source.

2.2. GENLOCK REFERENCE

For proper synchronization of the output video, the downconverter must be locked to a Genlock signal of the output video format. In addition, the input video must be clock-locked to the Genlock signal.

GLCK IN There are four possible sources to connect the Genlock reference. **DA OUTPUT 4** or **COMP/SDI OUT 1** can be used as a Genlock input by reconfiguring jumpers on the main circuit board. (See section 6.7). When the card is installed in a model 7700FR-G frame, the Genlock source can come from one of the two frame Genlock signals carried on the frame mid-plane. The Genlock signal may be NTSC or PAL colour black (the same as the output video format), and is auto-detected by the module. Jumper J21 on the 7713HDC module selects whether the selected reference input is terminated to 75 ohms (default) or high impedance. On Rev A and later boards, the *Frame Genlock Source* menu item is used to select whether one of the two Frame Genlock signals or the GLCK IN signal will be used. On Rev 1 boards, there is also a jumper that must be set (See section 6.7). 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 5.3.6) When no Genlock is provided, the output video is timed with respect to the input video.

2.3. 6 HZ PULLDOWN REFERENCE

For control of the 3/2 cadence on the output video, the downconverter can be locked to a 6 Hz reference pulse.

6 HZ IN **DA OUTPUT 4 / 6 HZ IN** can also be configured as a 6 Hz input by reconfiguring jumper J11 on the main circuit board. (See section 6.6 for information on configuring the BNC as a 6 Hz Input) The 6 Hz pulse should be a 1/30$_{th}$ second wide TTL level active high pulse occurring 6 times per second and must coincide with the start of an input frame. The 6 Hz pulse will normally identify the A frame candidates.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standards: 270 Mb/s SMPTE 259M-C (525i/59.94, 525i/60 or 625i/50) - pass through mode
1.485 Gb/sec SMPTE 292M – auto-detects standard
SMPTE 260M, SMPTE 274M, SMPTE 296M, SMPTE 349M – see Table 3-1 for a list of supported HD video standards

Common Name	Pixels / Active Lines	Frame Rate	Progressive /Interlace	SMPTE Standard	Output Format
1080i/60	1920 x 1080	30	I	274M	525i/60
1080i/59.94	1920 x 1080	29.97 (30/1.001)	I	274M	525i/59.94 (NTSC)
1080i/50	1920 x 1080	25	I	274M	625i/50 (PAL)
1080p/30	1920 x 1080	30	P	274M	525i/60
1080p/30sF	1920 x 1080	30	P (sF)	274M	525i/60
1080p/29.97	1920 x 1080	29.97 (30/1.001)	P	274M	525i/59.94 (NTSC)
1080p/29.97sF	1920 x 1080	29.97 (30/1.001)	P (sF)	274M	525i/59.94 (NTSC)
1080p/25	1920 x 1080	25	P	274M	625i/50 (PAL)
1080p/25sF	1920 x 1080	25	P (sF)	274M	625i/50 (PAL)
1080p/24	1920 x 1080	24	P	274M	525i/60
1080p/23.98	1920 x 1080	23.98 (24/1.001)	P	274M	525i/59.94 (NTSC)
1080p/24sF	1920 x 1080	24	P (sF)	274M	525i/60
1080p/23.98sF	1920 x 1080	23.98 (24/1.001)	P (sF)	274M	525i/59.94 (NTSC)
1035i/60	1920 x 1035	30	I	260M	525i/60
1035i/59.94	1920 x 1035	29.97 (30/1.001)	I	260M	525i/59.94 (NTSC)
720p/60	1280 x 720	60	P	296M	525i/60
720p/59.94	1280 x 720	59.94 (60/1.001)	P	296M	525i/59.94 (NTSC)
720p/50	1280 x 720	50	P	296M	625i/50
480p/60	720 x 483	60	P	293M, 349M	525i/60
480p/59.94	720 x 483	59.94 (60/1.001)	P	293M, 349M	525i/59.94 (NTSC)

Table 3-1: Video Input Formats

Connector: BNC per IEC 60169-8 Amendment 2
Input Equalization: Automatic to 100m @ 1.5Gb/s with Belden 1694 or equivalent cable
Return Loss: >15 dB up to 1.5GHz

3.2. RECLOCKED SERIAL VIDEO DA OUTPUTS

Standard:	Same as input
Number of Outputs:	4 Per Card reclocked
Connector:	BNC per IEC 60169-8 Amendment 2
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	200ps nominal for HD 750ps nominal for SD
Overshoot:	<10% of amplitude
Return Loss:	> 15 dB at 1.5 Gb/s
Jitter:	< 0.2 UI

3.3. DOWNCONVERTED SERIAL VIDEO OUTPUTS

Standard:	SMPTE 259M-C (270 Mb/s)
Number of Outputs:	up to 3 Per Card (jumper selectable)
Connector:	BNC per IEC 60169-8 Amendment 2
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	750ps nominal
Overshoot:	<10% of amplitude
Return Loss:	> 15 dB at 270 Mb/s
Jitter:	< 0.2 UI

3.4. DOWNCONVERTED COMPOSITE ANALOG VIDEO OUTPUTS

Standards:	Analog composite NTSC (SMPTE 170M) or Analog composite PAL (ITU-R BT.470)
Number of Outputs:	up to 3 Per Card (jumper selectable)
Connectors:	BNC per IEC 60169-8 Amendment 2.
Signal Level:	1 V p-p nominal
DC Offset:	0V ±0.1V
Return Loss:	>35dB up to 5 MHz
Frequency Response:	0.2dB to 4MHz
Differential Phase:	<0.5°(<0.3° typical)
Differential Gain:	<0.8% (<0.5 % typical)
SNR:	>78dB to 5 MHz (shallow ramp)
Impedance:	75 ohm

3.5. GENLOCK INPUT

Type:	NTSC or PAL Colour Black 1 V p-p
Connector:	BNC per IEC 60169-8 Amendment 2 or Frame Genlock on 7700FR-G frames. (selectable)
Termination:	High impedance or internal 75 ohm termination (jumper selectable)

3.6. 6 HZ INPUT

Type: TTL level active high pulse 1/30 sec wide
Connector: BNC per IEC 60169-8 Amendment 2 (jumper selectable)
Termination: 500 ohm
Signal Level: >3V relative to ground

3.7. INPUT TO OUTPUT PROCESSING DELAY (HD INPUT VIDEO)

Video Delay: Approximately 1 to 3 frames depending on input video format, processing mode and phase setting – see table Table 5-1.
Audio Delay: Audio is delayed and re-embedded in time with the output picture.

3.8. ELECTRICAL

Voltage: +12VDC
Power: 10 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.9. PHYSICAL

Number of slots: 1

4. STATUS INDICATORS

The 7713HDC has 11 LED Status indicators on the main circuit board front card edge to show operational status of the card at a glance. Figure 6-1 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 board power is good.

There are five small LEDs near the upper edge of the board that indicate the status of the equalizer and reclocker.

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

HD INPUT: This Green LED will be On when there is a valid high definition signal present at the module input.

SD INPUT: This Green LED will be On when there is a valid standard definition (525 or 625 line) SDI signal present at the module input.

SIGNAL WARNING: This Red LED will be On when the module cannot lock to the input serial digital signal.

GENLOCK PRESENT: This Green LED will be On when a Bi-Level Reference input is detected.

4.1. AUDIO STATUS LEDs

Four LEDs, located on the lower edge 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. These LEDs are only valid when an HD input video signal is applied.

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

Table 4-1: Audio Group Status LEDs

5. ON SCREEN MENUS

5.1. NAVIGATING THE ON SCREEN MENU SYSTEM

A toggle switch and pushbutton enables card edge navigation through a set of On Screen menus used to configure the card. To enter the On Screen menu system, press the pushbutton once. 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 selecting. Once the arrow is on the desired item, press the pushbutton to select the next menu level.

On all of the 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 options, 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.

5.2. ON SCREEN DISPLAY – MAIN MENU

The OSD menu is arranged in a layered structure that groups similar configuration items together. The following section provides 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 0 to 5.12 provide detailed descriptions on each of the sub-menus. The tables in sections 0 to 5.12 are arranged in an indented structure to indicate the path taken to reach the control. Menu items or parameters that are underlined indicate the factory default values.

Video	Sets input and output video standards and timing for video output.
Output Picture	Configures the output picture parameters.
Scaler	Configures the scaler filters and parameters.
VANC Data Processing	Controls Vertical Ancillary Processing Parameters.
Video Proc	Controls Video Processing Amp functions.
Image Enhancement	Controls the Image Enhancement functions.
Audio	Controls the Audio group selection.
Analog Output	Configures the analog video output parameters.
Marker	Configures the On Screen aspect ratio marker.
Utilities	Configures the Firmware and preset utilities.

5.3. CONFIGURING THE VIDEO CONTROLS

The *Video* menus are used to configure parameters associated with the input and output video standards and output video timing. Other than the Video Type menu, these menu items are not applicable when a standard definition input video is connected. The chart below shows the items available in the *Video* menu. Sections 5.3.1 to 5.3.6 provide detailed information about each of the menu items.

Video Type	Sets the video input type to High Definition (HD) or Standard Definition (SD).
Std	Selects the video input and output standards.
Genlock Source	Selects the Genlock source.
Reset Input Buffer	Sets the current input source to be the reference for the input line buffer.
Pulldown Reference	Selects reference source when 3:2 pulldown is being performed on the output.
A Frame Offset	Sets the A Frame Offset from the Pulldown Reference.
525 V Phase Offset	Sets 525 vertical phase of the output signal to NTSC Genlock reference input video.
525 H Phase Offset	Sets 525 horizontal phase of the output signal to NTSC Genlock reference input video.
625 V Phase Offset	Sets 625 vertical phase of the output signal to PAL Genlock reference input video .
625 H Phase Offset	Sets 625 horizontal phase of the output signal to PAL Genlock reference input video.
Set Minimum Delay	Configures output timing to achieve minimum delay.

5.3.1. Setting the Video Input Type

- *Video*
  - *Video Type*
    - *Auto*
    - *SD*
    - *HD*

This control enables the user to set whether the 7713HDC will function as a reclocking high definition serial digital video distribution amplifier and a high quality downconverter for 1.5 Gb/s HDTV signals or function as a monitoring distribution amplifier for standard definition 270 Mb/s signals.

When set to *Auto,* the module will autodetect the input video type. You can also force it to either high definition mode (*HD)* or standard definition mode (*SD).*

When the input video is Standard Definition, the 7713HDC operates as a monitoring distribution amplifier. In this mode it does not process the audio or vertical interval data but merely passes it through. Accordingly, the menu items that control these functions (as described in sections 5.3.2 to 5.7) have no effect when the 7713HDC is operating with standard definition video.

5.3.2. Setting the Video Input and Output Standard

- *Video*
  - *Std*
    - *Auto*
    - *1080i/59.94 to 525i/59.94*
    - *1080i/50 to 625i/50*
    - *1080p/23.98sF to 525i/59.94*
    - *1080p/24sF to 525i/60*
    - *1080p/29.97sF to 525i/59.94*
    - *1080p/25sF to 625i/50*
    - *1035i/59.94 to 525i/59.94*
    - *720p/59.94 to 525i/59.94*
    - *480p/59.94 to 525i/59.94*
    - *1080p/24 to 525i/60*
    - *1080p/23.98 to 525i/59.94*
    - *1080i/60 to 525i/60*
    - *720p/60 to 525i/60*
    - *1035i/60 to 525i/60*
    - *480p/60 to 525i/60*
    - *1080p/30sF to 525i/60*
    - *720p/50 to 625i/50*
    - *1080p/29.97 to 525i/59.94*
    - *1080p/30 to 525i/60*
    - *1080p/25 to 625i/50*

This control enables the user to set the input and output video standards. This menu item is not applicable when a standard definition input video is connected.

Note: When set to *Auto,* the module cannot distinguish between *1080i/59.94, 1080p/29.97sF and 480p/59.94*, so it will be treated as *1080i/59.94*. Similarly, *1080p/25sF* will be treated as *1080i/50*, and *1080p/30sF* and *480p/60* will both be detected as *1080i/60*.

When the input standard is *1080p/29.97sF, 1080p/30sF,* or *1080p/25sF* it is important to manually select the standard using this control so that the scaler knows to perform the proper down conversion.

5.3.3. Selecting the Genlock Source

Video
Genlock Source
Frame Ref. 1
Frame Ref. 2
External Input

If the card is installed in a 7700FR-G frame, two reference inputs are available on the frame that supplies the Genlock signal to every card in the frame. Either of these two inputs may be selected as reference sources. On Rev 1 boards you must also set a jumper to enable the Frame Genlock reference. On Rev A and later boards this is done automatically by selecting the Frame Ref 1 or Frame Ref 2 menu choices.

See section 6.6 and 6.7 for information on selecting the card reference source and termination. The reference may either be an externally supplied colour black reference signal or you may use the input video as a reference.

On Rev 1 boards this control allows you to select which frame reference will be used when the jumpers are configured for a Frame Genlock reference. When the jumpers are configured for a BNC reference, this control has no effect. On Rev A and later boards, the Frame Genlock Jumper is replaced with a switch under the menu control. When you select *External Input* then the Genlock BNC reference will be used.

The *Genlock Source* adjustments are REAL TIME ADJUSTMENTS and will affect the output video timing immediately. This setting should not be adjusted when the output video is in the broadcast chain.

5.3.4. Resetting the Input Line Buffer

Video
Reset Input Buffer
Reset
Cancel

There is a line buffer on the input of the 7713HDC that allows the input to be switched between feeds that are Genlocked, but offset ±1/4 of a line from a reference point.

When the input buffer is reset, the current video source is set to be the reference. An upstream router may now switch between feeds that are offset from this video source by ±1/4 of a line without any visual disruption in the output video.

Resetting the Input Buffer will affect the output video timing. These settings should not be adjusted when the output video is in the broadcast chain.

5.3.5. 3:2 Pulldown Processing

When using a 1080i/60 or 1080i/59.94 input video feed containing 3:2 pulldown, the 7713HDC downconverts each field of the incoming image to one field of output image. Therefore, 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/60, 720p/59.94, 720p/50, 1080p/25, 1080p/30 or 1080p/29.97 input video feed the 7713HDC downconverts each frame of the incoming image 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/24sF or 1080p/23.98sF input video feed the 7713HDC combines each segment of the incoming image back to a progressive frame before down conversion. When using a 1080p/24 or 1080p/23.98 input video feed the 7713HDC downconverts each frame of the incoming image. After down conversion, extra fields are inserted to create a 3:2 pulldown at the output. The *Pulldown Reference* and *A Frame Offset* controls are used to determine the cadence of the 3:2 output.

5.3.5.1. Selecting the 3:2 Pulldown Reference with 24 Fps and 23.98 Fps Input Video

This menu setting is only used when the input video is 1080p/24, 1080p/23.98, 1080p/24sF or 1080p/23.98sF. With other input video formats it is not applicable.

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

On 24 Fps and 23.98 Fps video input formats the *Pulldown Reference* control 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 5-1). The output of the *A frame candidate* frame will be delayed by 2 frames, will consist of two video fields and will normally be in time with the input. 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 5.3.5.2)

When you select *Auto* the 7713HDC will auto detect the pulldown reference according to the following priority:
- 6 Hz pulse if present
- RP188 ancillary time code if present
- Free Run pulldown if RP188 is not present

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

Select *6 Hz Input* when a 6 Hz pulse connected to **DA OUTPUT 4 / 6 HZ** BNC is used to determine the pulldown. (See section 6.6 for information on configuring the BNC as a 6 Hz Input). 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 will 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.

5.3.5.2. Accommodating Non-Standard 3:2 Sequences

This menu setting is only used when the input video is 1080p/24, 1080p/23.98, 1080p/24sF or 1080p/23.98sF. With 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 Frame.

Figure 5-2 shows how this control defines the A frame candidate when the 6 Hz pulse is present. Figure 5-3 shows how this control defines the A frame when RP188 Ancillary data is used to control the 3:2 pulldown.

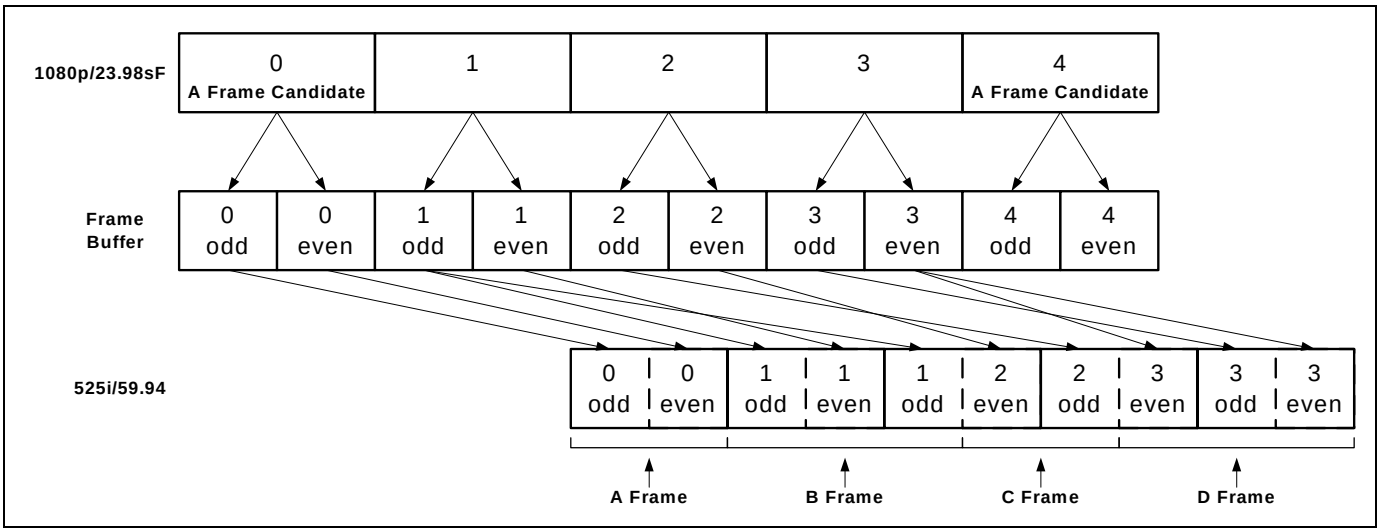

Figure 5-1: 3:2 Pulldown Sequence Insertion – 24 Fps and 23.98 Fps Input Video

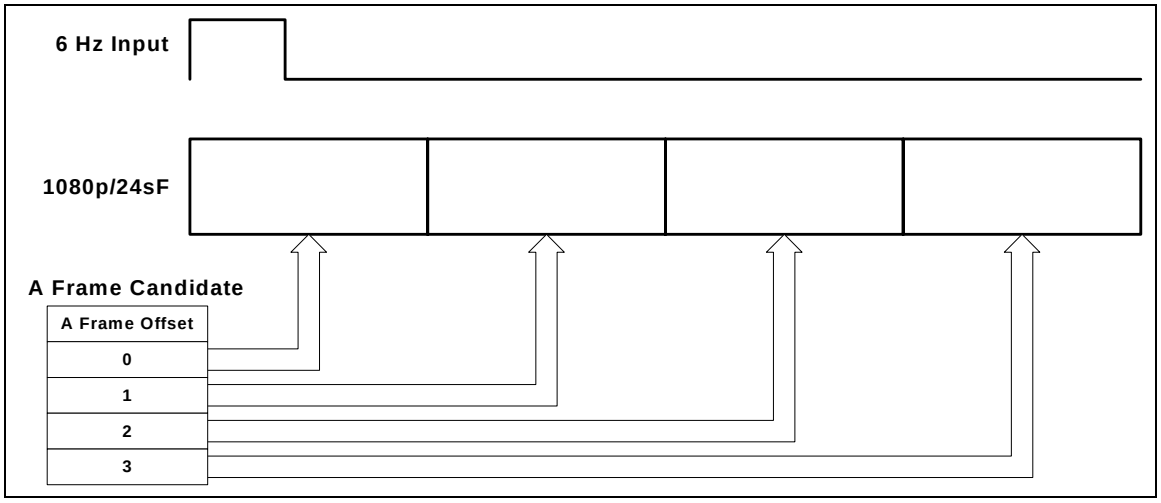

Figure 5-2: 6 Hz Pulldown Sequence A Frame Alignment – 1080p/23.98sF Input Video

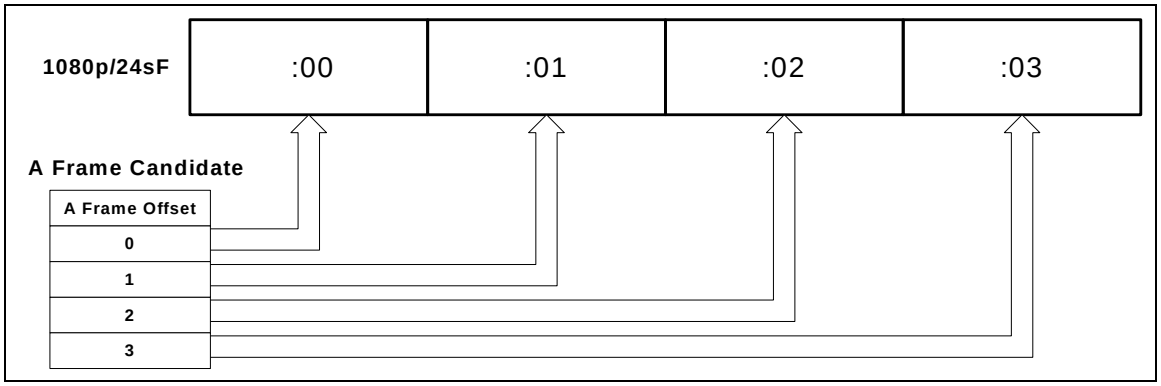

Figure 5-3: RP188 Pulldown Sequence A Frame Alignment – 24 Fps and 23.98 Fps Input Video

5.3.6. Setting Up the Video Output Timing

The output stage of the downconverter contains a frame buffer and a line buffer so that the output video can be timed with respect to the colour black reference applied to one of two GLCK BNCs or to one of the Genlock inputs of a 7700FR-G frame. The Genlock source is selected by configuring jumpers on the card and through the menu system. (See section 6.6 and 6.7) In the absence of a Genlock signal the output video will be timed with respect to the incoming HD Video.

The input video must be synchronous with the Genlock reference.

There are separate controls to adjust the horizontal and vertical timing of the output video for both the 525 and 625 line video standards. The controls work in the same way for each video standard, except that the *V Phase Offset* control has valid values from 0 to the number of lines per frame in the respective video standard.

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.

5.3.6.1. Calculating the Delay through the Downconverter

The delay through the downconverter is dependent on the video input format and the H and V phase settings. Table 5-1 shows the default delays for each video standard. Delays shown are expressed in the units of the output video.

The default delay will be when the *V Phase Offset* and *H Phase Offset* parameters are set to zero. 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 loss of one frame of throughput delay between the HD input and the video output. If when increasing the *H Phase Offset* value causes it to go beyond the limit of the line buffer the *H Phase Offset* will wrap to the beginning of the line buffer. Thus, the minimum delay is achieved when both the *V Phase Offset* and *H Phase Offset* wrap to the beginning of the frame and line buffers. The maximum delay is achieved one line before the *V Phase Offset* wraps to the beginning of the frame buffer and one sample before the *H Phase Offset* wraps to the beginning of the line buffer.

	Default Delay Output Frames
1080i/60 1080i/59.94	2
1080i/50	2
1080p/24sF 1080p/23.98sF	2.5
1080p/24 1080p/23.98	2.5
1080p/30sF 1080p/29.97sF	2
1080p/25sF	2
1035i/60 1035i/59.94	2
720p/60 720p/59.94	1
720p/50	1.5
480p/60 480p/59.94	1
1080p/29.97 1080p/30	2

Table 5-1: Video Delay

5.3.6.2. Setting the Vertical Phase of the Output Video – 525 Line Video

Video
525 V Phase Offset
0 to 524
0

This control enables the user to set the vertical timing of the output video with respect to the NTSC Genlock reference input when operating with a 525 line video output. 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. In order to advance the vertical timing set the control to 525 minus the number of lines that you wish to advance the output video. (E.g. to advance the output video 5 lines set the value to 520.) If 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 HD input and the video output.

5.3.6.3. Setting the Horizontal Phase of the Output Video – 525 Line Video

Video
525 H Phase Offset
0 to 1715
0

This control enables the user to set the horizontal timing of the output video with respect to the NTSC Genlock reference input when operating with a 525 line video output. 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, set the control to 1716 minus the number of samples that you wish to advance the output video. (E.g. to advance the output video 5 samples set the value to 1711.) If when increasing the *H Phase Offset* value causes it to go beyond the limit of the line buffer, the *H Phase Offset* will wrap to the beginning of the line buffer, resulting in a change of one line of throughput delay between the HD input and the video output.

5.3.6.4. Setting the Vertical Phase of the Output Video – 625 Line Video

Video
625 V Phase Offset
0 to 624
0

This control enables the user to set the vertical timing of the output video with respect to the PAL Genlock reference input when operating in a 625 line video output. 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-line increments. In order to advance the output video, set the control to 625 minus the number of lines that you wish to advance the output video. (E.g. to advance the output video 5 lines set the value to 620.) If 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 HD input and the video output.

5.3.6.5. Setting the Horizontal Phase of the Output Video – 625 Line Video

Video
625 H phase Offset
0 to 1727
0

This control enables the user to set the horizontal timing of the output video with respect to the PAL Genlock reference input when operating with a 625 line video output. 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, set the control to 1728 minus the number of samples that you wish to advance the output video. (E.g. to advance the output video 5 samples set the value to 1723.) If when increasing the *H Phase Offset* value causes it to go beyond the limit of the line buffer, the *H Phase Offset* will wrap to the beginning of the line buffer, resulting in a change of one line of throughput delay between the HD input and the video output.

5.3.6.6. Selecting the Minimum Delay

Video
Set Minimum Delay
Cancel
Set

This control enables the user to set the timing of the output video with respect to the current reference so that the minimum delay is achieved through the module.

When you choose *Set* and press the pushbutton, the *H Phase Offset* and *V phase Offset* menu items for the current video standard will be adjusted to achieve the minimum delay through the card.

Any subsequent changes to the settings of the card (video standard, Genlock reference selection, etc.) may affect the delay through the card. You will have to perform the *minimum delay* setting again.

5.4. CONFIGURING THE OUTPUT PICTURE

The *Output Picture* menu is used to configure parameters associated with the output picture. These menu items are not applicable when standard definition input video is connected. The chart below shows the items available in the *Output Picture* menu. Sections 5.4.1 to 5.4.3 provide detailed information about each of the menu items.

Aspect Ratio	Selects the aspect ratio of the output picture.
Loss of Video	Selects the action to take when the input video is missing.
Panel Colours	Sets the colour of the letterbox panels.

5.4.1. Setting the Aspect Ratio of the Output Picture

Output Picture
Aspect Ratio
16:9 Letterbox
4:3 Side Cut
4:3 Squeeze
14:9 Letterbox
13:9 Letterbox

SDTV monitors are usually 4:3, thus, there is a need for some simple aspect ratio conversion from the HDTV 16:9 format. This control enables you to set the aspect ratio of the output picture.

When we display a full 16:9 picture on a 4:3 (12:9) monitor, the picture becomes anamorphic (4:3 squeeze) resulting in tall thin people. To correct this problem, we have a choice of cropping the edges (4:3 side cut) or making the whole picture smaller (16:9 letter box). The 14:9 and 13:9 letterbox solutions are a compromise where the picture is larger than 16:9 letterbox and less of the edges are cropped than 4:3 side cut.

The anamorphic solution uses all the horizontal lines of the 4:3 raster. Clipping discards video information at the start and end of each line. For the letterbox solution, we have to re-map the picture to occupy fewer lines. The unused lines at the top and bottom of the picture can be set to different colours using the “Panel Colours” control. See section 5.4.3.

Figure 5-4 shows the various output aspect ratios available.

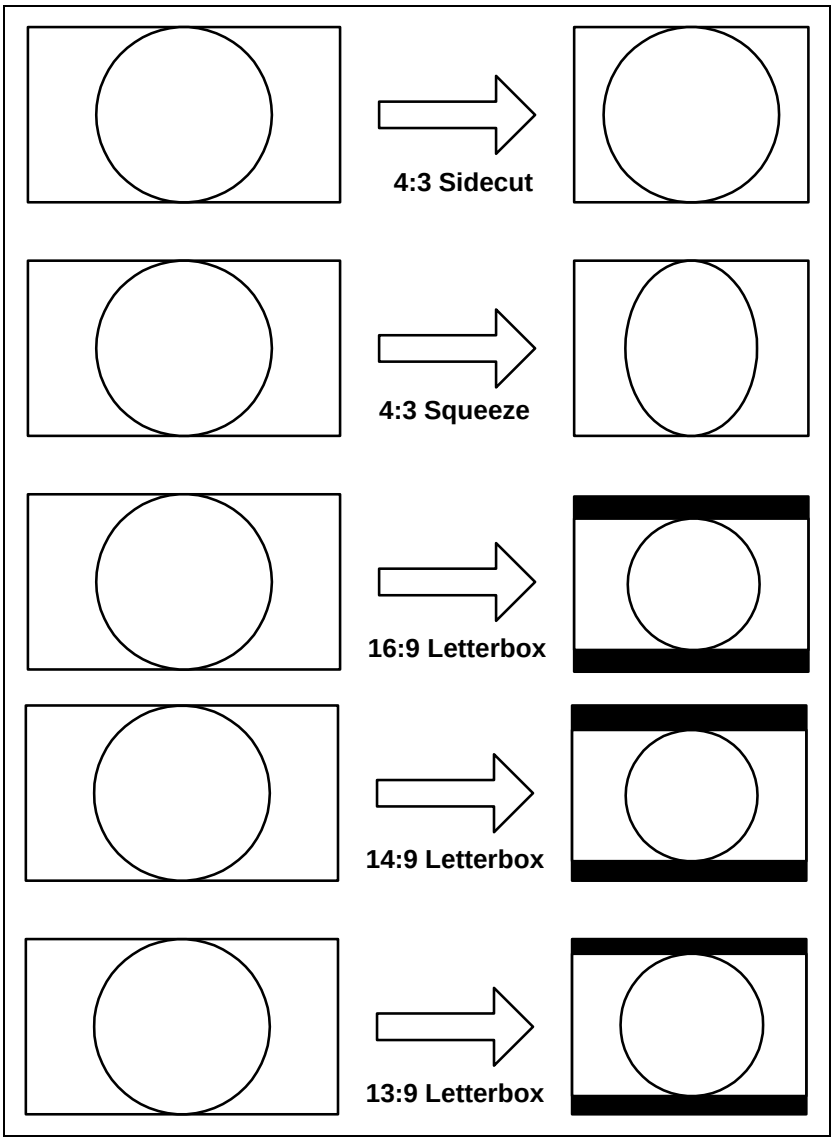

Figure 5-4: Aspect Ratio Conversions

5.4.2. Setting the Action to Take when Input Video is Missing

Output Picture
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 *Black* or *Blue* the video standard of the output is set by jumper J6. (See section 6.2)

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

5.4.3. Set the Colour of the Letterbox Panels

Output Picture *Panel Colours* *Black* *Blue* *Red* *White*	The user can set the colour of the letterbox panels with this control.

5.5. CONFIGURING THE SCALER

The 7713HDC scaler chip uses a process of filtering in order to reduce the resolution from 1920 x 1080 (or 1280 x 720) to 720 x 486 (or 720 x 576). The *Scaler* menu is used to configure the cut-off frequencies of the filters associated with the scaler hardware. These menu items are not applicable when a standard definition input video is connected. The chart below shows the items available in the *Scaler* menu. Sections 5.5.1 to 5.5.2 provide detailed information about each of the menu items.

H Filter Cutoff	Sets the cutoff frequency of the horizontal filter in the scaler.
V Filter Cutoff	Sets the cutoff frequency of the vertical filter in the scaler.

5.5.1. Setting the Scaler Horizontal Filter Sharpness

Scaler *H Filter Cutoff* *0.35 Fs* *0.15 to 0.5 Fs*	This control enables the user to set the sharpness of the horizontal filter used during the downconversion process. A higher number value reflects a sharper picture.

5.5.2. Setting the Scaler Vertical Filter Sharpness

Scaler *V Filter Cutoff* *0.35 Fs* *0.15 to 0.5 Fs*	This control enables the user to set the sharpness of the vertical filter used during the downconversion process. A higher number value reflects a sharper picture.

5.6. CONFIGURING THE VERTICAL INTERVAL PROCESSING

The *VANC Data Processing* menu is used to configure how vertical interval signals such as closed captions and vertical interval time code (VITC) are processed. Other than the SD 525 CC Input Line and SD 625 Input Line, these menu items are not applicable when a standard definition input video is connected. The chart below shows the items available in the *VANC Data Processing* menu. Sections 5.6.1 to 5.6.11 provide detailed information about each of the menu items.

Closed Captions En/Dis	Enables or Disables Closed Captioning on the output.
SD 525 CC Input Line	Sets the line to monitor for Closed Caption data on 525 line SD video inputs.
SD 625 CC Input Line	Sets the line to monitor for Closed Caption data on 625 line SD video inputs.
VITC Generator	Controls whether Vertical Interval Time Code (VITC) will be inserted on the program video outputs.
VITC UB	Controls whether the output VITC User Bits will contain the original time or original user bits.
Dflt VITC Source	Selects the preferred type of ancillary time code to read from the HD input.
525 VITC Line	Sets VITC insertion line on 525/NTSC video outputs.
625 VITC Line	Sets VITC insertion line on 625/PAL video outputs.
WSS En/Dis	Enables or Disables Wide-Screen Signaling on the output.
525 WSS Line Num	Sets Wide-Screen Signaling insertion line on 525/NTSC video output.
625 WSS Line Num	Sets Wide-Screen Signaling insertion line on 625/PAL video output.

5.6.1. Generating Closed Captions on the Program Video Outputs

VANC Data Processing	This control determines whether closed captions will be encoded on line 21 according to CEA 608B on the SDI and analog outputs.
Closed Captions En/Dis	
Off	Set the control to *Off* to disable closed caption encoding.
On	Set the control to *On* to encode the CEA 608 closed captions that have been extracted from SMPTE 334M VANC data on the incoming HD video. When there is no incoming SMPTE 334M caption data, a null CEA-608B waveform is inserted on line 21 of the output video (Line 22 for 625/PAL outputs).

5.6.2. Setting the Caption Decoder Line for 525 Line Video Outputs

VANC Data Processing
SD 525 CC Input Line
21
10 to 21

This control determines the line number to monitor for incoming closed captions when the input video is 525 line SDI.

Note: This control does NOT affect the caption encoder line for the 525 line output video. Captions are always encoded on line 21 of the output 525 line video.

5.6.3. Setting the Caption Decoder Line for 625 Line Video Outputs

VANC Data Processing
SD 625 CC Input Line
22
6 to 22

This control determines the line number to monitor for incoming closed captions when the input video is 625 line SDI.

Note: This control does NOT affect the caption encoder line for the 625 line output video. Captions are always encoded on line 22 of the output 625 line video.

5.6.4. Generating VITC on the Program Video Outputs

VANC Data Processing
VITC Generator
Off
On

This control determines whether vertical interval time code (VITC) will be inserted on the program SDI and analog video outputs. 525 VITC Line and 625 VITC Line menu items set the insertion line for the VITC. The time bits will be converted from the RP188 ancillary time code on the HD video input. The User Bits can be set to the original time or User Bits by the *VITC User Bits* menu item.

5.6.5. Selecting the Contents of the VITC User Bits

VANC Data Processing
VITC UB
Original Time
Original UB

This control determines whether VITC User Bits will contain the original time numbers or the original User Bit numbers. The VITC generator must be enabled using the *VITC Generator* menu item.

When the incoming video is at a different frame rate than the downconverted video, it is often useful to carry the original time code information in the VITC User Bits.

For other applications it is necessary to carry the User Bits from the incoming time code into the VITC User Bits.

5.6.6. Selecting the Default Source for the VITC Inserter

VANC Data Processing
Dflt VITC Source
RP188: LTC
RP188: VITC

Select the default source for the VITC Inserter. The reader will automatically switch to a valid source if the preferred source is not present

5.6.7. Setting the VITC Line for 525 Line Video Outputs

VANC Data Processing
525 VITC Line
14
10 to 20

This control determines the line number that will be used to insert VITC into the 525 line output video when the *VITC Generator* control is set to *On*.

5.6.8. Setting the VITC Line for 625 Line Video Outputs

VANC Data Processing
625 VITC Line
19
6 to 22

This control determines the line number that will be used to insert VITC into the 625 line output video when the *VITC Generator* control is set to *On*.

5.6.9. Generating Wide-Screen Signaling on the Program Video Outputs

VANC Data Processing
WSS En/Dis
Off
On

This control determines whether Wide-Screen signaling will be encoded on the SDI and analog outputs.

Set the control to *Off* to disable WSS encoding.

Set the control to *On* to encode WSS onto the line specified in sections 5.6.10 and 5.6.11 on the output video.

5.6.10. Setting the WSS Line for 525 Line Video Outputs

VANC Data Processing
525 WSS Line Num
22
10 to 22

This control determines the line number where WSS will be inserted in 525 line video when the *WSS Enable* control is set to *On*.

5.6.11. Setting the WSS Line for 625 Line Video Outputs

VANC Data Processing
625 WSS Line Num
23
6 to 23

This control determines the line number where WSS will be inserted in 625 line video when the *WSS Enable* control is set to *On*.

5.7. CONFIGURING THE VIDEO PROCESSING FUNCTIONS

The *Video Proc* menu is used to configure parameters associated with the video processing functions of the down converter. The chart below shows the items available in the *Video Proc* menu. Sections 5.7.1 to 5.7.6 provide detailed information about each of the menu items.

ALL of these parameters affect the video in real time.

Gamma Enable/Disable	Enables or Disables gamma adjustment.
Gamma Level	Sets the gamma correction factor.
RGB Clip Enable/Disable	Enables or Disables Clipping the video to valid R.G.B. values.
Y Gain	Sets the Y Gain of the input video.
Y Offset	Sets the Y Offset of the input video.
Cr Gain	Sets the Cr Gain of the input video.
Cr Offset	Sets the Cr Offset of the input video.
Cb Gain	Sets the Cb Gain of the input video.
Cb Offset	Sets the Cb Offset of the input video.
Hue	Sets the hue of the input values.
R Gain	Sets the R Gain of the input video.
G Gain	Sets the G Gain of the input video.
B Gain	Sets the B Gain of the input video.

5.7.1. Enabling Gamma Adjust

Video Proc
  Gamma Enable/Disable
  Disable
  Enable
	This control enables the Gamma to be adjusted. When enabled, the module will allow the user to adjust the gamma level (see section 5.7.2). If disabled, then the gamma level is set to 0.

5.7.2. Setting the Gamma Level

Video Proc
Gamma Level
+/- 128

This control enables the user to adjust the Gamma correction factor by +/- 128 in increments of 1.

5.7.3. Enabling RGB Clipping

Video Proc
RGB Clip Enable/Disable
Disable
Enable

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

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

5.7.4. 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
+/- 10%

This control enables the user to 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% increments.

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

5.7.5. 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

This control enables the user to adjust the DC offset of the 3 components in the Y Cr Cb domain in +/- 100 quantization levels.

5.7.6. Setting the Hue

Video Proc
Hue
+/- 30

This control enables the user to adjust the Hue or colour of components +/- 30 degrees

5.8. CONFIGURING IMAGE ENHANCEMENT

The *Image Enhancement* menu is used to configure parameters associated with the image enhancement functions of the down converter. The chart below shows the items available in the *Image Enhancement* menu. Sections 5.8.1 to 5.8.7 provide detailed information about each of the menu items.

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

Image Enhancement Enable/Disable	Enables or Disables the Image Enhancement.
Detail Gain	Sets the amount of detail enhancement.
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 detail value allowed.
Horizontal Band	Sets the horizontal frequency band to be enhanced.
Vertical Intensity	Sets the gain for vertical enhancements.

5.8.1. Enabling Image Enhancement

Image Enhancement *Image Enhancement Enable* *Disable* *Enable*	This control enables the Image Enhancement. When enabled, the module will enhance the detail within the video. If disabled, the image enhancement block will not effect the video.

5.8.2. Setting the Detail Gain

Video Proc *Detail Gain* *0 to 127*	This control enables the user to adjust the amount of detail enhancement. This can be adjusted in increments of 1 from 0 to 127.

5.8.3. Setting the Luma Floor

Video Proc *Luma Floor* *0 to 15*	Selects the minimum Luma value that will be enhanced. Pixels with a luma value below this floor will be left untouched.

5.8.4. 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.

5.8.5. 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.

5.8.6. Setting the Horizontal Band

Video Proc
Horizontal Band
0, 5, 10, 15, 20

Selects the Horizontal frequency band to be enhanced.

Where 0 selects the lowest frequency band available and 20 the highest.

5.8.7. Setting the V Enhancement

Video Proc
Vertical Intensity
0-100%

Selects the intensity of the vertical enhancement process as a ratio of the Horizontal enhancement.

The range is 0 to 100% in increments of 25%.
Where 0% refers to no Vertical enhancement and 100% provides a Vertical intensity that is equivalent to the Horizontal.

5.9. CONFIGURING THE AUDIO PROCESSING

The SMPTE 299M standard permits up to 4 groups of 4 audio channels to be embedded into the 1.5 Gb/s video bit stream. The 7713HDC de-embeds two groups of audio that are the source for re-embedding on the SDI output video. The *Audio* menus are used to configure the De-embedder and Embedder groups. These menu items are not applicable when a standard definition input video is connected. The chart below shows the items available in the *Audio* menu. Sections 5.9.1 to 5.9.2 provide detailed information about each of the menu items.

De-embedder A	Sets the audio group source for De-embedder A.
De-embedder B	Sets the audio group source for De-embedder B.
Embedder A	Sets the audio group destination for Embedder A.
Embedder B	Sets the audio group destination for Embedder B.
Embedder A Ch 1	Enables remapping of Channel 1 of Embedder A to another destination.
Embedder A Ch 2	Enables remapping of Channel 2 of Embedder A to another destination.
Embedder A Ch 3	Enables remapping of Channel 3 of Embedder A to another destination.
Embedder A Ch 4	Enables remapping of Channel 4 of Embedder A to another destination.
Embedder B Ch 1	Enables remapping of Channel 1 of Embedder B to another destination.
Embedder B Ch 2	Enables remapping of Channel 2 of Embedder B to another destination.
Embedder B Ch 3	Enables remapping of Channel 3 of Embedder B to another destination.
Embedder B Ch 4	Enables remapping of Channel 4 of Embedder B to another destination.

5.9.1. Selecting the Audio Groups that will be De-Embedded

There are two controls that set the source groups for the two De-embedders. For simplicity, only one control will be shown in the manual.

Audio *De-embedder A* *Group 1* *Group 2* *Group 3* *Group 4*	This control enables the user to set the source group for De-embedder A and B. Under normal conditions the settings for De-embedder A and B should be different otherwise the audio will be repeated on the SDI output. The default group for De-embedder A is group 1 and the default group for De-embedder B is group 2.

5.9.2. Selecting the Audio Groups that will be Embedded

The 7713HDC has two Embedders that each insert one group of audio on the SDI output. The source for Embedder A is the audio being extracted by De-embedder A. The source for Embedder B is the audio being extracted by De-embedder B. There are two controls that set the audio groups where the Embedders will put the audio on the SDI output. For simplicity, only one control will be shown in the manual.

Audio
Embedder A
Off
Follow A
Group 1
Group 2
Group 3
Group 4

This control enables the user to set the destination group for Embedder A and B.

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

When set to *Follow A* or *Follow B*, the embedder destination will follow the setting of the respective De-embedder. (See section 5.9.1)

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 the same group, then the next higher group number will be used for Embedder B.

5.9.3. 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 1 of group A will be shown in the manual.

Audio Proc
Embedder A Ch 1
De-embedder A Ch 1
De-embedder A Ch 2
De-embedder A Ch 3
De-embedder A Ch 4
De-embedder B Ch 1
De-embedder B Ch 2
De-embedder B Ch 3
De-embedder B Ch 4
Mute

This control selects the source of audio for channel 1 of Embedder A audio. The output can be taken from any of the input channels or the output can be muted.

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

5.10. SETTING UP THE ANALOG OUTPUT PARAMETERS

The *Analog Output* menu is used to configure parameters associated with the analog output. The chart below shows the items available in the *Analog Output* menu. Sections 5.10.1 to 5.10.7 provide detailed information about each of the parameters.

Composite Display	Sets whether the analog video output will be colour or monochrome.
Output Level	Sets the analog video output level.
Hue	Sets the analog video hue level.
Saturation	Sets the analog video saturation level.
Contrast	Sets the analog video contrast level.
Brightness	Sets the analog video brightness level.
NTSC Setup Pedestal	Controls the NTSC Setup Pedestal on the analog output.
Line 21 Setup Pedestal	Sets whether the NTSC Setup Pedestal will be on line 21 or analog video output.

5.10.1. Setting the Composite Display Mode – Colour or Monochrome

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

5.10.2. Setting the Analog Video Output Level

Analog Output
  Output level
  -120 to 56
  0
	This control allows the user to adjust the output level of the analog video. When set to 0, the nominal output video level will be 100 IRE.

5.10.3. Setting the Hue

Analog Output
  Hue
  -17.5 to 17.5
  0.0
	This control allows the user to adjust the Hue of the analog video in increments of 0.5 degrees.

5.10.4. Setting the Saturation

Analog Output	
Saturation	
-10 to 10	This control enables the user to adjust the saturation level of the analog video in increments of 1%.
0	

5.10.5. Setting the Contrast

Analog Output	
Contrast	
0 to 20	This control enables the user to adjust the contrast of the analog video in increments of 1%.
0	

5.10.6. Setting the Brightness

Analog Output	
Brightness	
-7.5 to 15.0	This control enables the user to adjust the brightness of the analog video in increments of 0.1 IRE.
0.0	

5.10.7. Setting the NTSC Setup Pedestal on the Analog Video Output

Analog Output	
NTSC Setup Pedestal	This control determines whether the 7.5 IRE NTSC Setup Pedestal will be applied on the analog video output. The NTSC Setup Pedestal should not be present when operating in Japan.
On	Set the control to *On* to apply the Setup Pedestal to the active picture lines.
Off	Set the control to *Off* to remove the Setup Pedestal from the active picture.

5.10.8. Setting the NTSC Setup Pedestal on Line 21 of the Analog Video Output

Analog Output	
Line 21 Setup Pedestal	This control determines how the NTSC Setup Pedestal will be applied on line 21 of the analog video output. The NTSC Setup Pedestal should not be present when there is an CEA-608 closed caption signal on line 21.
Auto	When the control is set to *Auto* the Setup Pedestal will be added to line 21 when captions are not being encoded. The *Captions* item on the *VANC Data Processing* menu is set to *Off* (see section 5.6). If captions are being encoded, NTSC setup will not be added to line 21.
Off	When the control is set to *Off* the NTSC Setup Pedestal will not be added to line 21.

5.11. CONFIGURING THE ON SCREEN MARKERS

The *Marker* menu is used to configure the On Screen aspect ratio markers. The chart below shows the items available in the *Marker* menu. These menu items are not applicable when a standard-definition video input is connected. Sections 5.11.1 to 5.11.3 provide detailed information about each of the parameters.

Type	Sets the type of On Screen marker.
Opacity	Sets the opacity of the On Screen markers.
Output Enable	Controls which output the On Screen marker is displayed on.

5.11.1. Setting the On Screen Marker Type

Marker	This control determines the type of On Screen markers.
Type	
4:3 Line	Select *4:3 Line* to display On Screen markers with vertical lines at the 4:3 aspect ratio of the original image.
4:3 Shaded	Select *4:3 Shaded* to display On Screen markers with areas outside the 4:3 aspect ratio of the original image shaded.
4:3 Line with center	Select *4:3 Line with center* to display On Screen markers with vertical lines at the 4:3 aspect ratio and a cross at the center of the original image.

5.11.2. Setting the On Screen Marker Opacity

Marker	This control selects the opacity of the On Screen markers.
Opacity	
25 percent	
50 percent	
75 percent	
100 percent	

5.11.3. Setting the Outputs that have the On Screen Marker

Marker	This control selects which outputs the On Screen markers are displayed on.
Output Enable	
Off	Select *Off* to disable the On Screen markers.
NTSC/PAL & SDI	Select *NTSC/PAL & SDI* to display the On Screen markers on both the NTSC/PAL composite analog and SDI outputs.
NTSC/PAL	Select *NTSC/PAL* to display the On Screen markers only on the NTSC/PAL composite analog outputs.
SDI	Select *SDI* to display the On Screen markers only on the SDI outputs.

5.12. UTILITIES

The *Utilities* menu is 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 5.12.1 to 5.12.5 provide detailed information about each of the parameters.

On Screen Display	Configures the On Screen display options.
Recall Preset	Recalls the current module configuration from the factory preset or one of the user presets.
Store Preset	Stores the current module configuration to one of the user presets.
Upgrade	Used to upgrade the firmware in the module.
About…	Displays product information.

5.12.1. Selecting the On Screen Display

Utilities	This control is used to enable the active display of various video parameters on the OSD output when the menus are not being displayed. For more information refer to section 6.8.
On Screen Display	
Off	Select *Off* to disable the On Screen Display Windows.
Status Window	Select *Status Window* to show module status at a glance (see section 6.8.)

5.12.2. Recalling Configurations to the User Presets or the Factory Preset

The 7713HDC module provides ten user preset areas to store the complete set of controls from the On Screen menu.

Utilities
Recall preset
Cancel
Factory
1 to 10

This control is used to initiate a recall of the entire card configuration from one of the user presets or from the factory preset.

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

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.

5.12.3. Saving Configurations to the User Presets

The 7713HDC module provides ten user preset areas to store the complete set of controls from the On Screen menu.

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 configuration will be stored. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

5.12.4. 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 menu item, 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.

Note that the baud rate for firmware upgrades is 115200 baud

5.12.5. Accessing Information about this Module and its Firmware

Utilities
About…

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

6. LOCATION OF LEDS AND JUMPERS

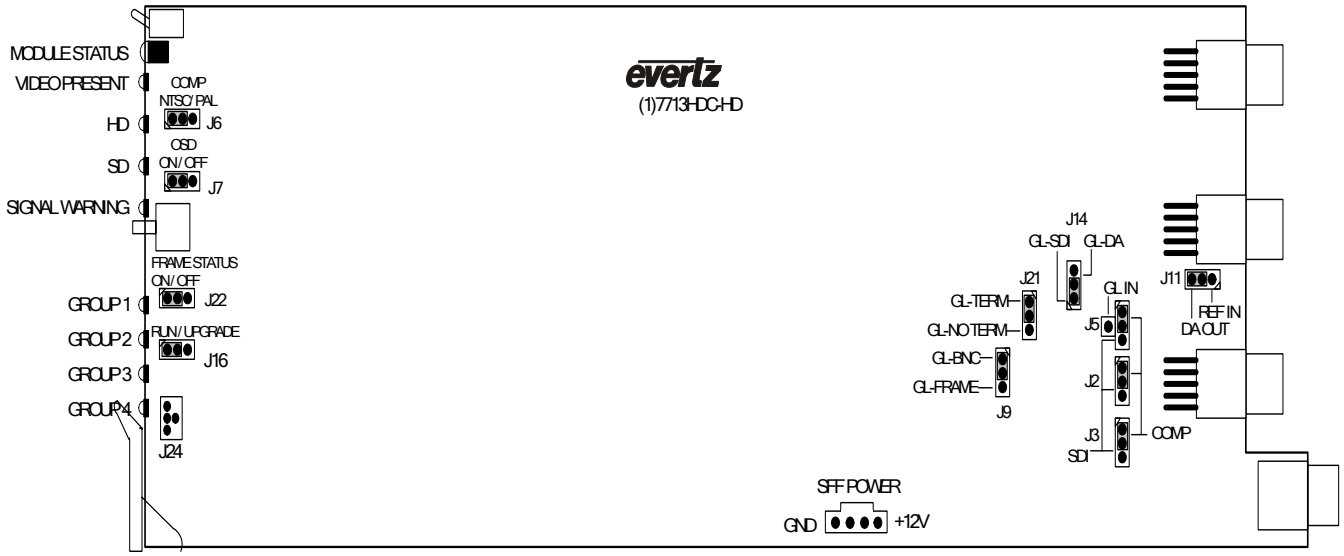

Figure 6-1: LED and Jumper Locations Rev 1 Boards

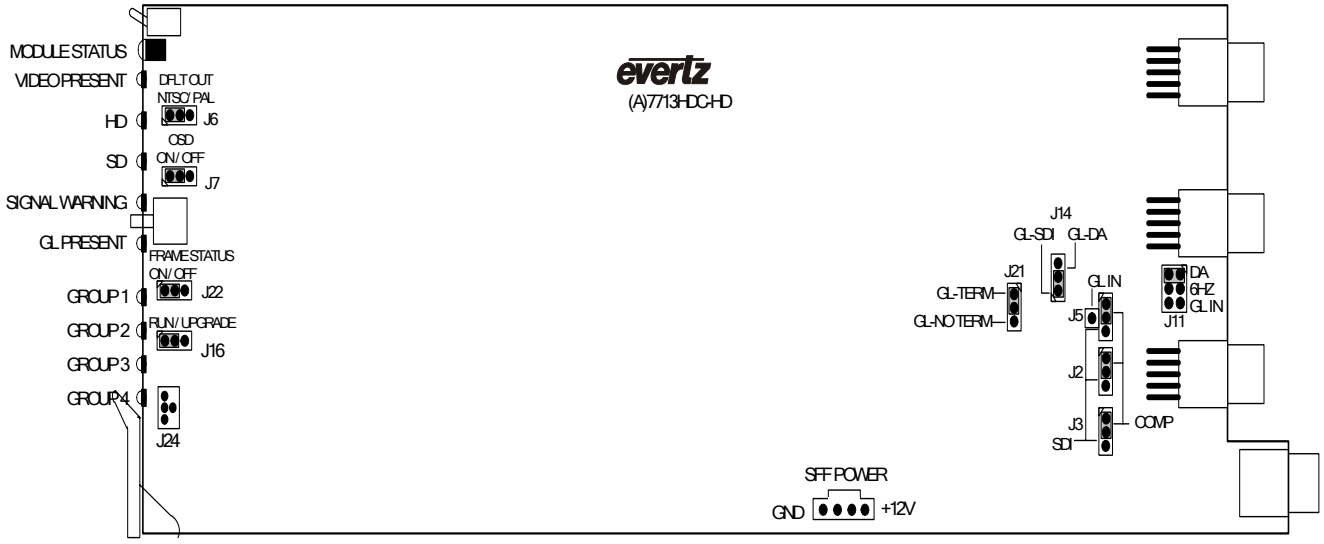

Figure 6-2: LED and Jumper Locations Rev A and Later Boards

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

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

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

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

6.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE The UPGRADE jumper J16, located at the edge of the module near the serial port header, is used when firmware upgrades are being performed on the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section in the front of the binder for more information.

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

Note that the baud rate for firmware upgrades is 115200 baud

6.3. CONTROLLING THE OUTPUT VIDEO STANDARD ON LOSS OF VIDEO

Jumper J6, located above jumper J7 near the pushbutton, controls the behaviour of the down converter outputs when there is no input video or input reference.

J6: To output 525i/59.94 (NTSC) video on loss of input video on the downconverted video outputs, install this jumper in the position closest to the front of the module.

To output 625i/50 (PAL) on loss of input video on the downconverted video outputs, install this jumper in the position closest to the center of the module.

6.4. DISABLING THE ON SCREEN DISPLAY ON THE PROGRAM VIDEO OUTPUTS

Jumper J7, located directly above the pushbutton at the front of the module, determines whether the On Screen display will be shown on the downconverted SDI and analog outputs.

J7: To enable the On Screen display on the downconverted video outputs install this jumper in the position closest to the front of the module.

To disable the On Screen display on the downconverted video outputs install this jumper in the position closest to the center of the module.

Installing jumper J7 closest to the center of the module will disable menus, CC decoders and the status window.

6.5. SELECTING THE FUNCTION OF THE COMP/SDI OUTPUTS 1 TO 3

OUTPUT SELECT: Three jumpers J5, J2 and J3, located near the rear of the module, are used to select whether the COMP/SDI outputs 1 to 3 will contain SDI video or composite analog (NTSC/PAL) video.

To select SDI on the output install the respective jumper in the SDI position (closest to the bottom of the card).

To select composite analog on the output, install the respective jumper in the COMP position (closest to the top edge of the card).

6.6. SELECTING THE 6 HZ INPUT (REV A AND LATER BOARDS ONLY)

6 HZ SELECT: Jumper J11, located near the rear of the module, is used to select whether the DA OUTPUT 4 BNC will be configured as a DA output, Genlock input, or a 6 Hz reference input. The 6 Hz input must also be selected as the pulldown reference using the *Pulldown Reference* menu (see section 5.3.5.1).

To select the DA Output on the BNC install jumper J11 in the DA OUT position. (closest to the top of the card)

To select the 6 Hz input from the BNC install jumper J11 in the 6 Hz IN position (middle position).

6.7. SELECTING THE GENLOCK INPUT SOURCE

The 7713HDC can be configured to accept one of four Genlock inputs. The **DA OUTPUT 4** and **SDI/COMP OUT 1** BNCs can be optionally configured as a Genlock input. When the card is installed in a model 7700FR-G frame, the Genlock source can come from one of the two frame Genlock signals carried on the frame mid-plane.

6.7.1. Rev 1 Boards

On the Rev 1 version of the board, jumpers J11, J5/J12, J14, J21 and J9, located near the rear of the card, are used to configure the Genlock input. Table 6-1 shows how to set the jumpers for each of the possible Genlock input selects. Figure 6-3 shows a simplified schematic of the Genlock selection jumpers.

When the jumpers are configured to take the Genlock source from the frame, the *Genlock Source* menu item is used to select which of the two Frame Genlock signals will be used. (See section 5.3.3)

Source	J9	J11	J5/J12	J14	Termination	J21
DA OUT 4	GL BNC	REF IN	SDI or Comp Out	GL DA	75 OHM	GL Term
					HI-Z	GL No Term
SDI/COMP OUT 1	GL BNC	DA OUT	GL In	GL SDI	75 OHM	GL Term
					HI-Z	GL No Term
FRAME GENLOCK	GL MI	DA OUT	SDI or Comp Out	GL SDI		
None		DA OUT	SDI or Comp Out	GL SDI		

Table 6-1: Genlock Source Jumper Configuration (Rev 1 Boards)

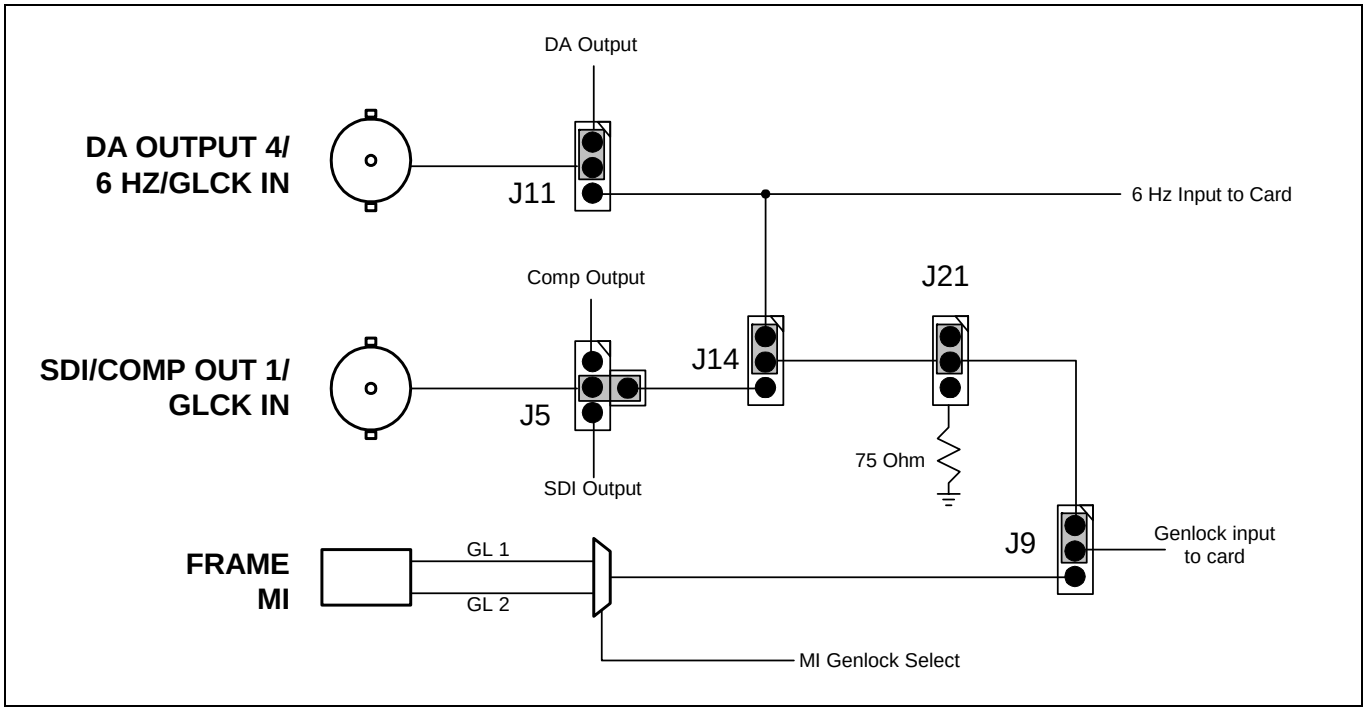

Figure 6-3: Genlock Selection Schematic showing BNC Genlock condition (Rev 1 Boards)

6.7.2. Rev A and Later Boards

On the Rev A and later versions of the board, jumpers J11, J5/J12, J14 and J21 located near the rear of the card, are used to configure the Genlock input. Table 6-2 shows how to set the jumpers for each of the possible Genlock input selects. Figure 6-4 shows a simplified schematic of the Genlock selection jumpers. The *Genlock Source* menu item is used to select whether one of the two Frame Genlock signals or the GLCK input signal will be used. (See section 5.3.3)

Source	J11	J5/J12	J14	Termination	J21
DA OUT 4	GL IN	SDI or Comp Out	GL DA	75 OHM	GL Term
				HI-Z	GL No Term
SDI/COMP OUT 1	DA OUT	GL In	GL SDI	75 OHM	GL Term
				HI-Z	GL No Term
FRAME GENLOCK	DA OUT	SDI or Comp Out	GL SDI		
None	DA OUT	SDI or Comp Out	GL SDI		

Table 6-2: Genlock Source Jumper Configuration (Rev A and Later Boards)

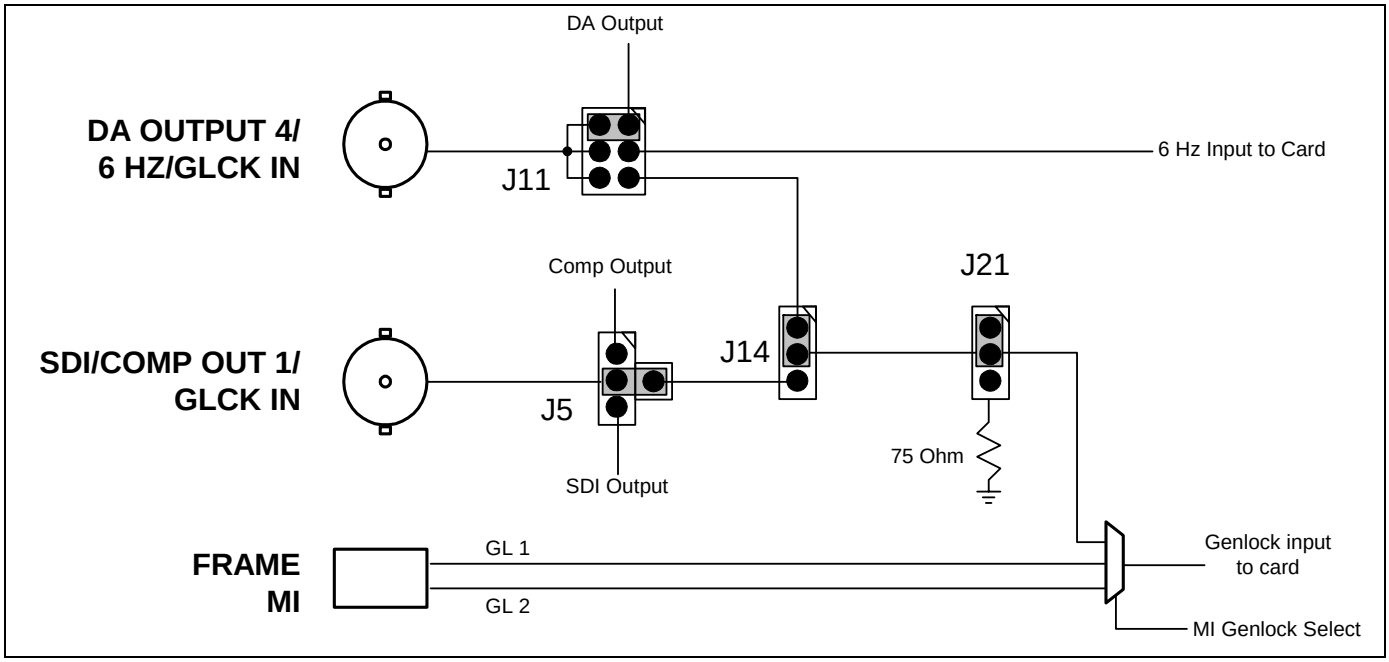

Figure 6-4: Genlock Selection Schematic Showing BNC Genlock Condition (Rev A and Later Boards)

6.8. STATUS WINDOW DISPLAY

When the On Screen menus are not being displayed, the Status Window can be used to display the video parameters over top of the video. Table 6-3 describes the Status Window items that will be output on the OSD. Refer to section 5.12.1 for more information on how to enable the Status Window. The VistaLINK® interface is also able to monitor these parameters (see section 7.2).

Status Window Item	Function
Video	Indicates the video standard of the input signal.
Video Delay (ms)	Indicates the video delay in milliseconds.
Video Delay (F,L,S)	Indicates the video delay in output video frames, lines, samples.
Audio Group 1	Indicates the presence of embedded audio in Group 1. (the state of the Group 1 present LED)
Audio Group 2	Indicates the presence of embedded audio in Group 2. (the state of the Group 2 present LED)
Audio Group 3	Indicates the presence of embedded audio in Group 3. (the state of the Group 3 present LED)
Audio Group 4	Indicates the presence of embedded audio in Group 4. (the state of the Group 4 present LED)
CEA-708	Indicates that CEA-708 type captions are present in the input video.
CEA-608	Indicates that CEA-608 type captions are present in the input video. If the CEA-608 type captions are present then the status window will display which data field(s) are present. (Field 1, Field 2 or Fields 1&2)
RP188	Indicates that the RP188 time code is present in the input video. If the time code is present, the status window displays the time code. NOTE: The number displayed is an approximate value of the ouput time code and is not intended to be used as an accurate account of the current output time code value.
6 Hz	Indicates the presence of a 6Hz reference input.
Bi - Lvl Genlock	Indicates the presence of a valid Genlock signal. If the Genlock is present, it displays the Genlock standard.

Table 6-3: Status Window Display

7. VistaLINK® REMOTE MONITORING/CONTROL

7.1. WHAT IS VistaLINK®

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

There are 3 components of SNMP:

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

2. Managed devices (such as 7713HDC), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC VistaLINK® frame controller module, which serves as the Agent.

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

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

7.2. VistaLINK® MONITORED PARAMETERS

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

Parameter	Description
Detected Input Video Type	Indicates the video type (SD or HD)
Input Video Present	Indicates the presence of a valid video input signal. (the state of the VIDEO PRESENT LED)
Detected Input Video Standard	Indicates video standard of input signal
Genlock Present	Indicates the presence of a valid Genlock signal. (the state of the GENLOCK PRESENT LED)
Genlock Standard	Indicates video standard of Genlock signal
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)
Video Delay (μs)	Indicates the video delay in micro seconds
Video Delay (F/L/S)	Indicates the video delay in output video frames, lines, samples
CEA-608 Captions Present	Indicates that CEA-608 type captions are present on the input video
CEA-708 Captions Present	Indicates that CEA-708 type captions are present on the input video
Time Code Present	Indicates the presence of RP188 time code on the input video
6 Hz Present	Indicates the presence of a 6Hz reference input

Table 7-1: VistaLINK® Monitored Parameters

7.3. VistaLINK® CONTROLLED PARAMETERS

Parameter	Description
Video Type	Sets the video input to High Definition (HD) or Standard Definition (SD)
Video Standard	Selects the video input and output standards
Frame Genlock Source	Selects the Genlock source
Reset Input Buffer	Sets the current input source to be the reference for the input line buffer
Pulldown Reference	Sets reference source when 3:2 pulldown is being performed on output
A Frame Offset	Sets the A Frame Offset from the Pulldown Reference
525 Vertical Phase Offset	Sets 525 Vertical phase of the output signal to NTSC Genlock reference input
525 Horizontal Phase Offset	Sets 525 Horizontal phase of the output signal to NSTC Genlock reference input
625 Vertical Phase Offset	Sets 625 Vertical phase of the output signal to PAL Genlock reference input
625 Horizontal Phase Offset	Sets 625 Horizontal phase of the output signal to PAL Genlock reference input
Set Minimum Delay	Configures output timing to achieve minimum delay
Output Aspect Ratio	Sets the aspect ratio of the output picture
Video Loss Output	Sets the action to take when the input video is missing
Panel Colours	Sets the colour of the letterbox panels
Horizontal Filter Cutoff	Sets the cutoff frequency of the horizontal filter in the scaler
Vertical Filter Cutoff	Sets the cutoff frequency of the vertical filter in the scaler
Closed Captions Enable	Controls whether closed captions will be encoded on the output
SD 525 CC Input Line	Sets the line to monitor for Closed Caption data on 525 line SD video input
SD 625 CC Input Line	Sets the line to monitor for Closed Caption data on 625 line SD video input
VITC Generator	Controls whether VITC will be inserted on the program video outputs

VITC User Bits	Controls whether VITC time will be original time or User Bits
Default VITC Source	Sets the preferred type of ancillary time code to read from the HD output
VITC Line Number 525	Sets VITC insertion line on 525/NTSC video outputs
VITC Line Number 625	Sets VITC insertion line on 625/PAL video outputs
WSS Enable	Controls whether Wide-Screen signaling will be encoded on the output
WSS Line 525	Sets Wide Screen Signaling insertion line on 525/NTSC video output
WSS Line 625	Sets Wide Screen Signaling insertion line on 625/PAL video output
Gamma Enable	Enables or disables gamma adjust
Gamma Level	Sets the gamma correction factor
RGB Clip Enable	Enables or Disables clipping the video to valid R.G.B. values
Y Gain DC	Sets the Y Gain of the input video
Y Offset DC	Sets the Y Offset of the input video
Cr Gain DC	Sets the Cr Gain of the input video
Cr Offset DC	Sets the Cr Offset of the input video
Cb Gain DC	Sets the Cb Gain of the input video
Cb Offset DC	Sets the CB Offset of the input video
Hue DC	Sets the hue of the input values. +/- 30 degrees 0.1 degree increments
R Gain DC	Sets the R Gain of the input video
G Gain DC	Sets the G Gain of the input video
B Gain DC	Sets the B Gain of the input video
Image Enhancement Enable	Enables or Disables Image Enhancement
Detail Gain	Sets the amount of detail enhancement
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 maximum detail value to be added back into the signal
Horizontal Band	Sets the horizontal frequency band to be enhanced
Vertical Intensity	Sets the gain for the vertical enhancement process
Audio De-embedder A Source	Sets the audio source group for De-embedder A
Audio De-embedder B Source	Sets the audio source group for De-embedder B
Audio Embedder A Group	Sets the audio group destination for Embedder A
Audio Embedder B Group	Sets the audio group destination for Embedder B
Embedder A Channel 1	Enables remapping of Channel 1 of Embedder A to another destination
Embedder A Channel 2	Enables remapping of Channel 2 of Embedder A to another destination
Embedder A Channel 3	Enables remapping of Channel 3 of Embedder A to another destination
Embedder A Channel 4	Enables remapping of Channel 4 of Embedder A to another destination
Embedder B Channel 1	Enables remapping of Channel 1 of Embedder B to another destination
Embedder B Channel 2	Enables remapping of Channel 2 of Embedder B to another destination
Embedder B Channel 3	Enables remapping of Channel 3 of Embedder B to another destination
Embedder B Channel 4	Enables remapping of Channel 4 of Embedder B to another destination
Composite Display	Sets whether the analog video output will be colour or monochrome
Composite Output Level	Sets the analog video output level
Hue	Sets the analog video hue level
Saturation	Sets the analog video saturation level
Contrast	Sets the analog video contrast level
Brightness	Sets the analog video brightness level
NTSC Setup Pedestal	Controls NTSC Setup Pedestal on the analog output
Line 21 Setup Pedestal	Sets whether the NTSC Setup Pedestal will be on line 21 or analog video output
Marker Type	Sets the type of On Screen markers
Marker Opacity	Sets the opacity of the On Screen markers
Marker Output Enable	Controls which output the On Screen marker is displayed on
On Screen Display	Configures the On Screen display options
Recall Preset	Recalls the module configuration from the factory preset or one of the user presets.
Store Preset	Stores the current module configuration to one of the user presets

Table 7-2: VistaLINK® Controlled Parameters

7.4. VistaLINK® TRAPS

Trap	Description
Video	Triggers when video is not present
Genlock	Triggers when Genlock is not present
Audio Group 1	Triggers when Audio group 1 is not present
Audio Group 2	Triggers when Audio group 2 is not present
Audio Group 3	Triggers when Audio group 3 is not present
Audio Group 4	Triggers when Audio group 4 is not present
Time Code	Triggers when RP188 Time code is not present
CEA-708 I	Triggers when CEA-708 Captions are not present
CEA-608 field 1	Triggers when CEA-608 Caption data is not present from Field 1
CEA-608 field 2	Triggers when CEA-608 Caption data is not present from Field 2

Table 7-3: VistaLINK® Traps

8. MENU QUICK REFERENCE

Video
- Video Type
- Std
- Genlock Source
- Reset Input Buffer
- Pulldown Reference
- A Frame Offset
- 525 V Phase Offset
- 525 H Phase Offset
- 625 V Phase Offset
- 625 H Phase Offset
- Set Minimum Delay

Output Picture
- Aspect Ratio
- Loss of Video
- Panel Colours

Scaler
- H Filter Cutoff
- V Filter Cutoff

VANC Data Processing
- Closed Captions En/Dis
- SD 525 CC Input Line
- SD 625 CC Input Line
- VITC Generator
- VITC UB
- Dflt VITC Source
- 525 VITC Line
- 625 VITC Line
- WSS En/Dis
- 525 WSS Line Num
- 625 WSS Line Num

Video Proc
- Gamma Enable/Disable
- Gamma Level
- RGB Clip Enable/Disable
- Y Gain
- Y Offset
- Cr Gain
- Cr Offset
- Cb Gain
- Cb Offset
- Hue
- R Gain
- G Gain
- B Gain

Image Enhancement
- Image Enhancement Enable/Disable
- Detail Gain
- Luma Floor
- Detail Noise Floor
- Enhancement Limit
- Horizontal Band
- Vertical Intensity

Audio
- De-embedder A
- De-embedder B
- Embedder A
- Embedder B
- Embedder A Ch 1
- Embedder A Ch 2
- Embedder A Ch 3
- Embedder A Ch 4
- Embedder B Ch 1
- Embedder B Ch 2
- Embedder B Ch 3
- Embedder B Ch 4

Analog Output
- Composite Display
- Output Level
- Hue
- Saturation
- Contrast
- Brightness
- NTSC Setup Pedestal
- Line 21 Setup Pedestal

Marker
- Type
- Opacity
- Output Enable

Utilities
- On Screen Display
- Recall Preset
- Store Preset
- Upgrade
- About...

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