Grey background indicate un-implemented or un-tested features

Figures

Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.0	start	Oct 03
1.0	First release	Jan 04
1.1	Added missing menu items	Mar 04

WARNING: This version contains areas of gray text that are indicative of future software releases. These sections are to be used as information only and are subject to change. Some of these features may seem to work but they have not been completed and have not been verified by Evertz.

1. OVERVIEW

The 7730DAC line of serial digital video to component analog converters are broadcast quality D to A's with an extensive list of additional features. High quality digital to analog conversion of audio or AES inputs/outputs can be packaged with the video to create a D to A frame synchronizer with audio demux. In addition, Evertz fault monitoring processing will analyze and report video and audio problems via an On-Screen-Display, or remotely via VistaLINK™ SNMP.

The Features of the D to A process:

- 12 bit, over sampled video DACs.
- SMPTE/EBU N10, Betacam, MII and NTSC related standards supported.
- Y, Pb, Pr or G, B, R output format.
- Selectable setup pedestal.
- Black level and gain controls of all three components.
- 300mV separate composite sync output.

The Features of all 7730DAC's are:

- SDI 525 or 625, 270 Mb/s component digital video input.
- One 270 Mb/s re-clocked SDI output.
- Four output BNCs for Y, Pb, Pr or G, B, R and composite sync.
- One composite analog output on BNC for monitoring and control.
- One frame video synchronizer (with +S option).
- Infinitely variable output phase (27MHz clock increments).
- Freeze modes: black, freeze, pass
- Menu adjustable free running frequency.
- VU/PPM bargraph level Indicators.
- Decodes vertical interval time code (VITC), outputs longitudinal time code (LTC) and "burns" the time code into the monitoring output picture.
- A comprehensive on screen display is available to configure the various features of the module.
- Flexible configuration of the text and audio bar graph information displays.
- An extensive list of error conditions can be monitored and fault conditions can be configured from these conditions.
- On screen messages can be triggered by the configured fault conditions.

The Features of "-A4" option are:

- One group (4 channels) of synchronous 20-bit audio is de-multiplexed from the incoming digital video.
- 2 unbalanced AES audio inputs (up to 48kHz, 24 bits) on BNC.
- User selects EITHER the de-embedded audio or the input AES audio.
- The selected audio is delayed equivalently to the video delay with the +S option.
- 4 high quality 24 bit audio channels are output (analog) as balanced on 2 removable barrier strips.
- Low impedance outputs (66Ω).
- Analog audio output levels are adjustable.
- Additional audio delay of up to 5 seconds.
- Additional audio advance of up to 1 frame, depending on video delay.

- Loss of video modes: pass audio, mute audio.

The Features of "-AES" option are:

- 75-Ohm coaxial (unbalanced) AES inputs (2) on BNC.
- Audio delay equivalent to video delay (with +S option).
- Additional audio delay of up to 5 seconds.
- Audio advance of up to 1 frame less 3 microseconds.
- One group (2 channels of audio) is multiplexed on the outgoing digital video.
- 2 unbalanced AES audio outputs delayed equivalently to the embedded audio.
- 75-Ohm coaxial (unbalanced) DARS reference input on BNC.
- Loss of video modes: pass audio, mute audio.
- Bypass relay protection that allows removing the card without re-wiring AES audio.

1.1. FUNCTIONAL DESCRIPTION

The 7730DAC is a complete standard definition component D to A system with frame synchronizing (+S version only), audio demulitplexing, audio delay and audio D to A. The embedded audio is extracted from the input video before the video and audio are synchronized to a reference source. The component serial digital video is then converted to 10 bit over-sampled component (Y, Pb, Pr or G, B R) analog video. Gain, black level, color space conversion and setup pedestal addition are functions that are performed during the digital processing.

In the 7730DAC-A4 version, the embedded audio is converted from digital PCM audio to balanced analog. The 7730DAC-AES, alternatively receives input AES audio and rate converts it to synchronous 48kHz. The digital audio is then delayed to match the delay experienced by the video in the video synchronizer (with +S option). This delayed audio (with +S option) is formatted properly and delivered to the user as unbalanced 75 Ohm AES audio on BNC and balanced analog audio.

The audio is also processed to extract level and phase information. The CPU creates the level and phase bar graphs and writes them out to the on screen display (OSD) memory.

The hardware mixes (keys) the on screen text and bar graphs display information onto the video stream. This video goes out through a composite encoder with the OSD "burn-ins".

The CPU also gets pushbutton and toggle switch commands from the card edge controls and draws extensive menus for configuring the operation of the card.

The following block diagrams illustrate the processing blocks.

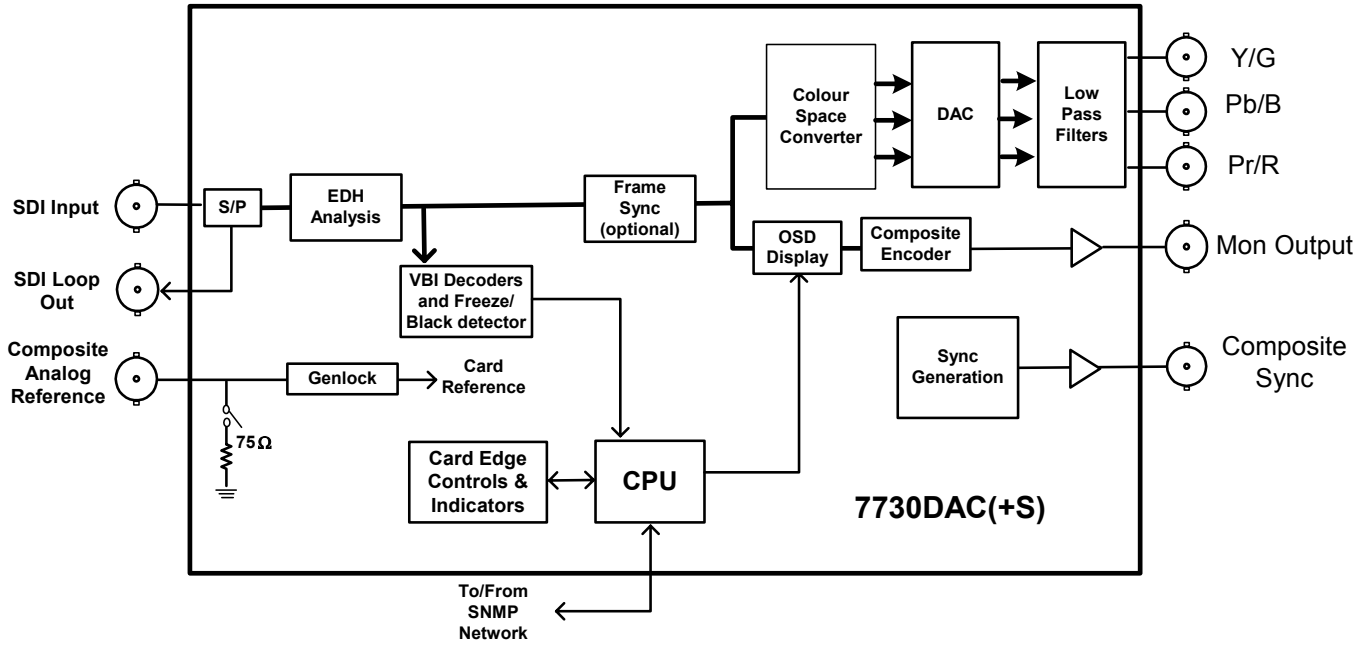


Figure 1: 7730DAC Block Diagram

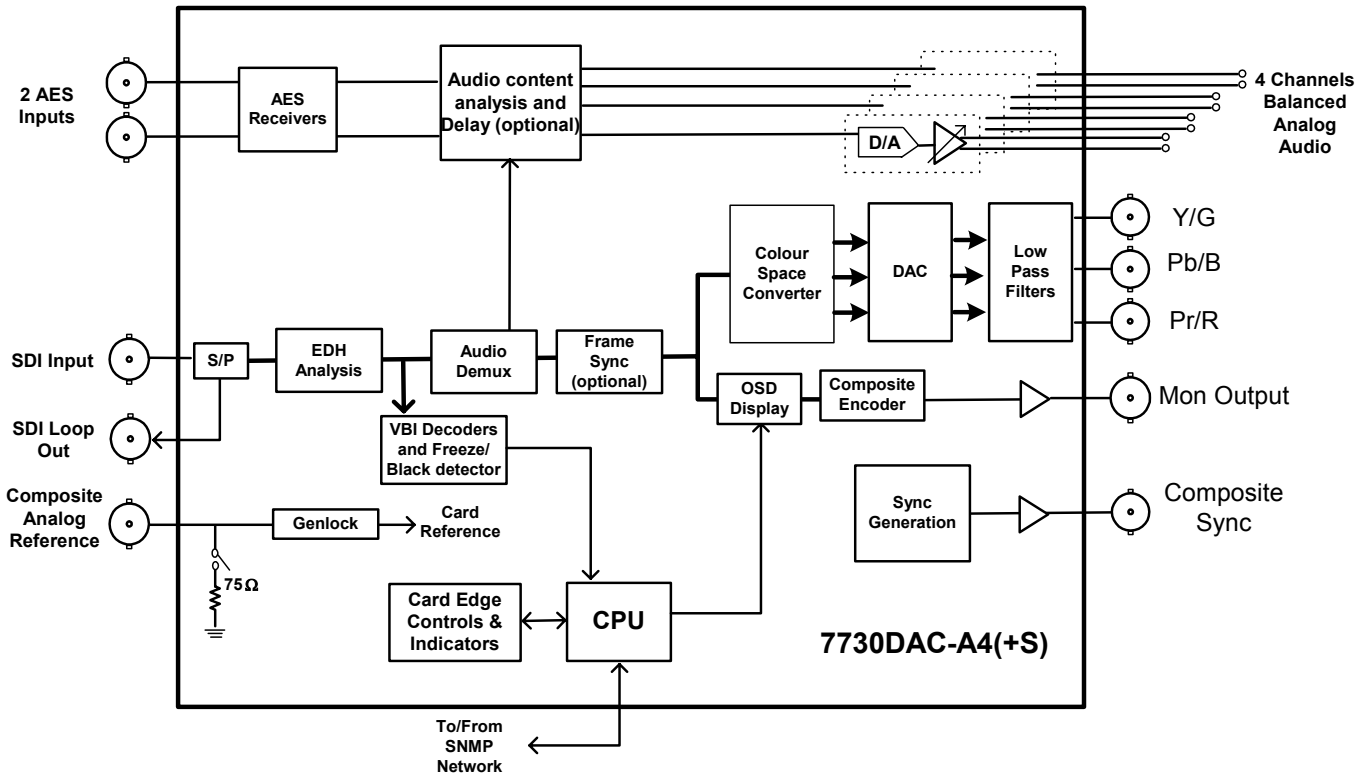


Figure 2: 7730DAC-A4 Block Diagram

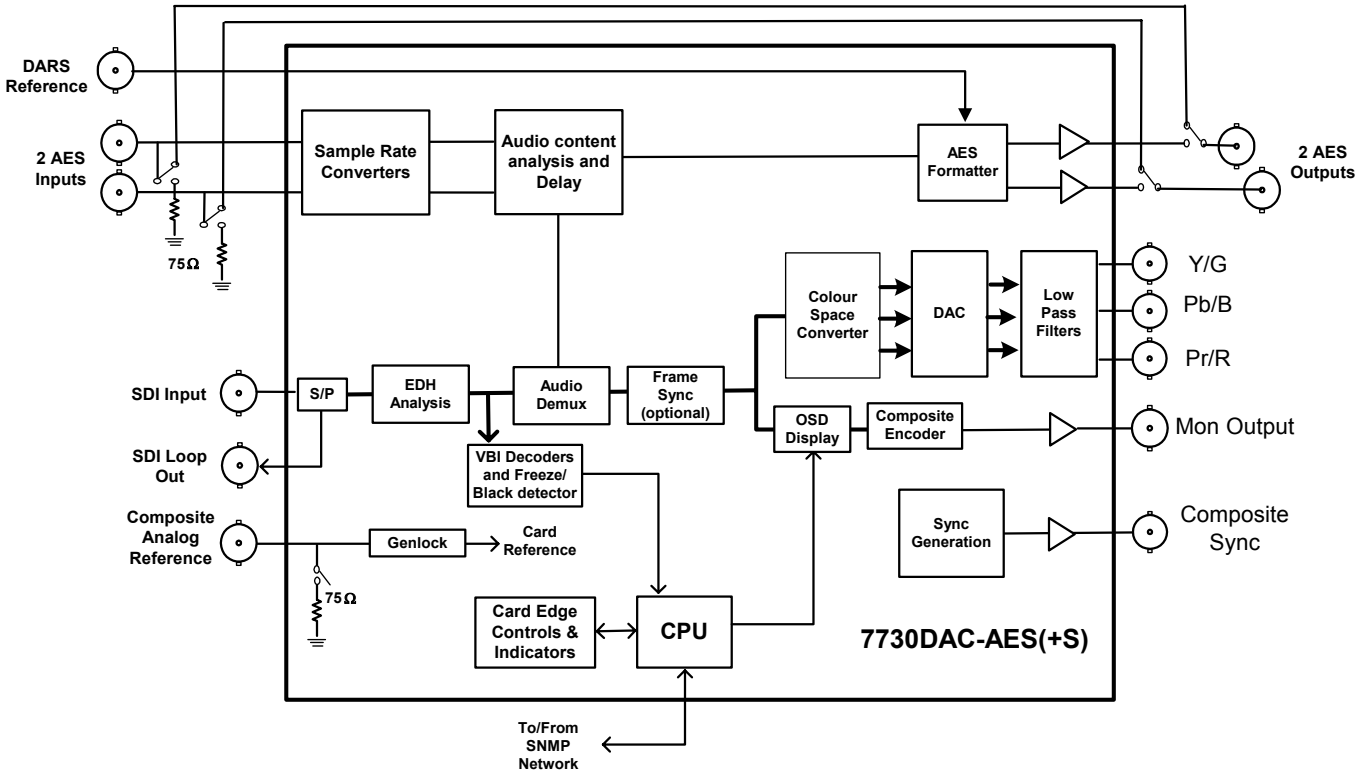


Figure 3: 7730DAC-AES Block Diagram

2. Installation

The 7730DAC modules come with a companion rear plate and occupy one or two slots in the 7700FR(-G) frame. Figure 4 shows a picture of each of the rear panels. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.

The 7730DAC cards must be inserted into slots with the correct rear panel. Some cards have physical differences and some have functional differences.

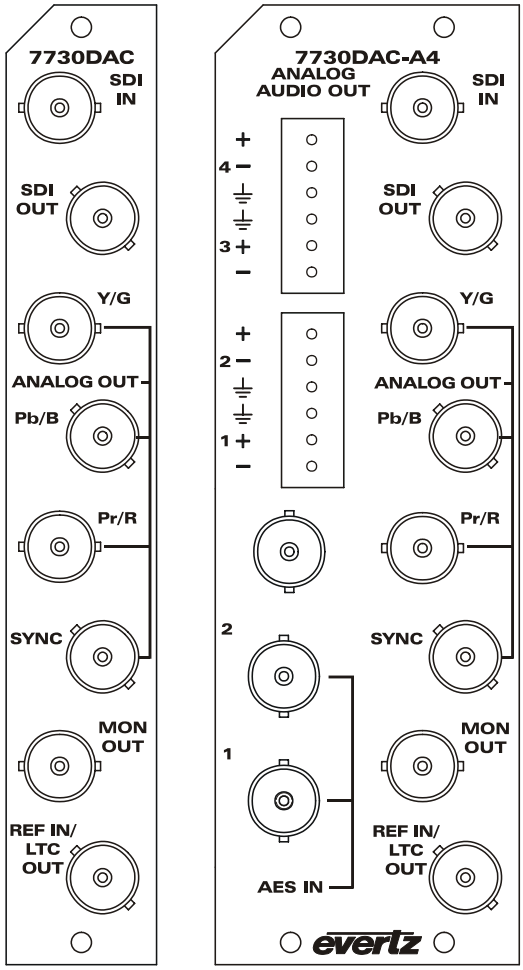


Figure 4: 7730DAC Rear Panels

2.1. VIDEO IN AND OUT

Connect a source of SDI component digital video to the top BNC labeled SDI IN. If needed, you can cascade the input SDI signal to other gear with the re-clocked output labeled SDI OUT. Connect the component analog output (Y/G, Pb/B, and Pr/R) to the destination equipment with three equal length coax cables. Separate composite sync is available on the SYNC output if needed. Connect a reference black signal to the REF IN BNC (+S option only). Alternatively, if you have a 7700FR-G frame, this card can be configured to accept one of the reference signals provided to the frame. Composite analog video with text and audio bar graphs are available on the MON OUT output BNC. If the card is not present or the power is off, there will be nothing on any of the outputs. Optionally, LTC is available on the REF IN/LTC OUT BNC which has been converted from the incoming VITC.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standard:	SMPTE 259M-C – 525 or 625 line component.
Number of Inputs:	1
Number of re-clocked outputs:	1
Connector:	BNC per IEC 169-8
Return Loss:	>15dB to 270MHz
Embedded Audio:	SMPTE 272M-A
Frequency Lock Range:	±75ppm from nominal

3.2. ANALOG VIDEO OUTPUT

Standards:	SMPTE/EBU N10, Betacam, MII and NTSC specific standards GBR or YPbPr formats with or without setup
Number of outputs:	1
Connectors:	4 BNCs per IEC 169-8
Video signal Level:	1V nominal
Sync signal Level:	300mV nominal
Output level control range:	±10%
Black level control range:	±10 IRE
Input Impedance:	75 Ohm
Return loss:	>45dB to 10MHz

3.3. REFERENCE VIDEO INPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Inputs:	1
Connector:	BNC per IEC 169-8
Signal Level:	1V nominal
Frequency Lock Range:	±75ppm from nominal
Input Impedance:	75 Ohm or High impedance (jumper selectable)
Return Loss:	>25dB to 10MHz

3.4. VIDEO PERFORMANCE

Frequency Response:	<±0.1dB (100kHz to 4.1MHz)
Noise Floor:	< -73dBrms (15kHz to 5MHz)
Inter-channel Delay:	<±5ns
Minimum Delay:	3 µsec
Maximum Delay:	1 frame plus 3 µsec

3.5. ANALOG AUDIO OUTPUTS (-A4 only)

Number of Outputs:	4
Type:	Balanced analog audio
Connector:	Two 6 pin removable terminal strips
Output Impedance:	66Ω balanced
Sampling Frequency:	48kHz
Signal Level:	0dBFS => 12 to 25dBu (user settable)
Frequency Response:	<+/- 0.05dB (20Hz to 20kHz)
Dynamic range:	24 bits when AES inputs selected, 20 bits when embedded audio selected
THD+N:	<0.001% (>100dB) @ 1kHz, -1dBFS
Crosstalk:	<-105dB (20Hz to 20kHz)
DC Offset:	<+/- 30mV
SNR:	>110dB "A" Weighting
Inter-Channel Phase Error:	<+/-1° (20Hz to 20kHz)

3.6. AES AUDIO INPUTS (-AES only) AND OUTPUTS

Number of Inputs:	none on –A4 versions, 2 on –AES versions
Number of Outputs:	2
Input Standard:	SMPTE 276M, single ended synchronous or asynchronous PCM AES
Output Standard:	SMPTE 276M, single ended synchronous AES
Connectors:	BNC per IEC 169-8
Resolution:	24 bits
Sampling Rate:	32kHz to 48 kHz on inputs, synchronous 48kHz on outputs
User Bits:	Transferred to output in a non-real-time, non-block-contiguous manner
Minimum I/O Delay:	2.1msec on –A4 versions 2.5msec on –AES versions
Maximum I/O Delay:	5 seconds

3.7. ELECTRICAL

Voltage:	+ 12VDC
Power:	10 Watts DAC + 7.5 Watts (-A4 option) = 17.5 Watts total
EMI/RFI:	Complies with FCC Part 15, class A and EU EMC directive

3.8. PHYSICAL

7700 frame mounting:

Number of slots:	1 for non-audio versions 2 for audio versions (-AES, -A4)

Stand Alone Enclosure:

Dimensions:	14 " L x 4.5 " W x 1.9 " H (355 mm L x 114 mm W x 48 mm H)
Weight:	approx. 1.5 lbs. (0.7 Kg)

4. STATUS LEDs

Front card edge drawing goes here.

4.1. MODULE STATUS LEDS

MODULE STATUS: This Green LED will be on when the module is operating properly.

LOCAL FAULT: This Red LED makes it easy to identify one module in a frame that is missing an essential input or has another fault.

The LED will blink on and off if the microprocessor is not running.

The LED will be on when there is a fault in the module power supply or a user configurable error condition exists.

NTSC/PAL: The NTSC/PAL Green LEDs (NTSC on the top, away from the PCB and PAL on the bottom, closest to the PCB) will indicate the video standard of the SDI video input. If video is removed, both LEDs will go off. If the input standard is opposite to the user selected standard, the LED will flash.

GENLOCKED: This Green LED is on solid if the genlock source is present and the user has turned on genlocking.

It is flashing if the user has turned on genlocking and the genlock source is not present.

It will be off if the user has turned genlocking off.

AUDIO: This Green LED is on solid when the user selected audio is present. It will flash when some, but not all, of the audio channels are present. If no audio is present, it will be off.

For instance, if external AES audio is selected (via. the OSD menu) and only one of the two AES channels is present, then this LED will flash.

4.2. AUDIO STATUS LEDS

Four LEDs located on the lower end of the module (near the card extractor) indicate which audio channels are present. Audio channel 1 LED is located closest to the center of the module. Digital audio presence is

determined by the AES receiver lock indicator (when AES input is selected). When embedded audio is selected, the channel must be present on the selected group for the LED to illuminate.

Audio LED	Colour	Audio Channel Status
1	Off	No channel 1 present.
	Green	Channel 1 present.
2	Off	No channel 2 present.
	Green	Channel 2 present.
3	Off	No channel 3 present.
	Green	Channel 3 present.
4	Off	No channel 4 present.
	Green	Channel 4 present.

Table 1: Audio Channel Status LEDs

5. AUDIO BUFFER MANAGEMENT (+S OPTION ONLY)

The audio is delayed, through a large memory buffer, by the same time value as experienced by the video through the video frame synchronizer. This is done to maintain a consistent video/audio relationship. Unfortunately, when the video frame buffer drops or repeats frames of video, we cannot do the same with the audio. The rate of the ingoing audio data is changed and over a period of time, the buffer is returned to a value that matches the video. A sample rate converter is used to change the rate of the incoming AES on the -AES version while the 48kHz sampling clock is changed slightly from it's nominal value on the analog audio input (-A4) version. This method is also used when video is first applied or there is a sudden change in either the input video phase or genlock video phase.

When the audio buffer delay needs to be changed, there are two rates used; +/- 1% and +/- 30ppm. Initially, a 1% rate change is used to quickly match the audio delay to the video delay. This correction will only take a couple of seconds but will produce a pitch change. The pitch change will be discernable, particularly on sustained musical notes. When the video/audio delays are close to each other and only small corrections are required, the audio buffer will be adjusted with a rate change of 30ppm (30 Parts-Per-Million is equivalent to 0.003%). This rate change will produce a pitch change that is near the threshold of where a human can detect it and should not be discernable with normal content.

Unfortunately, the audio buffer management relies on a sample rate converter (-AES versions only) to adjust the audio buffer size. This precludes the synchronization of non-PCM AES data (i.e. Dolby-E™). In the future, a non-sample rate converter mode may be available.

Audio A to D converters and sample rate converters have inherent delays that are much longer than what the minimum acceptable video I/O delay is. To allow the user to operate the video synchronizer with small video delays, we will hold the audio buffer delay at it's minimum value when the video is less than this minimum.

6. AUDIO LEVELS, HEADROOM, CLIPPING AND THE BAR GRAPHS

This section contains notes to understand how the 7730DAC-A4 relates analog audio levels, digital audio levels, and the displayed bar graph levels.

Before you can calibrate the audio digital to analog converter, you must know a couple of system issues specific to your application. What is your analog reference level and how much headroom is there in the digital audio signal? By adding these two values together, you will get the analog output level that will just begin to saturate the digital word (This is the highest level that can be represented without distortion with the digital numbers). This level is called 0dB FS (FS stands for "full scale"). For instance, if your analog program reference level is 4dBu and you have 20dB of headroom in the "digital world", then 0dB FS will correspond to an analog level of 24dBu. Once the audio output level is calibrated, when you apply a digital level of –20dB FS, the analog output signal will be 4dBu .

The SDI embedded audio, the AES input audio and the bargraphs are all based on the same digital quantized signal level. The AES/EBU bargraph ballistics mode is scaled to 0dB FS while the other modes have a user selectable headroom. For this reason, use the AES/EBU mode for calibrating audio levels.

When a full-scale digital signal is input, you will get a peak analog output signal level that is set by the *analog level* controls. The *Headroom* control sets the 100% program reference level (0 dB on the scale)

with respect to the Peak Output Level set by the *analog level* controls. For example, if the Peak Output Level is set to 24 dBu and the *Headroom* is set to 20 dB, then the 0 dB reference on the bar graphs will correspond to an output level of 4 dBu. This level will be achieved when a digital input signal of –20 dB FS is applied at the input. Therefore, the following relationship is always maintained:

PGM reference level + headroom = peak output level

NOTE: The VU and PPM standards were set before the digital revolution. These standards deal with headroom levels that are quite a bit lower what should be used in the digital world. Also, most of the bar graphs only display a few dB above the program reference level. In a digital world, one needs to leave around 20 dB of headroom to keep most material away from clipping.

For best results, follow these steps when setting up the audio bar graphs and output levels:

1. Set the *Headroom* control to the desired value. Remember that this is the value in dB between the 100% reference level (expressed in dB FS) and saturation level of the digital input word (0 dB FS). It will also correspond to the value in dB between the analog output level when a reference level is input and the maximum output level set by the *analog level* controls.
2. Pick the bar graph type and mode. This selection will configure the bar graphs with the defaults dictated by the standards. It will also set the Peak Output Level and the 0dB reference level to adhere to the standard and the desired headroom.
3. Adjust any of the bar graph configuration parameters to customize the display of the graphs.
4. Save the card configuration into a preset so that you can recall it if any card parameter is tampered with.

7. AUDIO ALARM CALIBRATION PROCEDURE (-A4 and –AES)

This section contains detailed description on setting the various audio warning/error detection parameters.

Some of the audio alarm detection algorithms are dependent on the state of other audio alarm detectors. For instance, the mono detection algorithm will not use periods of silence as determined by the silence detection. For this reason, the following sequence should be used to calibrate the audio alarms. The items in *italics* refer to menu items in the OSD. See section 8.10 for a complete description of the fault definition menu items.

7.1. CALIBRATE AUDIO SILENCE DETECTION

1. Supply the card with your plant's noisiest audio feed without any audio program material present. This will be a baseline noise level to calibrate the silence detector.
2. Turn off all sources of errors in a *Fault Condition* and assign *Audio Silence* as the only error. Also, make sure that you set the *Fault Duration* to a small number of frames so that you will see when the error condition disappears.
3. Set the *Silence Duration* to 0.5 sec so that you can see the results of adjusting the *Silence Level* parameter without getting confused with the detection time.
4. Adjust the audio *Silence Level* until the *Fault Condition* begins to go active. This will be the noise floor level. Raise the *Silence Level* a few dB to make the detector insensitive to this noise level.
5. Set the *Silence Duration* to a time appropriate to your application. This should be set to a value longer than your worst case acceptable quiet period.

7.2. CALIBRATE AUDIO PHASE REVERSAL DETECTION

1. Supply the card with a stereo signal that has the phases reversed. Make sure that the material is typical of normal content for this channel.
2. Turn off all sources of errors in a *Fault Condition* and assign *Phase Reversal* as the only error. Also, make sure that you set the *Fault Duration* to a small number of frames so that you will see when the error condition disappears.
3. Set the *Phase Reversal Duration* to 0.5 sec so that you can see the results of adjusting the *Phase Reversal Level* without getting confused with the detection time.
4. Adjust the *Phase Reversal Level* so that the *Fault Condition* detects the phase reversal.
5. Set the *Phase Reversal Duration* to a time period appropriate to your application.
   Warning: Periods of silence (below the *Silence Level*) will extend this duration. In other words, periods without audio content are not included in the phase reversal detection.
   Warning: Stereo material with long periods of dissimilar left/right content (i.e. music with plenty of panning) may cause the phase reversal detector to fire. It is best to set the *Phase Reversal Duration* to a value larger than what you would expect.

7.3. CALIBRATE AUDIO MONO DETECTION

1. Supply the card with a stereo signal that originated from mono material and that has a large amount of un-correlated noise added to each channel. This will allow you to set the *Mono Threshold* to a value that will detect the mono condition in the presence of noise.
   Warning: Make sure that the material is in-phase. Mono material will not be detected if it is out of phase.
2. Turn off all sources of errors in a *Fault Condition* and assign *Mono* as the only error. Also, make sure that you set the *Fault Duration* to a small number of frames so that you will see when the error condition disappears.
3. Set the *Mono Duration* to 0.5 sec so that you can see the results of adjusting the *Mono Threshold Level* without getting confused with the detection time.
4. Adjust the *Mono Threshold Level* so that the *Fault Condition* detects the mono material in the presence of noise.
5. Set the *Mono Duration* to a time period appropriate to your application.
   Warning: Periods of silence (below the *Silence Level*) will extend this duration. In other words, periods without audio content are not included in the mono detection.
   Warning: Stereo material with long periods of similar left/right content (i.e. talking heads in a news cast) may cause the mono detector to fire. It is best to set the *Mono Duration* to a value larger than what you would expect.

7.4. DEFINE THE FAULT CONDITION(S)

1. A *Fault Condition* is defined as a group of one or more problems grouped together that will create a fault when any one of the problems exist. Decide what grouping of error conditions will generate a fault by setting the appropriate condition to *Yes* in the *Fault Condition* menu.
2. Set the *Fault Duration* to either *Until Reset* or to a time value. This is how long the condition will stay active after the conditions generating the fault go away.
3. Configure a *Fault Message*. Enter the text to display on screen, it's H and V position, and it's characteristics (opacity, colour, etc).
4. Assign the *Fault Condition* to an output contact closure (GPO) if it is desired.

8. ON SCREEN MENUS

8.1. 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, 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 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. If the parameter contains a list of choices, you can cycle through the list by pressing the toggle switch in either direction.

When you have stopped at the desired value, depress the pushbutton. This will update the parameter to the selected value and 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.

8.2. CHANGING TEXT FIELDS

Some of the controls of the OSD menu allow you to adjust a text-based field. Editing a line of text can be a little tedious with a toggle switch and a pushbutton, but it can be done with the following procedure:

1. Select the text to edit by pressing the pushbutton when the menu item is selected. This will take you to a screen that has the label/name of the text being edited and a white box. The white box contains the text to change and is drawn to the maximum size of the text field.

   ```
   SAMPLE TEXT
   ^
   ```

   Note the arrow (^) under the character. This indicates which character you will be changing with the toggle switch.

2. Use the toggle switch to change the first character of the text message.

3. Once you have selected the desired character, press the pushbutton. This will advance the arrow to the next character. Continue changing the remainder of the characters in the same way.

4. There are two special characters to help you enter the text: a backspace character (left pointing arrow), and an end of line character (stop sign):

Left Arrow: If you have accidentally advanced to the next character and want to go back, select the left arrow with the toggle switch. When you press the pushbutton, you will go back to the previous character. This will save you from having to complete the editing and re-edit it to change the mistake.

Stop sign: If you are done changing the text, and the new text is shorter than old text, you can terminate the line with a stop sign. When you use the pushbutton after selecting the stop sign, any remaining characters in the text field will be erased and you will return to the menu structure.

5. You are done editing when you reach the end of the field (maximum length), or you select the stop sign and press the pushbutton.

8.3. ON SCREEN DISPLAY – MAIN MENU

Audio	Configuration of the parameters associated with analog audio inputs and audio multiplexing
Video	Controls for the operation of video processing.
Bar graphs	Configuration of the audio level and phase bar graphs.
On-screen display configuration	Positioning controls and the on/off state of all windows and bar graphs. Configuration of the text window colours and opacity levels.
Fault definitions	Definition and calibration of the fault conditions. Configuration of the fault message windows.
Utilities	Card preset management, and various debug and maintenance features.
Clear faults and peaks	An easy to access “clear fault state and bar graph peaks” command.

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 8.4 to 8.12 provide detailed descriptions of each of the sub menus. The tables in sections 8.4 to 8.12 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.

8.4. CONFIGURING THE AUDIO CONTROLS

The *Audio* menus are used to configure parameters associated with the analog audio outputs and the audio de-multiplexing. The chart below shows the items available in the *Audio* menu. Sections 8.4.1 to 8.4.6 give detailed information about each of the parameters. Many of the menu items are the same for the channel 1/2 and 3/4 channel pairs. For simplicity only the menu items for the channel 1/2 channel pair are shown in the manual.

Audio source	Selects the source of audio. It will either be the source group or external AES signals.
Audio freeze mode	Selects what action to take when video is gone
Audio delay	Add/remove audio delay
Audio buffer	Monitor audio delay buffer state
Ch1 processing	Configures audio routing and processing for channel 1
Ch2 processing	Configures audio routing and processing for channel 2
Ch3 processing	Configures audio routing and processing for channel 3
Ch4 processing	Configures audio routing and processing for channel 4
Ch 1 gain	-A4: Channel 1 output level control -AES: Channel 1 gain control
Ch 2 gain	-A4: Channel 2 output level control -AES: Channel 2 gain control
Ch 3 gain	-A4: Channel 3 output level control -AES: Channel 3 gain control
Ch 4 gain	-A4: Channel 4 output level control -AES: Channel 4 gain control

8.4.1. Selecting the Audio Source

Audio		Up to 4 groups of audio may be embedded on SDI video. This control selects the group ID of the de-multiplexed audio. In addition, the external AES source may be selected.
	Audio Source	
		Group 1 *Group 2* *Group 3* *Group 4* *AES* (-A4 and –AES only)

8.4.2. Audio Freeze Mode (-A4 and –AES only)

Audio		
	Audio freeze mode	
		pass
		mute

Two selectable actions can take place when input video is removed; pass and mute.

If it is desirable to maintain audio through the encoder (only valid with AES inputs), then set this control to *pass.* When set to mute, the audio will automatically be muted when video is removed.

8.4.3. Additional Audio Delay (-A4 and –AES only)

Audio		
	Audio delay	
		0
		-37ms to 5sec in 0.5ms increments

In addition to delaying the audio the same amount that the video is being delayed (in the video frame synchronizer), additional user requested delay may be added or removed with this control.

WARNING: Both the analog audio AND the AES audio are delayed by this amount.

WARNING: It takes approximately 1 minute, 40 seconds to adjust the audio delay by one second. This is required by the buffer management algorithm when changing the audio buffer size at a 1% rate without muting the audio. This long buffer adjusting will happen on power-up or when a new user supplied value is set with this control. However, the audio is still usable while the buffer is being adjusted. This is good for "On-Air" adjustment of audio delays!

NOTE: Advancing audio can only happen when video is undergoing a delay that is greater than the audio! If the system configured video delay becomes too small, the audio buffer shrinks to it's smallest delay and stays at that value.

8.4.4. Monitoring the audio buffer tracking (-A4 and –AES only)

Video/SID
Audio buffer

This item displays the status of the audio tracking buffer. It can be one of these states:

- Emptying (-1%)
- Emptying (-30 ppm)
- locked
- Filling (30 ppm)
- Filling (1%)

1% filling or emptying will have a slight pitch change that is near the edge of human perception for normal audio program material. This mode will be engaged when a large amount of delay needs to be changed quickly (video frame drops/repeats).

30ppm filling or emptying will be used to make minor delay buffer changes.

"Locked" will indicate that the video and audio buffers match.

The delay of the audio through the audio buffer always tracks the video except when the video frame synchronizer drops or repeats frames of video or the user supplies a different phase of input video. Unfortunately, at these boundary conditions, we cannot simply drop or repeat sections of audio! A rate conversion process is used to fill or empty the buffer to the needed level. The process must be spread out over a period of time so that the action is not audible.

This indicator is mainly used at the Evertz factory and may also be useful to monitor to help in debugging system issues.

8.4.5. Audio Channels Processing (-A4 and –AES only)

There are 4 menu items to adjust the routing and processing of the audio outputs. For simplicity only the menu for channel 1 will be shown in the manual.

Audio
Ch1 processing
Ch1
Ch2
Ch3
Ch4
(Ch1+Ch2)/2
(Ch3+Ch4)/2
Mute

Basic audio channel manipulation is possible with this control.

Any input channel can be routed to any output channel. A mono mix of either L/R input pair can also be performed. Muting an output is also possible.

Warning: This processing takes place before going to the audio analysis and bargraph display section. This means that you will be monitoring the processed version of the audio and not the input audio.

8.4.6. Setting the Analog Levels (-A4 only)

There are 4 menu items to adjust the levels of each of the analog audio outputs. For simplicity only the menu for channel 1 will be shown in the manual.

Audio	
Ch1 gain	
	12 to 24 *24*

The channel output level (-A4 only) is adjusted with this control. It has a range of approximately 12 dB with 1/10 dB resolution. The displayed value is the analog output level (dBu) corresponding to a 0dB FS digital input signal.

8.4.7. Audio Gain Control (-AES only)

There are 4 menu items to adjust the levels of each of the digital audio channels. For simplicity only the menu for channel 1 will be shown in the manual.

Audio	
Ch1 gain	
	-24dB to 24dB, *0dB*

This control will adjust the level of channel 1. It has a range of +/-12 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.

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

Warning: This processing takes place before going to the audio analysis and bargraph display section. This means that you will be monitoring the processed version of the audio and not the input audio.

8.5. CONFIGURING THE VIDEO CONTROLS

The *Video* menus are used to configure parameters associated with the video processing functions and the VBI decoders. The chart below shows the items available in the *Video* menu. The following sections give detailed information about each of the parameters.

Output video processing	Selecting this item takes you into the *Output Video Processing* Menu
Video standard	Selects the input video standard
525 format	Selects type of output video when in 525 mode
625 format	Selects type of output video when in 625 mode
Loss of video	Selects the action to take when the input video is missing
Genlock source	Selects the source of genlock timing including free-running
Free-run freq	Sets the VCXO free-running frequency
525 Fine phase	Sets the fine phase position of the output signal with respect to NTSC Genlock reference input
625 Fine phase	Sets the fine phase position of the output signal with respect to PAL Genlock reference input
525 H phase	Sets the horizontal phase of the output signal to the NTSC Genlock reference input
625 H phase	Sets the horizontal phase of the output signal to the PAL Genlock reference input.
H Delay	Status display that shows the current horizontal input to output delay
525 V phase	Sets the vertical phase of the output signal to the NTSC Genlock reference input
625 V phase	Sets the vertical phase of the output signal to the PAL Genlock reference input
V Delay	Status display that shows the current vertical input to output delay
Audio buffer	Status of audio delay buffer
525 VITC line	Sets the line number for decoding Vertical Interval Time Code in NTSC/525 line video.
625 VITC line	Sets the line number for decoding Vertical Interval Time Code in PAL/625 line video.

8.5.1. Setting the Video Standard

Video	
Video standard	
	525, *625*

The video line standard is selected with this control. Standard definition interlaced, 59.94/50Hz frame rate formats are supported. Also select the format of the associated line standard with the following controls.

8.5.2. Setting the 525 Format

Video	
525 video format	
	Betacam®, *SMPTE N10 YPbPr,* *MII*® YPbPr, *SMPTE N10 GBR,* *MII*® *GBR*, 714mV GBR, 714mV GBR w. setup

This is the format output when converting 525 line SDI video.

8.5.3. Setting the 625 Format

Video	
625 video format	
	EBU N10 YPbPr, *EBU N10* GBR

This is the format output when converting 625 line SDI video.

8.5.4. Selects the Action to Take when Input Video Is Missing.

Video	
Loss of video	
	Freeze, *Black,* *Pass*

The user can either have the output video go to black, pass the input video, or freeze the last good video picture at the input with this control.

8.5.5. Genlock Source Selection

Video
Genlock source
Card ref,
Ref. 1,
Ref. 2,
input video,
none,
not available

This control allows you to select the reference video for the frame synchronizer output timing. The reference may either be an externally supplied color black or you may use the input video as a reference. Optionally, the synchronizer can be free-run if the "*none*" option is selected.

If the card is installed in a 7700FR-G frame, two reference inputs are available on the frame that supply video to every card. Either of these two inputs may be selected as reference sources.

When genlocking to the input video, make sure to adjust the video H and V output phase controls to set the total processing delay. The *H* and *V Delay* indicators show you the time-of-flight of the video and audio through the frame synchronizer.

Not available will be displayed if the +S option was not purchased.

8.5.6. Setting the Free-Running Frequency

Video/SID
Free-run freq
-256 to 256
0

This control allows you to calibrate the free-running frequency of the on-board Voltage Controlled crystal Oscillator (VCXO). This oscillator provides the time-base when either operating without a reference input (free-running) or when running with a reference and the reference video is removed.

To calibrate the free-running frequency, use this or a similar procedure:

- Turn off genlocking with the "Genlock source" control or remove reference video from the reference input. Wait for the VCXO to stabilize at it's free-running frequency.
- Apply the composite analog monitoring output video to a vector scope that is externally referenced to the signal (usually plant reference black) that you are trying to frequency match.
- Adjust this control until the vectors spin slowly.
- Turn genlocking back on or apply reference video.

8.5.7. Setting the Fine Phase of the Output Video – NTSC/525 Video

Video/SID
525 fine phase
-128 to 127 0

With this control, you can set the horizontal fine phase timing of the output video with respect to the Genlock when operating in NTSC/525 video mode and locking to the reference input (this control is not available when locking to the input video). Increasing the value will delay the output video. There is approximately 250 ns range on this control.

Warning: For a set output horizontal phase, there are a few *fine phase/H phase* combinations that will achieve the same position. For best results, set this control to 0, set the H phase to get within 37ns of the desired position, then adjust this control to get closer.

8.5.8. Setting the Fine Phase of the Output Video – PAL-B/625 Video

Video/SID
625 fine phase
-128 to 127 0

With this control, you can set the horizontal fine phase timing of the output video with respect to the Genlock when operating in PAL/625 video mode and locking to the reference input (this control is not available when locking to the input video). Increasing the value will delay the output video. There is approximately 250 ns range on this control.

Warning: For a set output horizontal phase, there are a few *fine phase/H phase* combinations that will achieve the same position. For best results, set this control to 0, set the H phase to get within 37ns of the desired position, then adjust this control to get closer.

8.5.9. Setting the Horizontal Phase of the Output Video – NTSC/525 Video

Video
525 H phase
0 to 1715 0

With this control, you can set the horizontal timing of the output video with respect to the Genlock reference input when operating in NTSC/525 video mode. Setting this control to 0, keeps the monitoring output video in time with the Genlock reference. The SDI output will be a couple of microseconds advanced to the Genlock reference. Increasing the value will delay the output video in one-sample increments.

8.5.10. Setting the Horizontal Phase of the Output Video – PAL-B/625 Video

Video
625 H phase
0 to 1727 0

With this control, you can set the horizontal timing of the output video with respect to the Genlock reference input when operating in PAL/625 video mode. Setting this control to 0, keeps the monitoring output video in time with the Genlock reference. The SDI output will be a couple of microseconds advanced to the Genlock reference. Increasing the value will delay the output video in one-sample increments.

8.5.11. Monitoring the Horizontal Delay between the Input and Output Video

Video
H Delay

This item displays the horizontal delay between the input and output video. This value is useful to monitor while you are adjusting the *H phase* parameters and debugging system issues. One count is equivalent to 8 clocks of 27Mhz video.

8.5.12. Setting the Vertical Phase of the Output Video – NTSC/525 Video

Video
525 V phase
0 to 524
0

With this control, you can set the vertical timing of the output video with respect to the Genlock reference input when operating in 525 video mode. 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.

8.5.13. Setting the Vertical Phase of the Output Video – PAL-B/625 Video

Video
625 V phase
0 to 624
0

With this control, you can set the vertical timing of the output video with respect to the Genlock reference input when operating in 625 video mode. 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.

8.5.14. Monitoring the Vertical Delay between the Input and Output Video

Video
V Delay

This item displays the vertical delay, measured in lines, between the input and output video. This value is useful to monitor while you are adjusting the *V phase* parameters and debugging system issues.

8.5.15. Monitoring the audio buffer tracking

Video
Audio buffer

This item displays the status of the audio tracking buffer. It can be one of these states:

- Emptying (-1%)
- Emptying (-30 ppm)
- locked
- Filling (30 ppm)
- Filling (1%)

1% filling or emptying will have a slight pitch change that is near the edge of human perception for normal audio program material. This mode will be engaged when a large amount of delay needs to be changed quickly (video frame drops/repeats).

30ppm filling or emptying will be used to make minor delay buffer changes.

"Locked" will indicate that the video and audio buffers match.

The delay of the audio through the audio buffer always tracks the video except when the video frame synchronizer drops or repeats frames of video or the user supplies a different phase of input video. Unfortunately, at these boundary conditions, we cannot simply drop or repeat sections of audio! A rate conversion process is used to fill or empty the buffer to the needed level. The process must be spread out over a period of time so that the action is not audible.

This indicator is mainly used at the Evertz factory and may also be useful to monitor to help in debugging system issues.

8.5.16. Setting the VITC Line Number – 525 Line Video

Video
525 VITC line
10 to 32 *10*

With this control, set the VBI line number that contains the VITC information when operating in NTSC video mode.

If the wrong line number is set, no time code will be decoded.

8.5.17. Setting the VITC Line Number – 625 Line Video

Video
625 VITC line
6 to 32 *10*

With this control, set the VBI line number that contains the VITC information when operating in PAL-B video mode.

If the wrong line number is set, no time code will be decoded.

8.5.18. Setting the PESA Source ID Line Number – 525 Line Video

Video/SID
525 PESA line
10 to 21 *11*

With this control, set the VBI line number that contains the PESA SID information when operating in NTSC video mode. If the wrong line number is set, no SID will be decoded.

8.5.19. Setting the PESA Source ID Line Number – 625 Line Video

Video/SID
625 PESA line
7 to 22 *11*

With this control, set the VBI line number that contains the PESA SID information when operating in PAL-B video mode. If the wrong line number is set, no SID will be decoded.

8.5.20. Setting the Default SID Mode

Video/SID
Default SID mode
Disable *Enable*

Determines if the Default SID message will be displayed in the SID window when there is no incoming source ID on the VITC.

Set to *Disable* to blank the SID window when there is no incoming source ID.

Set to *Enable* to show the Default SID message in the SID window when there is no incoming source ID. The SID window must also be turned On to display the default SID message. See section 8.8.5 for information on turning the SID window On.

8.5.21. Setting the Message to be Displayed When There Is No Incoming SID

Video/SID
Default SID msg
No SID

This control sets the message that will be displayed in the SID window when there is no incoming source ID on the VITC. The text of the message can be changed. See section 8.2 for information on changing text fields.

8.6. CONFIGURING THE OUTPUT VIDEO PROCESSING CONTROLS

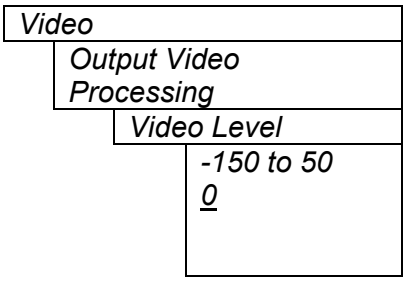
The *Output Video Processing* menu is used to configure parameters associated with the component D to A video processing. The chart below shows the items available in the *Output Video Processing* menu.

Colour bars	Turn on internal color bars
Video Level	Adjust the overall level of all 3 DACs
Black Level Y/GBR	Controls the Y channel black level when in YPbPr mode and black level of all 3 components in GBR mode
Y Video Level	Controls the video Y level
Cb Video Level	Controls the video Cb level
Cr Video Level	Controls the video Cr level
PbPr offset	Selects either 0V or 350mV DC offset on the color components
GBR Sync on video	Turn on/off sync on the GBR output video
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

8.6.1. Colour Bars

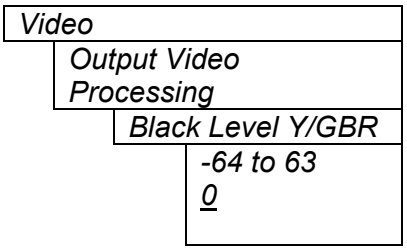
Video *Output Video Processing* *Colour bars* *On,* *Off*	Internally generated colour bars may be turned on to aid in video level calibration.

8.6.2. Video Level



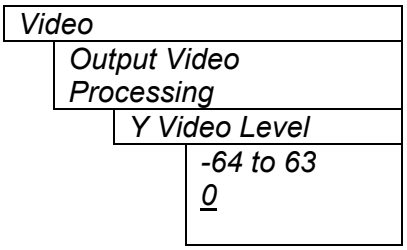
The video level of all 3 components is adjusted with this control. Both sync and active video are adjusted with this control. There is 7.5% range on this control. This is enough range to miss-calibrate sync to video ratio. Make sure to select/configure the desired format before adjusting this level. When in doubt, set the sync level with this control and verify over-all levels with a known test pattern.

8.6.3. Black Level Control



The black level of the Y channel is adjusted with this control when outputting YPbPr. The black level of all 3 components is adjusted when outputting GBR. Make sure to select/configure the desired format before adjusting this level.

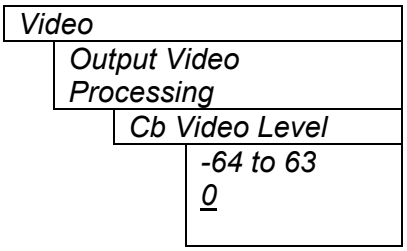
8.6.4. Y Video Level Control



The video level of the Y channel is adjusted with this control.

Warning: When in GBR mode, all three components will change. This control adjusts the Y level before the color space matrix operation which manipulates all of the components simultaneously and thus makes this control affect all of the GBR component outputs.

8.6.5. Cb Video Level Control



The video level of the Cb channel is adjusted with this control.

Warning: When in GBR mode, all three components will change. This control adjusts the Cb level before the color space matrix operation which manipulates all of the components simultaneously and thus makes this control affect all of the GBR component outputs.

8.6.6. Cr Video Level Control

Video	Output Video Processing	Cr Video Level	-64 to 63 0

The video level of the Cr channel is adjusted with this control.

Warning: When in GBR mode, all three components will change. This control adjusts the Cr level before the color space matrix operation which manipulates all of the components simultaneously and thus makes this control affect all of the GBR component outputs.

8.6.7. Setting the PbPr Offset

Video	Output Video Processing	PbPr Offset	0V, 350mV

When a YPbPr format is selected, the Pb and Pr channels may have their DC level at 0V or 350mV. On Rev 1 hardware [(1) 7735CE], only 0V is supported.

8.6.8. GBR Sync on Video

Video	Output Video Processing	GBR Sync on Video	Off, On

Sync on GBR video may be turned on/off with this control. When on, and in GBR modes, the all channels will have sync.

8.6.9. H Blanking

Video	Output Video Processing	H Blanking	Wide, Narrow

When set to *Narrow*, the active picture will be the full 720 pixel SMPTE259M wide (narrow H blanking). When set to Wide, the H blanking will correspond to the legacy composite/component analog video specs.

8.6.10. VBI Processing

Video	Output Video Processing	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.

8.6.11. Y Filter Selection

Video
Output Video Processing
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.

8.6.12. Wideband Y Frequency Response

Video
Output Video Processing
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.

8.6.13. Chroma Filter Selection

Video
Output Video Processing
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.

8.7. CONFIGURING THE BAR GRAPH CONTROLS (-A4)

The *Bar Graphs* menu items deal with the configuration and operation of the audio bar graphs; modes, ballistics, display properties, etc. The chart below shows the items available in the *Bar Graphs* menu. Sections 8.7.1 to 8.7.15 give detailed information about each configuration item for the audio bar graphs. Sections 8.7.1 to 8.7.3 show the items in the bar graphs 1 and 2 menu tree. These sections apply also to the items in the bar graph 3 and 4 menu tree. Sections 8.7.13 to 8.7.15 apply globally to all bar graphs.

Bar graphs 1 and 2	Setup items for bar graphs 1 and 2
Bar graphs 3 and 4	Setup items for bar graphs 3 and 4
Size	Sets bar graph size
Background opacity	Sets the background opacity or how much video picture content will be visible through the bar graph backgrounds.
Bars opacity	Sets the background opacity or how much video picture content will be visible through the bar graph bars.

When many windows are turned on, the on-screen information can get very crowded. The bar graphs and text windows are layered to keep the most important information from being covered by other not-so important windows. The priority is as follows:

Priority Level	Display Type
1 (top)	Fault Messages
2	Time Code Source ID Program Rating
3	Status window
4	Phase bar graphs
5 (bottom)	Level bar graphs

8.7.1. Selecting the Bar Graph Operating Mode

Bar graphs
- *Bar graphs 1 and 2*
  - *Bar mode*
    - *Normal*, *Sum + diff*

In *Normal* mode, stereo bar graphs are displayed.

In *Sum + diff* mode, bar graph 1 is the absolute value of the sum of both channels and bar graph 2 displays the absolute value of the magnitude of the difference of the two signals.

8.7.2. Setting the Headroom

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Headroom*
      - *0 to 30db*
      - *20db*

The *headroom* is the level difference between a maximum amplitude signal that can be represented in the digital world (this is called 0 dB FS or 0 dB Full Scale) to a nominal, user defined operating level, represented in Decibels. In modern digital studios and broadcast stations this is on the order of 20 dB.

This control is used to position the 0 dB point for the VU and PPM meters (excluding AES/EBU ballistics mode that always uses 0 dB FS). For example, if you set this control to 15dB and input a signal that is –15 dB FS, then the bar graph top will be at 0dB. If you are in PPM mode with AES/EBU ballistics, then the meter will read –15dB. When you adjust this level, you are changing the 0dBr or program reference point on the bar graphs.

After you set the headroom and select the bar type/mode, you can adjust the bar graph coloured area sizes with the *Error region* and *Warning region* controls.

8.7.3. Setting the Bar Graph Type

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Bar type*
      - *PPM*
      - *PPM peak*
      - *VU*
      - *VU peak*
      - *VU PPM*

This control sets the bar graph to one of five basic types. The ballistics and display characteristics of the bar graphs are configured with other items in this section of the menu structure

PPM:
Peak Program Meter tracks the peaks of the audio content rather than the perceived loudness or the power content of the material.

PPM with peak hold: (PPM peak)
The peak hold feature allows the user to keep track of the audio peak. A floating mark is pushed up by audio peaks and is reset with either a programmed GPI input (see the section on “GPI, GPO and Text Window Setup”) or a menu command (see the “Clear Faults” menu).

VU:
Volume Unit meter follows, approximately, the perceived loudness of human hearing.

VU with peak hold: (VU peak)
The peak hold feature allows the user to keep track of the peak VU reading. A floating mark is pushed up by audio VU peaks and is reset with either a programmed GPI input (see the section on “GPI, GPO and Text Window Setup”) or a menu command (see the “Clear Faults” menu).

VU with floating PPM: (VU PPM)

This mode displays both VU levels and PPM levels on the same bar graph. The VU level is indicated by the solid bar going up and down, while the PPM reading is indicated by a floating white bar. The scale displayed is a decibel scale with 0 corresponding to program reference level (for all modes except AES/EBU).

8.7.4. Setting the PPM Mode and Ballistics

Bar graphs
Bar graphs 1 and 2
PPM mode
DIN,
BBC,
Nordic N9,
AES/EBU

This parameter selects one of four industry standard of Peak Program Meter (PPM) display modes.

When one of these modes is selected, a number of items are set to adhere with predefined industry standards. The items affected include; meter attack time, meter decay time, min level displayed, max level displayed, analog reference (100%) level and, in some instances, region colouring and phase graph representation. Table 2 illustrates the values set by the standards.

Mode	***Attack Time***	***Decay Time***	***Ref. Level***	***Min Level***	***Max Level***	***Peak Output Level***	***Notes***
DIN 45 406 (IRT Rec. 3/6)	10 ms	1.5 sec for 20 dB	6 dBu	-50 dB	5 dB	6 + headroom	1 dB per div until –10 dB, logarithmic to bottom -50dB. Associated DIN phase correlation scale: • both the same => 1 r, • only 1 signal => 0 r, • both out of phase => -1r.
BBC 55428 part 9	12 ms	2.8 sec for 7 to 1	8 dBu	1 -12 dB	7 +12 dB	8 + headroom	# 6 on the scale is the reference level
Nordic N9	5 ms	1.7 sec for 20 dB	6 dBu	-42 dB	+12 dB	6 + headroom	
AES/ EBU	1 sample period	1.5 sec for 20 dB	User defined	-60 dB	0 dB	User defined	100% reading is user definable. 0 dB corresponds to 0 dB FS.

Table 2: PPM Bar Graph Characteristics

Note:
The phase correlation scale on the DIN type is different from our other phase indicators (*Sum* + *Diff* and phase bar graphs).

8.7.5. Setting the VU Display Range

Bar graphs
Bar graphs 1 and 2
VU range
Normal Extended

This parameter selects the VU display range when VU modes are active

Most VU meters have two possible ranges. These are:

Normal range: +3 to –20dB
Extended range: +3 to –57dB

The bar graphs will be re-scaled to represent the selected range.

When using VU and BBC PPM mode, the VU scale is truncated to –6dB to match the scaling of BBC mode.

8.7.6. Setting The Phase Bar Graph Type

Bar graphs
Bar graphs 1 and 2
Phase type
Stereo DIN

There are two types of phase bar graphs available: one that has a focus of presenting the amount and L/R distribution of stereo content (STEREO), and one that presents in-phase/out-of-phase proportions (DIN).

8.7.7. Setting the Bar Graph Error Region

Bar graphs
Bar graphs 1 and 2
Error region
-1 to –20 dB FS -6 dB FS

The bar graph "error" region is the area from clipping (0 dB FS) down to the level selected by this control. It is intended to tell the user when the audio signal is getting close to clipping.

Warning:
Some bar graph types (and ballistics) have this region defined. When you select one of these types, this value will automatically be set. After you choose the type, you can adjust this value to your desired level.

8.7.8. Setting the Bar Graph Warning Region

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Warning region*
      - *-2 to –40 dB FS*
      - *-20 dB FS*

The bar graph "warning" region is the area between the "OK" region and the "error" region. It is intended to indicate when the audio level is approaching the "error" region. This control sets the bottom of the "warning" region. Normally, it is set to the audio program level. The upper boundary of this region is always set with the "error" region control.

This value cannot be higher than the "error" region value. If the "error" region is lowered below the value of this parameter, the "warning" region will also be lowered.

Warning:
Some bar graph types (and ballistics) have this region defined. When you select one of these types, this value will automatically be set. After you choose the type, you can adjust this value to your desired level.

8.7.9. Setting the Level Bar Graph Scale Position

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Scale position*
      - *Off*
      - *Left*
      - *Right*

This control allows you to enable and position the level bar graph scale tick marks and the scale labels with respect to the bar itself. When off, there will not be any ticks or numerical labels while left or right will position them to the left or the right of the graphs respectively.

If a combination VU/PPM mode is selected, then "left" will select VU scale on the left, PPM scale on the right and "right" will select VU scale on the right and PPM scale on the left.

8.7.10. Setting The Phase Bar Graph Scale Position

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Phase scale*
      - *Top*
      - *Bottom*
      - *None*

This control allows you to enable and position the phase bar graph scale tick marks and the scale labels with respect to the bar itself. When off, there will not be any ticks or numerical labels while top or bottom will position them to the top or the bottom of the phase bar graph respectively.

8.7.11. Setting The Window And Bar Graph Positions

- *Bar graphs*
  - *Bar graphs 1 and 2*
    - *Window position*

This control allows you to change the positions of all windows and bar graphs. The window positions can also be set from the *Window position* menu item on the *On-screen display configuration menu.* See sections 8.8.2 to 8.8.4 for detailed information on position the windows and bar graphs.

8.7.12. Setting the Colours of the Bar Graphs

Each of the level bar graphs consists of three regions: the OK, warning and error regions. The *Colours* menu items allow you to select one of a group of standard colours, or choose your own custom colours for each of the regions. The controls for each region operate the same way so for simplicity only the controls for the OK region will be shown in the manual.

Tip: The colours of the various regions are defined by three 8 bit R, G, B values very similar to the values used in most paint programs like Microsoft Paint. When you choose one of the predefined colours, the module automatically sets the R, G, and B values. If you choose the custom colour, you will be able to set the R, G, and B values independently to give you the desired colour. If you are having problems setting these values with the menu system, open a paint program, select the colour you like (usually from a colour wheel) and set the R, G, and B values into the card using the respective *Custom colour* menu items for the region.

8.7.12.1. Setting the Level Bar Graph Region Colour

Bar graphs
- *Bar graphs 1 and 2*
  - *Colours*
    - *OK region*
      - *White*
      - *Black*
      - *Grey*
      - *Yellow*
      - *Red*
      - *Green*
      - *Custom…*

This control sets the colour of the bottom, “OK”, region of level bar graphs. You can choose from one of the predefined colours or define a custom colour.

8.7.12.1.1. Selecting a Bar Graph Region Custom Colour

There are three menu items used to set the custom 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.

Bar graphs
- *Bar graphs 1 and 2*
  - *Colours*
    - *Custom ok red: 0 to 255*

This control defines one of the component colours for a custom colour for one of the regions of level bar graphs.

When the menu item is selected you are shown a screen which shows all three colour components, with an arrow (<) to the right of the colour component you will be adjusting. In addition you are shown two boxes on the screen, which show you the current custom colour value to aid you in selecting the desired colour. The box on the left side of the screen shows the colour with the bar graph background opacity value applied, while the box on the right shows the colour with the bar graph bar opacity value applied.

8.7.13. Setting The Level Bar Graph Size

Bar graphs	
	Size
	Small, *Big*

This control sets the vertical size of the level bar graphs.

Two sizes of bar graphs are available. The *Big* size is about ¾ of the screen height while the *Small* size is about ½ of the screen height.

8.7.14. Setting the Transparency (Opacity) of Bar Graph Background

Bar graphs	
	Background opacity
	0 to 64, *32*

This control sets the bar graph background opacity or how much video picture content will be visible through the bar graph backgrounds.

When set to the minimum value, very little of the bar graph background colour will be visible over the video content. At the maximum value, very little of the background video will be visible through the bar graph.

8.7.15. Setting the Transparency (Opacity) of the Bar Graph Bars

Bar graphs	
	Bars opacity
	0 to 64, *64*

This control sets the bar graph foreground opacity or how much video picture content will be visible through the bar graph backgrounds.

When set to the minimum value, very little of the bar graph colour will be visible over the video content. At the maximum value, very little of the background video will be visible through the bar graph.

8.8. CONFIGURING THE ON-SCREEN DISPLAY CONTROLS

The *On-screen display configuration* menu items is used to configure the position and display characteristics of the text windows. It is also used to program on/off states of the text and bar graph windows. The chart below shows the items available in the *On-screen display configuration* menu. The following sections give detailed information about each of the menu items.

Window position	Controls used to position each one of the On Screen windows.
Window enable	Controls used to configure the on/off states of the text and bar graph windows.
Text windows	Controls used to set the text style, background colour and opacity for the On screen windows.

When many windows are turned on, the on-screen information can get very crowded. The bar graphs and text windows are layered to keep the most important information from being covered by other not-so important windows. The priority is as follows:

Priority Level	Display Type
1 (top)	Fault Messages
2	Time Code Source ID Program Rating XDS

3	Status window
4	Phase bar graphs
5 (bottom)	Level bar graphs

8.8.1. Descriptions of the On Screen Windows

8.8.1.1. Video/Audio Status

The purpose of the Video/Audio status screen is to show as much status information about the video and audio as possible in a small, concise table. Table 3 shows each item that may appear in the status screen. The Status window may be operated on one of two modes. In *normal* mode, all lines are controlled by the text window attributes. In *Fault* mode, those lines whose associated fault triggers are used to activate a fault, will be displayed using fault window properties. All other lines use the text window properties. If the Status window is enabled by a fault, only those lines associated with the fault triggers that enable the fault window will be displayed using fault window properties. All other lines use text window properties.

Item	***Value(s)***	***Description***
Video	525/625/not present	Input video standard detected on the input. The wrong standard is applied the *(wrong std)* is displayed
Picture Content	Moving/frozen/frozen, black	Shows the status of the picture content. Shows *moving* if the picture is active, *frozen* if the card detects no motion, or *frozen,black* if the picture is black
Genlock	present/not present/off	Genlock presence detected. If genlock is turned on and video of the correct standard is applied, *present* will be displayed. If a *genlock source* of *off* is selected, *off* will be displayed.
Time Code	TC Value/not present	If present, the time code value is displayed here.
Ch. 1 and 2	Not present/[(silent/over), (mono/out of phase)]	Status information about channels 1 and 2 are shown here. *Not present* will not be show on –A versions of hardware.
Ch. 3 and 4	Not present/[(silent/over), (mono/out of phase)]	Status information about channels 3 and 4 are shown here. *Not present* will not be show on –A versions of hardware.
DARS	Locked/lock slip/present/not present	*Locked* will be displayed if the DARS input frequency is within approx. +/- 30ppm of the genlock video. *Lock slip* indicates that a channel status 'Z' phase correction was performed on the output AES. This indicates that the DARS is not locked to genlock video but is close in frequency. *Present* is displayed if DARS is present but not frequency locked to the genlock video. *Not present* is displayed when there is no DARS input or the card is not genlocking (either free-running or no genlock is applied).

Table 3: Video/Audio Status Screen Items

8.8.1.2. Time Code Window

The time code window shows the vertical interval time code or longitudinal time code present at the input to the module. Use the time code select and VITC line select items on the Video menu to configure the

lines that the module will use for reading time code. (See sections 8.5.16 and 8.5.17 for information about setting the VITC line numbers.)

Warning: Because the video goes through a frame synchronizer, the time code displayed will not necessarily be the correct time code number for that particular frame of video. However, it will not be more than one frame in error.

The *TC window size* menu item controls whether the time code window will be displayed in the normal or large font size.

8.8.1.3. Fault Message Windows

The Fault 1 and Fault 2 window show user text messages when the Fault 1 or Fault 2 conditions are triggered. The Fault message windows have their own set of colour, opacity and size attributes, they can be set to come on steady or blinking and they contain fully programmable messages. See section 8.10 for more information on setting up the fault conditions and configuring the fault windows.

8.8.2. Setting the Position of On Screen Windows

To set the horizontal and vertical position of the Status, time code, or one of the Fault windows use the *WINDOW H* and *WINDOW V* menu items for the respective window. The controls for all of the windows work in the same way so, for simplicity only the menu items for the *STATUS WINDOW* will be shown.

8.8.2.1. Setting the Horizontal Position of On Screen Windows

On-screen display configuration
Window position
Status window H
0 to 39
7

The *Window H* position menu item sets the leftmost character position for the respective window.

When you select this parameter, the screen text will disappear and a box of the correct size will appear. Move it around to the desired position with the toggle switch. Press the pushbutton when done.

8.8.2.2. Setting the Vertical Position of On Screen Windows

On-screen display configuration
Window position
Status window V
0 to 19
7

The *Window V* position menu item sets the top row for the respective window.

When you select this parameter, the screen text will disappear and a box of the correct size will appear. Move it around to the desired position with the toggle switch. Press the pushbutton when done.

8.8.3. Setting the Position of the Bar Graphs

To set the horizontal and vertical position of the Level bar graph pair 1/2 or 3/4 or the phase bar graph pair 1/2 or 3/4, use the *Bar H* and *Bar V* menu items for the respective bar graph. . The controls for all of the bar graphs work in the same way so, for simplicity the menu item for the *Level bar graph 1/2* will be shown.

8.8.3.1. Setting the Horizontal Position of the Bar Graphs

On-screen display configuration
Window position
Level bar 1/2 H
0 to 39
0 (34)

The *Bar H* position menu item sets the top row for the respective window.

When you select this parameter, the horizontal position of the respective bar graph can be adjusted. Move it around to the desired position with the toggle switch. Press the pushbutton when done.

8.8.4. Setting the Vertical Position of the Bar Graphs

On-screen display configuration
Window position
Level bar 1/2 V
0 to 19
0

The *Bar V* position menu item sets the top row for the respective window.

When you select this parameter, the vertical position of the respective bar graph can be adjusted. Move it around to the desired position with the toggle switch. Press the pushbutton when done.

8.8.5. Selecting What Bar Graphs And Windows To Display

The windows and bar graphs can be turned permanently on or off. The *Window enable* menu item is used to program the on/off states of the text and bar graph windows. To display the Fault windows use the *Fault condition* menu item on the *Fault definitions* menu. (See section 8.10.1.4)

When you select the *Window enable* menu item you are presented with a list of the possible on/off states as shown in Table 4. Select the desired function using the toggle switch. When the pushbutton is pressed, the cell cycles through the valid values for the field. Each of the windows and bar graph displays can be set to *On* or *Off*. When set to *On*, the corresponding window or bar graph is always displayed. When set to *Off*, the window or bar graph is always off.

Item	State	Fault 1	Fault 2
Ch ½ level bars			
Ch ¾ level bars			
Ch ½ phase bars			
Ch ¾ phase bars			
Status			
Time code			

Table 4: Methods of turning Windows and Bar graphs On and Off

8.8.6. Setting the Text Window Attributes

The On screen text windows can be displayed as white characters with or without a coloured background. In addition the text and background opacity or how much video picture content will be visible through the text or background is adjustable. The *Text window config* menu items are used to set these parameters for all the text windows except the Fault windows. See section 8.8.7 for information on setting the *Fault window* attributes.

8.8.6.1. Turning on the Text Window Backgrounds

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Text type*
        - *White on bkgrnd*
        - *White with no bkgrnd*

The text displayed in the Text windows may either have a background box or if too much video information is hidden, it may be inserted with a thin black outline.

8.8.6.2. Setting the Text Window Background Colours

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Background colour*
        - *Black*
        - *Grey*
        - *Yellow*
        - *Red*
        - *Green*

Select the desired background colour around the text in the Text windows.

8.8.6.3. Setting the Text Window Background Opacity

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Background opacity*
        - *0 to 64*
        - *32*

This control sets the Text window background opacity or how much video picture content will be visible through the window background.

When set to the minimum value, very little of the window background colour will be visible over the video content. At the maximum value, very little of the background video will be visible through the window background.

8.8.6.4. Setting the Text Window Text Opacity

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Text opacity*
        - *0 to 64*
        - *64*

This control sets the Text window text opacity or how much video picture content will be visible through the text characters.

When set to the minimum value, very little of the white window text will be visible over the video content. At the maximum value, very little of the background video will be visible through the white window text.

8.8.6.5. Setting the Time Code Window Font Size

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *TC window size*
        - *Normal*
        - *Big*

This control sets the font size of the VITC time code window.

When it is set to *Big* the font size will be double the height and width of the *Normal* font size.

8.8.6.6. Setting the Status Window Mode

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Status window mode*
        - *Normal*
        - *Fault*

This control determines the display properties of the status window.

When it is set to *Normal* the status window will use the text window properties.

When it is set to *Fault*, items in the status window that have been selected for fault generation using the *Fault Trigger* menu item will use the *Fault window* properties when the fault is active. If the status window is enabled by either Fault 1 or Fault 2 triggering, then only the faults that actually enabled the window will be shown in the *Fault window* properties. The rest of the items on the status window will be shown in the *Text window* properties.

8.8.7. Setting the Fault Window Attributes

The On screen Fault windows can be displayed as white characters with or without a coloured background. In addition the text and background opacity or how much video picture content will be visible through the text or background is adjustable. The *Fault window config* menu items are used to set these parameters for the Fault windows.

8.8.7.1. Turning on the Fault Window Backgrounds

- *On-screen display configuration*
  - *Text windows*
    - *Fault window config*
      - *Text type*
        - *White on bkgrn*
        - *White with no bkgrnd*

The text displayed in the fault window may either have a background box or if too much video information is hidden, it may be inserted with a thin black outline.

8.8.7.2. Setting the Fault Window Background Colours

- *On-screen display configuration*
  - *Text windows*
    - *Fault window config*
      - *Background colour*
        - *Black*
        - *Grey*
        - *Yellow*
        - *Red*
        - *Green*

Select the desired background colour around the text in the fault windows.

8.8.7.3. Setting the Fault Window Background Opacity

- *On-screen display configuration*
  - *Text windows*
    - *Fault window config*
      - *Background opacity*
        - *0 to 64*
        - *32*

This control sets the Fault window background opacity or how much video picture content will be visible through the window background.

When set to the minimum value, very little of the window background colour will be visible over the video content. At the maximum value, very little of the background video will be visible through the window background.

8.8.7.4. Setting the Fault Window Text Opacity

- *On-screen display configuration*
  - *Text windows*
    - *Fault window config*
      - *Text opacity*
        - *0 to 64*
        - *64*

This control sets the Fault window text opacity or how much video picture content will be visible through the text characters.

When set to the minimum value, very little of the white window text will be visible over the video content. At the maximum value, very little of the background video will be visible through the white window text.

8.8.7.5. Setting the Fault Window Font Size

Similar window size menu items are available for the Fault 1 and Fault 2 windows.

- *On-screen display configuration*
  - *Text windows*
    - *Fault window config*
      - *Fault 1 window size*
        - *Normal*
        - *Big*

This control sets the font size of the program rating window.

When it is set to *Big* the font size will be double the height and width of the *Normal* font size.

8.8.7.6. Setting the Blink Mode of the Fault Windows

Similar blink mode menu items are available for the Fault 1 and Fault 2 windows.

On-screen display configuration
Text windows
Fault window config
Fault 1 blink
Disable
Enable

This control determines if the Fault 1 window will blink or be on solid when the fault is active.

When it is set to *Disable* the fault window will be on steady when it is active.

When it is set to *Enable* the fault window will blink when it is active.

8.9. GPO CONFIGURATION

The 7700 frame has a fault monitoring LED and general-purpose output. The user has the ability to configure which faults the module will assert onto the frame status system. The *GPO configuration* menu contains the controls used to configure the GPO. Section 8.9.1 gives detailed information about the menu item.

Frame stat trigger

Controls what events will trigger the Frame Status Fault line and the Fault Status LED.

8.9.1. Frame Status Fault Trigger Condition

GPO configuration
Frame status trigger
None
Fault 1
Fault 2
Fault 1 or 2

The 7700 frame has a global status line that any card can pull active. With this control, you can select the condition for the card to cause the line to go active. Also included on the frame status signal is card power supply monitoring. This is derived with hardware and cannot be disabled from the status signal.

If it is desired to use this feature, the frame status jumper J3 (located near the card extractor) must also be set to the *On* position. See section 9.2

The Red *Local Fault* LED will be On when the global status line is active regardless of the position of jumper J3.

8.10. Fault Definitions

When many windows are turned on, the on-screen information can get very crowded. The bar graphs and text windows are layered to keep the most important information from being covered by other not-so important windows. The Fault windows have the highest priority. The priority of the other windows is shown in section 8.8.

The *Fault definition* menu items are used to configure the fault settings, and the presentation of the fault conditions. The chart below shows the items available in the *Fault definition* menu. This section does not indicate which items do not apply on the different version of the module. Do not attempt to use audio faults on the video only (non –A4 or –AES) version. Section 8.10 to 8.10.8.2 give detailed information about each configuration item for the fault definitions.

Fault condition 1	Controls used to configure the Fault Condition 1 display.
Fault condition 2	Controls used to configure the Fault Condition 2 display.
Fault window config	Controls used to set the Fault Window text style, background colour and opacity. These parameters may also be set using the *On-screen Display Text window* menu.
Video invalid duration	Sets the time period that video must disappear before it is considered missing or invalid
Audio invalid duration	Sets the time period that audio must disappear before it is considered missing or invalid
Over level	Sets the level of audio over which is considered a fault or error condition
Over duration	Sets the duration of audio, over the above level which is considered a fault
Silence level	Sets the level of audio under which is considered silence
Silence duration	Sets the duration of audio in seconds under the above level which is considered a fault
Phase reversal level	Sets the level of L/R audio difference over which is considered phase reversal
Phase reversal duration	Sets the duration of audio in seconds over the above phase reversal level which is considered a fault
Mono threshold level	Sets the level of L/R audio difference under which is considered mono
Mono duration	Sets the duration of mono audio in seconds which is considered a fault

8.10.1. Setting Up How A Fault Is Triggered And How It Is Presented

The module has two fault conditions that can be configured to warn the user of numerous conditions. The *Fault condition 1* and *Fault condition 2* menu items are used to configure when fault 1 or fault 2 are triggered, and how the fault should be presented. The controls for each fault condition operate the same way so, for simplicity, the manual shows only the menu items for *Fault condition 1*.

8.10.1.1. Fault Status

Fault definitions
Fault condition 1
Fault status

This menu item displays a screen that shows the current status of all faults that can be used to define a fault condition

8.10.1.2. Setting the position of the Fault Windows

Fault definitions
Fault condition 1
Window position

This control allows you to change the window positions of all windows and bar graphs. The window positions can also be set from the *Window position* menu item on the *On-screen display configuration menu.* See sections 8.8.2 to 8.8.4 for detailed information on position the windows and bar graphs.

8.10.1.3. Setting the Message Associated with a Fault

Fault definitions
Fault condition 1
Fault 1 message
Video missing

This control sets the message to display when the fault condition is active. The text of the message can be changed. See section 8.2 for information on changing text fields.

8.10.1.4. Determining If The Fault Message Will Be Displayed

Fault definitions
Fault condition 1
Fault 1 mode
Disable
Enable

This control sets whether the fault message will be displayed when the fault condition is active.

When enabled, the fault message will be displayed until the condition is reset. When disabled, it will never be displayed. See section 8.10.1.5 for information on setting the duration of the fault condition.

8.10.1.5. Setting the Duration of the Fault Condition

Fault definitions
Fault condition 1
Fault duration
Until reset
1 to 254 frames
30 frames

This control sets how long the fault condition will be held. The fault display will be displayed as long as the fault condition is active and the *Fault mode* is set to *Enable*. The fault condition can either be held until the user clears the condition or until a programmable timer expires.

8.10.1.6. Determining What Items Will Generate The Fault Condition

Fault definitions
Fault condition 1

This control provides a list of items that may generate a fault condition. Use the toggle switch to travel up and down this list and the pushbutton to enable or disable the item from the fault condition criteria. Enabled items will be shown with a check mark.

A fault condition will exist when any of the selected items occurs.

Input video error	Video absent or wrong standard
Genlock error	Reference absent or wrong standard
Loss of audio ½	Audio 1 and 2 absent (–A4 only)
Loss of audio ¾	Audio 3 and 4 absent (–A4 only)
Phase reversal ½	Audio 1 and 2 out of phase (–A4 only)
Phase reversal ¾	Audio 3 and 4 out of phase (–A4 only)
Audio over ½	Audio 1 or 2 over level (–A4 only)
Audio over ¾	Audio 3 or 4 over level (–A4 only)
Audio silence ½	Audio 1 and 2 silent (–A4 only)
Audio silence ¾	Audio 3 and 4 silent (–A4 only)
Audio mono ½	Audio 1 and 2 mono (–A4 only)
Audio mono ¾	Audio 3 and 4 mono (–A4 only)
Loss of VITC	VITC absent
Loss of SID	Source IDentification is missing
Loss of Program Rating	Program Rating is missing
Loss of Closed Captioning	Closed Captioning is missing
Picture Frozen	Picture has no motion
Picture Black	Picture is black

Table 5: Possible Error Conditions to Produce a Fault

8.10.2. Setting the Fault Window Attributes

The Fault windows can be displayed as white characters with or without a coloured background. In addition the text and background opacity or how much video picture content will be visible through the text or background is adjustable. The Fault window config menu items are used to set these parameters for the Fault windows.

Fault definitions
Fault window config

This control is used to change the fault window colours. These parameters can also be set using the *Fault window config* menu items on the *On screen display* menu. See section 8.8.7 for a complete description of the *Fault window config* menu items.

8.10.3. Setting the Loss of Video Duration

Fault definitions
Video invalid duration
0 to 255 frames *0*

This control sets the duration, in number of consecutive frames of video, that video needs to disappear before the *Video invalid error* fault condition exists.

This control is included so that you can have a few frames of missing/bad video before the fault occurs. This is useful to eliminate fault generation when upstream non-synchronous switching occurs.

8.10.4. Setting the Loss of Audio Duration

Fault definitions
Audio invalid duration
0 to 255 frames *0*

This control sets the duration, in number of consecutive frames of video, that audio needs to disappear before the *Audio invalid error* fault condition exists.

This control is included so that you can have a few frames of missing/bad audio before the fault occurs. This is useful to eliminate fault generation when upstream non-synchronous video and audio switching occurs.

8.10.5. Detecting Audio Over Level Faults

The Over level and Over duration controls are used to detect when an audio amplitude is close to a dangerous level (i.e. clipping a downstream device, or saturating the digital word length). The Over level control sets the audio level over which there is considered to be a fault. The audio must be over this level for the duration set by the Over duration control before the fault condition exists. A fault will be generated when any channel has generated an over condition.

8.10.5.1. Setting the Audio Over Level

Fault definitions
Over level
-30dB to 0dB FS in 1/4dB increments *-6dB FS*

This control sets the audio level over which there is considered to be over level. This value is expressed in dB full scale (FS) and can even be used to detect digital clipping. If set to 0 dB FS, then if 3 or more consecutive samples (set with the duration control) are at digital saturation (max or min), then the digital word length has been exceeded.

8.10.5.2. Setting the Audio Over Duration

Fault definitions
Over duration
3 to 255 SAMPLES *3*

This control sets the duration, in number of consecutive samples that are at or above the *Over level* before a fault condition exists.

Note that as longer durations are configured, you are eliminating the detection of higher frequency content over the set *Over level*.

8.10.6. Detecting Audio Silence Faults

The *Silence level* and *Silence duration* controls are used to detect when the audio is considered to be silent. The *Silence level* control sets the audio level under which the audio is considered to be silent. The audio must be under the *Silence level* for the duration set by the *Silence duration* control before the fault

condition exists. When the fault condition exists, the audio must be over the *Silence level* for the duration set by the *Silence duration* control before the fault condition will be removed. A fault will be generated when both channels in a pair (1 and 2 or 3 and 4) has satisfied a silence condition.

8.10.6.1. Setting the Audio Silence Level

Fault definitions
Silence level
-96dB to –20dB FS *-60dB FS*

This control sets the audio level under which it is considered to be silent. This value is expressed in dB full scale (FS)

8.10.6.2. Setting the Audio Silence Duration

Fault definitions
Silence duration
0.5 to 127 sec *10 sec*

This control sets the amount of time the audio is silent in seconds before a fault occurs.

8.10.7. Detecting Audio Phase Reversal Faults

All stereo audio material has a varying amount of phase difference between the two channels. If there is significant phase reversal for a period of time, then this is a sign that the audio signals may be out of phase.

The *Phase reversal level* and *Phase reversal duration* controls are used to detect when the left and right audio channels are considered to be out of phase. The *Phase reversal level* control sets the amount of phase difference that is considered to be out of phase. The audio must be out of phase by more than the *Phase reversal level* amount for the duration set by the *Phase reversal duration* control before the fault condition exists. When the fault condition is active, the audio must be out of phase by less than the *Phase reversal level* amount for the duration set by the *Phase reversal duration* control before the fault condition will be removed.

8.10.7.1. Setting the Audio Phase Reversal Level

Fault definitions
Phase reversal level
0.5 to 1 in 0.01 increments *0.9*

This control sets the amount of phase difference before the audio is considered to be out of phase. This phase reversal is calculated by comparing the difference of the two channels to the average of the two. If a signal is always out of phase, then the difference between the two will be high compared to the average of the two. This corresponds to 1 in this control.

If there is only content on one of the channels (i.e. left only or right only), then the difference is equivalent to the average of the two channels. This corresponds to 0.5 in this control.

8.10.7.2. Setting the Audio Phase Reversal Duration

Fault definitions
Phase reversal duration
0.5 to 127 sec *10 sec*

This control sets the period over which to analyze the audio content for phase reversal.

Note that conditions of silence are not included in this value. This means that if the audio is 50% quiet then it will take twice the period set with this control to detect a phase reversal condition.

8.10.8. Detecting Audio Mono Faults

Mono audio material can take two forms: one channel with information and the other quiet or both channels with the same information. The card will detect both types of mono material.

If there is only a small amount of phase difference between the two channels (perhaps caused by the noise present on the audio) then the content may be mono. If there is no significant difference for a period of time, then this is a sign that the audio signals are mono.

Mono is detected by comparing the difference of the two channels to the average of the two. If a signal always has no out of phase information (or just a small amount) for a period of time, then the signal may be mono.

The *Mono threshold level* and *Mono duration* controls are used to detect when two audio channels are considered to be mono. The *Mono threshold level* control sets the threshold that decides whether the signals are the same. The audio difference must be less than the *Mono threshold level* amount for the duration set by the *Mono duration* control before the fault condition exists. When the fault condition exists, the audio difference must be more than the *Mono threshold level* amount for the duration set by the *Mono duration* control before the fault condition will be removed.

Material that is both mono and out of phase will be detected as being out of phase and not mono. Once the phase polarity is fixed, then the card will detect mono material.

8.10.8.1. Setting the Audio Mono Threshold Level

Fault definitions
Mono threshold level
0.2 to 0.5 in 0.01 increments *0.2*

This control sets the level of L/R audio difference under which is considered mono

0 corresponds to both channels being identical while 1 corresponds to both channels being exactly out of phase.

8.10.8.2. Setting the Audio Mono Duration

Fault definitions
Mono duration
0.5 to 127 sec *10 sec*

This control sets the duration of mono audio in seconds, which is considered a fault.

8.10.9. Detecting Loss of Primary Captioning

Fault definitions
Loss of CC duration
2 to 512 sec in 2 sec increments
180 sec

This control sets the amount of time in seconds with no primary CC1 captions encoded, which is considered a fault

This fault condition will also be generated if the closed caption signal is missing on the input video.

8.10.10. Detecting Loss of Program Rating Duration

Fault definitions
Loss of PR duration
1 to 255 sec
30 sec

This control sets the amount of time in seconds with no program rating packet encoded in the Line 21 XDS data stream, which is considered a fault

This fault condition will also be generated if the closed caption signal is missing on the input video.

8.10.11. Detecting Picture Freeze

The *Picture noise level* and *Picture freeze duration* controls are used to detect when a video picture is considered to be frozen. The *Picture noise level* control sets the threshold that decides whether activity in the picture is considered to be noise. The picture activity must be greater than this amount for the duration set by the *Picture freeze duration* control before the fault condition exists.

8.10.11.1. Setting the Picture Noise Level

Fault definitions
Picture noise level
1 to 10
7

This control sets the approximate level of noise expected in the video signal feed. It is used by the freeze detect feature to distinguish motion from background noise on top of a video feed.

For noisy video feeds, higher numbers are needed.

As a guide, the following chart is the approximate picture noise level that starts to be interpreted as motion for each of the *Picture noise level* settings:

Picture noise level	Noise that starts to be interpreted as motion * (dBrms)
1	-43
2	-42
3	-41
4	-39
5	-38
6	-37
7	-36
8	-34
9	-31
10	-28

* RMS noise relative to 714mV, 15kHz to 4.2Mhz bandwidth, VHF noise added to a static test signal, noise duration set to 30 frames.

8.10.11.2. Setting the Picture Freeze Duration

Fault definitions	
Picture freeze duration	
	6 to 902 frames
	302 frames

This control sets duration of video activity under the *Picture noise level* that is considered a fault.

When increasing *Picture noise level*, it is recommended that you increase *Picture freeze duration* as well. This is because higher Picture noise level settings also lowers the motion sensitivity, thus long periods without significant on-screen movement are more likely to trigger a “false” freeze alarm.

8.10.11.3. Optimizing the Picture Noise Level and Picture Freeze Duration Parameters

Setting up the optimum *Picture noise level* and *Picture freeze duration* parameters will depend on the amount of noise in the video path from the first equipment with freeze-frame capability to the monitoring point. The system designer should determine the maximum amount of time permissible between the moment of freeze and the alarm.

Setting this time as high as tolerable has two benefits:

- It lowers the frequency of “false” freeze alarms generated when a perfectly valid content contains long motionless periods
- It allows raising the *Picture noise level* parameter, without increasing frequency of “false” freeze alarms.

It is suggested that *Picture noise level* should be set after setting the *Picture freeze duration*.

If the user can place the equipment farthest upstream in the video path to go to a ‘freeze frame’ mode, then the *Picture noise level* should be optimized by initiating the ‘freeze frame’ mode in the upstream equipment and adjusting *Picture noise level* as low as possible, without losing the freeze alarm generated by the card. The user should note that because of the random nature of noise, the freeze alarm may be intermittent at some *Picture noise level* settings. The optimal *Picture noise level* setting is obtained when the loss of freeze alarm in the card occurs no more then once every 5 minutes.

If the equipment farthest upstream in the video path cannot go to a ‘freeze frame’ mode, then *Picture noise level* should be optimized by adjusting it as high as possible. If you trigger false freeze alarms more often than acceptable; lower the *Picture noise level* setting. Since the acceptable rate could be on the order of a day perhaps (depending on the facility), this adjustment procedure may consume a couple of days.

Failing to accomplish optimal adjustment of the *Picture noise level* will result in either:

- A large number of false alarms, or
- Lack of alarm condition when the video is frozen.

The *Picture noise level* and *Picture freeze duration* controls have been designed to be able to detect short-term "digital" freezes such as MPEG or motion JPEG server artifacts. When these devices have a significant problem with the content that they are de-compressing, they will typically start to produce a

"blocky" effect. If the problem is severe enough, they will freeze a frame of video and play it out for a number of frames. With the *Picture noise level* set to 1 (i.e. only detect exact, or nearly exact pictures) and the *Picture freeze duration* set to *minimum*, the card can detect these quick "digital freezes". You can't however detect both this type of freeze and a freeze from a link that has added noise to the picture.

8.10.12. Detecting Picture Black Duration

Fault definitions
Picture black duration
4 to 900 frames
88 frames

This control sets duration, in seconds, of active picture content below 7 IRE that is considered a fault.

A Fault is generated when the video level within the active picture area falls below the preset black level (7 IRE) and remains for the specified duration.

8.11. UTILITIES

8.11.1. Accessing Information About this Module and its Firmware

Utilities
About…

This menu item list 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.

8.11.2. Saving And Recalling Configurations

The module provide two user preset areas to save the complete set of control from the on screen menu. The *Store preset* and *Recall preset* menu items are used to save and recall these configurations.

For simplicity the following sections of the manual show how to store and recall from Preset 1 only.

8.11.2.1. Storing Configurations to the User Presets

Utilities
Store preset 1
Store
Cancel

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

After selecting the store preset operation, you must change the command to *Store* and press the pushbutton before the store will take place. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

8.11.2.2. Recall Configurations from the User Presets

Utilities
Recall preset 1
Recall,
Cancel

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

After selecting the recall preset operation, you must change the command to *Recall* and press the pushbutton before the store will take place. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

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

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

8.11.3. Initiating a Software Upgrade

Utilities
- *Upgrade*
  - *Yes*
  - *Cancel*

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

In addition to the software upgrade support detailed in this manual (See the *Upgrading Firmware* section of this manual for more information), you can initiate an upgrade with this command. 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 *Yes* and press the pushbutton before the upgrade can take place. 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.

8.11.4. Restoring the card to its Factory Default Configuration

Utilities
- *Factory reset*
  - *Yes*
  - *Cancel*

This menu item is used to restore all controls back to their factory defaults.

After selecting the reset operation, you must change the command to *Yes* and press the pushbutton before the command takes place. After the command, all parameters will be set to their factory default. You can abort the operation by pressing the pushbutton when *Cancel* is displayed.

8.12. CLEAR FAULTS AND PEAKS

Clear faults and peaks
- *Clear,*
- *Cancel*

This menu item on the top level menu provides a convenient method to clear any fault conditions and reset audio peak holds. You can also perform the clear by pressing the toggle switch up or down when not in the menu structure.

9. JUMPERS

The labeling for the jumpers has been put on the bottom of the card. This was done so that you can read the text when an audio daughter card (-A4 or –AES) is installed.

Figure 5 : Location of Jumpers on 7730DAC Main Board (7736CE)

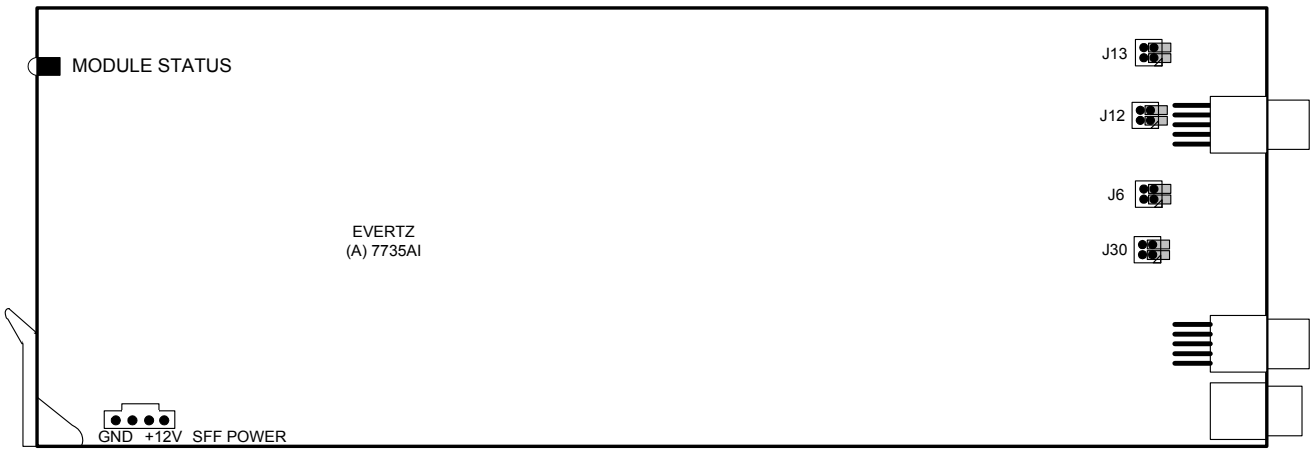


Figure 6 : Location of Jumpers on 7735AI Submodule

9.1. TERMINATION JUMPERS

REF TERM The REF TERM jumper J22 located on the rear edge of the 7730DAC board between the bottom two white multi-pin male connectors, selects the reference video termination impedance. Either 75Ω or a high-Z (27kΩ) termination impedance can be selected by placing the jumper in the "75" (top justified) or "HI-Z" (bottom justified) positions, respectively.

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

FRAME STATUS The FRAME STATUS jumper J3 located at the front of the module, on the 7730DAC board, determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR(-G) 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. (Default) When this jumper is removed, local faults on this module will not be monitored. For convenience you may re-install the jumper so that only one side is connected.

The *Frame stat trigger* menu item on the *Frame stat trigger* menu is used to configure whether *Fault condition 1* or *Fault condition 2* will assert the frame status

fault line. Power supply faults will always assert the frame status fault line when J3 is installed.

9.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

The following method can be used to upgrade the firmware in the card. You can also use the *UPGRADE* menu item located on the *UTILITIES* menu to upgrade the firmware.

UPGRADE

The UPGRADE jumper J2, located at the front edge of the board, is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J2 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J1 at the card edge. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* section of this manual. Once the upgrade is completed, remove the module from the frame, move J2 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

9.4. SETTING THE COARSE ANALOG AUDIO INPUT GAIN RANGE

J13, J12, J6, J30

Eight Jumpers located near the rear of the 7735AI submodule are used to set a coarse gain level.

When the jumpers are not installed (or installed so that only one side is connected), the input range is optimized for when peak audio levels up to 24dBu. (Default)

When the jumpers are installed, best performance is achieved when input peak levels are below 18dBu.

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