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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.0	start	Oct 03
0.1	Product definition manual	Jan 04
1.0	First release	Feb 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 7730ADC-HD line of component analog video to serial digital converters are broadcast quality high definition A to Ds with an extensive list of additional features. High quality analog to digital conversion of audio or AES inputs can be packaged with the video to create an A to D with audio embedder. 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 A to D process:

- 10 bit, 74.25MHz(/1.001) sampling of input video.
- Internal processing to maintain 10 bit digital video quality.
- Y, Pb, Pr or G, B, R input support.
- Black level clamp on all components.
- User adjustable input video processing functions: black level control on all 3 components, gain control on all 3 components, inter-channel delay and picture position control in 13.5 ns increments.
- Sync on green or separate sync input.

The Features of all 7730ADC-HD's are:

- Three input BNCs for Y, Pb, Pr or G, B, R input.
- One sync input BNC for separate sync.
- Two HD SDI 74.25 or 74.176 Mb/s component digital video output WITHOUT OSD text or audio bargraphs.
- One combination output that can either be an extra HD SDI output or composite analog video output. When configured as a composite analog output it will be a clean output (no picture), and have the OSD text and bargraph graphics for monitoring.
- One combination input BNC that can either be an LTC input or an analog reference input (Tri-level sync, NTSC or PAL-B with same frame rate as input video). 75 Ohm or high-Z, jumper configurable input impedance.
- One line video synchronizer.
- Variable output phase (in clock increments).
- Loss of video modes: black, pass
- A comprehensive on screen display is available to configure the various features of the module.

The Features of "-A4" option are:

- 4 balanced analog audio inputs on 2 removable barrier strips.
- High impedance inputs (user supplies termination resistors for other impedance's)
- Analog audio input levels are adjustable. Jumpers set coarse input levels, fine input levels are set by software control.
- Audio delay of up to 5 seconds.
- One group (4 channels of audio) is multiplexed on the outgoing digital video.
- 2 unbalanced AES audio outputs delayed equivalently to the embedded audio delay.
- 75-Ohm coaxial (unbalanced) DARS reference input on BNC.
- 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 of up to 5 seconds.
- 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

Component analog high definition video is converted to 10 bit parallel data. Inter-channel delay control allows the time-alignment of the 3 components with clock resolution (13.5ns). The components are then color space converted (if G, B, R format) into Y, Cb, Cr in 4:4:4 format. The Cb and Cr are decimated to create 4:2:2. Gain, and black level video processing functions are performed during the A to D process while color space conversion is done in the digital world.

In the 7730ADC-A4-HD version, the audio is converted from balanced analog to digital PCM audio. The 7730ADC-AES-HD, receives the input AES audio and rate converts it to synchronous 48kHz. The digital audio is then delayed if desired. This delayed audio is formatted properly and delivered to the user as unbalanced 75 Ohm AES audio on BNC. It is also formatted into one group of audio and embedded on the HD SDI output video.

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 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.

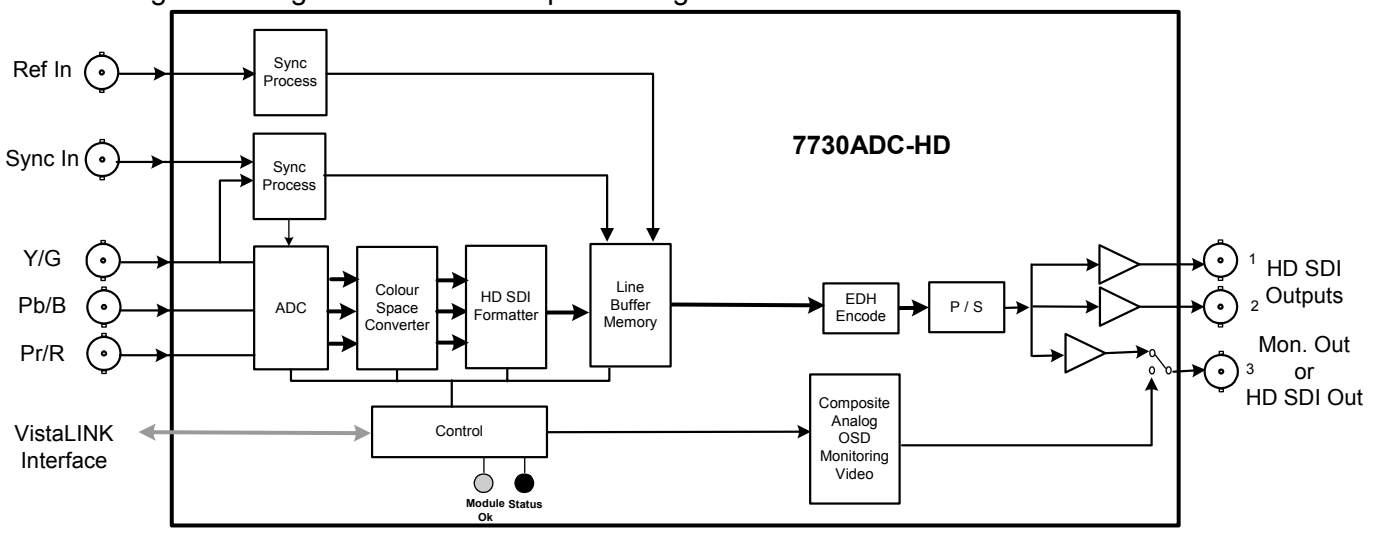

Figure 1: 7730ADC-HD Block Diagram

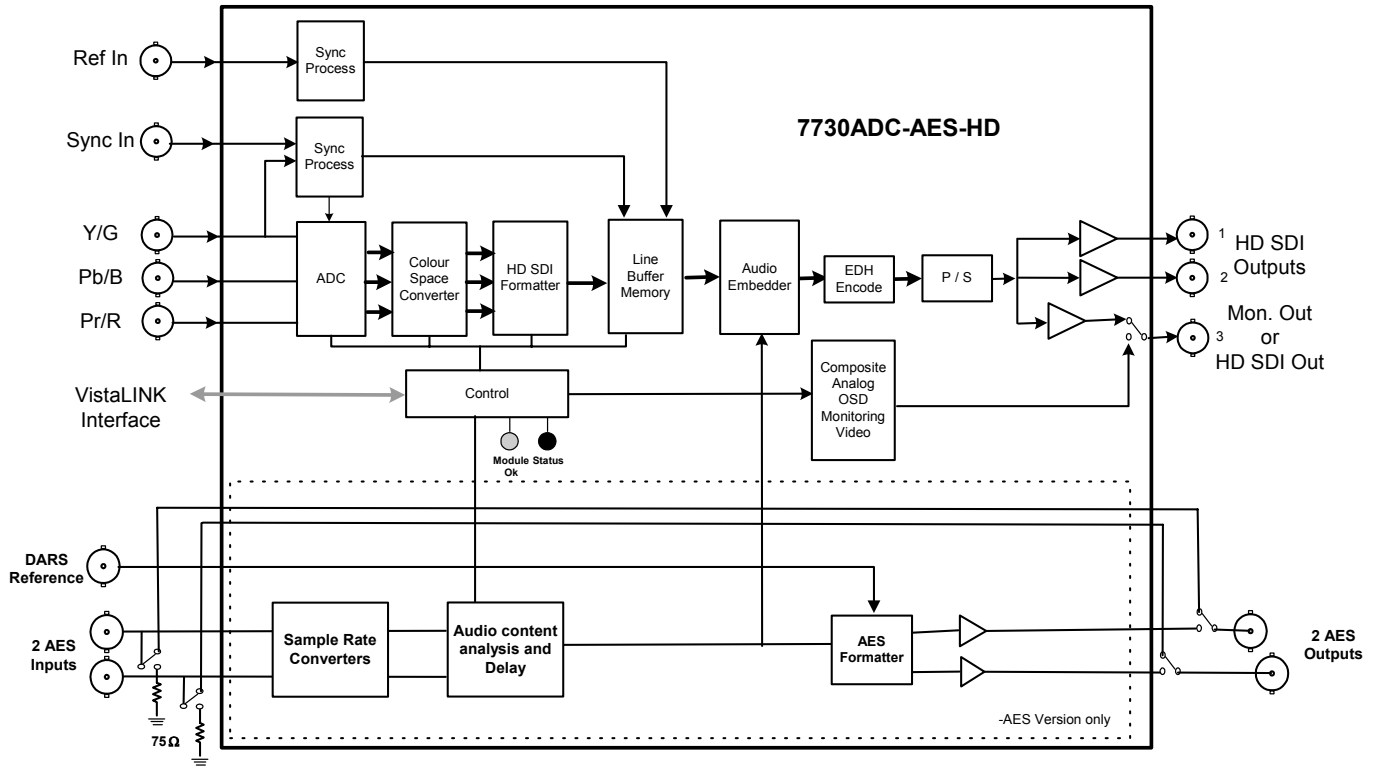

Figure 2: 7730ADC-AES-HD Block Diagram

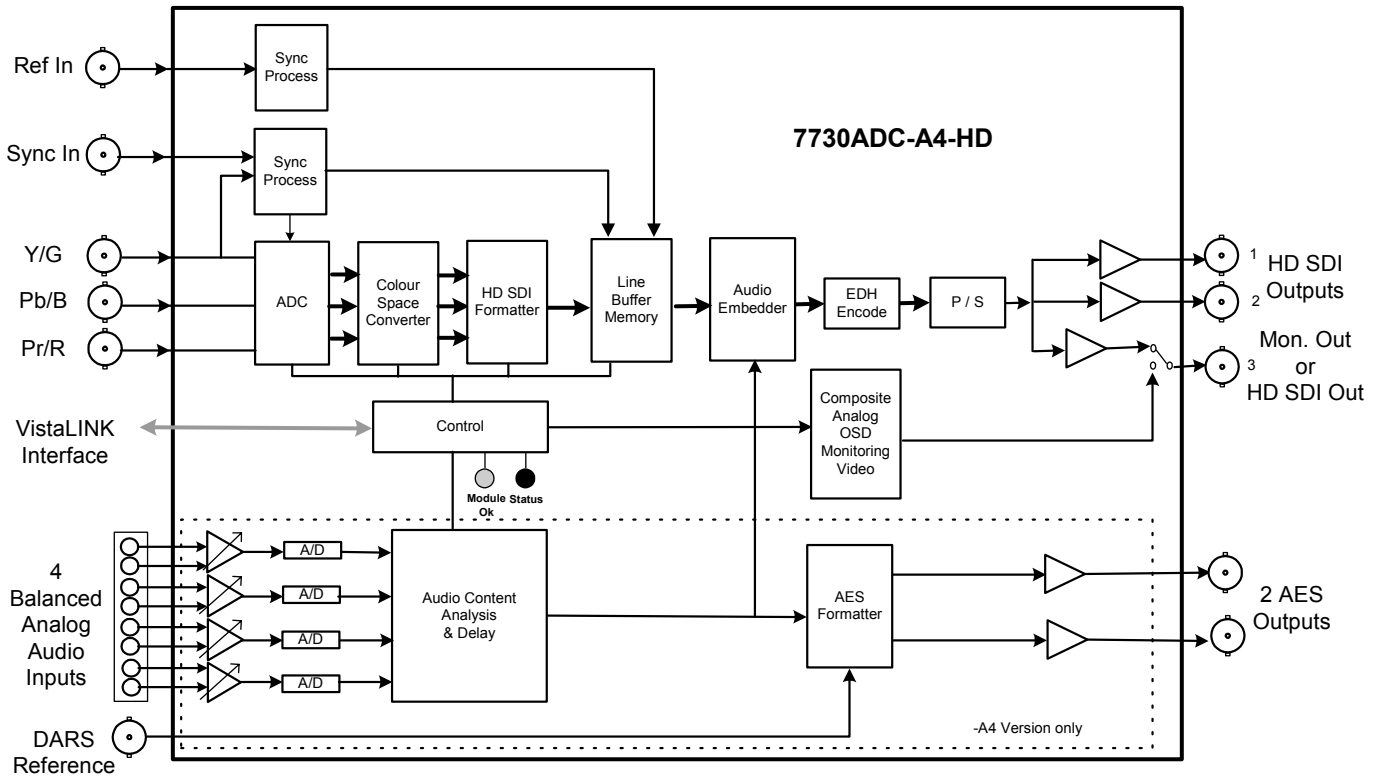

Figure 3: 7730ADC-A4-HD Block Diagram

2. Installation

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

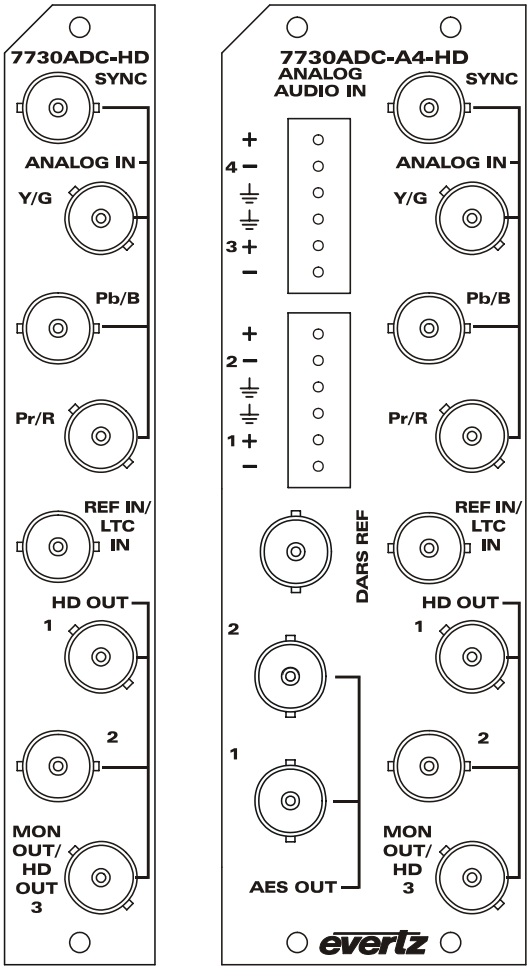

Figure 4: 7730ADC-HD Rear Panels

2.1. VIDEO IN AND OUT

Connect a source of HD component analog video to the top BNCs labeled ANALOG IN. Most high definition video has sync on the Y/G channel, so there is no need to connect anything to the SYNC input. However, if the analog video does not have tri-level sync, you may supply a reference signal to the SYNC input. It must be either tri-level or bi-level sync of the same frame rate as the input video. If line synchronization is desired, connect a reference signal to the REF IN BNC. Alternatively, if you have a 7700FR-G frame, this card can be configured to accept one of the reference signals provided to the frame. Converted video with embedded audio (on analog versions) is available on the SDI OUT BNCs. Composite analog video with text and audio bar graphs are available on the MON OUT output BNC, or after the card has been configured, this may be an additional HD SDI output. If the card is not present or the power is off, there will be nothing on any of the outputs.

3. SPECIFICATIONS

3.1. ANALOG VIDEO INPUT

Standards:	SMPTE 274M, 296M (analog) 1080i/59.94, 1080i/50, 720p/59.94
Input formats:	GBR, YPbPr
Number of Inputs:	1
Connector:	BNC per IEC 60169-8 Amendment 2.
Signal Level:	1V nominal
Frequency Lock Range:	±75ppm from nominal
Input level control range:	±15%
Black level control range:	±5 IRE
Input Impedance:	75 Ohm
Return Loss:	>30dB to 30MHz

3.2. REFERENCE VIDEO INPUT

Standard:	Tri-level sync, analog SMPTE 274M, 296M NTSC, SMPTE 170M PAL, ITU624-4
Number of Inputs:	1
Connector:	BNC per IEC 60169-8 Amendment 2.
Signal Level:	1V nominal
Frequency Lock Range:	±75ppm from nominal
Input Impedance:	75 Ohm or High impedance (jumper selectable)
Return Loss:	>35dB to 10MHz

3.3. MONITORING ANALOG VIDEO OUTPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Outputs:	1
Connector:	BNC per IEC 60169-8 Amendment 2.
Signal Level:	1V nominal
Output Impedance:	75 Ohm
Return Loss:	>30dB to 10MHz

3.4. SERIAL VIDEO OUTPUT

Standard:	SMPTE 292M (274M, 296M)
Number of Outputs:	2+1
Connector:	BNC per IEC 60169-8 Amendment 2.
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	180ps nominal
Overshoot:	<10% of amplitude
Return Loss:	>13dB to 1.5GHz
Embedded Audio:	SMPTE 299M

3.5. VIDEO PERFORMANCE (HD SDI OUTPUTS ONLY)

Frequency Response: (Y, Pb, Pr input)	Y: <±0.05dB to 30MHz Cb, Cr: <±0.05dB to 15MHz
Inter-channel Delay:	<±5ns
Minimum Delay:	0.5 usec
Maximum Delay:	1 line plus 0.5 usec

3.6. ANALOG AUDIO INPUT (-A4 only)

Number of Inputs:	4
Type:	Balanced analog audio
Connector:	Removable terminal strip
Input Impedance:	20kOhm minimum (differential)
Sampling Frequency:	48kHz
Signal Level:	0dB FS => 18 or 24dBu (jumper selectable)
Level Control Range:	+/- 10dB
Frequency Response:	+/- 0.1dB (20Hz to 20kHz) (broadcast quality)
SNR:	100dB with input at -0.5dBFS
THD+N:	<0.001% (>100dB) @ 1kHz, -0.5 dB FS (rev 2) <0.001% (>100dB) @ 20Hz to 20kHz, -0.5 dB FS (input video locked to genlock video)
CMRR	>100dB @ 1kHz

3.7. 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 60169-8 Amendment 2.
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

3.8. ELECTRICAL

Voltage:	+ 12VDC
Power:	14 Watts ADC + 9 Watts (-A4 option) = 23 Watts total.
EMI/RFI:	Complies with FCC Part 15, class A and EU EMC directive.

3.9. PHYSICAL

7700 frame mounting:

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

7701 frame mounting:
Number of slots: 1

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

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 (625 on the top, away from the PCB and 525 on the bottom, closest to the PCB) will indicate the frame rate operation of the card. When the NTSC LED is illuminated, the card is running with a frame rate of 59.94Hz, while the PAL LED indicates a 50Hz frame rate. These LEDs will flash if the correct input is not supplied.

GENLOCKED: This Green LED is on solid if the user selected genlock source (either external input or from the frame) is present and the user has turned on genlocking.

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

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. Analog audio (on -A4 versions) presence is determined with the silence detector. Digital audio (on –AES versions) presence is determined by the AES receiver lock indicator as well as the silence detector. If the audio is not silent, the LED will be on. See the sections associated to controlling and calibrating the silence detector for details.

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. RGB VIDEO LEVEL CALIBRATION

Calibrating the DC (black) level and gain (video level) of all 3 components can be a challenge when inputting RGB video. When converting RGB to YCbCr, a change in any one of the input components will have an effect in all three of the output components. This is by nature of the color space conversion process.

To aid in the calibration, special modes have been incorporated to isolate the processing functions (black or DC level adjustment and video level or gain control). The color space converter is re-programmed to pass the components straight through and one input component is routed to the Y channel of the output video. This will allow the calibration of a component, independent of the others. The procedure is as follows:

1. Select appropriate video standard (RGB mode).
2. Input calibrated 100% RGB colorbars.
3. Go into *Input Video Processing* menu and start adjusting the *Black Level Y/G*. Note that the Green signal is routed to the Y channel output and that the Cb and Cr channels have been set to black. Using a digital waveform monitor, adjust the *Black Level Y/G* to set black at 64 (40Hex).
4. Adjust the *Video Level Y/G* to set white to 940 (3ACHex).
5. Repeat steps 3 and 4 with the Blue and Red channels.
6. Leave the *Input Video Processing* menu and verify the calibration with the digital waveform monitor. The lightning display is the best because it shows you the relationship between all three components.

6. AUDIO BUFFER MANAGEMENT

The audio is delayed, through a large memory buffer, by the same time value as experienced by the video. This is done to maintain a consistent video/audio relationship. In addition, the user may add up to 5 seconds of audio delay. 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 plus the desired audio delay. 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 the user desired additional audio delay.

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.

7. AUDIO LEVELS, HEADROOM, CLIPPING AND THE BAR GRAPHS (-A4 and –AES)

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

Before you can calibrate the audio analog to digital converter, you must know a couple of system issues specific to your application. What is your analog reference level and how much headroom do you want to have in the digital audio signal? By adding these two values together, you will get the analog input 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 want 20dB of headroom in the "digital world", then 0dB FS will correspond to an analog level of 24dBu. Once the audio input level is calibrated, when you apply a 4dBu analog signal, the digital level will be –20dB FS.

The SDI embedded audio, the AES output audio and the bargraphs are all based on the digital quantized signal. 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 input levels.

7.1. INPUT AUDIO LEVEL CALIBRATION (-A4 only)

The analog audio input circuitry has two gain control stages before the audio is digitized; a jumper settable coarse range, and a software (menu system) control. One of the two coarse ranges is optimized for when peak audio levels are above 18dBu and one for levels below. The jumpers, when not installed, allow input levels of up to 24dBu. When the jumpers are installed, best performance is achieved when input peak levels are below 18dBu. The OSD menu system has independent +/- 10dB audio level control of all four channels (see Setting the Analog Levels for OSD control details).

The following is an example calibration procedure:

1. Take your analog program reference level and add the amount of desired headroom in the digital signal (SMPTE standard is 20dB). If this number is greater than 18dBu, then remove the 8 jumpers near the rear of the 7735AI-master card of the 7730ADC-A4-HD module. If the number is less than 18dBu, then install the 8 jumpers.
2. Apply an analog audio signal of the level calculated above.
3. Apply component analog video to the "ANALOG IN" BNCs.
4. Monitor either the embedded audio or the output AES audio with appropriate level measuring gear.
5. Adjust the *level adjust* controls in the *audio* menu so that the digital level just starts to clip.
6. Verify by applying program reference level. The bargraphs should read a level that is below 0dB FS by the desired headroom level.

More information:

Without front-end jumpers in place (common +24 dBu setting) and 0 dB gain control, the conversion will transform +24 dBu analog input to 0 dBFS digital signal. Gain control will allow adjustment of this setting +/-10 dB in 0.5 dB increments (see Setting the Analog Levels for OSD control details). The user has to be aware that the front-end analog amps will saturate (clip) at +27 dBu independently of adjustable gain/attenuation stage and the ADC stage.

With "+18 dBu" jumpers in place and 0 dB gain control, the conversion will transform +18 dBu analog input to 0 dBFS digital signal. Gain control will allow adjustment of this setting +/-10 dB in 0.5 dB increments (see Setting the Analog Levels for OSD control details). The user has to be aware that the front-end analog amps will saturate (clip) at +21 dBu independently of adjustable gain/attenuation stage and the ADC stage.

8. 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 ADC. See section 9.10 for a complete description of the fault definition menu items.

8.1. 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.
6.

8.2. 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.
6.

8.3. 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.

8.4. 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.

9. ON SCREEN MENUS

9.1. 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.

9.2. 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.

9.3. 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 9.4 to 9.12 provide detailed descriptions of each of the sub menus. The tables in sections 9.4 to 9.12 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.

9.4. CONFIGURING THE AUDIO CONTROLS (-A4 and –AES)

The *Audio* menus are used to configure parameters associated with the audio inputs and the audio multiplexing. The chart below shows the items available in the *Audio* menu. Sections 9.4.1 to 9.4.5 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 destination	Selects the destination group of audio.
Audio freeze mode	Selects what action to take when video is gone
Audio delay	Additional, user desired, delay may be added to the audio
Audio buffer	The audio buffer management status may be monitored with this item
Ch 1 adjust	Channel 1 level control (-A4)
Ch 2 adjust	Channel 2 level control (-A4)
Ch 3 adjust	Channel 3 level control (-A4)
Ch 4 adjust	Channel 4 level control (-A4)
Ch1/ch2 processing	Controls whether the channel 1 and 2 (L/R) inputs will be swapped or duplicated
Ch3/ch4 processing	Controls whether the channel 3 and 4 (L/R) inputs will be swapped or duplicated
Channel pair swap	Swaps channels 1 and 2 (stereo pair) with 3 and 4 (stereo pair)

9.4.1. Selecting the Audio Destination Group

Audio	Up to 4 groups of audio may be embedded on SDI video. This control selects the group ID of the multiplexed output audio. The input audio will be put in this group.
Audio destination	
Group 1 (underlined)	
Group 2	
Group 3	
Group 4	
None	

9.4.2. Audio Freeze Mode

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 card (both embedded and AES outputs), then set this control to *pass.* When set to mute, the audio will automatically be muted when video is removed.

9.4.3. Additional Audio Delay

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

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

WARNING: Both the embedded audio AND the external 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!

9.4.4. Monitoring the audio buffer tracking

Audio
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.

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 user supplies a different audio delay value. Unfortunately, at these boundary conditions, we can not 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.

9.4.5. Setting the Analog Levels (-A4 only)

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

Audio	ch1 adjust	-20 to 20
		0

The channel input level (-A4 only) is adjusted with this control. It has a range of approximately +/- 10 dB with 1/2dB resolution.

For more details about setting the input level jumpers, see the section on INPUT AUDIO LEVEL CALIBRATION.

9.4.6. Audio Channels 1 and 2 Processing

Audio	Ch1/ch2	Pass
		Swap
		Ch1 split
		Ch2 split

Basic audio channel manipulation is possible with this control.

Pass, routes both input channels straight through, while *Swap*, routes the two channels to the opposite channel output of the pair.

The *Ch1,2 split*, modes take a single channel, adjust the magnitude by –6dB (i.e. in half) and duplicates it on both output channels. This mode is designed for preparing a single channel (i.e. SAP: Secondary Audio Program) for a stereo infrastructure.

9.4.7. Audio Channels 3 and 4 Processing

Audio	Ch3/ch4	Pass
		Swap
		Ch3 split
		Ch4 split

Basic audio channel manipulation is possible with this control.

Pass, routes both input channels straight through, while *Swap*, routes the two channels to the opposite channel output of the pair.

The *Ch3,4 split*, modes take a single channel, adjust the magnitude by –6dB (i.e. in half) and duplicates it on both output channels. This mode is designed for preparing a single channel (i.e. SAP: Secondary Audio Program) for a stereo infrastructure.

9.4.8. Swapping Channel Pairs

Audio	Channel pair swap	No
		Yes

No, routes both stereo channels straight through, while *Yes*, swaps the channel pair. This means that channels 1 and 2 are routed to channels 3 and 4 of the embedded video and to AES channel 2.

The above channel processing is applied BEFORE this control processing.

9.5. CONFIGURING THE VIDEO CONTROLS

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

Input Video Processing	Selecting this item takes you into the Input Video Processing Menu
Video Standard	Selects the input video standard
Input Video Sync.	Selects either sync on Y/G or external sync source
Loss of video	Selects the action to take when the input video is missing
Genlock Source	Selects the source for locking the line synchronizer
H Phase	Sets the horizontal phase of the output video
V Phase	Sets the vertical phase of the output video

9.5.1. Setting the Video Standard

Video *Video standard* *1080i/59.94/YPbPr, 1080i/59.94/GBR, 720p/59.94/YPbPr, 720p/59.94/BGR, 1080i/50/YPbPr, 1080i/50/GBR, auto/YPbPr, auto/GBR*	The video line standard, frame rate and component format is selected with this control. Once you have configured this parameter and selected the synchronization source (see below), adjust the black (DC) level and then the gain of each of the components to calibrate the input for the desired standard.

9.5.2. Selecting the Input Video Synchronization Source

Video *Input Video Synchronization* *Sync on Y/G, ext sync*	The input video may be configured to either have sync on the Y/G channel or the *ext*ernal *sync*. The analogue HD video specs (SMPTE 274M and 296M) do not include a separate sync signal, but it was included because the hardware was also designed to support SD video that needs to support it.

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

Video		
	Loss of video	
		Black, *Pass*

The user can either have the output video go to black, or pass whatever is at the input when synchronization pulses are missing.

9.5.4. Genlock Source Selection

Video		
	Genlock source	
		card ref, *Ref. 1,* *Ref. 2,* *input video*

This control allows you to select the reference video for the line synchronizer output timing. The reference may either be an externally supplied signal or you may use the input video as a reference.

If the card is installed in a 7700FR-G frame, two reference inputs are available on the frame that supplies video to every card. Either of these two inputs may be selected as reference sources. Note that you must also set a jumper to enable these inputs (see the section on *jumpers*).

When genlocking to the input video, make sure to adjust the video H and V output phase controls to set the total processing delay/phase.

9.5.5. Setting the Horizontal Phase of the Output Video

Video		
	H phase	
		0 to *Hmax-1* *512*

With this control, you can set the horizontal timing of the output video with respect to the Genlock reference input. Set this control before calibrating the *V phase*. Increasing the value will delay the output video in one-sample increments. Hmax depends on the video standard.

9.5.6. Setting the Vertical Phase of the Output Video

Video		
	V phase	
		0 to *Vmax-1* *0*

With this control, you can set the vertical timing of the output video with respect to the Genlock reference input. Setting this control to 1 keeps the output video in time with the Genlock reference. Increasing the value will delay the output video in one-line increments. Vmax depends on the video standard.

Note: This device has a line synchronizer, not a frame synchronizer. Unlocked input video with respect to reference video will cause the active picture to be miss-framed and scroll up or down the output video raster. If the input video is locked to the reference and this control is miss-adjusted, the active picture will be offset vertically.

9.5.7. 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 user supplies a different audio delay value. Unfortunately, at these boundary conditions, we can not 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.

9.6. CONFIGURING THE INPUT VIDEO PROCESSING CONTROLS

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

Black Level Y/G	Controls the Y/G channel black level
Black Level Pb/B	Controls the *Pb/B* channel black level
Black Level Pr/R	Controls the *Pr/R* channel black level
Video Level Y/G	Controls the input video level of the Y/G channel
Video Level Pb/B	Controls the input video level of the *Pb/B* channel
Video Level Pr/R	Controls the input video level of the *Pr/R* channel
Delay Y/G	Controls the delay on the Y/G channel
Delay Pb/B	Controls the delay on the Pb/B channel
Delay Pr/R	Controls the delay on the Pr/R channel
Fine Phase	Controls the sub-clock phase of all 3 component channels

For simplicity, only one description for each type of control is included.

9.6.1. Black Level Control

Video
Input Video Processing
Black Level Y/G
-511 to 512
0

The black level of the Y/G channel is adjusted with this control.

When in RGB mode, it's almost impossible to calibrate this control without some sort of calibration mode. This is because of the color space matrix operation that manipulates all of the components simultaneously and thus makes all of the controls affect all of the component outputs.

This control will map the selected input channel to the output Y channel, allowing the adjustment of the black (DC) level.

If the card is in one of the YPbPr modes, this mode is not needed and thus will not re-map any inputs.

9.6.2. Video Level Control

Video
Input Video Processing
Video Level Y/G
-255 to 256
0

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

When in RGB mode, it's almost impossible to calibrate this control without some sort of calibration mode. This is because of the color space matrix operation that manipulates all of the components simultaneously and thus makes all of the controls affect all of the component outputs.

This control will map the selected input channel to the output Y channel, allowing the adjustment of the video (gain) level.

If the card is in one of the YPbPr modes, this mode is not needed and thus will not re-map any inputs.

Note: You may have to re-adjust the *Black (DC) Level* a small amount after adjusting this control.

9.6.3. Delay Y/G

Video
Input Video Processing
Delay Y/G
-8 to 7
0

The horizontal position of the Y/G channel is adjusted with this control. Each step shifts the channel by 13.5ns. Bigger numbers shift the channel to the right.

By adjusting all three *delay* controls, you can adjust the horizontal picture position.

9.6.4. Fine Phase

Video
Input Video Processing
Fine Phase
-128 to 127
0

The fine, sub-clock, horizontal position of all three channels is adjusted with this control. There is approximately 250ns range with this control. Bigger numbers shift the channels to the right.

Note: There is more range on this control than there is with the above three *Delay* controls.

9.7. CONFIGURING THE BAR GRAPH CONTROLS (-A4 and –AES)

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 9.7.1 to 9.7.15 give detailed information about each configuration item for the audio bar graphs. Sections 9.7.1 to 9.7.3 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 9.7.13 to 9.7.15 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
3	Status window
4	Phase bar graphs
5 (bottom)	Level bar graphs

9.7.1. 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.

9.7.2. 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.

9.7.3. 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 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 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).

9.7.4. 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).

9.7.5. 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.

9.7.6. 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).

9.7.7. 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.

9.7.8. 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 can not 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.

9.7.9. 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.

9.7.10. 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.

9.7.11. 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 9.8.2 to 9.8.4 for detailed information on position the windows and bar graphs.

9.7.12. 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.

9.7.12.1. 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.

9.7.12.1.1. 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.

9.7.13. 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.

9.7.14. 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.

9.7.15. 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.

9.8. 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
3	Status window
4	Phase bar graphs
5 (bottom)	Level bar graphs

9.8.1. Descriptions of the On Screen Windows

9.8.1.1. 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	"standard"/not present/wrong std	Input video standard detected on the input. If the wrong standard is applied, or a 60Hz frame rate is detected, *"wrong std"* is displayed.
Genlock	"standard"/not present/off	Genlock presence detected. If genlock is turned on and video of a compatible standard is applied, the standard will be displayed. If the *genlock source* of *input* is selected, *off* will be displayed. *Invalid* will be displayed if an incompatible standard is applied.
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

9.8.1.2. Time Code Window

The time code window shows the longitudinal time code present at the input to the module.

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

9.8.1.3. 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 9.10 for more information on setting up the fault conditions and configuring the fault windows.

9.8.2. 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.

9.8.2.1. 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.

9.8.2.2. 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.

9.8.3. 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.

9.8.3.1. 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.

9.8.4. 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.

9.8.5. 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 9.10.1.3)

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

9.8.6. 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 9.8.7 for information on setting the *Fault window* attributes.

9.8.6.1. Turning on the Text Window Backgrounds

- *On-screen display configuration*
  - *Text windows*
    - *Text window config*
      - *Text type*
        - *White on bkgrn*
        - *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.

9.8.6.2. 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.

9.8.6.3. 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.

9.8.6.4. 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.

9.8.6.5. 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 time code window.

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

9.8.6.6. 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.

9.8.7. 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.

9.8.7.1. 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.

9.8.7.2. 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.

9.8.7.3. 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.

9.8.7.4. 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.

9.8.7.5. 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.

9.8.7.6. 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.

9.9. 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.

Frame stat trigger

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

9.9.1. 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 can not be disabled from the status signal.

If it is desired to use this feature, the frame status jumper J21 (located near the card extractor) must also be set to the *On* position. See section 10.4

The Red *Local Fault* LED will be On when the global status line is active regardless of the position of jumper J21.

9.10. 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 9.8.

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. The following sections 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

9.10.1. 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*.

9.10.1.1. 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 9.8.2 to 9.8.4 for detailed information on position the windows and bar graphs.

9.10.1.2. 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 9.2 for information on changing text fields.

9.10.1.3. 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 9.10.1.4 for information on setting the duration of the fault condition.

9.10.1.4. 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.

9.10.1.5. 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
DARS error	DARS reference absent or not locked to video
Loss of audio ½	Audio 1 and 2 absent (only -AES versions)
Loss of audio ¾	Audio 3 and 4 absent (only -AES versions)
Phase reversal ½	Audio 1 and 2 out of phase
Phase reversal ¾	Audio 3 and 4 out of phase
Audio over ½	Audio 1 or 2 over level
Audio over ¾	Audio 3 or 4 over level
Audio silence ½	Audio 1 and 2 silent
Audio silence ¾	Audio 3 and 4 silent
Audio mono ½	Audio 1 and 2 mono
Audio mono ¾	Audio 3 and 4 mono
Loss of TC	Time Code absent

Table 5: Possible Error Conditions to Produce a Fault

9.10.2. 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 9.8.7 for a complete description of the *Fault window config* menu items.

9.10.3. 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.

9.10.4. 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.

9.10.5. 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.

9.10.5.1. 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.

9.10.5.2. 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*.

9.10.6. 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.

9.10.6.1. 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)

9.10.6.2. 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.

9.10.7. 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.

9.10.7.1. 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.

9.10.7.2. 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.

9.10.8. 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.

9.10.8.1. 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.

9.10.8.2. 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.

9.11. UTILITIES

9.11.1. 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.

9.11.2. 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.

9.11.2.1. 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.

9.11.2.2. 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.

9.11.3. 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.

9.11.4. 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.

9.12. 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.

10. 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 7730ADC-HD Main Board

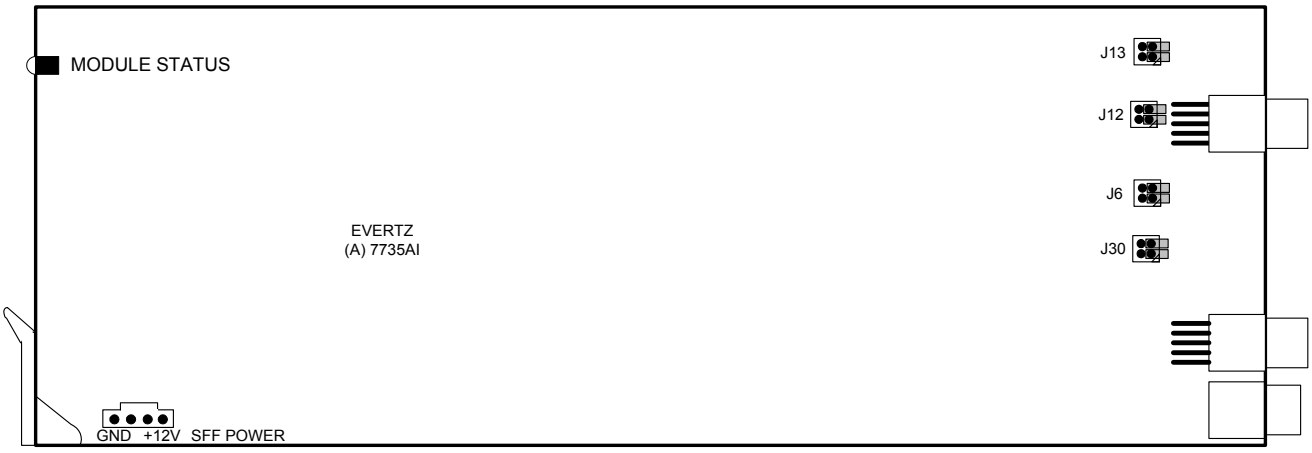

Figure 6 : Location of Jumpers on 7735AI Submodule

10.1. TERMINATION JUMPER

GL/LTC TERM The GL/LTC TERM jumper J19 located on the rear edge of the 7730ADC-HD 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.

10.2. REFERENCE VIDEO SELECTOR JUMPER

GL SEL

The GL SEL jumper J3 located on the rear edge of the 7730ADC-HD board between the bottom two white multi-pin male connectors, selects the source of genlock reference video for the card. Card external input BNC is selected by installing the jumper in the "EXT" (bottom justified) position. By placing the jumper in the "FRAME" (top justified) position, you can select the global frame reference video. NOTE: This reference will only be present if the frame is of the type 7700FR-G.

10.3. OUTPUT 3 SELECTOR JUMPER

OUT 3 SEL

The OUT 3 SEL jumper J17 located on the rear edge of the 7730ADC-HD board behind the bottom white multi-pin female connector, selects the source of output video for the third output BNC(bottom output of the card). SDI output is selected by installing the jumper in the "SDI" (forward justified) position. By placing the jumper in the "ANAL" (rearward justified) position, you can select analog (composite) video with OSD text for controlling the card.

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

FRAME STATUS

The FRAME STATUS jumper J21 located at the front of the module, on the 7730ADC 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 J21 is installed.

10.5. 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 7730ADC 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 in the front of the binder 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 in the front of the manual binder. 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.

10.6. 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.