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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.0	Preliminary	Dec 04
1.0	First release	Feb 05
1.1	Added –A8 product option	May 07
1.2	Modified section 5.8.2	Oct 07
1.3	General format clean up	May 09

1. OVERVIEW

The 7736CE2 series of modules are broadcast quality component serial digital to composite analog video converters with an extensive list of advanced features. The 7736CE2-A4 and 7736CE2-A8 versions offer respectively four (two per encoding channel) or eight (four per encoding channel) high quality audio digital to analog converters that can be driven from discrete AES inputs or audio embedded within the video input signal. The module features a clean (asynchronous) and a fast (synchronous) input video lock modes to handle upstream switches. In addition, control of card is via an On-Screen Display or remotely via VistaLINK®.

Features:

- Two component serial digital inputs (525 or 625)
- One composite analog video output per channel WITHOUT OSD text
- Internal processing to maintain 10 bit digital video quality
- 12 bit output video digital to analog conversion
- One monitoring quality video output with OSD text for card configuration
- User adjustable output video processing functions: black level (brightness), gain (contrast), hue, and saturation
- User selectable luminance and chrominance filters for different applications (i.e. broadcast vs. studio)
- User selectable horizontal blanking interval width: narrow, normal
- One composite analog reference input (NTSC or PAL-B) on BNC. 75 Ohm or high-Z, jumper configurable input impedance
- Video Frame synchronizer (with +S option)
- Infinitely variable output phase
- Freeze modes: black, freeze
- Adjustable free running frequency. Both channels must be free running to be able to adjust frequency
- A comprehensive on screen display is available to configure the various features of the module

The Features of "-A4" and the "-A8" Options:

7736CE2-A4 (per video channel):

- One half group (2 channels) of synchronous 20-bit audio may be de-multiplexed from the incoming digital video
- 1 unbalanced (or balanced) AES audio input (up to 48kHz, 24 bits) on BNC (or terminal strip for balanced audio)
- 2 high quality 24-bit audio channels are converted to balanced analog on 2 removable barrier strips

7736CE2-A8 (per video channel):

- One full group (4 channels) of synchronous 20-bit audio may de-multiplexed from the incoming digital video
- 2 unbalanced AES audio input (48kHz, 24 bits) supplied via 15dB
- 4 high quality 24-bit audio channels are converted to balanced analog on 2 removable barrier strips

7736CE2-A4 and 7736CE2-A8:

- User selects either the de-embedded audio or the input AES audio
- Audio delay tracks the video delay with the (+S option)
- Low impedance outputs (66Ω)
- Analog audio output levels are adjustable
- Additional audio delay of up to 2.5 seconds
- Audio advance of up to 1 frame, depending on video delay
- Loss of video modes: pass audio, mute audio

1.1. FUNCTIONAL DESCRIPTION

270Mbps component SDI video is converted to 10 bit parallel data and encoded to high quality composite analog video. Various video processing functions (gain, saturation, black level, etc) are performed during the encoding process. The card is designed to support two SDI to composite video encoders. Both processing paths are designed to support encoding to the same output standard.

Digital audio is de-multiplexed from the incoming SDI video. For the –A4 version, external digital AES audio is also received via input BNC's (unbalanced) or removable terminal strip (balanced). For the –A8 version, unbalanced external digital AES is received via a high density DB15 connector. The user can select either of these two sources for further processing. The selected digital audio is delayed (with +S option) to match the delay experienced by the video in the video synchronizer. In addition, the user can select additional audio delay. On the 7736CE2-A4 and 7736CE-A8 products, the audio is converted to balanced analog audio through a high quality 24 bit D to A converter and delivered to the outside world via removable terminal strips (-A4 version) or removable barrier strips (-A8 version).

The output video goes out through two paths; a high quality component to composite converter (composite encoder) and a monitoring quality composite encoder with the OSD "burn-ins". The hardware mixes (keys) the on screen text and bar graphs display information onto the monitoring output video stream. There is only one monitoring output, so the OSD hardware will switch between the two input videos depending on which channel you are configuring.

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.

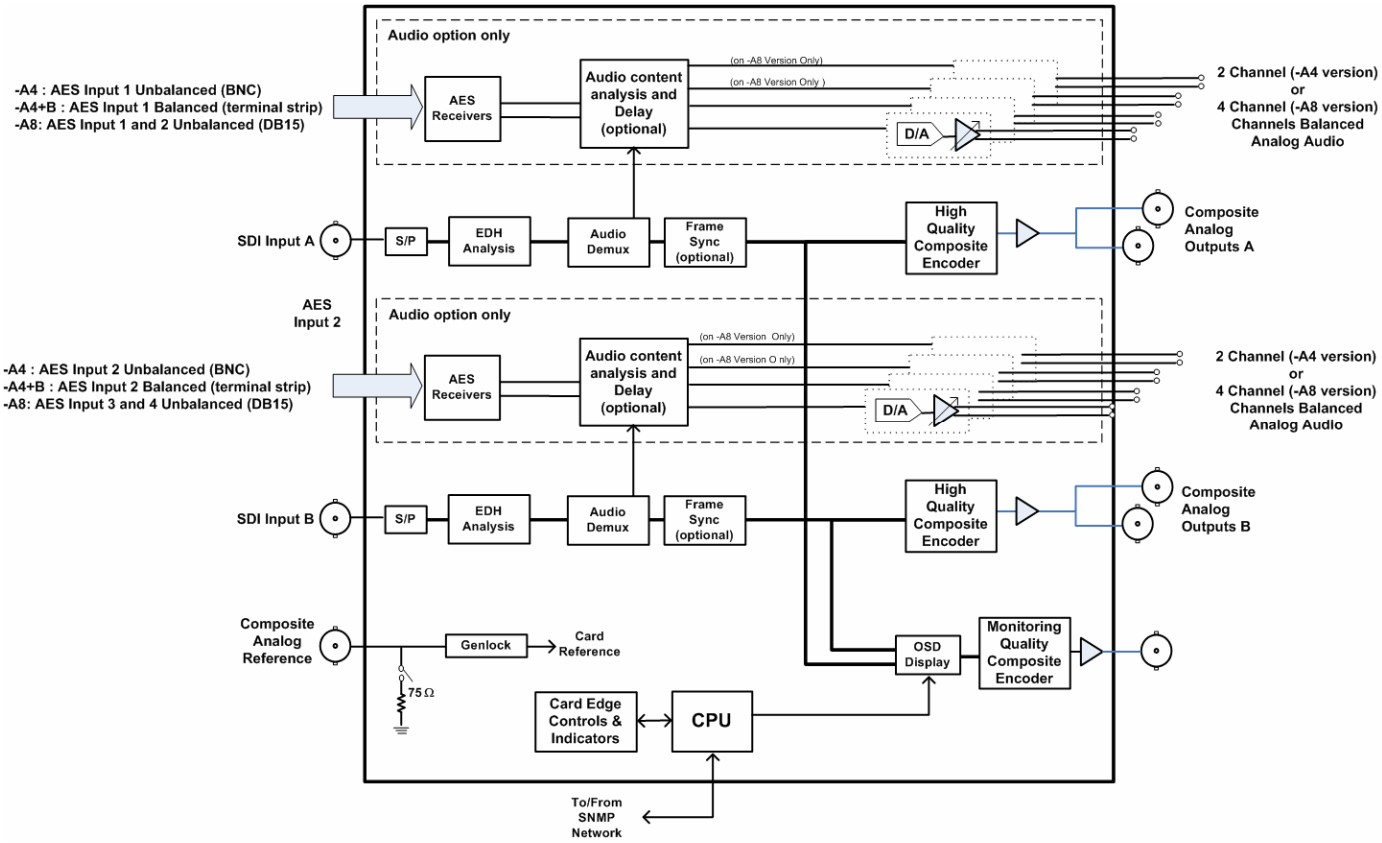


Figure 1-1: 7736CE2 (-A4) (+B) and 7736CE2-A8 Block Diagram

2. Installation

The 7736CE2 modules come with a companion rear plate and occupy one or two slots in the 7700FR frame.

Figure 2-1 shows a picture of each of the rear panels. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

The 7736CE2 cards must be inserted into slots with the correct rear panel. Some cards have physical differences and some have functional differences; the associated labels will be misleading.

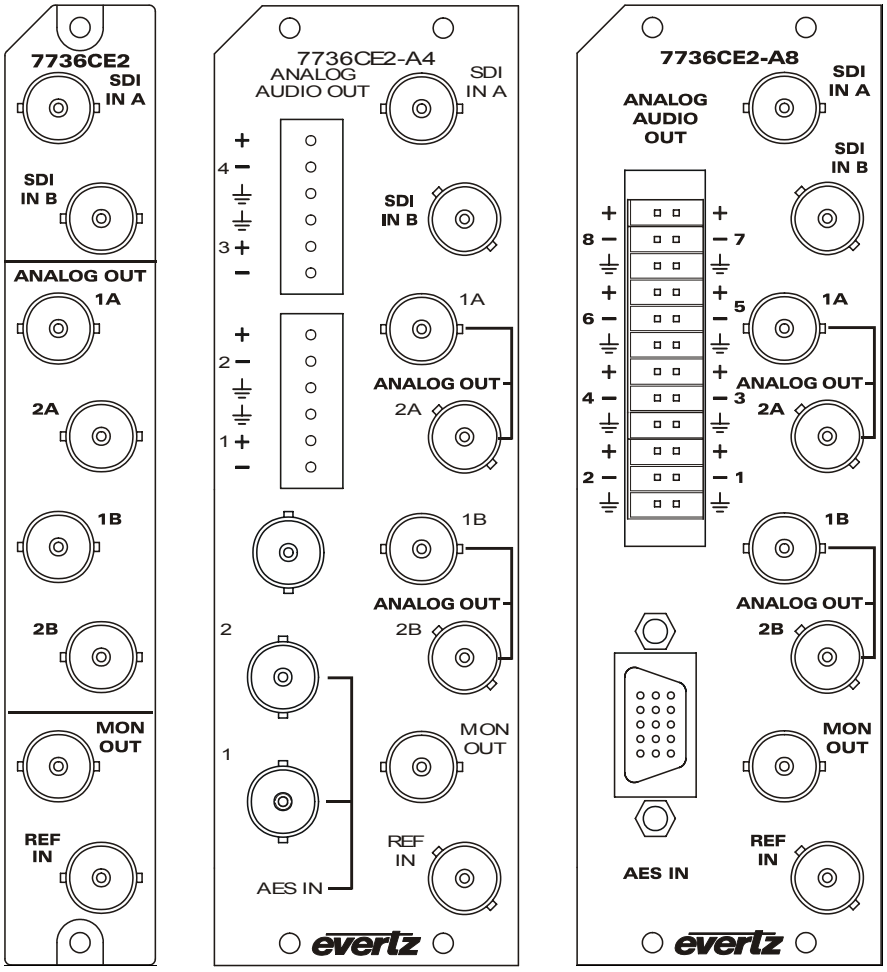


Figure 2-1: 7736CE2 Rear Panels

2.1. VIDEO IN AND OUT

Connect a source of component serial digital (525 or 625 line) video to the top BNCs labeled SDI IN A and SDI IN B. Connect a reference black signal to the REF IN BNC if frame synchronization is desired (+S only). Broadcast quality composite analog video is available on the ANALOG OUT BNCs, 1A and 2A are converted versions of SDI IN A while 1B and 2B are converted versions of SDI IN B. Monitoring quality video with text is available on the MON OUT output BNC. If the card is not present or the power is off, there will be nothing on any of the outputs.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standard:	SMPTE 259M-C – 525 or 625 line component
Number of Inputs:	2
Number of Re-clocked Outputs:	0
Connector:	BNC per IEC 61169-8 Annex A
Return Loss:	>15dB to 270MHz
Embedded Audio:	SMPTE 272M-A
Frequency Lock Range:	±75ppm from nominal
Lock up time on a hot switch:	none or 7 frames (based on lock mode)

3.2. ANALOG BROADCAST VIDEO OUTPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Inputs:	2 per input video
Connector:	BNC per IEC 61169-8 Annex A
Signal Level:	1V nominal
Output Impedance:	75 Ohm
DC Offset:	0V +/- 50mV
Return Loss:	>45dB to 10MHz
Frequency Response:	<+/- 0.1dB to 4 MHz (response will depend on selected filtering)
Differential Phase:	< 0.5° (< 0.3° typical)
Differential Gain:	< 0.5% (< 0.3% typical)
SNR:	>75dB (both channels black video, 100kHz to 5MHz)
Output Level Control Range:	±10%
Black Level Control Range:	±7.5 IRE
Chroma Level Control Range:	±10%
Hue Control Range:	±15 deg. (NTSC only)
Minimum Delay:	3 µs
Maximum Delay:	1 frame + 3 µs (+S option only)

3.3. REFERENCE VIDEO INPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Inputs:	1
Connector:	BNC per IEC 61169-8 Annex A
Signal Level:	1V nominal (0.5V to 1.5V)
Frequency Lock Range:	±75ppm from nominal
Input Impedance:	75 Ohm or High impedance (jumper selectable)
Return Loss:	>25dB to 10MHz
Max Subcarrier Jitter:	< 3 degrees
Free-Running Frequency Control Range:	> +/- 10ppm (> +/- 270Hz)

3.4. ANALOG MONITORING VIDEO OUTPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Outputs:	1
Connector:	BNC per IEC 169-8
Signal Level:	1V nominal
Output Impedance:	75 Ohm
Return Loss:	>35dB to 10MHz

3.5. ANALOG AUDIO OUTPUTS (-A4 and –A8 only)

Number of Outputs:	4 (2 per video channel) for –A4 version 8 (4 per video channel) for –A8 version
Type:	Balanced analog audio
Connector:	Two 6 pin removable terminal strips for –A4 version Single 24 pin removable barrier strip for –A8 version
Output Impedance:	66Ω balanced
Sampling Frequency:	48kHz
Signal Level:	0dBFS => 12 to 25dBu (user settable)
Frequency Response:	<+/- 0.05dB (20Hz to 20kHz)
Dynamic Range:	24 bits when AES inputs selected, 20 bits when embedded audio selected
THD+N:	<0.001% (>100dB) @ 1kHz, -1dBFS
Crosstalk:	<-105dB (20Hz to 20kHz)
DC Offset:	<+/- 30mV
SNR:	>110dB "A" Weighting
Inter-Channel Phase Error:	<+/-1° (20Hz to 20kHz)

3.6. UNBALANCED AES AUDIO INPUTS (-A4 and –A8 versions only)

Number of Inputs:	2 for –A4 version 4 for –A8 version
Input Standard:	SMPTE 276M, single ended synchronous or asynchronous PCM AES
Connectors:	BNC per IEC 61169-8 Annex A for –A4 version DB15 for –A8 version
Resolution:	Up to 24 bits
Input Sampling Rate:	48 kHz +/- 600 ppm (+/-30 Hz)
Minimum I/O Delay:	3.5msec

3.7. BALANCED AES AUDIO INPUTS (-A4+B only)

Number of Inputs:	2
Input Standard:	AES3-1992, balanced synchronous or asynchronous PCM AES
Connectors:	One 6 pin removable terminal strip
Impedance:	110 Ohm
Resolution:	Up to 24 bits
Sampling Rate:	32kHz to 48 kHz
Input Level:	2V to 7V p-p
Minimum I/O Delay:	3.5msec

3.9. ELECTRICAL

Voltage:	+ 12VDC
Power:	10.2 Watts (7736CE2) 17.75 Watts (-A4 or –A4+B option) 18 Watts (-A8 version)
EMI/RFI:	Complies with FCC Part 15, class A and EU EMC directive.

3.10. PHYSICAL

350FR:	2
7700FR-C:	2
7800FR:	2

4. STATUS LEDs

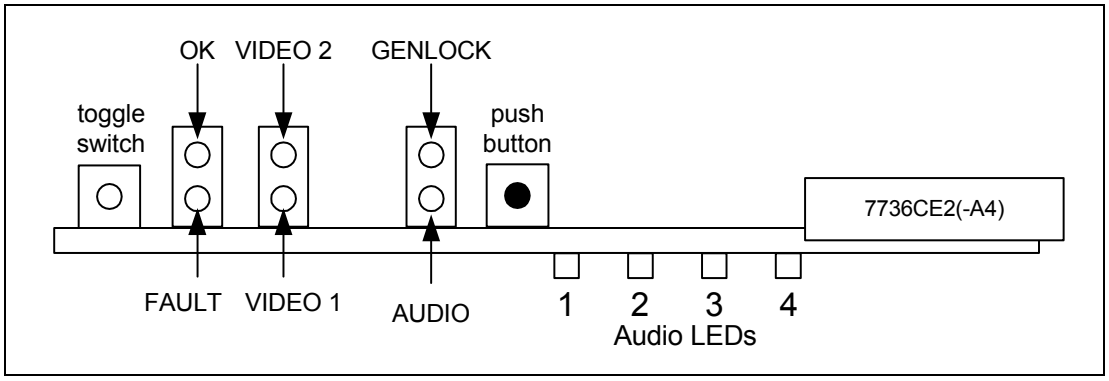


Figure 4-1: LED Locations

4.1. MODULE STATUS LEDS

MODULE OK: 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 has a 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 the card cannot communicate with its audio daughter board (-A4 only).

VIDEO 1, VIDEO 2: The VIDEO Green LEDs (#1 on bottom, closest to PCB and #2 on the top, away from the PCB) will indicate the video presence of the component serial digital inputs.

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

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

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

AUDIO: This Green LED is on solid when the user selected audio is present for both video inputs.

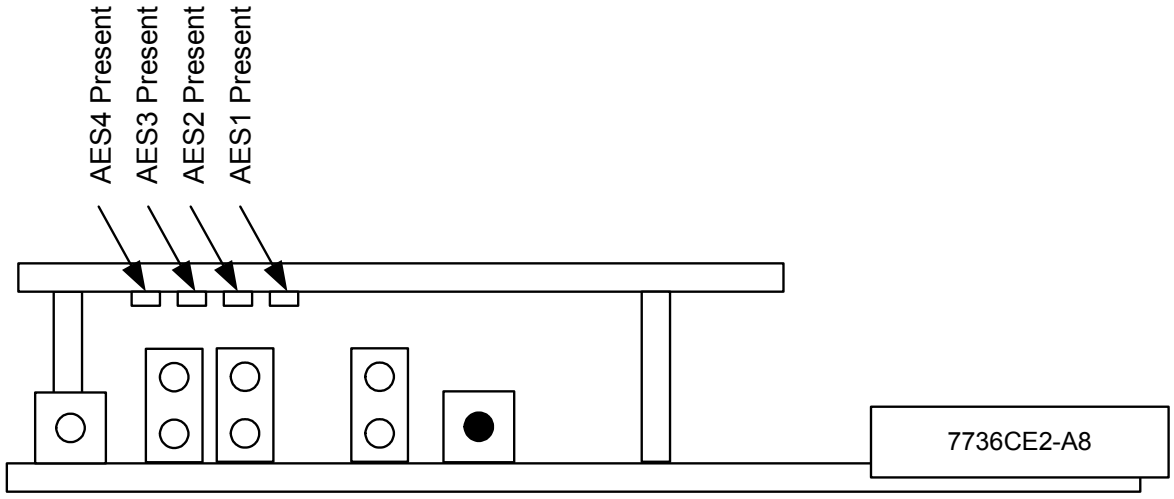
4.2. AUDIO STATUS LEDS

Four LEDs located on the lower end of the module (near the card extractor) indicate which selected audio is present. Audio channel 1 LED is located closest to the center of the module. Digital audio presence is determined by the AES receiver lock indicator (when AES input is selected). Audio LED's 1 and 2 displays the status of selected audio source for video 1 and Audio LED's 3 and 4 displays the status of selected audio source for video 2.

Audio LED	Colour	Audio Channel Status
1	Off	Audio not present for video 1
	Green	Selected audio present for video 1
2	Off	Reserved
	Green	Reserved
3	Off	Audio not present for video 2
	Green	Audio present for video 2
4	Off	Reserved
	Green	Reserved

Table 4-1: Audio Channel Status LEDs 7736CE-A4

For the 7736CE2-A8 four bi-colour (Red and Green) LEDs indicate whether or not AES audio is present as per the diagram below. If the AES signal is present the LED lights up green, while signal loss or sampling rate outside of locking range lights up the LED red.



4.3. Audio Break-Out Cable (7736CE2-A8 only)

AES audio is supplied to the card via DB15 connector. The pin-out of this connector is as follows:

Break-out Cable Label	Description	DB-15 Pin
	Reserved for future use	1
	Reserved for future use	2
	Reserved for future use	3
	Reserved for future use	4
	Reserved for future use	5
	Reserved for future use	6
AES A2	AES input 2 - unbalanced	7
	Reserved for future use	8
AES B2	AES output 2 - unbalanced	9
AES B1	AES output 1 – unbalanced	10
AES A1	AES input 1 – unbalanced	11
AES B4	AES output 4 – unbalanced	12
AES B3	AES output 3 - unbalanced	13
AES A4	AES input 4 – unbalanced	14
AES A3	AES input 3 – unbalanced	15
GND	Ground	Shell

Table 4-2: AES Audio Breakout Cable (Evertz Part # WPAES8-BNCM-6F)

5. ON SCREEN MENUS

5.1. NAVIGATING THE ON SCREEN MENU SYSTEM

A toggle switch and pushbutton allows 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 options, use the toggle switch to select the desired menu item and press the pushbutton.

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

5.2. STATUS SCREEN

The purpose of the status screen is to show status information about the video and audio in a small, concise table. Table 5-1 shows each item that appears in the status screen. This screen will always be displayed when the user is not in the configuration menu.

Item	***Value(s)***	***Description***
Video 1	Present / Not Present	Displays Input video 1 status
Video 2	Present / Not Present	Displays Input video 2 status
Genlock	Present / Not present	Displays Genlock status
Video 1 Audio Groups	Groups / none	Displays which audio groups are present
Video 2 Audio Groups	Groups / none	Displays which audio groups are present
V1. Sel Aud Source	Present / Not Present	Displays status of selected audio source for video 1
V2. Sel Aud Source	Present / Not Present	Displays status of selected audio source for video 2

Table 5-1: Video/Audio Status Screen Items

5.3. ON SCREEN DISPLAY – MAIN MENU

Channel 1	Configuration of the parameters associated with channel 1 video and audio.
Channel 2	Configuration of the parameters associated with channel 2 video and audio.
Genlock	Configures genlocking and other items that are shared between channels.
Utilities	Card preset management, data logging and various debug and maintenance features.

The OSD menu is arranged in a layered structure that groups similar configuration items together. The following section provides a brief description of the first level of menus that appear when you enter the OSD screens. Selecting one of these items will take you to the next menu level. The remaining sections provide detailed descriptions of each of the sub-menus. The tables in each section 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.

5.4. ON SCREEN DISPLAY – CHANNEL MENU

Audio	Configuration of the parameters associated with the selected channel audio.
Video / SID	Configuration of the parameters associated with the selected channel video.

The *Channel* menus for each channel are identical. For simplicity, only one is described.

5.5. CONFIGURING THE AUDIO CONTROLS (-A4 and –A8 Versions)

The *Audio* menus are used to configure parameters associated with the analog audio outputs and the audio de-multiplexing. The chart below shows the items available in the *Audio* menu. Many of the menu items are the same for the channel 1/2 (-A4 version) and channel 1/2/3/4 (-A8 version). For simplicity only the menu items for the channel 1/2/3/4 (-A8 version) are shown in the manual.

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

5.5.1. Loss of Video Mode (-A4)

Audio
- *Loss of video*
  - *pass audio*
  - *mute audio*

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

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

5.5.2. Selecting the Audio Source

Audio
- *Audio Source*
  - *Group 1*
  - *Group 2*
  - *Group 3*
  - *Group 4*
  - *AES*

Up to 4 groups of audio may be embedded on SDI video. This control selects the group ID of the de-multiplexed audio. In addition, the external AES source may be selected.

5.5.3. Additional Audio Delay (-A4)

Audio
Audio delay
0 *-37ms to 2.5sec in 0.5ms increments*

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

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

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

5.5.4. Monitoring the Audio Buffer Tracking (-A4)

Video/SID
Audio buffer

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

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

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

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

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

The delay of the audio through the audio buffer always tracks the video except when the video frame synchronizer drops or repeats frames of video or the user supplies a different phase of input video. Unfortunately, at these boundary conditions, we cannot simply drop or repeat sections of audio. A rate conversion process is used to fill or empty the buffer to the desired 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 in order to help in debugging system issues.

5.5.5. Setting the Analog Levels (-A4 and –A8 versions)

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

Audio
Ch1 adjust
12 to 24
24

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

5.5.7. Audio Channels Processing (-A4)

Audio
Ch1 / Ch2 processing
Pass
swap

Basic audio channel manipulation is possible with this control. Either audio is passed straight through or a left/right swap is performed.

Audio
Ch3 / Ch4 processing
Pass
swap

Basic audio channel manipulation is possible with this control. Either audio is passed straight through or a left/right swap is performed.

5.6. CONFIGURING THE VIDEO

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

Video processing	Selecting this item provides access to the *Video Processing* Menu.
Loss of video	Selects the action to take when the input video is missing.
525 H phase	Sets the horizontal phase of the output signal with respect to the NTSC Genlock reference input.
625 H phase	Sets the horizontal phase of the output signal with respect to the PAL-B Genlock reference input.
H Delay	Status display that shows the current horizontal input to output delay.
525 V phase	Sets the vertical phase of the output signal with respect to the NTSC Genlock reference input.
625 V phase	Sets the vertical phase of the output signal with respect to the PAL-B Genlock reference input.
V Delay	Status display that shows the current vertical input to output delay.
NTSC Colour Field Phase	Sets the colour field phase of the NTSC output video.
PAL-B Colour Field Phase	Sets the colour field phase of the PAL-B output video.
Audio buffer	Status of audio delay buffer.

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

Video
Loss of video
Freeze,
Black

With this control, the output video can be configured to go to black or freeze the last good video picture at the input.

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

Video
525 H phase
0 to 1715
0

With this control, you can set the horizontal timing of the output video with respect to the Genlock reference input when operating in NTSC/525 video mode. Increasing the value will delay the output video in one-sample increments.

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

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

Video
625 H phase
0 to 1727
0

With this control, you can set the horizontal timing of the output video with respect to the Genlock reference input when operating in PAL/625 video mode. Increasing the value will delay the output video in one-sample increments.

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

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

Video
H Delay

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

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

Video
525 V phase
0 to 524
0

With this control, you can set the vertical timing of the output video with respect to the Genlock reference input when operating in 525 video mode. Increasing the value will delay the output video in one-line increments.

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

Video
625 V phase
0 to 624
0

With this control, you can set the vertical timing of the output video with respect to the Genlock reference input when operating in 625 video mode. Increasing the value will delay the output video in one-line increments.

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

Video
V Delay

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

5.6.8. Setting the Colour Field Phase of the Output Video – NTSC Video

Video
NTSC C phase
0 to 1
0

With this control, you can set the colour field phase of the output video with respect to the Genlock reference input when operating in NTSC/525 video mode.

The correct value for this register will depend on the reference to output video phase. If the output video is later than the reference video, but less than one field, then setting this control to "0" will assign the output video the same colour field relationship to the genlock.

5.6.9. Setting the Colour Field Phase of the Output Video – PAL-B Video

Video
PAL-B C phase
0 to 3
0

With this control, you can set the colour field phase of the output video with respect to the Genlock reference input when operating in PAL-B/625 video mode.

The correct value for this register will depend on the reference to output video phase. If the output video is later than the reference video, but less than one field, then setting this control to "0" will assign the output video the same colour field relationship to the genlock.

5.6.10. Monitoring the Audio Buffer Tracking (-A4 and –A8)

Video
Audio buffer

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

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

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

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

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

The delay of the audio through the audio buffer always tracks the video except when the video frame synchronizer drops or repeats frames of video or the user supplies a different phase of input video. Unfortunately, at these boundary conditions, we cannot simply drop or repeat sections of audio. A rate conversion process is used to fill or empty the buffer to the desired 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 in order to help in debugging system issues.

5.7. CONFIGURING THE VIDEO PROCESSING CONTROLS

The *Video Processing* menu is used to configure parameters associated with the composite encoder video processing. The chart below shows the items available in the *Video Processing* menu.

NTSC setup pedestal	Selects whether the NTSC 7.5 IRE pedestal will be added to the composite analog output video
Line 21 setup	Controls line 21 processing
Colour Bars	Turn on internally generated colour bar test signal
Composite display mode	Selection of colour or B/W modes
Video level	Controls the output video level
Hue	Controls the output video hue
Saturation	Controls the output video saturation
Contrast	Controls the output video white level
Brightness	Controls the output video black level
H blanking	Controls the width of horizontal blanking
VBI processing	Either pass or blank the vertical blanking interval lines
Y Filter Selection	Standard composite filtering or adjustable filtering is selectable
Wideband Y Freq. Resp.	Controls the frequency response with the wideband filter selected
Chroma Filter Selection	Various chroma bandwidths are available with this control

5.7.1. Adding the NTSC Setup Pedestal

Video
Video Processing
NTSC setup pedestal
Off
On

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

5.7.2. Line 21 Processing

Video
Video Processing
Line 21 setup
Off,
On,
Blank

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

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

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

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

Blank is used to remove captioning from line 21.

5.7.3. Colour Bars

Video
Output Video Processing
Colour bars
On,
Off

Internally generated colour bars may be turned on.

Warning: Output H and V phase controls cannot be controlled when the colour bars are turned on. In addition, if the unit is re-powered, the bars will be turned off.

5.7.4. Setting the Composite Display Mode – Colour or Monochrome

Video
Video Processing
Composite display mode
Colour
B/W

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

5.7.5. Video Level

Video
Video Processing
Video level
-128 to 127,
0

This control allows the user to adjust the output level of the analog video (including sync). When set to 0, the nominal output video level will be 1V plus or minus analog component variations.

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

5.7.6. Setting the Hue

Video
Video Processing
Hue
-22.5 to 22.5
0.0

This control allows the user to adjust the Hue of the analog video in steps of 0.175 degrees.

5.7.7. Setting the Saturation

Video
Video Processing
Saturation
-64 to 63
0

This control allows the user to adjust the saturation level of the analog video.

5.7.8. Setting the Contrast

Video
Video Processing
Contrast
-64 to 63
0

This control allows the user to adjust the contrast (white level) of the analog video. There is a +/- 10% range on this control.

5.7.9. Setting the Brightness

Video
Video Processing
Brightness
-32 to 31
0

This control allows the user to adjust the brightness (black level) of the analog video. There is a +/- 15 IRE range on this control.

5.7.10. H Blanking

Video
Video Processing
H Blanking
Wide,
Narrow

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

5.7.11. VBI Processing

Video
Output Video Processing
VBI Processing
Blank,
Pass

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

5.7.12. Y Filter Selection

Video
Output Video Processing
Y Filter Selection
Wide bandwidth, *Composite*

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

5.7.13. Wideband Y Frequency Response

Video
Output Video Processing
Wideband Y Freq. Resp.
-6 to 6 *0*

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

Note: If you want to observe the filtering, supply a component multi-burst or H sweep test signal.

5.7.14. Chroma Filter Selection

Video
Output Video Processing
Chroma Filter Selection
650kHz, *1.0Mhz,* *1.3MHz,* *2.0MHz,* *3.0MHz*

The Cb and Cr channels may be filtered with any of these bandwidths.

5.8. CONFIGURING THE GENLOCK CONTROLS

5.8.1. Setting the Video Standard

Genlock
Video standard
NTSC/525
PAL-B/625

The video standard is selected with this control.

Warning: If you power up the card in a standard opposite to the standard that is being applied as the genlock source, the OSD will not be readable to change the standard. You must remove the genlock signal, change the standard, and then re-apply the genlock.

5.8.2. Genlock Source Selection

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

This control allows you to select the reference video for the frame synchronizer output timing. Optionally, the synchronizer can be free-run if the "*none*" option is selected.

Warning: Both channels share the genlock. It is not possible to lock one channel and free-run the other or use a different genlock source.

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.

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

5.8.3. Setting the Free Running Frequency

Genlock
Free-run freq
-256 to 256
0

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

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

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

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

Genlock
525 fine phase
-128 to 127
0

With this control, you can set the horizontal fine phase timing of the output video with respect to the Genlock when operating in NTSC/525 video mode and locking to the reference input. Increasing the value will delay the output video. There is approximately 250 ns range on this control.

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

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

Video
625 fine phase
-128 to 127
0

With this control, you can set the horizontal fine phase timing of the output video with respect to the Genlock when operating in PAL/625 video mode and locking to the reference input. Increasing the value will delay the output video. There is approximately 250 ns range on this control.

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

5.9. UTILITIES

5.9.1. Accessing Information about this Module and its Firmware

Utilities
About…

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

5.9.2. Saving and Recalling Configurations

The module provides two user preset areas to save the complete set of controls 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.

5.9.2.1. 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.

5.9.2.2. 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.

5.9.3. 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.

5.9.4. 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.

6. JUMPERS

6.1. TERMINATION JUMPERS

REF TERM: The REF TERM jumper J22, located on the rear of the card near the white multi-pin 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.

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

FRAME STATUS: The FRAME STATUS jumper J3 located at the front of the module determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

To monitor faults on this module with the frame status indicators (on the PS FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the ON position. (Default) When this jumper is moved to the OFF position, local faults on this module will not be monitored.

Power supply faults will assert the frame status fault line when J3 is installed in the ON position.

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

The following method can be used to upgrade the firmware in the CE2 card. You can also use the *UPGRADE* menu item located in the *UTILITIES* menu to upgrade the firmware.

UPGRADE: The UPGRADE jumper J2 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* chapter 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* chapter in the front of the binder. Once the upgrade is complete, 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.

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