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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Feb 01
1.1	Added features for LB (Line Buffer) version	Mar 01
1.2	Incorporated module features into one 7735AVC-LB document, "7735AVC" version is discontinued	Apr 01
1.3	Added references to re-embedded audio on output SDI stream	Jun 01
1.4	Minor modifications	Oct 01
1.4.1	Figure 2 Updated to show 15 pin D connector	Feb 02
1.4.2	Analog Video Specs updated	Mar 02
1.5	Added Video Invalid Duration control, changed picture freeze and black duration values, added About … Menu item to Utilities menu	Apr 02
1.6	Updated card edge menu items	Jun 08

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1. OVERVIEW

The 7735AVC-LB is a 10-bit component SDI to composite analog converter with line synchronizing buffer, audio de-multiplex and digital to analog converter. The 7735AVC-LB is also equipped with Evertz's SoftSwitch™ technology, which mitigates audio pops during hot-switching while maintaining consistent video and audio sequences and formats. In addition, the 7735AVC-LB cards are VistaLINK® enabled offering local and remote monitoring as well as control and configuration capabilities.

Model	Description	Slots
7735AVC-LB	SDI to Composite Analog Encoder with Line Synchronizing buffer and VistaLINK® Audio and Fault Monitoring	2

Features:

- One SDI 525 or 625, 270 Mb/s component digital video input
- Two SDI 525 or 625, 270 Mb/s component digital video outputs
- Two composite analog video outputs
- Genlock reference loop input for proper timing and colour framing
- Line synchronizing buffer allows re-timing of output video up to one line
- Embedded audio on input is de-embedded and re-embedded after re-timing
- Hot-switch audio pop mitigation through SoftSwitch™ technology
- One group (4 channels of audio) is de-multiplexed from the incoming digital video
- 4 adjustable analog audio outputs can be set so both are a mono mix of the selected channel pair
- Two pairs of stereo balanced analog outputs and 2 AES digital audio outputs
- VistaLINK® monitoring of an extensive list of error and fault conditions including freeze or black video, etc.
- RS-232 data logging port to log fault conditions
- Two GPI and one GPO to control and report user definable fault conditions through high density DB15 connector
- Bulkhead panel is available to facilitate wiring to the high density DB15 connector (up to 10 7735AVC-LB modules can be wired to each bulkhead panel)
- Comes with *ConfigSet* software to upload or download board configurations to a PC. Setups can be copied from one module to another to facilitate configuration of a large number of modules

1.1. FUNCTIONAL DESCRIPTION

On the 7735AVC-LB, serial digital video is converted to parallel and the embedded audio is de-multiplexed. The video is clocked into a line buffer which is then clocked out of the line buffer in time with the reference timing. Audio is re-multiplexed and sent to two separate serial digital outputs. The video also goes to the high quality composite encoder, where it is properly colour framed to the reference input and then output on two separate BNCs. The de-multiplexed audio is converted to analog and delivered out to the high density DB-15 connector on the rear of the card. The output timing and colour frame may be offset from the reference through menu settings.

General-purpose inputs are used for remote control of some features and general-purpose outputs are generated under error conditions.

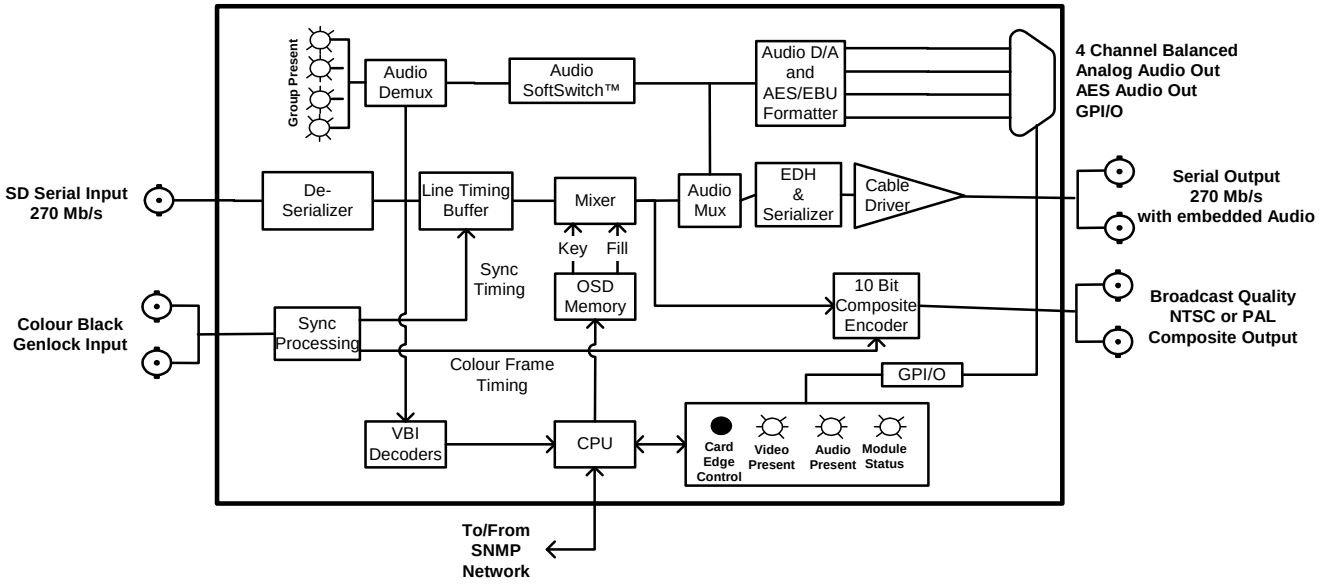

Figure 1-1: 7735AVC-LB Block Diagram

2. INSTALLATION

The 7735AVC-LB version comes with a companion rear plate that has 7 BNC connectors and one high density female DB-15, occupying two slots in the 7700FR frame. Figure 2-1 provides an illustration of the rear panel. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

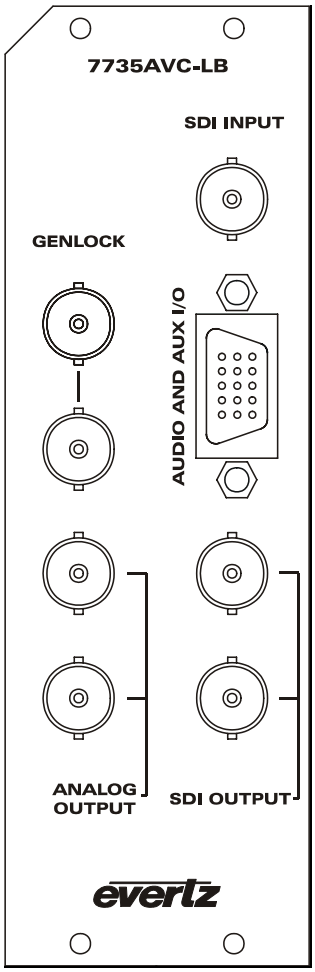

Figure 2-1: 7735AVC-LB Rear Panel

2.1. VIDEO CONNECTIONS

Connect a source of component digital 525 or 625 line 270 Mb/s video to the BNC labeled SDI INPUT. Analog video output is available on the ANALOG OUTPUT BNCs. Two SDI outputs are also available through the SDI OUTPUT BNCs.

2.2. GENLOCK REFERENCE

For proper synchronization of the output video, the 7735AVC-LB must be locked to a stable 1 volt p-p composite analog colour black source, applied to the GENLOCK video loop. The internal sync separator has a high impedance input tapped off the loop through, therefore, the video signal must be properly terminated at the end of the line.

If Genlock video is not present, the input video is used to determine the output timing. When the Genlock video is applied or removed, the output video timing will suddenly jump to the new timing phrase, creating video and audio artifacts.

2.3. AUDIO AND AUX I/O

The audio outputs are available on a female high density DB-15 connector labeled "Audio and Aux I/O." Table 2-1 shows the pin-out of the connector:

Name	Description	DB-15
A1-	Audio channel 1 -	4
A1+	Audio channel 1 +	5
A2-	Audio channel 2 -	14
A2+	Audio channel 2 +	15
A3-	Audio channel 3 -	9
A3+	Audio channel 3 +	10
A4-	Audio channel 4 -	12
A4+	Audio channel 4 +	13
AES1	Single ended AES output 1	11
AES2	Single ended AES output 2	7
GPI1	General Purpose Input 1	8
GPI2	General Purpose Input 2	1
GPO1	General Purpose Output 1	3
Tx	RS-232 (output)	2
Rx	RS-232 (input)	6
	Ground	Shell

Table 2-1: Audio and Aux I/O Pinout

The physical layout is as follows:

			6	Rx			
1	GPI2		7	AES2		11	AES1
2	Tx		8	GPI1		12	A4-
3	GPO1		9	A3-		13	A4+
4	A1-		10	A3+		14	A2-
5	A1+					15	A2+

Table 2-2: Audio and Aux I/O Physical Layout

Connect to the shell for ground.

2.3.1. Analog Audio Connections

Four channels of balanced analog audio are available through this connector. The balanced audio can be connected to male XLR connectors as follows (standard pin 2 +ve connection):

HD DB-15	XLR
Audio +	2
Audio -	3
Shell	1

Table 2-3: Analog Audio to XLR Connection

2.3.2. General Purpose Inputs and Outputs

The GPIs are active low with internal pull up resistors (4.7kΩ) to +5V. To make an input active, lower the signal to near ground potential (i.e. connect to shell or chassis ground). This can be done with a switch, relay, TTL drive, GPO output or other similar methods. Figure 2-2 illustrates the input circuit for the General Purpose Inputs:

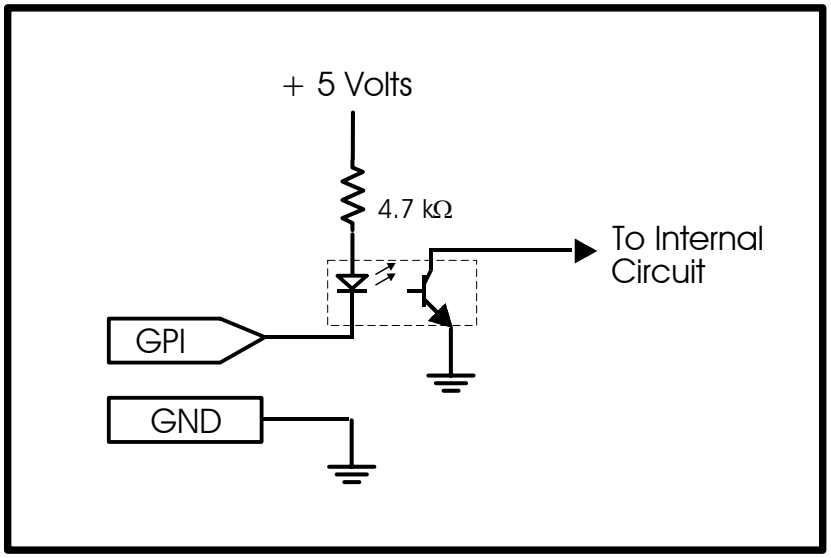

Figure 2-2: GPI Circuitry

The GPO is software programmable active high or low with internal pull up (10kΩ) resistors to +5V. When the output goes low it is able to sink up to 10mA. When high, the signal will go high (+5V). **Do not draw more than 100μA from the output.** Figure 2-3 illustrates the circuit for the General Purpose Output:

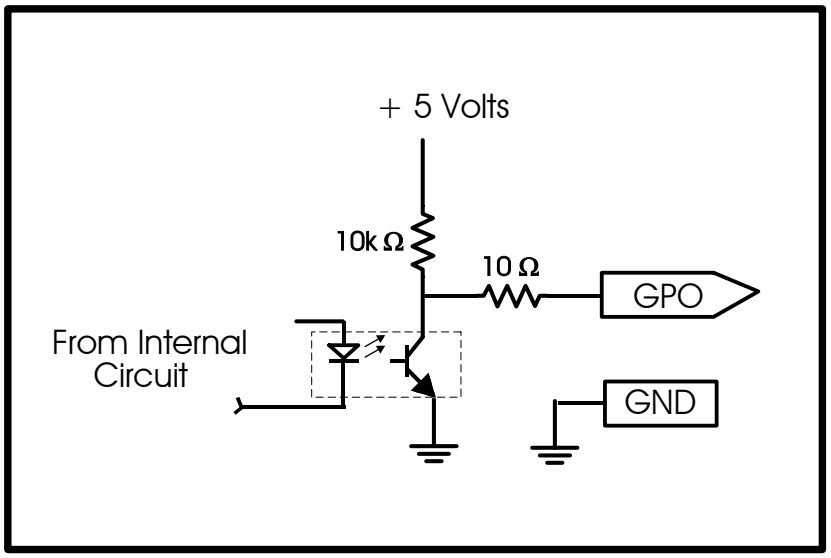

Figure 2-3: GPO Circuitry

2.3.3. RS-232 Serial Port Connections

The COM port signals are standard RS-232 with no hardware flow control. The directions of the signals are indicated in Table 2-1. The RS-232 port on the AUDIO AND AUX I/O connector is used for control and data logging of status and fault conditions. Control and data logging is done with custom software that communicates with the 7735AVC-LB card using the AVC Control/Status Protocol. For more information about configuring the data logging output, see sections 7.8.2 and 9.

The RS232 port is also used for extracting and uploading configurations to 7735AVC-LB cards using the *ConfigSet* software (included). For more information on *ConfigSet* see section 8.

2.4. INSTALLING THE BULKHEAD BREAKOUT PANEL

The 7760AVM-BHP Bulkhead breakout panel (an accessory designed for our 7760AVM modules) can also be used with the 7735AVC-LB cards. It provides the user with a convenient way of connecting the audio and GPI/O signals into the HD DB-15 connectors on the rear of the modules. This panel occupies 1.5 units of rack space and is designed to be mounted at the rear of the user's rack panel. The breakout panel can be used to connect up to ten AVC modules. Each of the ten sets of connectors on the breakout panel is fitted with two BNCs for AES audio out, two six position terminal strips for the 4 channels of analog audio, and one six position terminal strip for the GPI/O and RS-232 signals. Figure 2-4 shows one section of the breakout panel. On the rear of the breakout panels are 10 female HD DB-15 connectors.

To connect the AVC module to the breakout panel, connect the 15 pin extender cables supplied with the breakout panel between the **AUDIO AND AUX I/O** connector on the rear of the AVC module and the appropriate D connector on the breakout panel. The user must make sure to secure the connectors with the screws supplied. The audio and aux cables can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip is inserted into the breakout panel and secured using the two hold down screws.

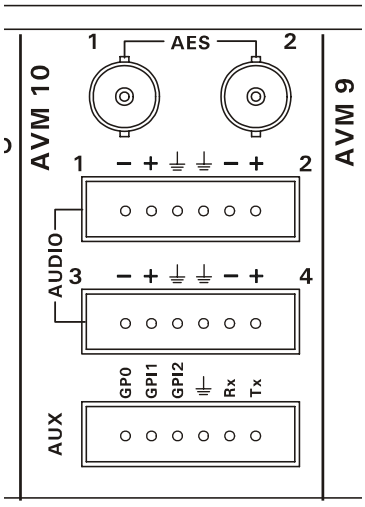

Figure 2-4: Breakout Panel for Wiring Audio and Aux Connections

3. SPECIFICATIONS

3.1. SERIAL DIGITAL VIDEO INPUT

Standard:	SMPTE 259M-C – 525 or 625 line component
Connector:	1 BNC per IEC 169-8
Termination:	75 ohm
Equalization:	Automatic 200m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss:	> 15dB up to 270MHz
Embedded Audio:	SMPTE 272M-A

3.2. SERIAL DIGITAL VIDEO OUTPUT

Standard:	SMPTE 259M-C – 525 or 625 line component. – same as input
Number of Outputs:	2
Connector:	BNC per IEC 169-8
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	470ps nominal
Overshoot:	<10% of amplitude
Embedded Audio:	Same signal as input: SMPTE 272M-A

3.3. GENLOCK INPUT

Type:	NTSC (SMPTE 170M) Colour Black 1 V p-p
Connector:	2 BNC per IEC 169-8
Termination:	igh impedance loop through
Return loss:	>35 dB up to 10 MHz
SNR:	> 50dB
Levels:	min: 0.5Vp-p, max: 1.5Vp-p

Max Sub-carrier Jitter: < 3degrees

3.4. ANALOG VIDEO OUTPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Outputs:	2
Connector:	BNC per IEC 169-8
Signal Level:	1V nominal (user adjustable from menu)
DC Offset:	0V ±0.02V
Return Loss:	> 35dB up to 5MHz
Frequency Response:	0.1dB to 4 MHz, 0.15dB to 5.5 MHz
Differential Phase:	< 0.5° (<0.3° typical)
Differential Gain:	< 0.5% (<0.3 % typical)
SNR:	> 78dB to 5 MHz
Minimum Delay:	3 µsec

3.5. ANALOG AUDIO OUTPUT

Number of Outputs:	4
Type:	Balanced analog audio
Connector:	Female High Density DB-15
Output Impedance:	33Ω
Sampling Frequency:	48kHz
Signal Level:	0dB FS =>8 to 24dBu (user settable) **NOTE:** High impedance loads only (10 kΩ) Not good for low impedance loads (i.e. 600Ω)
Frequency Response:	< ± 0.05dB (20Hz to 15kHz) < ± 0.1dB (20Hz to 20kHz)
Dynamic Range:	> 84dB RMS
THD+N:	> 74dB RMS @ 1kHz, relative to 14dBu > 63dB RMS @ 20Hz to 20kHz, relative to 14dBu
Crosstalk:	< -75dB RMS (20Hz to 20kHz)

3.6. AES AUDIO OUTPUTS

Number of Outputs:	2
Standard:	SMPTE 276M, single ended synchronous or asynchronous AES
Connectors:	High-density female DB-15
Resolution:	20 bits (from embedded audio)
Sampling Rate:	48 kHz
Impedance:	75 Ohms unbalanced

3.7. GENERAL PURPOSE IN/OUT

Number of Inputs:	2
Number of Outputs:	1
Type:	Opto-isolated, active low with internal pull-ups to +5V
Connector:	Female High Density DB-15
Signal Level:	+5V nominal

3.8. CONTROL AND DATA LOGGING SERIAL PORT

Standard:	RS-232
Connector:	Female High Density DB-15
Format:	As per AVC Control/Status Protocol document – contact factory

3.9. ELECTRICAL

Voltage: + 12VDC
Power: 12 Watts
EMI/RFI: Complies with FCC Part 15, class A and EU EMC directive

3.10. PHYSICAL

Number of slots: 2

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.

SIGNAL PRESENT: This Green LED will be on when there is a valid video signal present at the module SDI input.

AUDIO PRESENT: This Green LED will be on when the selected audio source is present.

4.2. AUDIO STATUS LEDs

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

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

Table 4-1: Audio Group Status LEDs

5. OUTPUT TIMING CALIBRATION PROCEDURE

This section contains a detailed description on setting the various Genlock phasing and colour framing parameters. Items in italics refer to menu items in the 7735AVC-LB. The following description uses 525 line parameters for simplicity of discussion, however calibrating the card for 625 video is identical using 625 line parameters.

5.1. CALIBRATE TIMING OF THE OUTPUT VIDEO

1. Supply the card with the plant's Genlock reference feed. If the user's Genlock reference is in time and in the same colour frame sequence with plant timing, the user should not have to adjust the phasing parameters.
2. Adjust the *525 H phase* parameter so that the output video is in time with the plant's horizontal timing.
3. Adjust the *525 V phase* parameter so that the output video is in time with the plant's vertical timing.
4. Adjust the *525 Colour Frame Offset* parameter so that the colour frame sequence of the output video matches the plant's colour framing.

5.2. VERIFY TIMING OF THE INPUT VIDEO

1. Supply the card with each of the different video feeds that will be used during operation.

2. The *525 V delay* menu item allows the user to see the vertical delay between the input and the output. Normally this value should be zero. If the vertical delay is not zero, the user will have to adjust the vertical timing of the input signal.

   TIP: A simple method of verifying the vertical timing if the user does not have a waveform monitor available is to connect a source of video with closed captions encoded on line 21. Connect the output of the 7735AVC-LB to a closed caption decoder. Adjust the vertical timing of the video signal until the caption decoder begins reading line 21 captions. (Caption decoders usually must see the caption signal exactly on line 21 before they will decode anything).

3. The *525 H delay* menu item allows the user to see the horizontal delay between the input and the output. Normally this value should be in the range of 100 to 1500 to permit a sufficient margin in the line buffer timing to allow for proper synchronization of the video. If the horizontal delay value is outside this range, the user will have to adjust the horizontal timing of the input signal.

6. AUDIO ALARM CALIBRATION PROCEDURE

This section contains detailed descriptions outlining how to set 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 AVC. Please refer to section 7.7 for a complete description of the fault definition menu items.

6.1. CALIBRATE AUDIO SILENCE DETECTION

1. Supply the card with the 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, be sure to set the *Fault Duration* to a small number of frames in order to see when the error condition disappears.
3. Set the *Silence Duration* to 0.5 sec to view the results of adjusting the *Silence Level* parameter without getting confused by 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 the application. This should be set to a value longer than the worst case acceptable quiet period.

6.2. CALIBRATE AUDIO PHASE REVERSAL DETECTION

1. Supply the card with a stereo signal that has the phases reversed. Ensure 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 the *Fault Duration* is set to a small number of frames in order to see when the error condition disappears.
3. Set the *Phase Reversal Duration* to 0.5 sec to view the results of adjusting the *Phase Reversal Level* without getting confused by 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 the application.

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.

Stereo material with long periods of dissimilar left/right content (for example, 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 would be expected.

6.3. CALIBRATE AUDIO MONO DETECTION

1. Supply the card with a stereo signal that originated from mono material and that has a large amount of uncorrelated noise added to each channel. This will allow the user to set the *Mono Threshold* to a value that will detect the mono condition in the presence of noise.

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 the *Fault Duration* is set to a small number of frames in order to see when the error condition disappears.
3. Set the *Mono Duration* to 0.5 sec to view the results of adjusting the *Mono Threshold Level* without getting confused by 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 the application.

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.

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 the user would expect.

6.4. DEFINE THE AUDIO 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, its H and V position, and its characteristics (opacity, colour, etc).
4. Assign the *Fault Condition* to an output contact closure (GPO) if it is desired.

7. ON SCREEN MENUS

7.1. 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. When configuring multiple cards it is useful to copy board configurations from one board to another using the *ConfigSet* utility provided with the user's card. Please view the *ConfigSet* information in section 8 of this manual.

To enter the menu system, simultaneously push and hold the toggle switch up, and press and hold the push-button. After about 5 seconds, the main menu appears. The user can now 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 the user is 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 the user 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 navigate 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 the user can now adjust the parameter. Using the toggle switch, adjust the parameter to the desired value. If the parameter is a numerical value, the number will increase if the toggle switch is lifted and decrease if the toggle switch is pushed down. If the parameter contains a list of options, the user can cycle through the list by pressing the toggle switch in either direction.

When the desired value is reached, 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.

7.2. CHANGING TEXT FIELDS

Some of the controls of the OSD menu allow the user to adjust a text-based field. Editing a line of text can be rather tedious using a toggle switch and a pushbutton; however, 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 the user 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 will be changed with the toggle switch.

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

3. Once the desired character is selected, 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 assist in entering the text: a backspace character (left pointing arrow), and an end of line character (stop sign):

Left Arrow: If the user accidentally advances to the next character and wants to go back, select the left arrow with the toggle switch. When the pushbutton is pressed, it will return to the previous character. This will save the user from having to complete the editing and re-edit to change the mistake.

Stop Sign: If new, changed text is shorter than old text, the line can be terminated with a stop sign. When the pushbutton is used after selecting the stop sign, any remaining characters in the text field will be erased and the user will return to the menu structure.

5. Editing is complete when the end of the field (maximum length) is reached, or when the stop sign is selected and the pushbutton is pressed.

7.3. ON SCREEN DISPLAY – MAIN MENU

The OSD menu is arranged in a layered structure that groups similar configuration items together. The following section provides a brief description of the first level of menus that appear when the user enters the OSD screens. Selecting one of these items will take the user to the next menu level. Sections 7.4 to 7.9 provide detailed descriptions of each of the sub-menus. The tables in sections 7.4 to 7.9 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.

Audio	Configuration of the parameters associated with audio de-multiplexing and the analog audio outputs.
Video/SID	Controls for the operation of video processing.
GPO configuration	Configuration of the General Purpose Outputs.
Fault definitions	Definition of the fault conditions.
Utilities	Card preset management and various debug and maintenance features.
Clear faults	An easy to access “clear fault state” command.

7.4. CONFIGURING THE AUDIO CONTROLS

The *Audio* menus are used to configure parameters associated with the audio de-multiplexing and the analog audio outputs. The chart below shows the items available in the *Audio* menu. Sections 7.4.1 to 7.4.5 provide detailed information about each of the parameters. Many of the menu items are the same for the channel 1/2 and 3/4 channel pairs. For simplicity only the menu items for the channel 1/2 channel pair are shown in the manual.

Audio source	Selects the source of audio to process.
Ch1/ch2 swap	Controls whether the channel 1 and 2 (L/R) outputs will be swapped.
Ch3/ch4 swap	Controls whether the channel 3 and 4 (L/R) outputs will be swapped.
Ch1/ch2 output mode	Controls whether the channel 1 and 2 will be treated as a stereo pair or will be added to make mono outputs.
Ch3/ch4 output mode	Controls whether the channel 3 and 4 will be treated as a stereo pair or will be added to make mono outputs.
Ch1/ch2 peak output level	Controls the channel 1 and 2 output level when a 0 dB FS input is applied (1 dB increments).
Ch3/ch4 peak output level	Controls the channel 3 and 4 output level when a 0 dB FS input is applied (1 dB increments).
Fine ch 1 adjust	Channel 1 fine level control.
Fine ch 2 adjust	Channel 2 fine level control.
Fine ch 3 adjust	Channel 3 fine level control.
Fine ch 4 adjust	Channel 4 fine level control.

7.4.1. Selecting the Audio Source to Monitor

Audio
Audio source
Group 1
Group 2
Group 3
Group 4

Up to 4 groups of audio may be de-embedded from and re-embedded in the incoming SDI video. This control selects which one of the four to de-embed, monitor and re-embed. There are four green LEDs under the PCB to indicate which of the four groups are currently present on the input video.

7.4.2. Swapping the Audio Channels of a Channel Pair

Audio
Ch1/ch2 swap
No
Yes

This control, if set to Yes, routes the two channels or a channel pair to the opposite channel output of the pair.

7.4.3. Selecting Whether a Channel Pair Is Monitored In Stereo Or Mono

Audio
Ch1/ch2 output mode
Stereo
Mono

This control, if set to Mono, adds the two channels of the pair, reduces the summed amplitude by 2 (to keep consistent operating levels), and routes this mono signal to both analog audio outputs or the channel pair.

7.4.4. Setting the Analog Peak Audio Output Level for a Channel Pair

Audio
Ch1/ch2 peak output level
8 to 24 dBu
14 dBu

This control sets the analog audio outputs of a channel pair to the desired operating level in 1 dB increments. The value selected corresponds to the output level when a 0 dB FS input signal is applied. To adjust the levels independently, or to fine tune the levels, use the Fine controls for the respective channels.

7.4.5. Setting the Analog Levels - Fine Adjust

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

Audio
Fine ch1 adjust
-128 to 127
0

The channel output level is adjusted with this control. It has a range of approximately +/- 3 dB with 15mdB resolution.

7.5. CONFIGURING THE VIDEO AND SOURCE ID CONTROLS

The *Video/SID* menus are used to configure parameters associated with the video input and output functions and the Source ID decoders. The chart below shows the items available in the *Video/SID* menu. Sections 7.5.1 to 7.5.7 provide detailed information about each of the parameters.

Analog Video	Controls the parameters such as NTSC setup pedestal, output level, hue, saturation, contrast and brightness on the composite analog video output.
Video Standard	Selects the input video standard.
Loss of Video	Selects the action to take when the input video is missing.
525 VITC line	Sets the line number for decoding Vertical Interval Time Code in 525 line video.
625 VITC line	Sets the line number for decoding Vertical Interval Time Code in 625 line video.
525 PESA line	Sets the line number for decoding PESA format Source ID in 525 line video.
625 PESA line	Sets the line number for decoding PESA format Source ID in 625 line video.
525 H phase	Sets the horizontal phase of the output signal to the NTSC Genlock reference input.
625 H phase	Sets the horizontal phase of the output signal to the PAL Genlock reference input.
H Delay	Status display which shows the current horizontal input to output delay.
525 V phase	Sets the vertical phase of the output signal to the NTSC Genlock reference input.
625 V phase	Sets the vertical phase of the output signal to the PAL Genlock reference input.
V Delay	Status display which shows the current vertical input to output delay.
525 Colour Frame Offset	Sets the offset in frames between colour frame 1 of the NTSC output signal with respect to colour frame 1 of the NTSC Genlock reference input.
625 Colour Frame Offset	Sets the offset in frames between colour frame 1 of the PAL output signal with respect to colour frame 1 of the PAL Genlock reference input.

7.5.1. Controlling the Composite Analog Video Parameters

7.5.1.1. Setting the NTSC Setup Pedestal

Video/SID
- *Analog Video*
  - *NTSC setup pedestal*
    - *On* (underlined)
    - *Off*

The NTSC setup pedestal should not be present when operating in Japan. This control allows it to be removed.

When the NTSC setup is On, the *Line 21 Setup* control determines whether setup will be applied to line 21.

7.5.1.2. Setting the Line 21 Setup Pedestal

- *Video/SID*
  - *Analog Video*
    - *Line 21 setup*
      - *On*
      - *Off*

When the NTSC setup pedestal is turned on using the *NTSC Setup Pedestal* control, setup will be applied to all lines of the active picture starting at line 21. The NTSC setup pedestal should not be present on line 21 when it is used for closed captions. This control allows it to be added if line 21 closed captions are not being used.

7.5.1.3. Setting the Composite Display Mode – Colour or Monochrome

- *Video/SID*
  - *Analog Video*
    - *Composite display mode*
      - *Colour*
      - *B/W*

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

7.5.1.4. Setting the Analog Video Output Level

- *Video/SID*
  - *Analog Video*
    - *Output level*
      - *-129 to 47*
      - *0*

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

7.5.1.5. Setting the Hue

- *Video/SID*
  - *Analog Video*
    - *Hue*
      - *-17.5 to 17.5*
      - *0.0*

This control allows the user to adjust the Hue of the analog video in increments of 0.5 degrees.

7.5.1.6. Setting the Saturation

- *Video/SID*
  - *Analog Video*
    - *Saturation*
      - *-10 to 10*
      - *0%*

This control allows the user to adjust the saturation level of the analog video in increments of 1%.

7.5.1.7. Setting the Contrast

- *Video/SID*
  - *Analog Video*
    - *Contrast*
      - *0 to 20*
      - *0*

This control allows the user to adjust the contrast of the analog video in increments of 1%.

7.5.1.8. Setting the Brightness

Video/SID
Analog Video
Brightness
-7.5 to 15.0
0.0

This control allows the user to adjust the brightness of the analog video in increments of 0.1 IRE.

7.5.2. Setting the Input Video Standard

Video/SID
Video Standard
Auto
625
525

This control enables the user to set the video standard to 625 (PAL) or 525 (NTSC).

7.5.3. Loss of Video

Video/SID
Loss of Video
Black
Pass

This control is used to determine what action to take when the video input is missing. The user can either have the output video go to black or pass whatever data is at the input.

7.5.4. Setting the VITC Line Number – 525 Line Video

Video/SID
525 VITC line
10 to 32
10

This control enables the user to set the VBI line number that contains the VITC information when operating in 525 video mode.

7.5.5. Setting the VITC Line Number – 625 Line Video

Video/SID
625 VITC line
6 to 32
10

This control enables the user to set the VBI line number that contains the VITC information when operating in 625 video mode.

If the VITC contains Source ID (SID) information, the AVC will automatically decode it.

If the wrong line number is set, no time code (or SID) will be decoded.

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

Video/SID
525 PESA line
10 to 21
11

This control enables the user to set the VBI line number that contains the PESA SID information when operating in 525 video mode. If the wrong line number is set, no SID will be decoded.

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

Video/SID
625 PESA line
7 to 22
11

This control enables the user to set the VBI line number that contains the PESA SID information when operating in 625 video mode. If the wrong line number is set, no SID will be decoded.

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

Video/SID
525 H phase
0 to 1715
0

This control enables the user to set the horizontal timing of the output video with respect to the Genlock reference input when operating in 525 video mode. Setting this control to 0, keeps the output video in time with the Genlock reference. Increasing the value will delay the output video in one-sample increments.

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

Video/SID
625 H phase
0 to 1727
0

This control enables the user to set the horizontal timing of the output video with respect to the Genlock reference input when operating in 625 video mode. Setting this control to 0, keeps the output video in time with the Genlock reference. Increasing the value will delay the output video in one-sample increments.

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

Video/SID
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.

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

Video/SID
525 V phase
0 to 524
0

This control enables the user to set the vertical timing of the output video with respect to the Genlock reference input when operating in 525 video mode. Setting this control to 0, keeps the output video in time with the Genlock reference. Increasing the value will delay the output video in one-sample increments.

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

Video/SID
625 V phase
0 to 624
0

With this control, the user can set the vertical timing of the output video with respect to the Genlock reference input when operating in 625 video mode. Setting this control to 0, keeps the output video in time with the Genlock reference. Increasing the value will delay the output video in one-sample increments.

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

Video/SID
V Delay

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

7.5.14. Setting the Colour Frame sequence of the Analog Output Video – 525 Line Video

Video/SID
525 Colour Frame Offset
0, 1 *0*

This control enables the user to set offset between colour frame A of the NTSC reference and colour frame A of the NTSC analog output video.

Setting this control to 0, aligns the colour frame A of the output video with colour frame A on the Genlock reference. Increasing the value will delay the output colour frame A in one-frame increments.

7.5.15. Setting the Colour Frame sequence of the Analog Output Video – 625 Line Video

Video/SID
625 Colour Frame Offset
1 to 3 *0*

This control enables the user to set offset between colour frame A of the PAL reference and colour frame A of the PAL analog output video.

Setting this control to 0, aligns the colour frame A of the output video with colour frame A on the Genlock reference. Increasing the value will delay the output colour frame A in one-frame increments.

7.6. GPO CONFIGURATION

The AVC module has a general purpose output available on the high-density DB 15 connector which can be used to signal several conditions to the user. In addition, this output can be configured to be active high or low. The 7700 frame also has a fault monitoring LED and general-purpose output. The user has the ability to configure which faults the 7735AVC-LB will assert onto the frame status system. The *GPO configuration* menu contains the controls used to configure the GPOs. Sections 7.6.1 to 7.6.3 provide detailed information regarding each of the menu items.

GPO1 active state	Controls whether the general-purpose output is active high or low.
GPO1 trigger	Controls the events that will trigger the general-purpose output.
Frame stat trigger	Controls the events that will trigger the Frame Status Fault line and the Fault Status LED.

7.6.1. Setting the General Purpose Output Active State

GPO configuration
- *GPO1 active state*
  - *High*
  - *Low*

This control sets the output level for active state of the general-purpose output.

NOTE: The output will power up in a high state until the software has had sufficient time to update the output with the appropriate condition.

7.6.2. Configuring what Condition will Activate the General Purpose Output

GPO configuration
- *GPO1 trigger*
  - *None*
  - *Fault 1*
  - *Fault 2*
  - *Fault 1 or 2*

This control configures the condition that will cause the general-purpose output to go to the active state.

7.6.3. 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, the user can select the condition for the card to cause the line to go active. Also included on the frame status signal is the card power supply monitoring. This is derived with hardware and cannot be disabled from the status signal.

If it is desired to use this feature, the frame status jumper J22 (located near the card extractor) must also be set to the *On* position. See section 10.1

The Red *Local Fault* LED will be On when the global status line is active regardless of the position of jumper J22.

7.7. FAULT DEFINITIONS

The *Fault definition* menu items are used to configure the fault settings, and the presentation of the fault conditions. The chart below illustrates the items available in the *Fault definition* menu. Sections 7.7.1 to 7.7.11 provide detailed information about each configuration item for the fault definitions.

Fault Condition 1	Controls used to configure Fault Condition 1.
Fault Condition 2	Controls used to configure Fault Condition 2.
Video Invalid Duration	Sets the minimum duration (in frames) during which the AVC-LB will ignore such glitches and not trigger a fault alert.
EDH Error Duration	Sets the number of consecutive fields of EDH errors to consider as a fault.
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 a fault.
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.
Loss of CC Duration	Sets the duration, of no primary CC1 captions, in seconds which is considered a fault.
Loss of PR Duration	Sets the duration, of no program rating XDS packet, in seconds which is considered a fault.
Picture Noise Level	Sets the approximate level of noise expected in the video signal feed.
Freeze Duration	Sets the duration, of no picture activity above the *Picture noise level*, in seconds which is considered a fault.
Black Duration	Sets the duration, of no active picture content above 7 IRE, in seconds which is considered a fault.

7.7.1. Setting Up How a Fault Is Triggered and How It Is Presented

The AVC 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, therefore for simplicity, the manual shows only the menu items for *Fault condition 1*.

7.7.1.1. Fault Status

Fault definitions
- *Fault condition 1*
  - *Fault status*

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

7.7.1.2. Fault 1 Mode

Fault definitions
- *Fault condition 1*
  - *Fault 1 mode*
    - *Enable*
    - *Disable*

This menu item enables or disables the fault mode.

7.7.1.3. 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 will be held 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.

7.7.1.4. 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 occur.

Video invalid	Video absent or different than *Video Standard* Setting.
Loss of audio	Audio absent.
Loss of audio ch 1/2	Audio channel 1/2 absent.
Loss of audio ch 3/4	Audio channel 3/4 absent.
AP EDH errors	Active picture EDH errors present.
FF EDH errors	Full Frame EDH errors present.
Audio format error	Audio Format errors.
Phase reversal 1/2	Audio 1 and 2 out of phase.
Phase reversal 3/4	Audio 3 and 4 out of phase.
Audio over 1/2	Audio 1 or 2 over level.
Audio over 3/4	Audio 3 or 4 over level.
Audio silence 1/2	Audio 1 and 2 silent.
Audio silence 3/4	Audio 3 and 4 silent.
Audio mono 1/2	Audio 1 and 2 mono.
Audio mono 3/4	Audio 3 and 4 mono.
Loss of VITC	VITC absent.
Loss of SID	SID absent.
Loss of program rating	Program rating absent.
Loss of CC	Primary CC1 Closed Captioning absent.
GPI1	General Purpose Input 1 closed to ground.
GPI2	General Purpose Input 2 closed to ground.
Picture Freeze	No activity above preset noise level in active picture.
Picture Black	No active picture above 7 IRE.
Genlock invalid	Genlock missing or different standard than input video.

Table 7-1: Possible Error Conditions to Produce a Fault

7.7.2. Setting Video Invalid Durations

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

Upon hot-switches, a resulting glitch in the video signal can cause the AVC-LB to momentarily report a video fault. This menu item allows the user to set a minimum duration (in frames) during which the AVC-LB will ignore such glitches and not trigger a fault alert.

7.7.3. Error Detection and Handling (EDH) Error Duration

Fault definitions
EDH error duration
NA *1 to 127 fields*

A check sum is calculated for every field of video and compared to the same EDH check sum transmitted in the vertical interval. If the check sums do not match, then there was at least one bit error in the active picture area of the image.

This control enables the user to set an error condition when a number of consecutive fields contain EDH errors. If set to NA, this type of fault detection is turned off. If set to 1, any "Error Detection and Handling" (EDH) error will generate an error while large numbers (>20) will effectively check the presence/absence of EDH encoding.

If the video signal has passed through hardware that has modified the picture (i.e. a vision mixer) without re-calculating the EDH check sums, then both full field and active picture errors will be generated. In that case, disable both full field and active picture error detection in the "Fault Definitions" above.

If the video signal has passed through hardware that has modified the ANC data area (i.e. audio multiplex) without re-calculating the EDH check sums, then full field errors will always be generated. In that case, disable full field error detection and use active picture only.

Fore more information on Error Detection and Handling, see SMPTE RP-165.

7.7.4. 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.

7.7.4.1. 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.

7.7.4.2. 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, the user is eliminating the detection of higher frequency content over the set *Over level*.

7.7.5. 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.

7.7.5.1. 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).

7.7.5.2. 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.

7.7.6. 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.

7.7.6.1. 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.

7.7.6.2. 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.

7.7.7. 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 AVC cards 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 determines 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.

7.7.7.1. 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.

7.7.7.2. 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.

7.7.8. Detecting Loss of Primary Captioning

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

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

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

7.7.9. Detecting Loss of Program Rating Duration

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

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

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

7.7.10. Detecting Picture Freeze

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

7.7.10.1. Setting the Picture Noise Level

Fault definitions
Picture noise level
1 to 10 *9*

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

As a guide, here are some signal to noise ratio comparisons:
1 = digital freeze (no noise on top of frozen picture)
10 = 40 dB SNR

7.7.10.2. Setting the Picture Freeze Duration

Fault definitions
Picture freeze duration
6 to 902 frames *302 frames*

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

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

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

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

Setting this time as high as tolerable has two benefits:

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

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

If the video path is fully digital, then set the *Picture noise level* depending on bit-error rate of the link as follows:

- For bit-error rates less than 1 in 10^{E-12}, set value in the range of 1 to 5
- For bit-error rates greater than 1 in 10^{E-12}, set value in the range of 6 to 10

If the path is even partially analog and if the user can place the equipment farthest upstream in the video path to go to a 'freeze frame' mode, then the *Picture noise level* should be optimized by initiating the 'freeze frame' mode in the upstream equipment and adjusting *Picture noise level* as low as possible, without losing the freeze alarm on the 7735AVC-LB. The user should note that because of the random nature of noise, the freeze alarm might be intermittent at some *Picture noise level* settings. The optimal *Picture noise level* setting is obtained when the loss of freeze alarm in the AVC occurs no more then once every 5 minutes.

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

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

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

The *Picture noise level* and *Picture freeze duration* controls have been designed with the ability to detect short-term "digital" freezes such as MPEG or motion JPEG server artifacts. When these devices have a significant problem with the content that they are de-compressing, they will typically start to produce a "blocky" effect. If the problem is severe enough, they will freeze a frame of video and play it out for a number of frames. With the *Picture noise level* set to 1 (i.e. only detect exact, or nearly exact pictures) and the *Picture freeze duration* set to *minimum*, the 7735AVC-LB can detect these quick "digital freezes." The user cannot, however, detect both this type of freeze and a freeze from a link that has added noise to the picture.

7.7.11. Detecting Picture Black Duration

Fault definitions
Picture black duration
4 to 900 frames *88 frames*

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

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

7.8. UTILITIES

7.8.1. Accessing Information About this Module and its Firmware

Utilities
About…

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

7.8.2. Data Logging

The RS-232 port on the Audio and Aux I/O connector is used for control and data logging of the status and fault conditions. Control and data logging needs to be done with custom software that communicates with the 7735AVC-LB card using the AVC Control/Status Protocol. For more information about configuring the data logging output see section 7.8.2. When faults are logged on the serial port a time stamp accompanies them from incoming VITC or from an internal clock.

There are 2 data logging options which can be enabled separately or at the same time:

- Periodically output card status
- Output fault data on a fault status change

7.8.2.1. Setting the Status Poll Polling Rate

Utilities
Data logging
Status poll setup
Poll rate
1 to 60 min
1 min

This control sets the rate at which card status is sent out the rear serial port.

The status includes all items from the status window, AP and FF EDH error states, and the audio format error state.

7.8.2.2. Outputting The Module Status At Any Time

Utilities
Data logging
Status poll setup
Query status
Yes
No

This menu item is used to output the card status regardless of whether the polling rate timer has expired. Each time the *Query status* menu item is set to *Yes*, the card status is output on the serial port.

7.8.2.3. Selecting the Fault Log Event Stamp Mode

Utilities
Data logging
Fault log setup
Event stamp mode
Free run,
VITC

When a fault state changes, the AVC will time stamp the fault log output. This control selects whether the AVC will use VITC (if present) or an internal free-running clock to time stamp the fault log.

7.8.2.4. Enabling the Fault Logging Output

Utilities
Data logging
Fault log
Disable
Enable

This control selects whether or not fault log data should be sent out the serial port.

When Fault logging is enabled, a text message is sent out the serial port when a fault condition changes.

7.8.2.5. Enabling the Status Logging Output

Utilities
Data logging
Status log
Disable
Enable

This control selects whether or not status log data should be sent out to the serial port.

When Status logging is enabled, text messages representing the current status of the 7735AVC-LB are sent out the serial port at the poll rate specified in the *Status poll rate* menu item (see section 7.8.2.1).

7.8.2.6. Setting the AVC's Data Logging ID

Utilities
Data logging
Card id
7735AVC-LB

All data logs include a text string that can be used to uniquely identify a 7735AVC-LB card.

This menu item is used to set the text string. See section 7.2 for information on changing text fields.

7.8.2.7. Setting the Event Stamp Clock

Utilities
Data logging
Event stamp
Current time

This control sets the current state of the free-running clock.

7.8.3. Saving And Recalling AVC Configurations

The AVC modules 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.

In addition, the user can use the *ConfigSet* software provided with the AVC card to save and recall an unlimited number of configurations using a PC running Windows. The *ConfigSet* software also allows the user to transport a configuration from one card to another. For information on using the *ConfigSet* utility see section 8.

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

7.8.3.1. Storing AVC 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, the user must change the command to *Store* and press the pushbutton before the store will take place. The operation can be aborted by pressing the pushbutton when *Cancel* is displayed.

7.8.3.2. Recall AVC 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, the user must change the command to *Recall* and press the pushbutton before the store will take place. The operation can be aborted 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.

7.8.4. 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), the user can initiate an upgrade with this command. This will allow the user to upgrade the software without unplugging the card and changing the upgrade jumper.

After selecting the upgrade operation, the user must change the command to *Yes* and press the pushbutton before the upgrade can take place. The operation can be aborted by pressing the pushbutton when *Cancel* is displayed.

After the upgrade has finished, the unit will automatically restart and run in normal operating mode.

7.8.5. Restoring the AVC 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, the user 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. The operation can be aborted by pressing the pushbutton when *Cancel* is displayed.

7.9. 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. The user can also perform a clear by pressing the toggle switch up or down when not in the menu structure or use a GPI if it is programmed to do so.

8. CONFIGURING THE AVC USING THE CONFIGSET SOFTWARE

A companion application software called *ConfigSet* was shipped with the order of AVC cards (*ConfigSet* Version 1.2 or later is required to work with the AVC cards). This software allows the user to move configurations from card to card using a standard PC computer. It also allows the user to maintain more configurations than the two presets available on the card as well as make backup copies of the configurations. *ConfigSet* does not allow the user to directly set up the card's control, it merely acts as a tool to copy card configurations from one card to another.

Presets loaded from the PC will become the active card configuration and are not automatically stored in the card's internal preset storage system. To store the active card configuration into a user-recallable preset, the *Store card preset x* menu item in the *Utilities* sub-menu must be used.

Please review the software system requirements located on the CD-ROM case. To install the software run the setup program provided on the CD-ROM. Instructions for running the software are included in the on-line help system and can be accessed by pressing the "F1" key on the keyboard once the software is installed. A viewable help file is also included on the CD-ROM.

In order for the *ConfigSet* software to communicate with the 7735AVC-LB card the user will need to install the upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J24 at the card edge. Connect the other end to an available serial port on the application PC.

Use the following procedure to recall a preset configuration from a card and save it to a hard drive:

1. Connect the upgrade cable (delivered with the manual) between a computer and a powered up AVC card.
2. Start the *ConfigSet* software and select the COM port that has the upgrade cable attached.
3. Configure the 7735AVC-LB or recall the desired preset to download to the computer.
4. Get the card set-up configuration from the card with the *ConfigSet* software. See the online help in the software for the correct procedure for doing this.
5. After a successful upload, save the configuration, with a unique name, to a disk for future use.

Use the following procedure to send a preset configuration to a card from a hard drive:

1. Connect the upgrade cable (delivered with the manual) between a computer and a powered up 7735AVC-LB card.
2. Start the *ConfigSet* software and select the COM port that has the upgrade cable attached.
3. Load a saved configuration preset from the hard drive to download into the 7735AVC-LB card.
4. Send the card set-up configuration to the card with the *ConfigSet* software. Consult the online help tool in the software for the correct procedure for doing this.
5. After a successful download, if desired, store the configuration to a preset for easy recovery in case someone accidentally modifies the active setup.

9. CONTROLLING THE 7735AVC-LB FROM THE COMMUNICATIONS PORT

Remote control and status monitoring of some of the AVC features are available through the RS-232 port on the AUDIO AND AUX I/O connector. The COM port signals are standard RS-232 with no hardware flow control. The directions of the signals are indicated in Table 2-2. Control and data logging must be configured with custom software that communicates with the 7735AVC-LB card using the AVC Control/Status Protocol.

The following items can be controlled using the control port. See the appropriate section in this manual for specific details:

- Output video level control (section 7.5.1.4)
- NTSC setup pedestal on/off control (section 7.5.1.1)
- Line 21 setup pedestal on/off control (section 7.5.1.2)
- Audio group source selection (section 7.4.1)
- Analog peak audio output level control (section 7.4.4 and 7.4.5)

In addition, module fault and status may be extracted from the card. The on-screen menus, fault and status can either be pulled out of the card at any time, automatically sent out of the card based on a timer, or sent out only when a user defined fault occurs. See section 7.8.2 for complete details of how to set up data logging.

Card presets (complete card configurations) can also be downloaded from and uploaded to the card through this communication port using the *ConfigSet* software supplied with the 7735AVC-LB (please refer to section 8).

For more information on the protocol used for these services please contact Evertz Microsystems Ltd. for the following documents:

1. *Communications Protocol Specification* Revision 1.16 or greater for the description of the low level (application non-specific) description of the communications dialog.
2. *AVC Control/Status Protocol* Revision 1.0 or greater for the description of how the previously mentioned AVC controls are transported over the above protocol.
3. *SID Setup Transfer Protocol* Revision 1.0 or greater for the description of how the card presets are transferred to/from the hardware.

10. JUMPERS

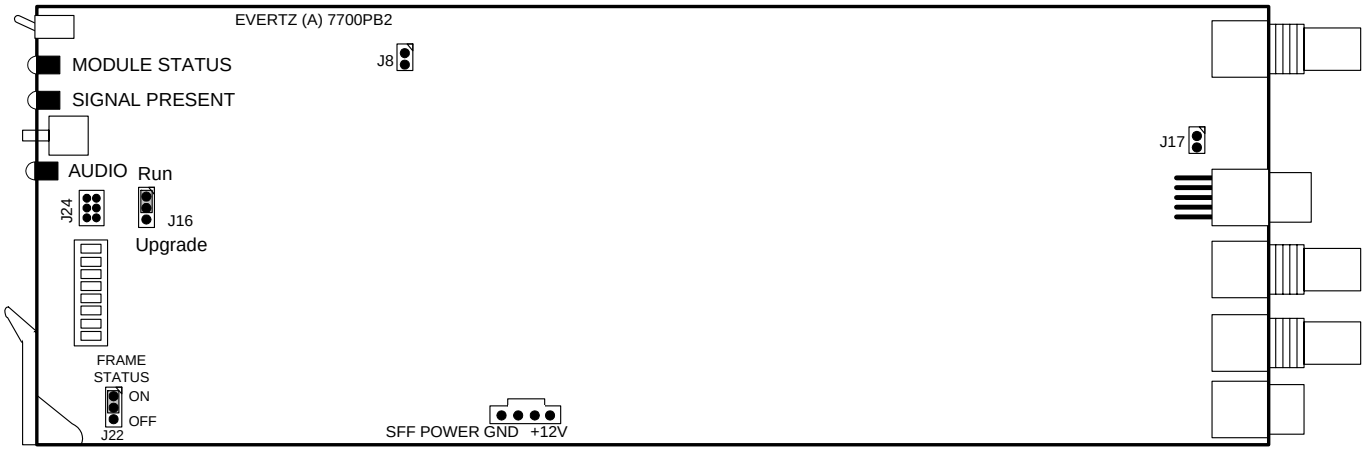

Figure 10-1: Location of Jumpers on 7700PB2 Boards

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

FRAME STATUS: The FRAME STATUS jumper J22 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 (Default). When this jumper is removed, local faults on this module will not be monitored. For convenience the user may re-install the jumper so that only one side is connected.

The *Frame stat trigger* menu item on the *GPO configuration* 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 J22 is installed.

10.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

The following method can be used to upgrade the firmware in the 7735AVC-LB card. The user can also use the *UPGRADE* menu item located on the *UTILITIES* menu to upgrade the firmware.

UPGRADE: The UPGRADE jumper J16 located at the front of the module is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section of this manual for more information.

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

11. MENU QUICK REFERENCE

Audio

- **Audio Source**
- **Ch 1/2 swap**
- **Ch 3/4 swap**
- **Ch 1/2 output mode**
- **Ch 3/4 output mode**
- **Ch 1/2 peak analog output level**
- **Ch 3/4 peak analog output level**
- **Fine ch 1 adjust**
- **Fine ch 2 adjust**
- **Fine ch 3 adjust**
- **Fine ch 4 adjust**

Video/SID

- **Analog Video**
  - NTSC setup pedestal
  - Line 21 setup
  - Composite display mode
  - Output level
  - Hue
  - Saturation
  - Contrast
  - Brightness
- **Video standard**
- **Loss of video**
- **525 VITC line**
- **625 VITC line**
- **525 PESA line**
- **625 PESA line**
- **525 H phase**
- **625 H phase**
- **H delay**
- **525 V phase**
- **625 V phase**
- **V delay**
- **525 Colour Frame Offset**
- **625 Colour Frame Offset**

GPO configuration

- **GPO1 active state**
- **GPO1 trigger**
- **Frame status trigger**

Fault definitions

- **Fault condition 1**
  - Fault status
  - Fault Mode
  - Duration
  - Video invalid
  - Loss of audio
  - AP EDH
  - FF EDH
  - Audio format
  - Phase reversal 1/2
  - Phase reversal 3/4
  - Over 1/2
  - Over 3/4
  - Silence 1/2
  - Silence 3/4
  - Mono 1/2
  - Mono 3/4
  - Loss of VITC
  - Loss of SID
  - Loss of PR
  - Loss of CC
  - GPI 1
  - GPI 2
  - Picture freeze
  - Picture black
  - Genlock invalid
- **Fault condition 2**
  - Same as fault condition 1
- **Video invalid duration**
- **EDH error duration**
- **Over level**
- **Over duration**
- **Silence level**
- **Silence duration**
- **Phase reversal level**
- **Phase reversal duration**
- **Mono threshold level**
- **Mono duration**
- **Loss of CC duration**
- **Loss of PR duration**
- **Picture noise level**
- **Freeze duration**
- **Black duration**

Utilities

- **About…**
- **Data logging**
  - Status poll setup
    - *Poll rate*
    - *Query Status*
  - Fault log setup
    - *Event stamp mode*
  - Fault log enable
  - Status log enable
  - Card id
  - Event stamp
- **Store preset 1**
- **Store preset 2**
- **Recall preset 1**
- **Recall preset 2**
- **Upgrade**
- **Factory reset**

Clear Fault