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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Nov 01
1.0	First Release – added EAES features	Dec 02
1.1	Added Proc Amp information	Jun 03
1.1.1	Updated Input Equalization Specification	Aug 03
1.1.2	Minor Typographical changes	Dec 03

1. OVERVIEW

The 7745FS series SDI video and audio frame synchronizers are designed to retime a 270 Mb/s SMPTE 259M (525 or 625 line) input to a local reference composite sync signal. When necessary, frames are repeated or dropped to maintain synchronization. During the synchronizing process the video delay varies from 3 lines through to 1 frame plus 3 lines. Additional delay can be added to the synchronizing process in 1 frame increments.

The 7745FS Frame Synchronizers contain an extensive list of additional features, including AES or embedded audio input versions. In addition, Evertz Vistalink™ processing will analyze and report video and audio problems via an On-Screen-Display, or remotely via SNMP. (Vistalink™ not supported at the time of this printing)

The 7745FS series is available in two versions to suit various application requirements.

	Synchronizes			AES Audio	
Model	**Video**	**Embedded Audio**	**AES Audio**	**Inputs**	**Outputs**
7745FS-AES (discontinued – replaced by 7745FS-EAES)	Yes	Removes	2 (mux on output video)	2	2
7745FS-EAES	Yes	Demux and mux 1 groups	2 (mux on output video)	2	2

On the 7745FS-EAES version, the user can choose to have either 1 group from the upstream embedded audio or audio from the 2 AES inputs embedded on the output video and output as AES. With either selection, the audio is delayed the same amount that the video is delayed through the synchronizing process. When the input video is lost, the module will either mute or pass the input AES when it is selected as the source. The 7745FS-EAES also has the ability to set the audio delay independently from the video delay. On the 7745FS-AES version (now discontinued), the audio from the 2 AES inputs is synchronized and embedded on the output video and output as AES. (Operation of the 7745FS-AES version is similar to the EAES version except that the *Audio Source* menu item is missing and its audio source is always set to *AES.* It is included in this manual for those who have the earlier model.)

When the Processing (+P) option is added the frame synchronizer has the ability to adjust video parameters such as brightness, contrast and saturation, and audio parameters such as gain, mixing stereo pairs into monaural and reassignment of audio channels within the group.

Features common to all 7745FS versions:

- One SDI 525 or 625, 270 Mb/s component digital video input
- One bypass protected SDI 525 or 625, 270 Mb/s component digital video output, without OSD text or audio bargraphs.
- One additional SDI output, non-bypass protected (same as bypass protected SDI output).
- Composite analog reference input loop (NTSC or PAL-B). 75 Ohm or high-Z, jumper configurable input impedance.
- Programmable output phase with respect to reference input (in 27MHz clock increments.)
- EDH encoding on SDI output.
- One frame video synchronizer.
- Dolby E compliant

- Freeze on last good frame, or field, or go to black on loss of video
- Adjustable free running frequency.
- Two composite analog video outputs with OSD text and bargraph graphics.
  - VU/PPM bargraph level Indicators.
  - Decodes vertical interval time code (VITC) and “burns” the time code into the picture.
  - Decodes PESA format Source ID (8 characters) or Evertz format VITC Source ID (5 or 9 characters) and burns the ID into the picture.
  - A comprehensive on screen display is available to configure the various features of the module.
  - Flexible configuration of the text and audio bar graph information displays.
  - On screen messages can be triggered by the configured fault conditions
- VistaLINK™ - enabled offering remote monitoring, control and configuration capabilities via SNMP (using VistaLINK™ PRO or 9000NCP Network Control Panel) is available when modules are used with the 3RU 7700FR-C frame and a 7700FC VistaLINK™ Frame Controller module in slot 1 of the frame
- 2 unbalanced (75-Ohm coaxial) AES inputs.
- Synchronizes two external AES signals or 1 group of embedded audio to the video
- Synchronized audio is output as 2 AES signals and multiplexed onto the SDI video output
- AES outputs bypass relay protected on power loss
- Selected audio source is delayed equivalent to the video delay through the synchronizer
- Additional, user selected, audio delay may be added to, or removed from the delay used to match the video
- Minimum audio input to output delay – 98 samples when video delay is less than 64 lines
- Maximum audio input to output delay – 7 frames
- Selectable pass or mute or audio when video input missing

Additional Features with +P Option are:

- Adjustable video black level (brightness), Y level (contrast) and chroma level (saturation)
- Independently adjustable audio levels on all channels
- Ability to combine stereo pairs to monaural
- Reassignment of audio channels within the embedded group

1.1. FUNCTIONAL DESCRIPTION

SDI video input is stored to a frame buffer, and VITC, closed captioning and Source ID are extracted from this input stream. In addition, the video is monitored for black and freeze conditions. The video is synchronized to the genlock reference and output on the SDI video output. When necessary, frames are repeated or dropped to maintain synchronization. During the synchronizing process the video delay varies from 3 lines through to 1 frame plus 3 lines. Additional delay can be added to the synchronizing process in 1 frame increments.

On the EAES version, embedded audio is demultiplexed, or audio on the AES inputs is stored to a separate audio data buffer and delayed to match the video delay through the synchronizer. This delayed audio is formatted properly and delivered to the user as unbalanced 75 Ohm AES audio on BNC. It is also formatted into one group of audio and embedded on the SDI output video. The audio is also processed to extract level and phase information. The CPU creates the level and phase bar graphs and writes them out to the on screen display (OSD) memory.

The CPU also reads raw closed captioning, VITC and SID data and extracts time code, program rating and the source ID information and writes them to the OSD memory.

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

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

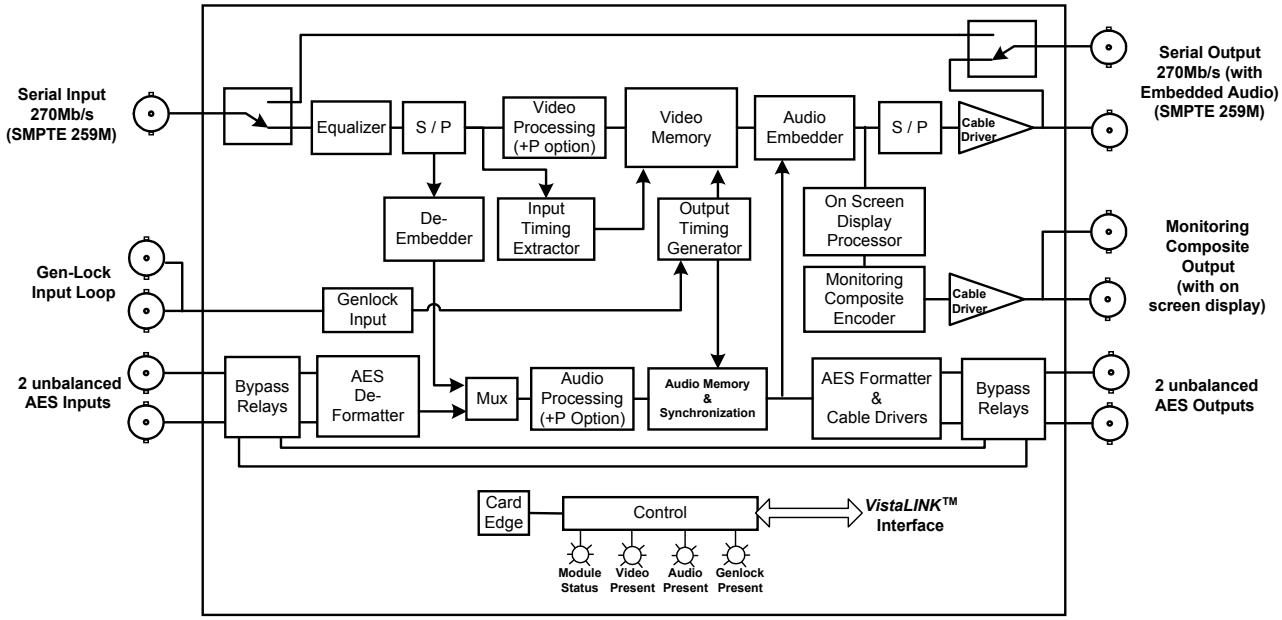

Figure 1: 7745FS-EAES Block Diagram

2. Installation

The 7745FS modules come with a companion rear plate and occupy one or two slots in the 7700FR frame. Figure 2 shows a picture of each of the rear panels. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.

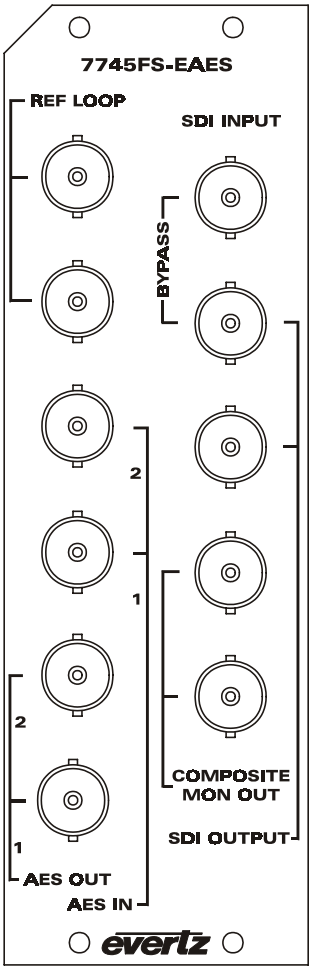

Figure 2: 7745FS-EAES Rear Panel

2.1. VIDEO INPUTS AND OUTPUTS

SDI INPUT Input BNC connector for 10-bit component serial digital video signals (525 or 625 line) compatible with the SMPTE 259M-C standard.

SDI OUTPUT Output BNC connector with serial component video, compatible with the SMPTE 259M-C standard. This output is EDH encoded and contains the input video synchronized to the Genlock input video or to the free running internal oscillator if Genlock is not present. The output closet to the Input BNC is protected by a bypass relay, which will activate in the event of power loss to the module. On the EAES version there will also be 1 group of embedded audio on this output from either the AES inputs or from embedded audio at the input. There is a second identical SDI output that is not bypass protected. If the card is not

present there will be nothing on the outputs. If the card fails the BYPASS OUT will be the bypassed SDI input video. If there is no input video the user can choose to have either black or blue video output.

COMPOSITE MON OUT Two output BNCs with monitor quality composite analog video. These outputs contain the input video synchronized to the Genlock input video, with text and audio bar graphs keyed on. It is also used to display the On screen menu system.

2.2. GENLOCK REFERENCE

For proper synchronization of the output video, the frame synchronizer must be locked to a genlock signal.

GENLOCK There is high impedance BNC loop input for connecting an analog Genlock reference. The genlock signal may be NTSC or PAL colour black or sync, and is auto-detected by the module.

2.3. AUDIO IN AND OUT

Two unbalanced AES inputs and outputs are provided on BNC connectors. These inputs and outputs are for unbalanced AES signals conforming to SMPTE 276M. The user can select whether audio from the two channels of AES audio input, or from 1 group of upstream embedded audio is synchronized and embedded on the output video. The synchronized audio is also output as two AES channels. The AES outputs are protected by bypass relays, which will activate in the event of power loss to the module.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standard:	SMPTE 259M-C – 525 or 625 line component.
Number of Inputs:	1
Connector:	BNC per IEC 169-8
Signal Level:	800mV nominal
Equalization:	Automatic 250m @ 270Mb/s Belden 1694 (or equivalent)
Return Loss:	>15dB to 270MHz

3.2. SERIAL VIDEO OUTPUT

Standard:	SMPTE 259M-C – 525 or 625 line component.
Number of Outputs:	1 from input bypass relay 1 non-protected
Connector:	BNC per IEC 169-8
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	900ps nominal
Overshoot:	<10% of amplitude
Return Loss:	>15dB to 270MHz
Embedded Audio:	SMPTE 272M-A
Wide Band Jitter:	< 0.2 UI

3.3. REFERENCE VIDEO INPUT

Standard:	NTSC, SMPTE 170M or PAL, ITU624-4 Colour Black Composite Bi-level sync (525i/59.94 or 625i/50) 300 mV
Connector:	BNC loop per IEC 169-8
Signal Level:	1V nominal
Frequency Lock Range:	±75ppm from nominal
Input Impedance:	High impedance loop
Return Loss:	>35dB to 10MHz
SNR:	> 50dB
Level:	Max 2Vp-p video Min sync level 150 mV

3.4. ANALOG MONITORING VIDEO OUTPUT

Standard:	NTSC, SMPTE 170M PAL, ITU624-4
Number of Outputs:	2
Connector:	BNC per IEC 169-8
Signal Level:	1V nominal
Output Impedance:	75 Ohm
Return Loss:	>35dB to 10MHz

3.5. AES AUDIO INPUTS AND OUTPUTS

Standard:	SMPTE 276M, single ended synchronous or asynchronous AES
Number of Inputs:	2
Number of Outputs:	2
Connector:	BNC per IEC 169-8
Resolution:	24 bits
Sampling Rate:	32kHz to 48 kHz on inputs, 48kHz on outputs
User Bits:	Transferred to output with < 12 ms delay

3.6. INPUT TO OUTPUT PROCESSING DELAY

3.6.1. Video Processing Delay

Synchronizing:	3 µSec to 1 frame plus 3 µSec
Output Phasing	up to 1 frame of additional delay

3.6.2. Audio Processing Delay

AES Input to Output:	140 samples when video delay is less than 64 lines Same as video delay when video delay is greater than 64 lines
Embedded to AES:	4.5 mSec to 1 frame plus 4.5 mSec
AES to Embedded:	4.5 mSec to 1 frame plus 4.5 mSec

3.7. PROCESSING FUNCTIONS (7745FS-EAES WITH +P OPTION ONLY)

Video:
Black Level: +/- 7%
Luminance Gain: +/- 6dB
Chrominance Gain: +/- 6dB
Audio Gain: +/- 24dB

3.8. ELECTRICAL

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

3.9. PHYSICAL

7700 frame mounting:
Number of slots: 2

7701 frame mounting:
Number of slots: 1

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

4. STATUS LEDs

4.1. MODULE STATUS LEDS

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

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

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

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

GENLOCK: This Green LED is on solid if a valid reference input is present.

4.2. AUDIO STATUS LEDS

Four LEDs located on the lower end of the module (near the card extractor) indicate audio input status. When the audio source is set to AES the LEDS indicate whether AES audio is present or not.

Audio LED	Colour	Audio Input Status
1	Off	AES 1 not present.
	Green	AES 1 input present.
2	Off	AES 2 not present.
	Green	AES 2 input present.
3	Off	(not used)
4	Off	(not used)

Table 1: Audio Status LEDs - Audio Source set to AES

When the audio source is set to one of the embedded groups the LEDS indicate which groups are present.

Audio LED	Colour	Audio Group Status
1	Off	Audio Group 1 not present.
	Green	Audio Group 1 present.
2	Off	Audio Group 2 not present.
	Green	Audio Group 2 present.
3	Off	Audio Group 3 not present.
	Green	Audio Group 3 present.
4	Off	Audio Group 4 not present.
	Green	Audio Group 4 present.

Table 2: Audio Group Status LEDs - Audio Source set to Embedded

5. AUDIO ALARM CALIBRATION PROCEDURE

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

Some of the audio alarm detection algorithms are dependent on the state of other audio alarm detectors. For instance, the mono detection algorithm will not use periods of silence as determined by the silence detection. For this reason, the following sequence should be used to calibrate the audio alarms. The items in *italics* refer to menu items in the 7745FS. See section 6.8 for a complete description of the fault definition menu items.

5.1. CALIBRATE AUDIO SILENCE DETECTION

1. Supply the card with your plant's noisiest audio feed without any audio program material present. This will be a baseline noise level to calibrate the silence detector.
2. Turn off all sources of errors in a *Fault Condition* and assign *Audio Silence* as the only error. Also, make sure that you set the *Fault Duration* to a small number of frames so that you will see when the error condition disappears.
3. Set the *Silence Duration* to 0.5 sec so that you can see the results of adjusting the *Silence Level* parameter without getting confused with the detection time.

4. Adjust the audio *Silence Level* until the *Fault Condition* begins to go active. This will be the noise floor level. Raise the *Silence Level* a few dB to make the detector insensitive to this noise level.
5. Set the *Silence Duration* to a time appropriate to your application. This should be set to a value longer than your worst case acceptable quiet period.

5.2. CALIBRATE AUDIO PHASE REVERSAL DETECTION

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

5.3. CALIBRATE AUDIO MONO DETECTION

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

5.4. DEFINE THE FAULT CONDITION(S)

1. A *Fault Condition* is defined as a group of one or more problems grouped together that will create a fault when any one of the problems exist. Decide what grouping of error conditions will generate a fault by setting the appropriate condition to *Yes* in the *Fault Condition* menu.
2. Set the *Fault Duration* to either *Until Reset* or to a time value. This is how long the condition will stay active after the conditions generating the fault go away.

3. Configure a *Fault Message*. Enter the text to display on screen, it's H and V position, and it's characteristics (opacity, colour, etc).
4. Assign the *Fault Condition* to an output contact closure (GPO) if it is desired.

ON SCREEN MENUS

6.1. NAGIVATING THE ON SCREEN MENU SYSTEM

A toggle switch and pushbutton allow card edge navigation of a set of on-screen menus used to configure the card.

To enter the on-screen menu system, press the pushbutton once. This will bring you to the main setup menu where you can use the toggle switch to move up and down the list of available sub menus. An arrow (>) moves up and down the left hand side of the menu items to indicate which item you are currently choosing. Once the arrow is on the desired item, press the pushbutton to select the next menu level.

On all menus, there are two extra selectable items: *Back* and *Exit*. Selecting *Back* will take you to the previous menu (the one that was used to get into the current menu) while *Exit* will return the display to its normal operating mode. On the main menu, BACK and EXIT will both take you to the normal operating mode.

Once in a sub menu, there may be another menu layer, or there may be a list of parameters to adjust. If there is another set of menu choices, use the toggle switch to select the desired menu item and press the pushbutton.

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

When you have stopped at the desired value, depress the pushbutton. This will update the parameter to the selected value and move the arrow back to the left side of the parameter list (>). Continue selecting and adjusting other parameters or use the BACK or EXIT commands.

6.2. CHANGING TEXT FIELDS

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

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

   ```
   SAMPLE TEXT
   ^
   ```

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

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

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

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

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

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

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

6.3. ON SCREEN DISPLAY – MAIN MENU

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

The OSD menu is arranged in a layered structure that groups similar configuration items together. The following section gives a brief description of the first level of menus that appear when you enter the OSD screens. Selecting one of these items will take you to the next menu level. Sections 6.4 to 6.10 provide detailed descriptions of each of the sub menus. The tables in sections 6.4 to 6.10 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.

6.4. CONFIGURING THE AUDIO CONTROLS

The *Audio* menus are used to configure parameters associated with the analog audio inputs and the audio multiplexing. The chart below shows the items available in the *Audio* menu. Sections 6.4.1 to 6.4.14 give detailed information about each of the parameters. Many of the menu items are the same for the channel 1/2 and 3/4 channel pairs. For simplicity only the menu items for the channel 1/2 channel pair are shown in the manual.

Audio source	Selects the source of audio.
Audio destination	Selects the destination group of audio.
Audio freeze mode	Selects what action to take when video is gone

6.4.1. Selecting the Audio Source (7745FS-EAES only)

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

Selects the audio source for the synchronizer. This control selects between the 2 AES inputs or one group ID of embedded audio on the SDI video input.

On the 7745FS-AES version this menu is not available. The audio source is always the AES audio inputs.

6.4.2. Selecting the Audio Destination

Audio
Audio destination
Group 1
Group 2
Group 3
Group 4
None

This control selects the group ID of the multiplexed output audio. The processed audio will be put in this group.

Note: Embedded audio is not passed through the video synchronizer, therefore, no other audio groups will be present on the output except what is selected by this control.

6.4.3. Audio Freeze Mode

Audio
Audio freeze mode
pass
mute

This control selects the action to take place when input video is removed and AES audio is selected as the audio source.

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

6.5. CONFIGURING THE VIDEO AND SOURCE ID CONTROLS

The *Video/SID* menus are used to configure parameters associated with the video processing functions and the VBI decoders. The chart below shows the items available in the *Video/SID* menu. Sections 6.5.1 to 6.5.13 give detailed information about each of the parameters.

Video standard	Selects the input video standard
Loss of video	Selects the action to take when the input video is missing
Genlock source	Selects the source of genlock information.
525 H phase	Sets the horizontal phase of the output signal to the NTSC Genlock reference input.
625 H phase	Sets the horizontal phase of the output signal to the PAL Genlock reference input.
H Delay	Status display that shows the current horizontal input to output delay
525 V phase	Sets the vertical phase of the output signal to the NTSC Genlock reference input.
625 V phase	Sets the vertical phase of the output signal to the PAL Genlock reference input.
V Delay	Status display that shows the current vertical input to output delay
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.
Default SID mode	Selects whether the Default SID message will be shown when there is no source ID on the incoming video
Default SID msg	Sets the message that will be shown when *Default SID mode* is enabled and the SID window is turned On

6.5.1. Setting the Video Standard

Video/SID
  Video standard
  525
  625
	The video standard is selected with this control.

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

Video/SID
Loss of video
Freeze
Black

The user can either have the output video go to black or freeze whatever data is at the input with this control.

Note: The monitoring analog output does not go to black. This allows you to troubleshoot the feed by allowing you to see what is in the system memory.

6.5.3. Genlock Source Selection

Video/SID
Genlock source
Ref. in
Input video
none

This control allows you to set the reference input to the frame synchronizer. The reference may either be an externally supplied color black or you may use the input video as a reference. Make sure to adjust the video H and V output phase controls to set the total processing delay.

Optionally, the synchronizer can be free-run if the "none" option is selected

6.5.4. Setting the Horizontal Phase of the Output Video – 525 Video

Video/SID
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 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.

6.5.5. Setting the Horizontal Phase of the Output Video – 625 Video

Video/SID
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 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.

6.5.6. Monitoring the Horizontal Delay between the Input and GenLock Video

Video/SID
H Delay

This item displays the horizontal delay between the input and genlock video. This value is useful to monitor while you are adjusting the H phase parameters.

6.5.7. Setting the Vertical Phase of the Output Video – 525 Video

Video/SID
525 V phase
0 to 524
0

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

6.5.8. Setting the Vertical Phase of the Output Video – 625 Video

Video/SID
625 V phase
0 to 624
0

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

6.5.9. 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 you are adjusting the V phase parameters.

6.5.10. Setting the VITC Line Number – 525 Line Video

Video/SID
525 VITC line
10 to 32
10

With this control, set the VBI line number that contains the VITC information when operating in 525 video mode.

If the VITC contains Source ID (SID) information, the 7745FS will automatically decode it, and turn on the SID window if the user has enabled this window
If the wrong line number is set, no time code (or SID) will be decoded.

6.5.11. Setting the VITC Line Number – 625 Line Video

Video/SID
625 VITC line
6 to 32
10

With this control, 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 7745FS will automatically decode it, and turn on the SID window if the user has enabled this feature
If the wrong line number is set, no time code (or SID) will be decoded.

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

Video/SID
525 PESA line
10 to 21
11

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

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

Video/SID
625 PESA line
7 to 22
11

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

6.5.14. Setting the Default SID Mode

Video/SID
Default SID mode
Disable / *Enable*

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

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

Set to *Enable* to show the Default SID message in the SID window when there is no incoming source ID. The SID window must also be turned On to display the default SID message. See section 6.7.2 for information on turning the SID window On.

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

Video/SID
Default SID msg
No SID

This control sets the message that will be displayed in the SID window when there is no incoming source ID on the VITC. The text of the message can be changed. See section 6.2 for information on changing text fields.

6.6. CONFIGURING THE BAR GRAPH CONTROLS

The *Bar Graphs* menu items deal with the configuration and operation of the audio bar graphs; modes, ballistics, display properties, etc. The chart below shows the items available in the *Bar Graphs* menu. Sections 6.6.1 to 6.6.15 give detailed information about each configuration item for the audio bar graphs. Sections 6.6.1 to 6.6.3 show the items in the bar graphs 1 and 2 menu tree. These sections apply also to the items in the bar graph 3 and 4 menu tree. Sections 6.6.13 to 6.6.15 apply globally to all bar graphs.

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

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

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

(bottom)	

6.6.1. Selecting the Bar Graph Operating Mode

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

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

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

6.6.2. Setting the Headroom

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

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

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

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

6.6.3. Setting the Bar Graph Type

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

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

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

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

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

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

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

6.6.4. Setting the PPM Mode and Ballistics

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

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

When one of these modes is selected, a number of items are set to adhere with predefined industry standards. The items affected include; meter attack time, meter decay time, min level displayed, max level displayed, analog reference (100%) level and, in some instances, region colouring and phase graph representation. Table 3 illustrates the values set by the standards.

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

Table 3: PPM Bar Graph Characteristics

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

6.6.5. Setting the VU Display Range

Bar graphs
- *Bar graphs 1 and 2*
  - *VU range*
    - *Normal*
    - *Extended*

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

Most VU meters have two possible ranges. These are:

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

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

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

6.6.6. Setting The Phase Bar Graph Type

Bar graphs
- *Bar graphs 1 and 2*
  - *Phase type*
    - *Stereo*
    - *DIN*

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

6.6.7. Setting the Bar Graph Error Region

Bar graphs
- *Bar graphs 1 and 2*
  - *Error region*
    - *-1 to –20 dBFS*
    - *-6 dBFS*

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

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

6.6.8. Setting the Bar Graph Warning Region

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

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

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

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

6.6.9. Setting the Level Bar Graph Scale Position

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

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

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

6.6.10. Setting The Phase Bar Graph Scale Position

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

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

6.6.11. Setting The Window And Bar Graph Positions

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

This control allows you to change the window positions of all 7745FS windows and bar graphs. The window positions can also be set from the *Window position* menu item on the *On-screen display configuration menu.* See sections 6.7.2 to 6.7.3.2 for detailed information on position the windows and bar graphs.

6.6.12. Setting the Colours of the Bar Graphs

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

Tip: The colours of the various regions are defined by three 8 bit R, G, B values very similar to the values used in most paint programs like Microsoft Paint. When you choose one of the predefined colours, the 7745FS automatically sets the R, G, and B values. If you choose the custom colour, you will be able to set the R, G, and B values independently to give you the desired colour. If you are having problems setting these values with the menu system, open a paint program, select the colour you like (usually from a colour wheel) and set the R, G, and B values into the 7745FS card using the respective *Custom colour* menu items for the region.

6.6.12.1. Setting the Level Bar Graph Region Colour

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

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

6.6.12.1.1. Selecting a Bar Graph Region Custom Colour

There are three menu items used to set the custom colour. The menu item for each colour component works in the same way so for simplicity only the menu item for the *Red* component will be shown in the manual.

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

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

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

6.6.13. Setting The Level Bar Graph Size

- *Bar graphs*
  - *Size*
    - *Small,*
    - *Big*

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

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

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

- *Bar graphs*
  - *Background opacity*
    - *0 to 64,*
    - *32*

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

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

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

Bar graphs	
Bars opacity	
0 to 64, <u>*64*</u>	

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

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

6.7. CONFIGURING THE ON-SCREEN DISPLAY CONTROLS

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

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

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

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

6.7.1. Descriptions of the 7745FS On Screen Windows

6.7.1.1. Video/Audio Status

Item	*Value(s)*	*Description*
Video	525/625/not present	Input video standard detected regardless of what the card is configured to process.
Picture Content	Moving/frozen/frozen,black	Shows the status of the picture content. Shows moving if the picture is active, frozen if the card detects no motion, or frozen,black if the picture is black
VITC	TC Value/not present	If present, the time code value is displayed here.
VITC SID	SID value/not present	If present, the VITC SID is displayed here.
PESA SID	SID value/not present	If present, the PESA SID is displayed here.
CC	Present/not present	The presence/absence of Closed Captioning is indicated.
PR	Value/not present	The program rating of Closed Captioning is indicated, if present.
Ch. 1 and 2	Not present [(silent/over), (mono/out of phase)]	Status information about channels 1 and 2 are shown here.
Ch. 3 and 4	Not present [(silent/over), (mono/out of phase)]	Status information about channels 3 and 4 are shown here.

Table 4: Video/Audio Status Screen Items

The purpose of the Video/Audio status screen is to show as much status information about the video and audio as possible in a small, concise table. Table 4 shows each item that may appear in the status screen. The Status window may be operated on one of two modes. In *normal* mode, all lines are controlled by the text window attributes. In *Fault* mode, those lines whose associated fault triggers are used to activate an 7745FS fault, will be displayed using fault window properties. All other lines use the text window properties. If the Status window is enabled by an 7745FS fault, only those lines associated with the fault triggers that enable the fault window will be displayed using fault window properties. All other lines use text window properties.

6.7.1.2. VITC Time Code Window

The VITC time code window shows the vertical interval time code present at the input to the 7745FS module. Use the VITC line select items on the Video menu to configure the lines that the 7745FS will use for reading VITC. (See sections 6.5.4 and 6.5.11 for information about setting the VITC line numbers.)

Warning: Because the video goes through a frame synchronizer, the time code displayed will not necessarily be the correct time code number for that particular frame of video.

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

6.7.1.3. Program Rating Window

The Program rating window shows data decoded from the Line 21 XDS Program rating packet. This information is usually encoded by the user to control the operation of V-Chip decoders in the viewer's receiver. The *PR window size* menu item controls whether the time code window will be displayed in the normal or large font size.

6.7.1.4. CC Window

The CC window is only available on 7745FS models that have an analog video output. It contains caption information from the CC1 data stream.

6.7.1.5. XDS Window

The XDS window contains 2 lines with the following information: network name, call letters, program name, time of day. Only the information found in the XDS stream will be displayed. An item is considered to be missing if it does not appear in the XDS stream for 15 seconds. There is no ability to trigger faults on the absence of XDS.

6.7.1.6. Source Identification Window

The 7745FS module has the ability to decode source identification (SID) information from the vertical interval time code present at the input to the 7745FS module. When no VITC SID is encoded, the 7745FS module will decode SID that has been encoded in the PESA format. The Source Identification window is used to display the decoded SID information. When there is neither VITC SID or PESA SID encoded the *Default SID message* will be displayed if *Default SID mode* is enabled, otherwise the SID window will be turned off. (See sections 6.5.14 and 6.5.15 for information about setting the *Default SID message*). Use the VITC line select items on the Video menu to configure the lines that the 7745FS will use for reading VITC. (See sections 6.5.4 and 6.5.11 for information about setting the VITC line numbers.) Use the PESA line select items on the Video menu to configure the lines that the 7745FS will use for reading PESA format source ID. (See sections 6.5.12 and 6.5.13 for information about setting the VITC line numbers.) The *SID window size* menu item controls whether the time code window will be displayed in the normal or large font size.

6.7.1.7. Fault Message Windows

The Fault 1 and Fault 2 window show user text messages when the Fault 1 or Fault 2 conditions are triggered. The Fault message windows have their own set of colour, opacity and size attributes, they can be set to come on steady or blinking and they contain fully programmable messages. See section 6.8 for more information on setting up the fault conditions and configuring the fault windows.

6.7.2. Setting the Position of On Screen Windows

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

6.7.2.1. Setting the Horizontal Position of On Screen Windows

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

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

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

6.7.2.2. Setting the Vertical Position of On Screen Windows

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

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

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

6.7.3. Setting the Position of the Bar Graphs

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

6.7.3.1. Setting the Horizontal Position of the Bar Graphs

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

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

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

6.7.3.2. Setting the Vertical Position of the Bar Graphs

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

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

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

6.7.4. Selecting What Bar Graphs And Windows To Display

The *Window enable* menu item is used to control the on/off states of the text and bar graph windows. To display the Fault windows use the *Fault condition* menu item on the *Fault definitions* menu. (See section 6.8.1.6)

When you select the *Window enable* menu item you are presented with a list of the possible windows and bar graphs. Select the desired item using the toggle switch. When the pushbutton is pressed, the cell cycles through the valid values for the field. Each of the windows and bar graph displays can be set to

On, or *Off*. When set to *On*, the corresponding window or bar graph is always displayed. When set to *Off*, the window or bar graph is always off.

6.7.5. Setting the Text Window Attributes

The On screen text windows can be displayed as white characters with or without a coloured background. In addition the text and background opacity or how much video picture content will be visible through the text or background is adjustable. The *Text window config* menu items are used to set these parameters for all the text windows except the Fault windows. See section 6.7.6 for information on setting the *Fault window* attributes.

6.7.5.1. Turning on the Text Window Backgrounds

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

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

6.7.5.2. Setting the Text Window Background Colours

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

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

6.7.5.3. Setting the Text Window Background Opacity

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

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

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

6.7.5.4. Setting the Text Window Text Opacity

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

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

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

6.7.5.5. Setting the Time Code Window Font Size

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

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

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

6.7.5.6. Setting the Program Rating Window Font Size

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

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

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

6.7.5.7. Setting the Source ID Window Font Size

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

This control sets the font size of the source ID window.

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

6.7.5.8. Setting the Status Window Mode

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

This control determines the display properties of the status window.

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

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

For example, if "program rating" is set up as a fault trigger, and the rating disappears, then the "program rating" line of text on the status screen will take up the characteristics of the "fault text". Usually this is white text on a red background.

6.7.6. Setting the Fault Window Attributes

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

6.7.6.1. Turning on the Fault Window Backgrounds

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

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

6.7.6.2. Setting the Fault Window Background Colours

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

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

6.7.6.3. Setting the Fault Window Background Opacity

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

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

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

6.7.6.4. Setting the Fault Window Text Opacity

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

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

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

6.7.6.5. Setting the Fault Window Font Size

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

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

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

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

6.7.6.6. Setting the Blink Mode of the Fault Windows

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

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

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

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

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

6.7.7. Frame Status Fault Trigger Condition

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

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

If it is desired to use this feature, the frame status jumper J22 (located near the card extractor) must also be set to the *On* position. See section 7.1

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

6.8. FAULT DEFINITIONS

When many windows are turned on, the on-screen information can get very crowded. The bar graphs and text windows are layered to keep the most important information from being covered by other not-so important windows. The Fault windows have the highest priority. The priority of the other windows is shown in section 6.7.

The *Fault definition* menu items are used to configure the fault settings, and the presentation of the fault conditions. The chart below shows the items available in the *Fault definition* menu. Sections 6.8.1 to 6.8.12 give detailed information about each configuration item for the fault definitions.

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

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

The 7745FS has two fault conditions that can be configured to warn the user of numerous conditions. The *Fault condition 1* and *Fault condition 2* menu items are used to configure when fault 1 or fault 2 are triggered, and how the fault should be presented. The controls for each fault condition operate the same way so, for simplicity, the manual shows only the menu items for *Fault condition 1*.

6.8.1.1. 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

6.8.1.2. Setting the position of the Fault Windows

Fault definitions
Fault condition 1
Window position

This control allows you to change the window positions of all 7745FS windows and bar graphs. The window positions can also be set from the *Window position* menu item on the *On-screen display configuration menu.* See sections 6.7.2 to 6.7.3.2 for detailed information on position the windows and bar graphs.

6.8.1.3. Setting the Message Associated with a Fault

Fault definitions
Fault condition 1
Fault 1 message
Video missing

This control sets the message to display when the fault condition is active. The text of the message can be changed. See section 6.2 for information on changing text fields.

6.8.1.4. Determining If The Fault Message Will Be Displayed

Fault definitions
Fault condition 1
Fault 1 mode
Disable
Enable

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

When enabled, the fault message will be displayed until the condition is reset. When disabled, it will never be displayed. See section 6.8.1.5 for information on setting the duration of the fault condition.

6.8.1.5. Setting the Duration of the Fault Condition

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

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

6.8.1.6. Determining What Items Will Generate The Fault Condition

Fault definitions
Fault condition 1

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

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

Input video error	Video absent or wrong standard
Genlock error	Reference absent or wrong standard
Loss of audio	Audio absent
Phase reversal ½	Audio 1 and 2 out of phase
Phase reversal ¾	Audio 3 and 4 out of phase
Audio over ½	Audio 1 or 2 over level
Audio over ¾	Audio 3 or 4 over level
Audio silence ½	Audio 1 and 2 silent
Audio silence ¾	Audio 3 and 4 silent
Audio mono ½	Audio 1 and 2 mono
Audio mono ¾	Audio 3 and 4 mono
Loss of VITC	VITC absent
Loss of SID	SID absent
Loss of program rating	Program rating absent
Loss of CC	Primary CC1 Closed captioning absent
Picture Freeze	No activity above preset noise level in active picture
Picture Black	No active picture above 7 IRE

Table 5: Possible Error Conditions to Produce a Fault

6.8.2. Setting the Fault Window Attributes

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

Fault definitions
- *Fault window config*

This control is used to change the fault window colours. These parameters can also be set using the *Fault window config* menu items on the *On screen display* menu. See section 6.7.6 for a complete description of the *Fault window config* menu items.

6.8.3. Setting the Loss of Video Duration

Fault definitions
- *Video invalid duration*
  - *0 to 30 frames*
  - *0*

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

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

6.8.4. Setting the EDH Error Duration

Fault definitions
EDH Error duration
1 to 127 frames *N/A*

This control sets the duration, in number of consecutive fields of video, with EDH errors before the *EDH rrror* fault condition exists.

Set the control to *N/A* to disable the EDH Error condition

6.8.5. Detecting Audio Over Level Faults

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

6.8.5.1. Setting the Audio Over Level

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

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

6.8.5.2. Setting the Audio Over Duration

Fault definitions
Over duration
3 to 255 SAMPLES *3*

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

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

6.8.6. Detecting Audio Silence Faults

The *Silence level* and *Silence duration* controls are used to detect when the audio is considered to be silent. The *Silence level* control sets the audio level under which the audio is considered to be silent. The audio must be under the *Silence level* for the duration set by the *Silence duration* control before the fault condition exists. When the fault condition exists, the audio must be over the *Silence level* for the duration set by the *Silence duration* control before the fault condition will be removed. A fault will be generated when both channels in a pair (1 and 2 or 3 and 4) has satisfied a silence condition.

6.8.6.1. Setting the Audio Silence Level

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

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

6.8.6.2. Setting the Audio Silence Duration

Fault definitions
Silence duration
0.5 to 127 sec
10 sec

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

6.8.7. Detecting Audio Phase Reversal Faults

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

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

6.8.7.1. Setting the Audio Phase Reversal Level

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

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

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

6.8.7.2. Setting the Audio Phase Reversal Duration

Fault definitions
Phase reversal duration
0.5 to 127 sec
10 sec

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

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

6.8.8. Detecting Audio Mono Faults

Mono audio material can take two forms: one channel with information and the other quiet or both channels with the same information. The 7745FS 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 decides whether the signals are the same. The audio difference must be less than the *Mono threshold level* amount for the duration set by the *Mono duration* control before the fault condition exists. When the fault condition exists, the audio difference must be more than the *Mono threshold level* amount for the duration set by the *Mono duration* control before the fault condition will be removed.

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

6.8.8.1. Setting the Audio Mono Threshold Level

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

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

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

6.8.8.2. Setting the Audio Mono Duration

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

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

6.8.9. Detecting Loss of Primary Captioning

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

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

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

6.8.10. Detecting Loss of Program Rating Duration

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

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

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

6.8.11. Detecting Picture Freeze

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

6.8.11.1. 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.

For noisy video feeds, higher numbers are needed.

6.8.11.2. Setting the Picture Freeze Duration

Fault definitions
Picture freeze duration
1 to 900 frames *30 frames*

This control sets duration, in 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 is equipment's motion sensitivity, thus long periods without significant on-screen movement are more likely to trigger a "false" freeze alarm.

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

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

Setting this time as high as tolerable has two benefits:

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

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

If the user can place the equipment farthest upstream in the video path to go to a 'freeze frame' mode, then the *Picture noise level* should be optimized by initiating the 'freeze frame' mode in the upstream equipment and adjusting *Picture noise level* as low as possible, without losing the freeze alarm on the 7745FS. The user should note that because of the random nature of noise, the freeze alarm may be intermittent at some *Picture noise level* settings. The optimal *Picture noise level* setting is obtained when the loss of freeze alarm in the 7745FS occurs no more then once every 5 minutes.

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

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

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

6.8.12. 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.

Setting the control to *minimum* detects a black picture after several frames.

6.9. UTILITIES

6.9.1. Accessing Information About this Module and its Firmware

Utilities
About…

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

6.9.2. Saving And Recalling 7745FS Configurations

The 7745FS 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.

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

6.9.2.1. Storing 7745FS 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.

6.9.2.2. Recall 7745FS 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.

6.9.3. 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.

6.9.4. Restoring the 7745FS 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.

6.10. CLEAR FAULTS AND PEAKS

Clear faults and peaks
Clear,
Cancel

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

7. JUMPERS

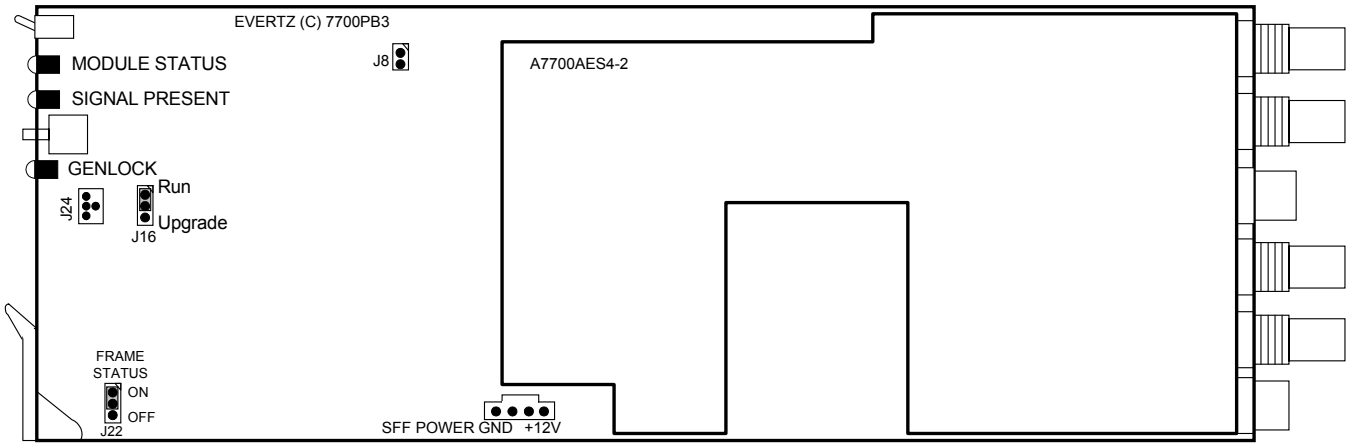

Figure 3: Location of Jumpers on 7745FS-EAES

7.1. 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 you may re-install the jumper so that only one side is connected.

Power supply faults will always assert the frame status fault line when J22 is installed.

7.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

The following method can be used to upgrade the firmware in the 7745FS card. You 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 completed, 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.