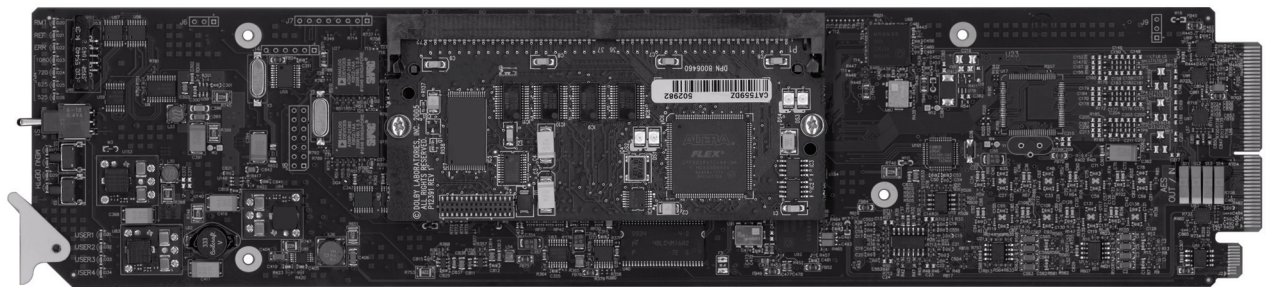


FSD-8240
HD/SD-SDI Frame Synchronizer with Dolby® Decoding
User Manual



FSD-8240 • HD/SD-SDI Frame Synchronizer with Dolby® Decoding User Manual

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Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the “Contact Us” section on the last page of this manual. All openGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the “Warranty and Repair Policy” section in this manual for details.

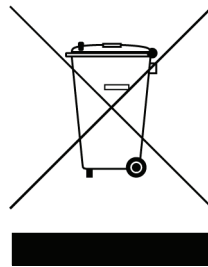
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- Collect this product separately.
- Use collection and return systems available for you.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Ross Video for more information on the environmental performances of our products.

Company Address



Ross Video Limited

8 John Street
Iroquois, Ontario
Canada, K0E 1K0

Ross Video Incorporated

P.O. Box 880
Ogdensburg, New York
USA 13669-0880

General Business Office: (+1) 613 • 652 • 4886

Fax: (+1) 613 • 652 • 4425

Technical Support: (+1) 613 • 652 • 4886

After Hours Emergency: (+1) 613 • 349 • 0006

E-mail (Technical Support): techsupport@rossvideo.com

E-mail (General Information): solutions@rossvideo.com

Website: <http://www.rossvideo.com>

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Introduction

In This Chapter

This chapter contains the following information:

- Overview
- Functional Block Diagram
- Functional Summary
- Manual Overview
- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing an openGear FSD-8240 HD/SD-SDI Frame Synchronizer with Dolby® Decoding. Your FSD-8240 is part of a full line of Digital Products within the openGear Terminal Equipment family of products, backed by Ross Video's experience in engineering and design expertise since 1974.

You will be pleased at how easily your new FSD-8240 fits into your overall working environment. Equally pleasing is the product quality, reliability and functionality. Thank you for joining the group of worldwide satisfied Ross Video customers!

Should you have a question pertaining to the installation or operation of your FSD-8240, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The FSD-8240 is an HD/SD-SDI frame sync and Dolby® decoder, with 16 channels of audio embedding or de-embedding. When Dolby® Digital or Dolby® E is present on a discrete AES pair or on an embedded audio pair, the decoder produces up to 10 decoded channels, according to the Dolby® sub-format received by the metadata. The resulting channels are then available for mapping, inversion and level adjustment and then embedded into the video signal.

The FSD-8240 offers glitch-free handling of embedded audio during frame synchronization, and a user-adjustable offset to the frame sync to align the Dolby® delay. Video and audio processing controls as well as flexible timecode processing, closed captioning support and AFD code insertion, provide complete signal management for all incoming signals.

The FSD-8240 can embed Dolby® metadata on the SDI output, sourced from either SDI input video or from the decoder as desired. With the optional metadata rear module's Dolby® META output can provide RS-485 metadata for downstream devices or systems. Metadata on the Dolby® META RS-485 output can also be sourced from either SDI input video or from the decoder as desired.

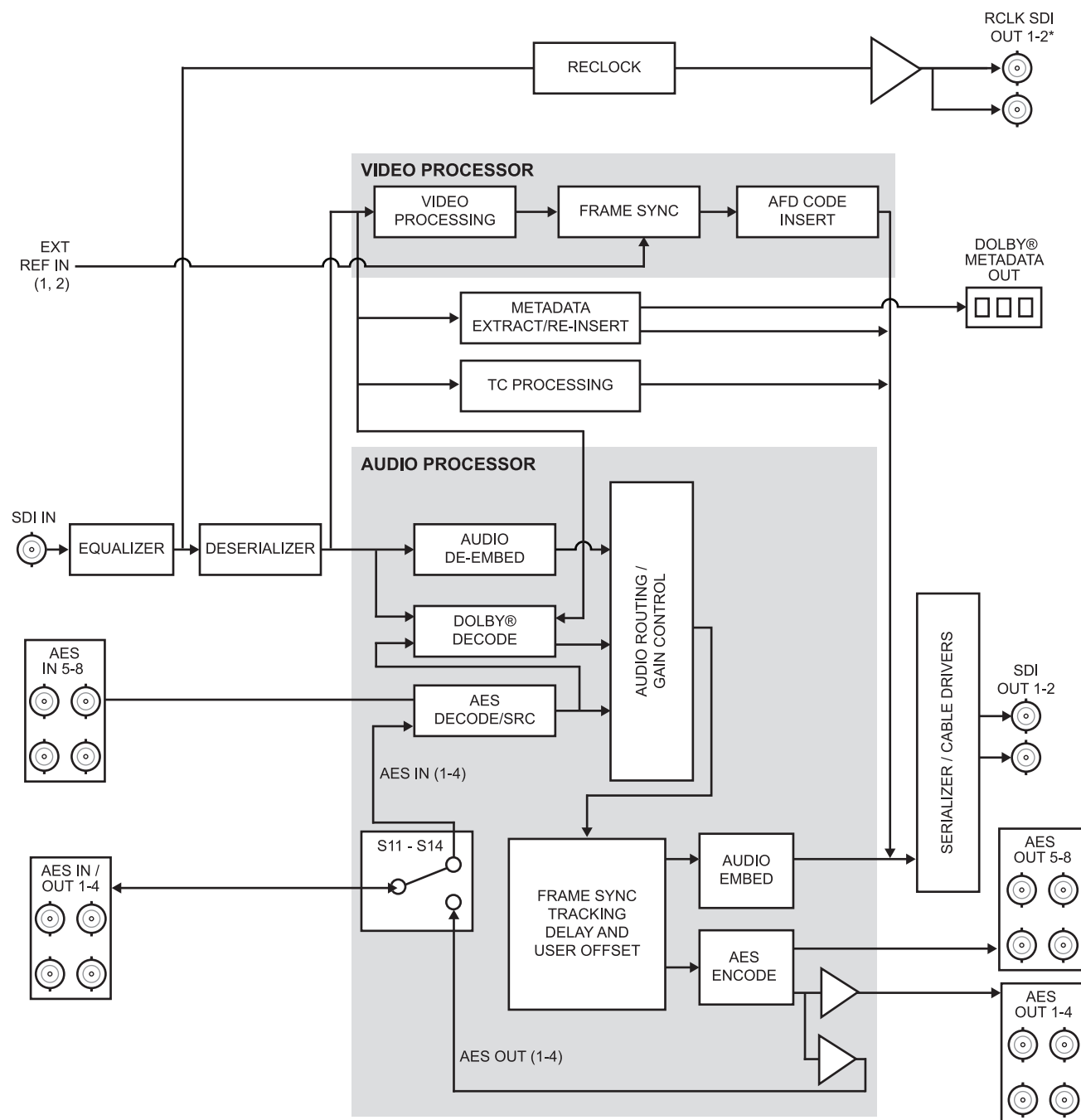
Features

The following features are standard with the FSD-8240:

- Handles all popular formats of SD (270Mbps) and HD (1.485Gbps) signals
- Glitch-free handling of embedded audio when a frame is dropped or duplicated
- Dolby® Digital and Dolby® E Decoding with optional metadata output
- 16 channels of discrete audio embedding or de-embedding
- User offset to frame sync to align Dolby® delay
- AFD code insertion
- HD/SD closed captioning and flexible timecode support
- Frame Sync with up to 13 frames of user-adjustable delay
- 4 internal tone generators
- Reports status and configuration remotely via the DashBoard Control System™
- 5-year transferable warranty

Functional Block Diagram

This section provides a functional block diagram that outlines the workflow of the FSD-8240.



*Available on the R2-8240 rear modules only.

Figure 1.1 Simplified Block Diagram — FSD-8240

Functional Summary

Figure 1.1 shows a functional block diagram of the FSD-8240. The frame synchronizer also includes a full 16-channel audio embedder/de-embedder, and an 8-channel. The FSD-8240 also handles AFD code detection/insertion and transfer of Dolby® metadata. The FSD-8240 also performs Dolby® E and Dolby® Digital™ decoding and decoded channel routing.

Some of the functions described below are available only when using the DashBoard. Refer to the section “**User Control Interface**” on page 1-12 for user interface descriptions.

Input/Output Formats

The FSD-8240 provides the following inputs:

- **HD/SD SDI IN** – dual-rate HD/SD-SDI input
- **AES I/O (1-4)** – user-switchable as AES inputs or AES outputs
- **AES IN (5-8)** – dedicated AES inputs

The FSD-8240 provides the following outputs:

- **SDI OUT** – two dual-rate HD/SD-SDI buffered video outputs
- **RCK OUT** – two reclocked HD/SD-SDI input copies
- **AES OUT (1-8)** – dedicated AES outputs
- **AES I/O (1-4)** – user-switchable as AES inputs or AES outputs
- **DOLBY META** – RS-485 Dolby® metadata output (extracted from input video). Note that RS-485 Dolby® metadata output can consist of input video or Dolby® decoder metadata output.

The input/output complement listed above represents the maximum capability of the FSD-8240. The practical input/output complement is determined by the particular Rear Module used with the FSD-8240. Refer to the section “**Rear Modules**” on page 1-10 for more information.

Video Processor Description

Video Processor

The FSD-8240 provides full color processing control (luma gain and lift, chroma saturation, and color phase) of the output video.

Frame Sync Function

This function provides for frame sync control using either one of two external **EXT REF IN (1,2)** reference signals distributed with the card frame, or the input video as a frame sync reference.

This function allows horizontal and/or vertical offset to be added between the output video and the frame sync reference.

A video/audio delay offset function allows adding or reducing audio delay from the matching video delay. This function is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays. A Reset Framesync function resets the frame sync following any horizontal or vertical offset changes, clearing any buffered audio and video and re-establishing the frame sync. The FSD-8240 re-establishes video/audio sync following framesync changes by applying an offset in small, progressive amounts to provide a seamless, glitch-free retiming. A user-selectable hard resync function allows setting a threshold at which hard resync is applied if audio-video offset exceeds the threshold. Hard resync provides fastest

sync-up suitable for off-air manipulation. Conversely, a threshold setting that avoids hard resync allows glitch-free on-air manipulation.

In the event of input video loss of signal, this function provides for disabling the video, going to a desired color raster, or freezing to the last intact frame (last frame having valid SAV and EAV codes).

When Dolby® data is received and actively routed into embedded or AES output channels, the frame sync function delays the video by one frame (as required by the Dolby® decode processing delay) to maintain video/audio sync.

AFD Inserter

This function provides for assignment and insertion of AFD codes into the SDI output video. Using this function, AFD codes in accordance with the standard 4-bit AFD code designations can be applied to the output video.

This function checks for any existing AFD code within the received video input. If a code is present, the code is displayed. When used in conjunction with a separate downstream card capable of providing AFD-directed scaling, the image can in turn be scaled in accordance with the AFD coding embedded by this card.

The function also allows the selection/changing of the AFD code and ancillary data line number for the outputted AFD code.

Timecode Processor

This function provides for extraction of timecode data from the input video, and in turn re-insertion of timecode data into the output SDI. (**Figure 1.2**) The function can monitor the SDI video input of the card for supported timecode formats, and then select and prioritize among SDI VITC, SDI ATC VITC, and SDI ATC LTC timecode sources. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired.

The function provides conversion between various timecode formats and provides independent insertion and line number controls for each SDI timecode output format.

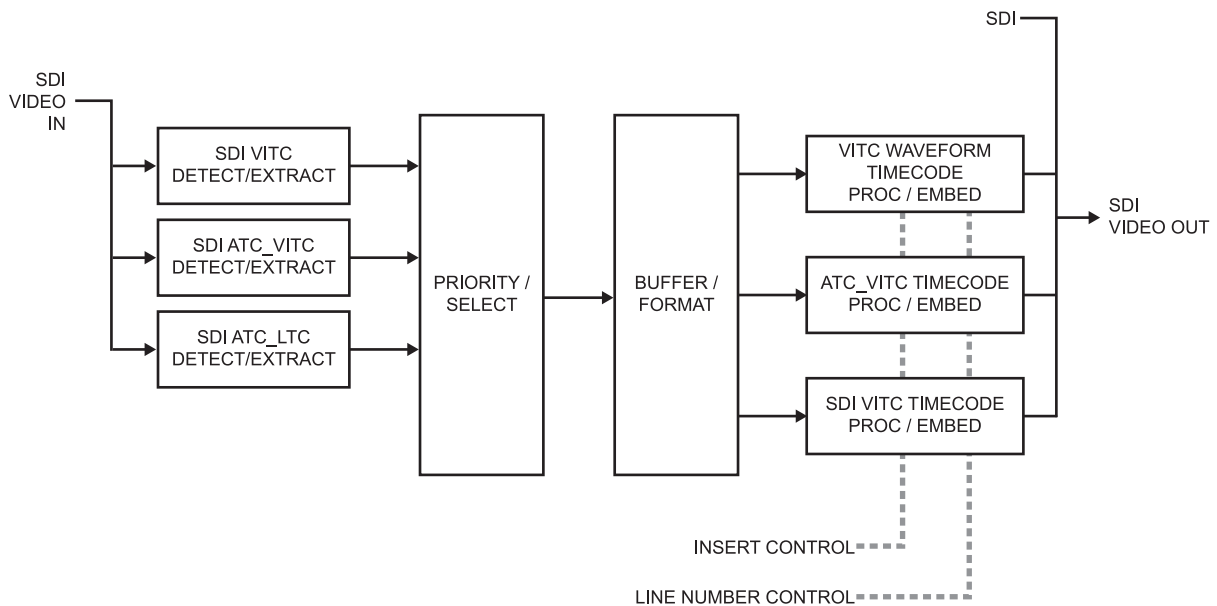


Figure 1.2 Timecode Processor

Audio Processor Description

The audio processor operates as an internal audio router. The router function chooses from the following inputs:

- 16 channels of embedded audio from the SDI video
- 16 channels (8 pairs) of discrete AES input
- Four independent internal tone generators (described below)
- Digital silence (mute) setting
- Internal Down Mix and Mono Mixer outputs (described below)
- Decoded Dolby® channels

The router function provides the following audio outputs:

- 16 channels of embedded audio on the SDI output
- 16 channels of discrete AES output on eight AES pairs

The router acts as a full audio cross point. Each of the 32 output channels (16 embedded AES, 16 discrete AES) can receive signal from any one of the 32 (16 embedded AES, 16 discrete AES) input channels, four internal tone generators, or several mixer outputs. Unused output channels can be mapped to a “Silence” source. Each output also provides gain adjustment and selectable polarity inversion.

Output audio rates are always 48 kHz locked to output video, but discrete AES inputs can pass through the sample rate converters to align these inputs with the output timing. (AES must be nominally 48 kHz input; 32, 44.1, 96, and 192 kHz inputs are not compatible with the FSD-8240.) The sample rate converters are disabled by default. Output AES is always precisely synchronized with the output video.

As set with the default settings, the routing between embedded audio channels **Embed Ch 1** thru **Embed Ch 16** and discrete AES audio channels **AES Ch1** thru **AES Ch 16** is as shown in **Figure 1.3**. In this mode, the routing is basic 1-to-1 embedding/de-embedding for the 16 embedded and AES discrete audio channels. Other sources and/or destinations (described below) for each channel are selected using the card-edge controls or a remote control system.

As shown in **Figure 1.2**, the FSD-8240 is equipped with eight discrete AES input pair ports and eight discrete AES output pair ports. On Rear Modules having limited AES I/O capabilities, switches **S11** thru **S14** allow available rear module BNC connectors to be allotted between AES inputs and outputs as desired. Buffered copies of **AES OUT (1-4)** are available as dedicated outputs and as respective outputs fed through **S11 – S14** on the FSD-8240 card.

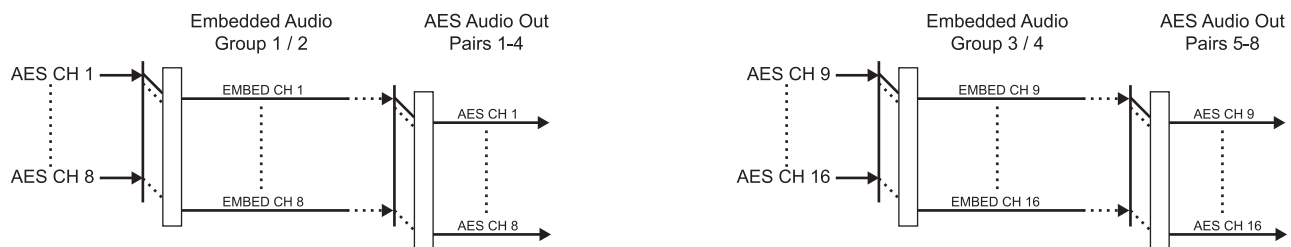


Figure 1.3 Default Embed/De-Embed Audio Routing

Audio Down Mixer and Mono Mixer Function

The Audio Down Mixer function provides for the selection of any five embedded, or AES discrete audio sources serving as Left (**L**), Right (**R**), Center (**C**), Left Surround (**Ls**), and Right Surround (**Rs**) individual signals to be multiplexed into a stereo pair (Down Mix Left (**DM-L**) and Down Mix Right (**DM-R**). (**Figure 1.4**) The resulting stereo pair **DM-L** and **DM-R** can in turn be routed and processed just like any of the other audio sources described earlier.

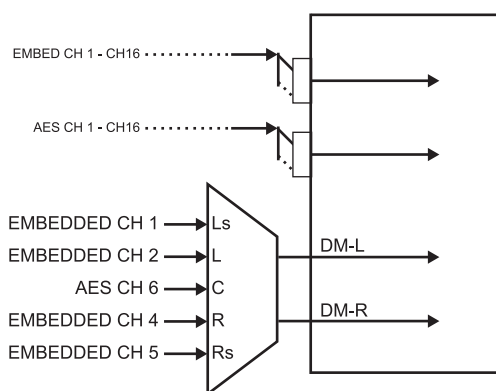


Figure 1.4 Audio Mixing Functional Block Diagram with Example Sources

The Mono Mixer function (**Figure 1.5**) generates an additional mono-mixed channel from two selected embedded, or AES discrete input channels serving as left and right inputs. The resulting mono mix channel **MONO** can in turn be routed and processed just like any of the other audio sources described earlier.

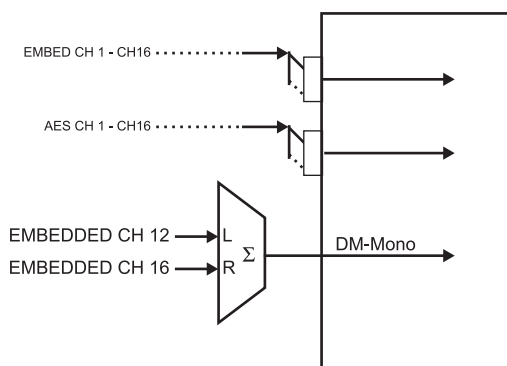


Figure 1.5 Audio Mono Mix Functional Block Diagram with Example Sources

Tone Generator Function

The FSD-8240 contains four built-in tone generators (Tone Generator 1 thru Tone Generator 4). Each of the four tone generators can be set to a different frequency, and are available as audio sources for the embedded or AES audio outputs.

18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz).

Audio Routing Example

Figure 1.6 shows an example of using the FSD-8240 audio embedding/de-embedding and routing functions to de-embed audio, route the audio to discrete outputs for post-production processing (in this example, a console used for post-production EQ, levels, and monitor), and finally re-embed the audio into the SDI video output. Additionally, the example shows how internal tone generator sources can be embedded into the SDI output (in this example, a provision for a tone).

Note that the source and destination correlations shown here are only examples; any source can route to any destination.

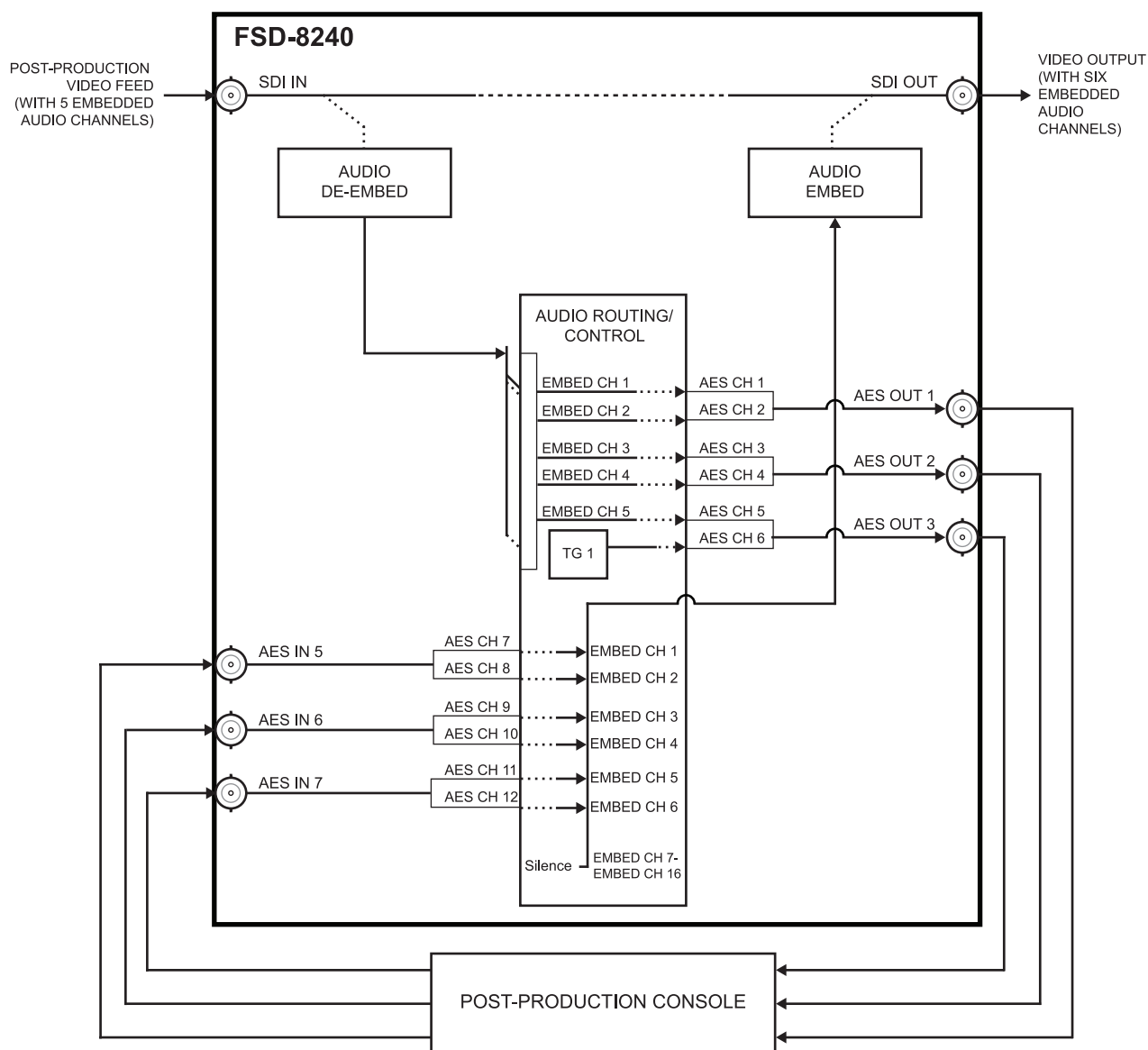


Figure 1.6 Audio Routing Example

AES Audio Input Advanced Features

AES Sample Rate Converter

The FSD-8240 AES inputs have sample rate converters that can be independently enabled for each AES pair to allow the card to interface with asynchronous AES sources (sources in which AES timing does not match the video input timing). The sample rate converters are set to disabled (bypassed) by default; this is necessary when embedding non-PCM AES audio such as Dolby® E or Dolby® Digital audio streams. When a valid Dolby® E or Dolby® Digital signal (in accordance with SMPTE 337M) is detected on an AES or embedded audio signal, SRC is automatically bypassed along with gain and polarity controls.

Zero-Delay Audio Embedding

In cases where additional delay must be avoided, it may be desirable to embed AES with minimum latency. For example if Dolby® E is to be embedded into video with no latency, additional delay may not be tolerable.

When zero-delay audio embedding is enabled for a given AES pair, the pair is directly embedded into its corresponding group (for example, AES Pair 1 into embedded channels 1 and 2; AES Pair 2 into embedded channels 3 and 4, and so on) with the normal frame sync audio delay being bypassed.

This function overrides the audio routing system (for example if AES Pair 1 is selected, then the controls to route AES Pair 1 into other embedded channels will not apply). Gain and polarity control is not available when this option is selected. Zero-delay audio embedding is set to Off by default.

Low-Latency AES Passthrough

This function is similar to zero-delay audio embedding. If low-latency AES passthrough is selected for a given input pair, it causes the corresponding AES output pair to act as a bit-for-bit copy of the corresponding AES input pair.

This control overrides the normal audio routing and delay. Gain and polarity control is not available when this option is selected. Passthrough is set to Off by default.

Dolby® Decoding

When Dolby® E or Dolby® Digital™ is present on an embedded audio pair, the decoder produces up to 10 decoded channels (according to the Dolby® sub-format received from the metadata). All resulting channels are available as inputs to the audio router.

Dolby® Identification and Metadata Output Processing

All embedded channels are checked by the FSD-8240 for valid Dolby® status. (**Figure 1.7**) When a valid Dolby® encoded embedded pair is detected, the channel pair carrying the Dolby® format is displayed as “Present, Dolby E” or “Present, Dolby Digital”, as applicable. (The decoder always uses the metadata associated with its respective pair.) A selected encoded channel pair can then be directed to the Dolby® decoder. The decoder then displays the Dolby® bitstream format and program configuration (for example, “Dolby E 20-bit 5.1+2” indicating 5-channel surround with LFE channel and stereo monitor pair) for the selected pair, as defined by its metadata.

The FSD-8240 can embed metadata on the SDI output, sourced from either SDI input video or from the decoder as desired. Similarly, the FSD-8240 **DOLBY META** output can provide RS-485 metadata for downstream devices or systems. Metadata on the **DOLBY META** RS-485 output can also be sourced from either SDI input video or from the decoder as desired.

Audio Decoding

Based on the channels carrying the Dolby® encoded pair and the format defined within, the Dolby® decoder provides up to 10 decoded audio channels (**Dolby Ch 1** thru **Dolby Ch 8**; **Dolby Mix 1**, **Dolby Mix 2**). (**Figure 1.7**) Each channel can be routed just as any other audio channel described in this section.

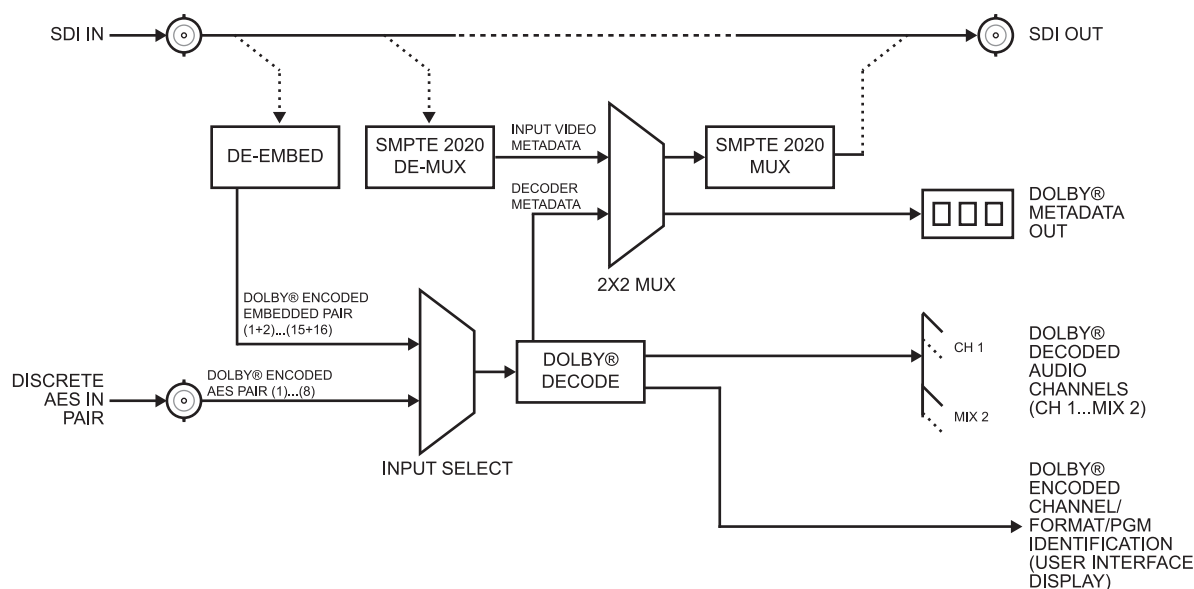


Figure 1.7 *Dolby® Decoding and Metadata Output Processing*

Rear Modules

The FSD-8240 physically interfaces to system video and audio connections using a Rear Module.

All inputs and outputs shown in **Figure 1.1** enter and exit the card via the card-edge backplane connector. The Rear Module breaks out the FSD-8240 card-edge connections to industry standard connections that interface with other components and systems in the signal chain.

In this manner, the particular inputs and outputs required for a particular application can be accommodated using a Rear Module that suits the requirements. The required input and outputs are broken out to the industry standard connectors on the Rear Module; the unused inputs and outputs remain unterminated and not available for use.

The full assortment of Rear Modules is described in the section “**Installing a Rear Module**” on page 2-4.

Supported Audio and Video Formats

The FSD-8240 supports all current SMPTE standard SD and HD video formats. **Table 1.1** lists and provides details regarding the audio and video formats supported by the FSD-8240.

Table 1.1 *Supported Audio and Video Formats*

Item	Description/Specification	
Input / Output Video	Raster Structure:	Frame Rate:
	1080pSF	23.98; 24
	1080p	23.98; 24
	1080i (1)	25; 29.97; 30
	720p	23.98; 24; 25; 29.97; 30; 50; 59.94; 60
	486i (1)	29.97
	575i (1)	25

Table 1.1 Supported Audio and Video Formats

Item	Description/Specification
Embedded Audio	The FSD-8240 supports all four groups (16 channels) of embedded audio at full 24-bit resolution in both SD (with extended data packets) and HD.
Discrete AES Audio Input	The FSD-8240 can accept 16 channels (8 pairs) of discrete AES audio on 75W BNC connections. Sample rate conversion can be employed to account for minor clock rate differences in the AES stream and the input video stream. Note: The AES signal must have a nominal rate of approximately 48kHz. The FSD-8240 does not support AES input at 32kHz, 44.1kHz, 96kHz or 192kHz rates.
Discrete AES Audio Output	The FSD-8240 can provide 16 channels (8 pairs) of discrete AES audio on 75W BNC connections.
Dolby® E/Dolby® Digital™ Audio Input Decode	The FSD-8240 provides up to 10 decoded AES channels when valid Dolby® E or Dolby® Digital™ audio is received on either discrete AES or embedded inputs with corresponding metadata.
(1) All rates displayed as frame rates; interlaced (“i”) field rates are two times the rate value shown.	

User Control Interface

Figure 1.8 shows the user control interface options for the FSD-8240. These options are individually described below.

All user control interfaces described here are cross-compatible and can operate together as desired. Where applicable, any control setting change made using a particular user interface is reflected on any other connected interface.

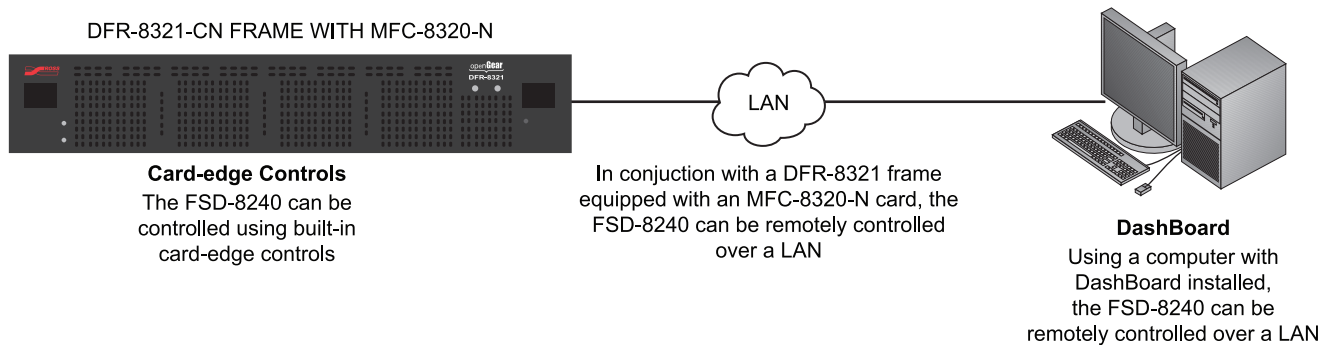


Figure 1.8 User Control Interface

Built-in Card-edge User Interface

Using the built-in card-edge controls and display, card control settings can be set using a front panel menu which is described in the section “**Control and Display Descriptions**” on page 3-2.

Some of the FSD-8240 functions described in this manual are available only when using DashBoard.

DashBoard User Interface

Using DashBoard, the FSD-8240 and other cards installed in the DFR-8321 series frame can be controlled from a computer and monitor.

DashBoard allows users to view all frames on a network with control and monitoring for all populated slots inside a frame. This simplifies the setup and use of numerous modules in a large installation and offers the ability to centralize monitoring. Cards define their controllable parameters to DashBoard, so the control interface is always up to date.

The DashBoard software can be downloaded from the Ross Video website. The DashBoard user interface is described in the section “**Accessing the FSD-8240 via Remote Control**” on page 3-11.

If network remote control is to be used for the frame and the frame has not yet been set up for remote control, refer to the *MFC-8300 Series User Manual*.

Manual Overview

This manual provides installation and operating instructions for the FSD-8240 HD/SD-SDI Frame Synchronizer with Dolby® Decoding card.

This manual consists of the following chapters:

- **Introduction** — Provides information about this manual and what is covered. Also provides general information regarding the FSD-8240.
- **Installation** — Provides instructions for installing the FSD-8240 in a frame, and optionally installing Rear Modules.
- **Operating Instructions** — Provides overviews of operating controls and instructions for using the FSD-8240.
- **Specifications** — Provides the technical specifications for the FSD-8240.
- **Service Information** — Provides troubleshooting solutions and warranty information.

Card Software Versions and this Manual

When applicable, Ross Video provides for continual openGear card product enhancements through software updates. As such, functions described in this manual may pertain specifically to cards loaded with a particular software build. If you received your FSD-8240 and this manual at the same time, this manual reflects all facets of your card.

If your card was purchased earlier than receiving this manual, you can check the Software Version of your card and see if it matches the Software Version covered by this manual.

If necessary, the Software Release Number/Software Build Number of your FSD-8240 can be checked by viewing this information as displayed on the Info submenu on the card-edge display, or by checking the Card Info menu in DashBoard. Refer to the section “**Checking Card Information**” on page 3-13 for more information.

This section provides guidance when your card software does not match this manual.

Card software is an earlier version

Card is not loaded with the latest software. Not all functions and/or specified performance described in this manual may be available.

You can update your card by:

1. Contacting Ross Technical Support.
2. Downloading the latest firmware and/or software for your card onto your computer.
3. Uploading the firmware and/or software to your card through DashBoard.

Software updates are field-installed without any need to remove the card from its frame.

Card Software is a newer version

A new manual is expediently released whenever a card’s software is updated and specifications and/or functionality have changed as compared to an earlier version (a new manual is not necessarily released if specifications and/or functionality have not changed). A manual earlier than a card’s software version may not completely or accurately describe all functions available for your card.

If your card shows features not described in this manual, you can check for the latest manual (if applicable) and download it by going to our website.

Documentation Terms and Conventions

In this manual, display messages and connectors are shown using the exact name shown on the FSD-8240 itself. Examples are provided below.

- Card-edge display messages are shown like this:

Ch01

- Connector names are shown like this: **SDI OUT**

In this manual, the terms below are applicable as follows:

- All references to the **DFR-8300 series frame** also includes all version of the 20-slot frames and any available options unless otherwise noted.
- All references to the **FSD-8240** also includes all versions unless otherwise indicated.
- “**Board**”, and “**Card**” refer to openGear terminal devices within openGear frames, including all components and switches.
- “**DashBoard**” refers to the DashBoard Control System™.
- “**Frame**” refers to DFR-8300 series frame that houses the FSD-8240 card, as well as any openGear frames.
- “**Operator**” and “**User**” refer to the person who uses FSD-8240.
- “**System**” and “**Video system**” refer to the mix of interconnected production and terminal equipment in your environment.
- The “**Operating Tips**” and “**Note**” boxes are used throughout this manual to provide additional user information.

Installation

In This Chapter

This chapter provides instructions for installing the FSD-8240, installing the card into the frame, and cabling details.

This chapter contains the following information:

- Before You Begin
- Setting I/O Switches for AES I/O (1-4) Ports
- Installing a Rear Module
- Installing the FSD-8240
- Cabling for the FSD-8240
- Setting up Network Remote Control

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your DFR-8300 series frame is properly installed according to the instructions in the ***DFR-8300 Series User Manual***.

Static Discharge

Throughout this chapter, please heed the following cautionary note:



ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

This card contains semiconductor devices which are susceptible to serious damage from Electrostatic Discharge (ESD). ESD damage may not be immediately apparent and can affect the long-term reliability of the device.

Unpacking

Unpack each FSD-8240 you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Setting I/O Switches for AES I/O (1-4) Ports

This procedure is applicable only if any of the four **AES I/O (1-4)** ports on the FSD-8240 are to be used as outputs (the switches are set to input mode by factory default). The FSD-8240 is equipped with a four-section red DIP switch that sets AES pairs 1 thru 4 as either inputs or outputs. The factory default position is the input position for each pair.

- If all of the **AES I/O (1-4)** ports are to be used as inputs (or not used at all), omit this procedure.
- If any of the **AES I/O (1-4)** ports are to be used as outputs, set the switches as described in this procedure.

Note switch **S11** thru **S14** settings for **AES I/O 1** thru **AES I/O 4** mode shown in **Figure 2.1**. For port to be used as an output, set switch to down position as shown in **Figure 2.1**.

Regardless of **S11** thru **S14** settings for **AES I/O 1** thru **AES I/O 4**, outputs **AES OUT (1-8)** are still available on cards equipped with a Rear Module having dedicated **AES OUT (1-8)** BNC connectors.

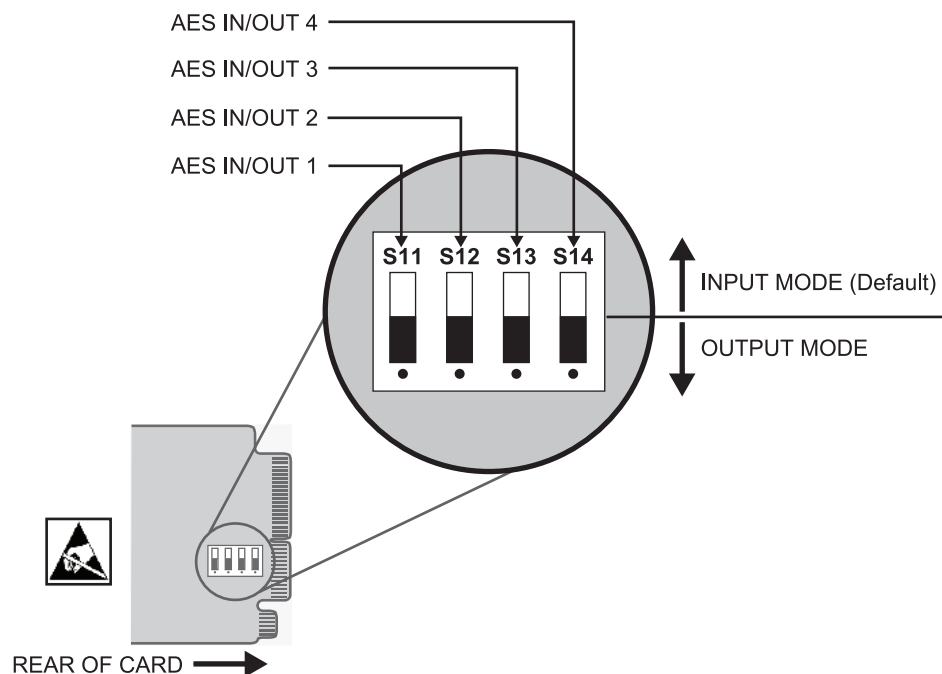


Figure 2.1 AES I/O (1-4) Mode Switches

Installing a Rear Module

This procedure is applicable only if a Rear Module is not currently installed in the slot where the FSD-8240 is to be installed.

Rear Modules

When installing the FSD-8240 in the DFR-8321 series frames, the **R2-8240** Full Rear Module or the **R2M-8240** can be used. Note that the available cable designations differ between the type of module used. Refer to the section

Installing a Rear Module

Use the following procedure to install a Rear Module in your DFR-8300 series frame:

1. Locate the card frame slots on the rear of the frame.
2. Remove the Blank Plate from the slot you have chosen for the FSD-8240 installation. If there is no Blank Plate installed, proceed to the next step.
3. Install the bottom of the Rear Module in the **Module Seating Slot** at the base of the frame's back plane. **Figure 2.2**

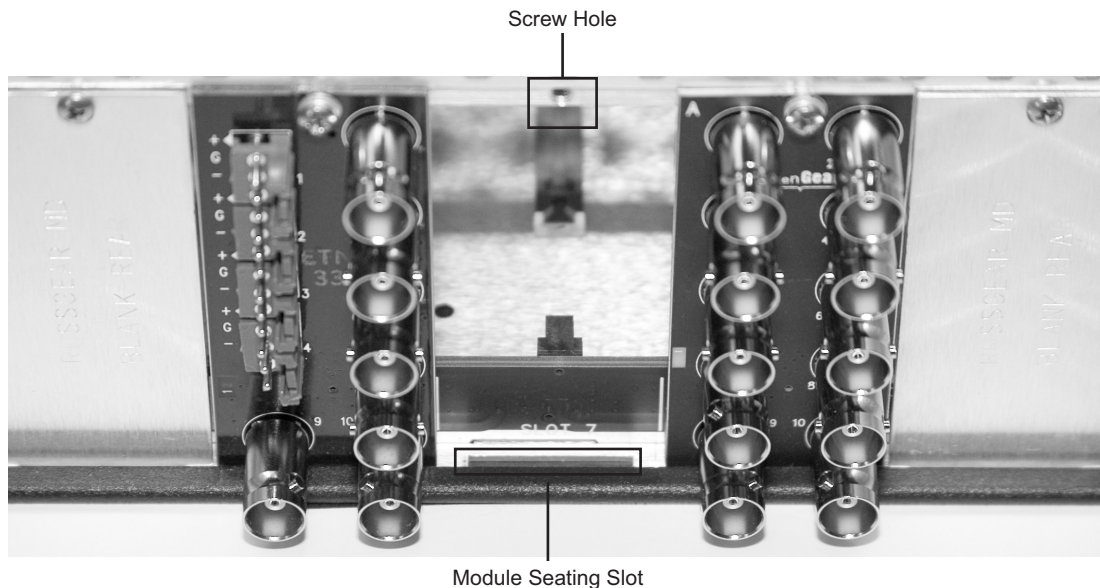


Figure 2.2 Rear Module Installation in a DFR-8310 Series Frame (FSD-8240 not shown)

4. Align the top hole of the Rear Module with the screw on the top-edge of the frame back plane.
5. Using a Phillips screwdriver and the supplied screw, fasten the Rear Module to the back plane of the frame. Do not over tighten.
6. Ensure proper frame cooling and ventilation by having all rear frame slots covered with Rear Modules or Blank Plates.

This completes the procedure for installing a Rear Module in your DFR-8300 series frame.

Installing the FSD-8240

This section outlines how to install a FSD-8240 card when the Rear Module is already installed in a DFR-8300 series frame. If you are installing the FSD-8240 card in a slot with no rear module, a rear module is required before cabling can be connected. Refer to the section “**Installing a Rear Module**” on page 2-4 for rear module installation procedure.



Caution — *If required, make certain the rear module(s) is installed before installing the FSD-8240 card into the frame slot. Damage to card and/or rear module can occur if module installation is attempted with card already installed in the slot.*

Installing the FSD-8240

Use the following procedure to install the FSD-8240 in a DFR-8300 series frame:

1. Check the packaging in which the card was shipped for any extra items such as a rear module label. In some cases, this label is shipped with the card and should be installed on the rear I/O connector bank corresponding to the slot location of the card.
2. Determine the slot in which the FSD-8240 is to be installed.



Notice — *Heat and power distribution requirements within a frame may dictate specific slot placements of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up.*

3. Open the frame front access panel.
4. While holding the card by the card-edges, align the card such that the plastic ejector tab is on the bottom.
5. Align the card with the top and bottom guides of the slot in which the card is being installed.
6. Gradually slide the card into the slot. When resistance is noticed, gently continue pushing the card until its rear printed circuit edge terminals engage fully into the rear module mating connector.



Caution — *If the card resists fully engaging in rear module mating connector, check for alignment and proper insertion in slot tracks. Damage to card and/or rear module may occur if improper card insertion is attempted.*

7. Verify that the card is fully engaged in rear module mating connector.
8. Close the frame front access panel.
9. Connect the input and output cables as outlined in the section “**Cabling for the FSD-8240**” on page 2-6.
10. Repeat steps 1 through 9 for other cards.



Operating Tip — *To remove a card, press down on the ejector tab to unseat the card from the rear module mating connector. Evenly draw the card from its slot.*

This completes the procedure for installing the FSD-8240 in a DFR-8300 series frame.

Cabling for the FSD-8240

This section provides information for connecting cables to the installed rear modules in the DFR-8300 series frame. Note that the FSD-8240 card BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.

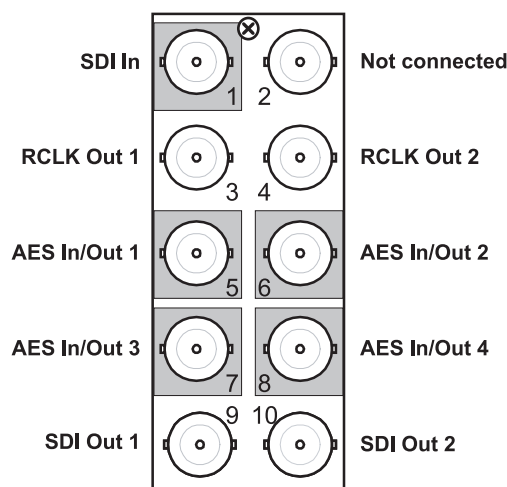


Figure 2.3 Cable Connections for the **R2-8240** Rear Module

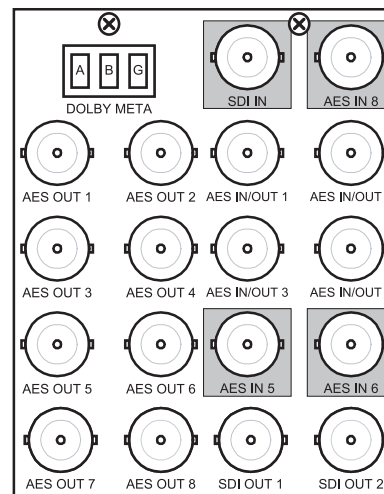


Figure 2.4 Cable Connections for the **R2M-8240** Rear Module

R2-8240 Full Rear Module

Each card occupies two slots and provides the following connections:

- HD/SD-SDI coaxial input (**SDI IN**)
- Two HD/SD-SDI reclocked input copies (**RCK OUT 1** and **RCK OUT 2**)
- Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable)
- Two buffered SDI coaxial outputs (**SDI OUT 1** and **SDI OUT 2**)

R2M-8240 Full Rear Module

Each card occupies two slots and provides the following connections:

- HD/SD-SDI coaxial input (**SDI IN**)
- Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable)
- Two dedicated AES coaxial audio inputs (**AES IN 5** and **AES IN 6**)
- Eight dedicated AES coaxial audio outputs (**AES OUT 1** thru **AES OUT 8**)
- Dolby® RS-485 metadata output (**DOLBY META**)
- Two buffered SDI coaxial outputs (**SDI OUT 1** and **SDI OUT 2**)



Note — **AES OUT 1** thru **AES OUT 4** always function as outputs regardless of whether **AES I/O 1** thru **AES I/O 4** are used as inputs or outputs.

Setting up Network Remote Control

If network remote control is to be used for the frame and the frame has not yet been set up for remote control, refer to the *MFC-8300 Series User Manual* for information.

If installing a card in a frame already equipped for, and connected to DashBoard, no network setup is required for the card. The card will be discovered by DashBoard and be ready for use.

Operating Instructions

In This Chapter

This chapter describes the user interface controls, indicators, and displays (both on-card and remote controls) for using the FSD-8240 card. The FSD-8240 functions can be accessed and controlled using any of the user interfaces described here.

The following topics are discussed:

- Control and Display Descriptions
- Card-edge Controls, Indicators, and Display
- DashBoard User Interface
- Accessing the FSD-8240 via Remote Control
- Checking Card Information
- Ancillary Data Line Number Locations and Ranges

Control and Display Descriptions

The format in which the FSD-8240 functional controls, indicators, and displays appear and are used varies depending on the user interface being used. Regardless of the user interface being used, access to the FSD-8240 functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Submenus under which related parameters can be accessed (as described in **Function Submenu/Parameter Submenu Overview** below).

After familiarizing yourself with the arrangement described in **Function Submenu/Parameter Submenu Overview**, proceed to the subsection for the particular user interface being used. Descriptions and general instructions for using each of the three user interfaces are individually described in the following subsections:

- “**Card-edge Controls, Indicators, and Display**” on page 3-3
- “**DashBoard User Interface**” on page 3-9

Instructions provided here are applicable for all available user control methods. However, DashBoard provides greatly simplified user interfaces as compared to using the card-edge controls. For this reason, **it is strongly recommended** that DashBoard be used for all card applications other than the most basic cases.

Not all functions available using DashBoard are available using the card-edge controls.

When a setting is changed, settings displayed on DashBoard are the settings as effected by the FSD-8240 card itself and reported back to the remote control; the value displayed at any time is the actual value as set on the card.

Function Submenu/Parameter Submenu Overview

The functions and related parameters available on the FSD-8240 are organized into function submenus, which consist of parameter groups as shown below.

Figure 3.1 shows how the FSD-8240 card and its submenus are organized, and also provides an overview of how navigation is performed between cards, function submenus, and parameters.

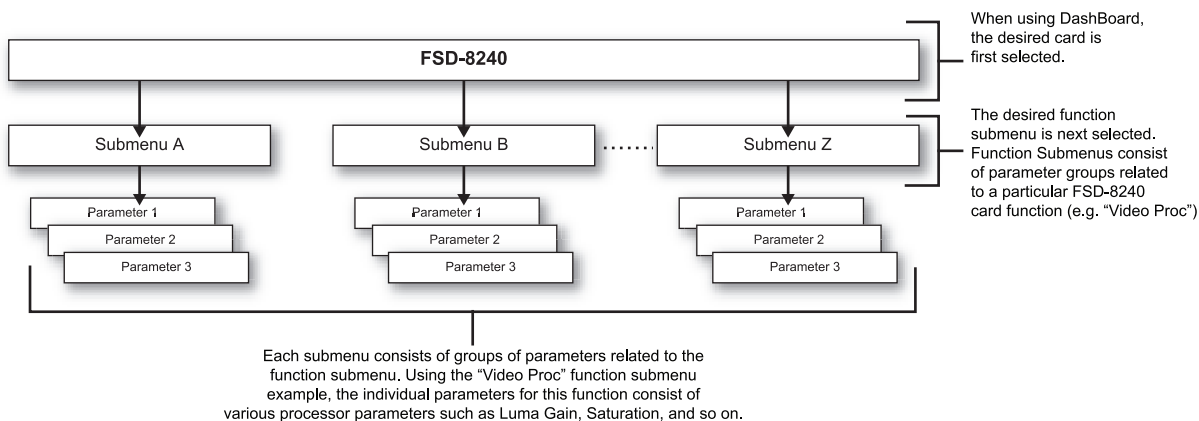


Figure 3.1 Function Submenu/Parameter Submenu Overview

Card-edge Controls, Indicators, and Display

Figure 3.2 shows and describes the FSD-8240 card-edge controls, indicators, and display.

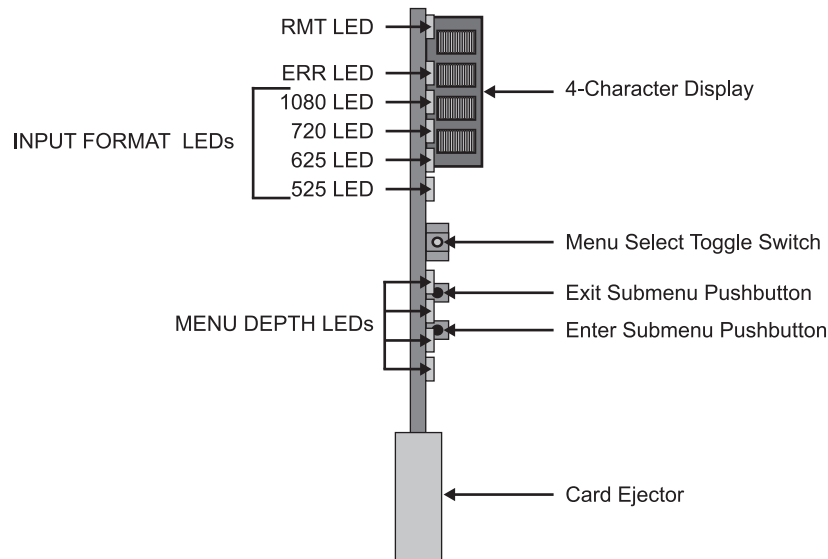


Figure 3.2 Controls, Indicators, and Display

Card-edge Controls

This section provides a general overview of the components used for navigating the menu system on the card-edge.

4-Character Display

Displays 4-digit abbreviated code showing menu and submenu selections. When in a menu displaying a parameter setting, the display shows parametric scalar value (and +/- sign where applicable).

Menu Selection Toggle Switch

When in a menu or submenu selection mode, moving the switch up or down toggles up and down through the menu or submenu item choices.

When in a mode where a parameter setting is displayed, moving the switch up or down increase or decreases the parametric value.

Enter Menu Pushbutton

When pressed, selects and opens the current mode shown on the display. At this point, submenu choices within the selected menu are now displayed. Pressing the pushbutton again goes deeper into the submenu, now opening items subordinate to the selected submenu. In this manner, pressing the **Enter Menu** pushbutton navigates into a menu and its submenus.

Exit Menu Pushbutton

When pressed, moves in the opposite direction of the **Enter Menu** pushbutton. It closes the currently selected submenu and moves to the next higher menu, eventually moving completely out of the item's submenus. In this manner, pressing the **Exit Menu** pushbutton navigates out of a menu and its submenus.

Status and Selection LEDs on the Card-edge

The front-edge of the FSD-8240 has LED indicators for communication activity. Basic LED displays and descriptions are provided in **Table 3.1**.

Table 3.1 LEDs on the FSD-8240

LED	Color	Display and Description
RMT	Blue	When flashing, this LED indicates when the card is receiving control messages from DashBoard.
REF	Blue	When lit, this LED indicates when the card is receiving valid frame sync enable when set up for reference frame sync.
ERR	Red	When lit, this LED indicates when the card is unable to lock to frame sync, or unable to lock to the input standard.
INPUT FORMAT	Blue	Four blue LEDs indicate the input signal raster format being received and locked onto by the card (1080, 720, 625, 525). Continuous cycling of the LEDs indicates the card has not locked onto a particular format (as in the case of no signal input)
MENU DEPTH	Green	Four green LEDs show the currently selected menu/submenu depth navigation. <ul style="list-style-type: none">• No LEDs indicate top-level menu items are now ready for selection.• One LED indicates first submenu items (items subordinate to currently selected menu item) are now ready for selection.• Two LEDs indicates second submenu items (items subordinate to currently selected submenu item) are now ready for selection.• Three LEDs indicates third submenu items (items subordinate to currently selected submenu item) are now ready for selection. Typically, this is the level where values can now be adjusted for a specific parameter.• Four LEDs indicate fourth submenu items are now ready for selection. (This depth is not applicable to most items.)

Card-edge Control Menu/Submenu Structure

Using the menu system of group menus and submenus described earlier, the FSD-8240 parameters/controls are organized into menus and submenus. (**Table 3.2**) As appropriate, a submenu similarly may have its own further additional subordinate submenus.

Table 3.2 Card-edge Control Menu Structure

	Menu Depth	Menu Depth as indicated by LEDs
Menu Group Item		none
Submenu 1 Submenu 1 selection items	1	● ○ ○ ○
Submenu 2 Submenu 2 selection items	2	● ● ○ ○
Submenu 3 Submenu 3 selection items and/or parameter values	3	● ● ● ○
Submenu 4 Submenu 4 selection items and/or parameter values	4	● ● ● ●

Table 3.3 shows an example of using the card-edge controls to access the Embedded Audio processing group menu (along with some of its submenus) to set the routing and signal processing parameters for an embedded audio channel. **A** through **S** in **Table 3.3** denote the discrete tasks required in performing the example setup using the card-edge controls.

In this example, the following input processing is being performed:

- Embedded Channel 3 is selected as the source for Embedded Channel 1 within Embedded Audio Group 1.
- Gain is increased over unity default by 12.1.
- Phase is inverted.

In this example, the following output processing is being performed:

- The embedded Channel 1 path has been directed to AES Output Channel 1.
- Gain is increased over unity output default by 18.5.
- Phase is normal (non-inverted).

Due to the limited control available when using the built-in card-edge control user interface, the navigation into and out of submenus shown in **Table 3.3** is required to perform the setup described above.

Table 3.3 Card-edge Controls Setup of Example Embedded Audio Function Setup

	Submenu Depth				Description
	1	2	3	4	
A	Embd AES Tone				Press Enter Menu and in this example, select Embd (Embedded Audio Groups). This selects the embedded audio function of the Audio processor.

Table 3.3 Card-edge Controls Setup of Example Embedded Audio Function Setup

Submenu Depth					Description
	1	2	3	4	
B		Grp1 Grp2 Grp3 Grp4			Press Enter Menu again and in this example, select Grp1 (Embedded Audio Group 1). This selects the embedded audio group to be accessed.
C			Enbl		Press Enter Menu again and in this example, select Enbl (Enable).
D				On Off	Press Enter Menu again and in this example, select On . This sets the selected embedded audio group to Enabled .
E			Ch01 Ch02 Ch03 Ch04		Press Exit Menu and in this example, select Ch01 . (Destination: Embedded Channel 1). This selects the embedded channel to be accessed.
F				Src Gain Pol	Press Enter Menu and select in this example, Src (source for Embedded Channel 1). This selects the source for the embedded channel.
G				Em01 Em02 Em03 ...	Press Enter Menu again and in this example, select Em03 (Embedded Channel 3 as source for Embedded Channel 1).
H				Src Gain Pol	Press Exit Menu and in this example, select Gain (gain adjustment field for selected embedded audio channel).
I				(gain value)	Press Enter Menu again and in this example, select a gain value of 12.1 for this channel.
J				Src Gain Pol	Press Exit Menu and in this example, select Pol (phase for Embedded Channel 1).
K				Norm Inv	Press Enter Menu again and in this example, select Inv (invert polarity for Embedded Channel 1).
L	Embd AES Tone				Go to submenu 1 and in this example, select AES (AES output channel selection). This selects an AES output channel as the output for this group.
M		Ch01 Ch02 Ch03 ...			Press Enter Menu and in this example, select Ch01 (AES Output Channel 1).
N			Src Gain Pol		Press Enter Menu again and select in this example, Src (source for AES Output Channel 1).
O				Em01 Em02 Em03 ...	Press Enter Menu again and in this example, select Em01 (Embedded Channel 1 as source for AES Output Channel 1).

Table 3.3 Card-edge Controls Setup of Example Embedded Audio Function Setup

Submenu Depth					Description
	1	2	3	4	
P			Src Gain Pol		Press Exit Menu and in this example, select Gain (gain adjustment field for the selected AES output channel).
Q				(gain value)	Press Enter Menu and in this example, select a gain value of 18.5 for this channel.
R			Src Gain Pol		Press Exit Menu and in this example, select Pol (polarity for Embedded Channel 1).
S				Norm Inv	Press Enter Menu and in this example, select Norm (no invert for AES Output Channel 1).

Card-edge Display Orientation, Brightness, and Timeout Adjust

The card-edge 4-Character Alphanumeric Display can be changed between vertical or horizontal character orientation to suit the mounting position of the card as shown and described below.

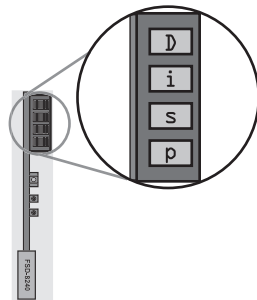


Figure 3.3 Vertical Orientation

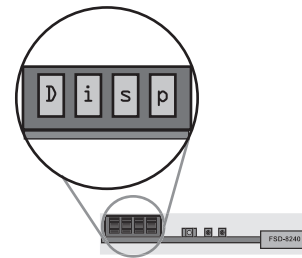


Figure 3.4 Horizontal Orientation

Vertical orientation displays characters as show in **Figure 3.3** (in this example, “**Disp**”). Use this orientation when a frame has cards positioned vertically.

Horizontal orientation displays characters as show in **Figure 3.4** (in this example “**Disp**”). Use this orientation when a frame has cards positioned horizontally.

1. Access the **Displ** (Display) menu.
2. Select between Horizontal or Vertical as shown below.

Card-edge Control Menu: Disp			
1	2		
H/V			
	Horz	Horizontal orientation	
	Vert	Vertical orientation	

Use the following procedure to adjust the display brightness:

1. Access the **Displ** (Display) menu.
2. Select from the relative brightness levels as shown below.

Card-edge Control Menu: Disp	
1	2
BRGT	
	100%
	53%
	40%
	27%
	20%
	13%
	6.6%

The timeout period from when a menu is entered to when the display times outs (reverts to the default card model display) can be adjusted from 5 to 9999 seconds (166.7 minutes) as described below.

1. Access the **Displ** (Display) menu.
2. Use the **Menu Selection Toggle** switch to enter the desired timeout value as shown below.

Card-edge Control Menu: Disp	
1	2
TOUT	
	(value) Timeout value (in seconds)

DashBoard User Interface

The FSD-8240 function submenus are organized in DashBoard using tabs (for example, “Embedded Audio Group 1/2” in **Figure 3.5**). When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists. (In this manner, the setting effected using controls and selection lists displayed in DashBoard are comparable to the submenu items accessed and committed using the FSD-8240 card-edge controls.)

Figure 3.5 shows the same setup described in **Table 3.3** as performed using DashBoard. Note how this setup is greatly simplified using DashBoard with most of the discrete tasks (**A** through **S** in **Table 3.3**) performed with the card-edge controls now rolled into simple actions using DashBoard.

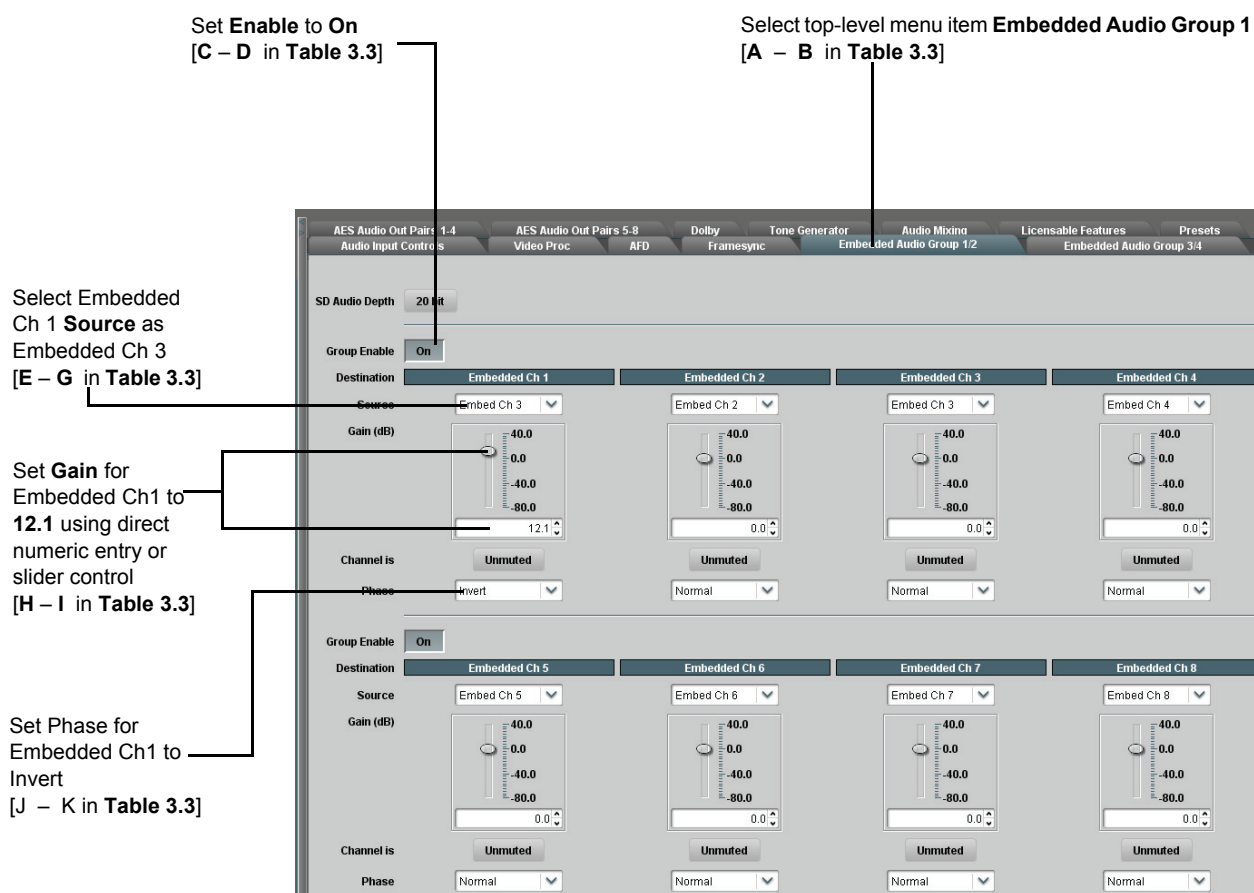


Figure 3.5 DashBoard Setup of Example Embedded Audio Function (1 of 2)

Select **AES Audio Out Pairs 1-4**
[L – M in Table 3.3]

Select Embedded Ch 1
as **Source** for **AES Ch1**
output
[N – O in Table 3.3]

Set **Gain** for AES Ch1
to **18.5** using direct
numeric entry or slider
control
[P – Q in Table 3.3]

Set **Phase** for AES
Ch1 to **Normal**
[R – S in Table 3.3]

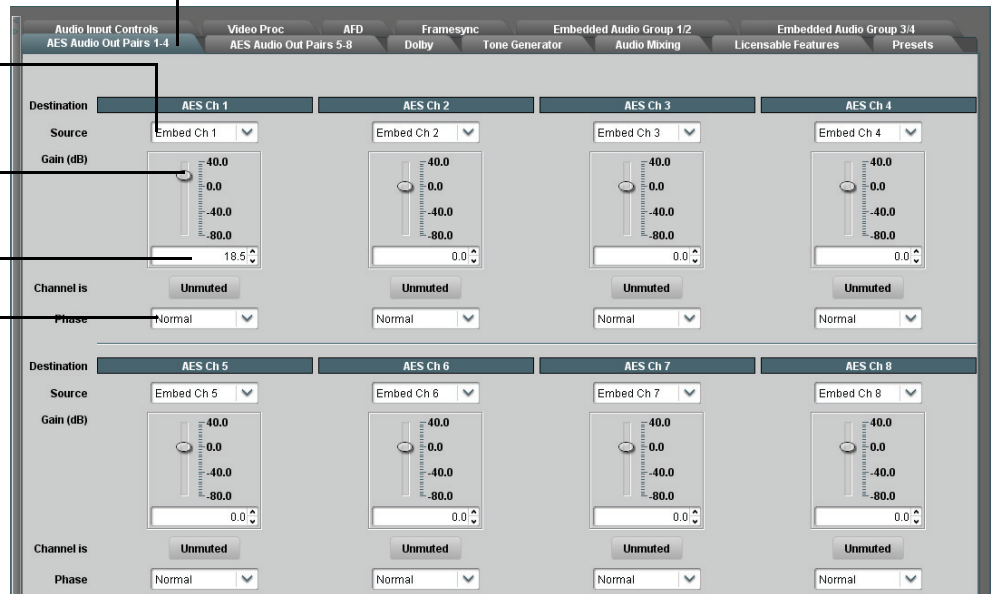


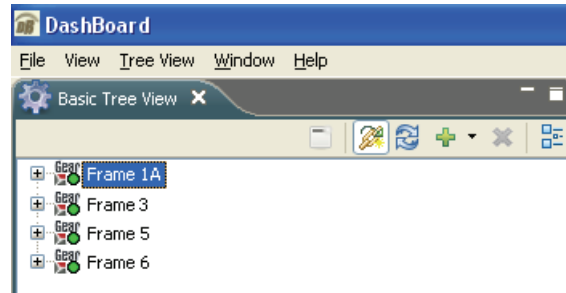
Figure 3.6 DashBoard Setup of Example Embedded Audio Function (2 of 2)

Accessing the FSD-8240 via Remote Control

Access the FSD-8240 card using DashBoard as described below.

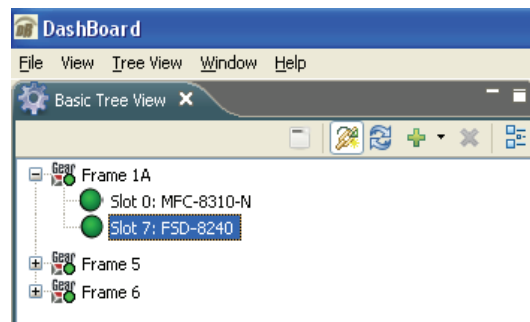
Accessing the Card via DashBoard

1. On the computer connected to the frame LAN, open DashBoard.
2. As shown below, in the left side Basic View Tree, locate the frame containing the FSD-8240 card to be accessed (in this example, Frame 1A).



Basic Tree View — Selecting the Frame

3. As shown below, expand the tree to access the cards within the frame. Click on the card to be accessed (in this example, "Slot 7: FSD-8240").



Basic Tree View — Selecting the FSD-8240

As shown in **Figure 3.7**, when the card is accessed a DashBoard its function submenu screen showing tabs for each function is displayed. (The particular submenu screen displayed is the previously displayed screen from the last time the card was accessed by DashBoard).

Card Access/Navigation
Tree Pane

Card Info Pane

Card Function Submenu and Controls Pane

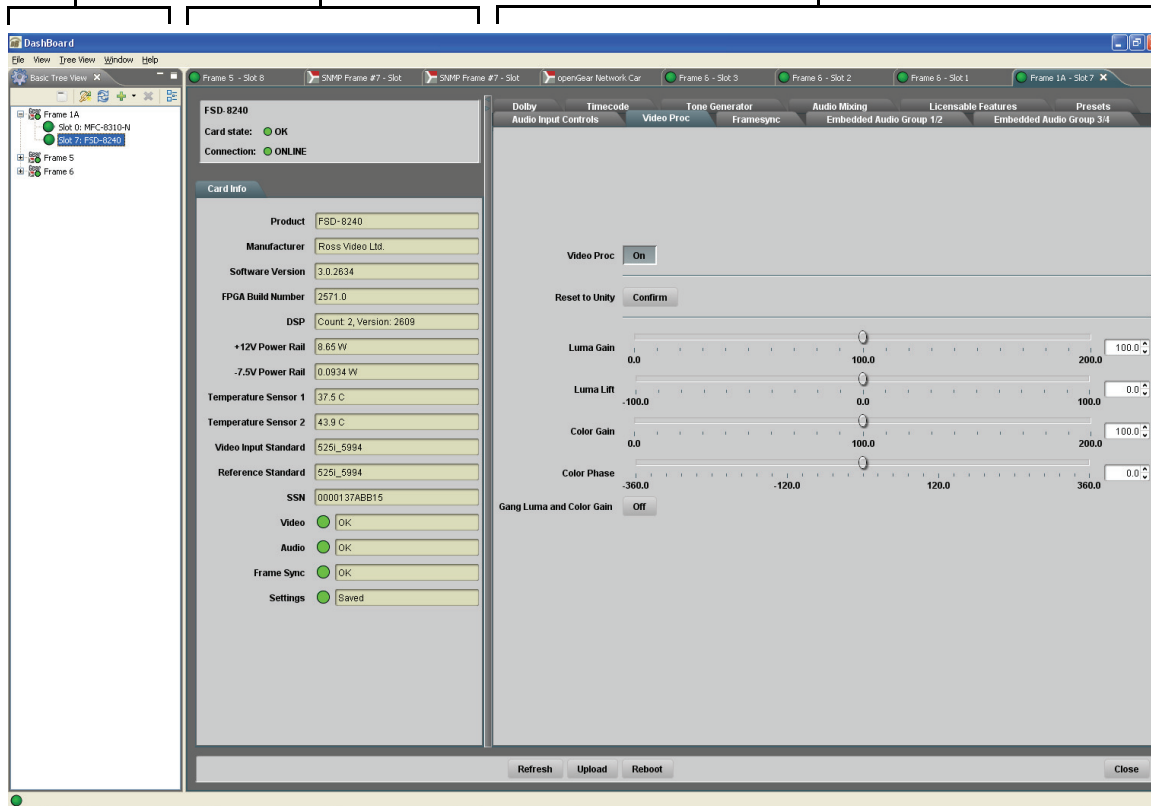


Figure 3.7 FSD-8240 Tabs in DashBoard

Checking Card Information

The operating status and software version the FSD-8240 card can be checked using DashBoard or the card-edge control user interface. **Figure 3.8** shows and describes the FSD-8240 card information screen using DashBoard and accessing card information using the card-edge control user interface.

Proper operating status in DashBoard is denoted by green icons for the status indicators shown in **Figure 3.8**. Yellow or red icons respectively indicate an alert or failure condition. Refer to the section “**Troubleshooting**” on page 3-60 for corrective action.

The **Tree View** shows the cards seen by DashBoard. In this example, Frame 1A is hosting a FSD-8240 card in slot 7.

Software Version Number

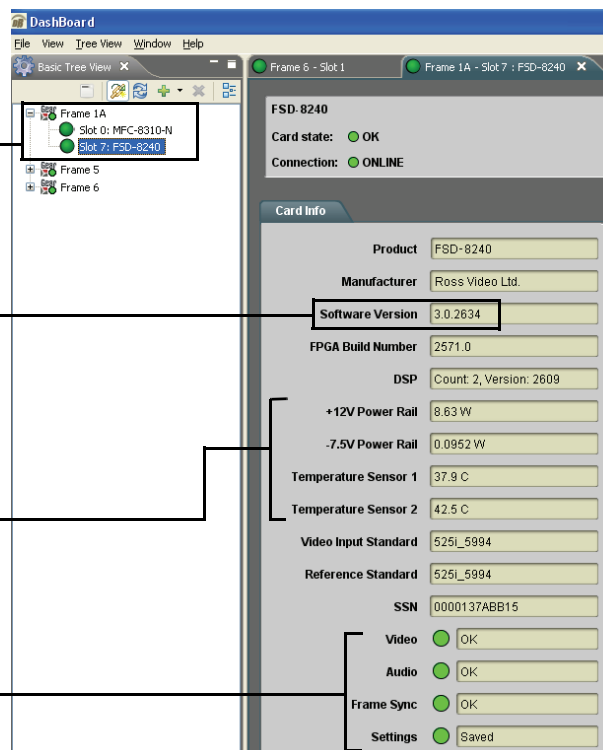
Refer to this number to check that documentation (such as this manual) matches the card’s Software Version Number. Use this number also when communicating to Ross Video regarding this card.

Power Consumption and Temperature Displays

This display shows the power consumed by the FSD-8240 for both the +12V and -7.5V rails, as well as key device temperatures.

Status Displays

These displays show the status the signal being received by the FSD-8240. Green Settings icon shows that any changes made on DashBoard are successfully saved on the card’s memory.



Checking Card Using
Card-edge Controls

Info

1	2
+POW	(value) +12V Watts consumed
-POW	(value) -7.5V Watts consumed
SWR#	(value) Software Release Number
SWB#	(value) Software Build Number
FPG#	(value) FPGA Build Number

Figure 3.8 Card Info Utility

Ancillary Data Line Number Locations and Ranges

Table 3.4 lists typical default output video VANC line number locations for various ancillary data items that may be passed or handled by the card.

Table 3.4 Typical Ancillary Data Line Number Locations/Ranges

Item	Default Line No. / Range	
	SD	HD
AFD	12 (Note 2)	9 (Note 2)
ATC_VITC	12 (locked)	9/8 (Note 2)
ATC_LTC	—	10 (Note 2)
Dolby® Metadata	13 (Note 2)	13 (Note 2)
SDI VITC Waveform	14/16 (Note 2)	—
Closed Captioning	21 (locked)	10 (Note 2)

Notes:

1. The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.
2. While range indicated by drop-down list on GUI may allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Limiting ranges for various output formats are as follows:

Format	Line No. Limiting	Format	Line No. Limiting	Format	Line No. Limiting
525i	12-19	720p	9-25	1080p	9-41
625i	9-22	1080i	9-20		

Because line number allocation is not standardized for all ancillary items, consideration should be given to all items when performing set-ups. **Figure 3.9** and **Figure 3.10** show an example of conflicted and resolved VANC allocation within an HD-SDI stream.

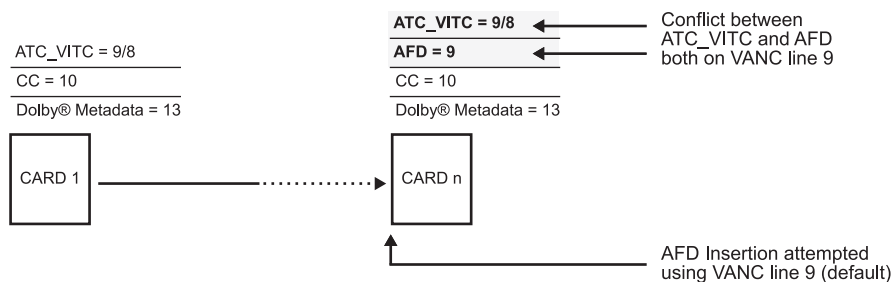


Figure 3.9 Example VANC Line Number Allocation — Conflicted

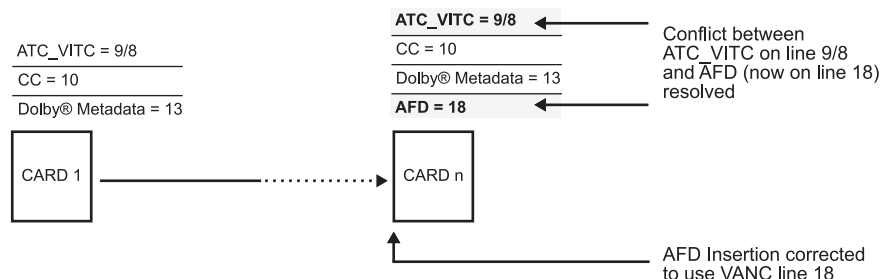



Figure 3.10 Example VANC Line Number Allocation — Resolved

Function Submenu List and Descriptions

This section individually lists and describes each FSD-8240 function submenu (“tab”) and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. This information is primarily based upon using DashBoard to access each function and its corresponding submenus and parameters.

All numeric (scalar) parameters displayed on DashBoard can be changed using the slider controls,  arrows, or by numeric keypad entry in the corresponding numeric field. (When using numeric keypad entry, add a return after the entry to commit the entry.)

This section also provides abbreviated menu structure charts showing the menu structure for accessing the function/parameter using the card-edge controls. If using card-edge controls, refer to the section “**Card-edge Control Menu/Submenu Structure**” on page 3-5 for an explanation and an example of card-edge control menu structure navigation. Where this is not shown for a particular control, this indicates the control is not available using card-edge controls.

On DashBoard itself and in this section, the function submenu items are organized using tabs as shown below.



The table below provides a quick-reference to the page numbers where each function submenu item can be found.

Function Submenu Item	Page	Function Submenu Item	Page
Audio Input Controls	3-16	Dolby Decoder	3-42
Video Proc	3-19	Dolby E Metadata	3-45
AFD	3-21	Dolby D Metadata	3-46
Framesync	3-22	Timecode	3-47
Embedded Audio Group 1/2	3-28	Audio Mixing	3-51
Embedded Audio Group 3/4	3-34	Tone Generator	3-53
AES Audio Out Pairs 1-4	3-36	Presets	3-53
AES Audio Out Pairs 5-8	3-41		

Audio Input Controls

Controls the AES Audio Input features for the eight AES pairs, and displays signal status for the AES pairs and the 16 embedded audio channels. Also provides global unity routing/parameter control resets.

Note: Also refer to the section “AES Audio Input Advanced Features” on page 1-8 for detailed information regarding these functions.

AES SRC

AES	SRC
Pair 1	Disabled
Pair 2	Enabled
•	
•	
Pair 8	Disabled

Individual SRC Disable control for each AES pair (1 thru 8) disables or enables Sample Rate Conversion (SRC) bypass as follows:

- **Disabled On:** In this mode, AES SRC for the corresponding AES pair is bypassed (button pressed in). SRC is set to Disabled (bypass turned on) by default. This mode is preferred where the AES rate matches the input video rate. This mode is necessary when embedding non-PCM AES audio such as Dolby® E or Dolby Digital™ audio streams.

Note: In this mode AES rate must match the input video rate or audio dropouts will occur.

Note: AES audio must be nominally 48 kHz.

- **Disable Off:** In this mode, AES SRC for the corresponding AES input pair is enabled (button in out position). SRC enabled allows the FSD-8240 to interface with asynchronous AES sources (sources in which the AES timing does not match the video reference timing). SRC can be used to compensate for minor clock rate differences in the AES stream and the input video stream.

Card-edge Control Menu: Aud

1	2	3	4
AES	SBYP	AES #	Apply to AES pair (1-8)
		On	SRC Bypass is on
		Off	SRC Enabled (bypass is off)

AES Passthrough

AES	Passthrough
Pair 1	Off
Pair 2	On
•	
•	
Pair 8	Off

Individual AES Passthrough **On/Off** control for each AES pair (1 thru 8) disables or enables Passthrough as follows:

- **Off:** Disables AES passthrough for the selected AES input pair. Passthrough is set to **Off** by default.
- **On:** Passthrough is turned on, with the corresponding AES output pair to act as a bit-for-bit copy with zero delay of the corresponding AES input pair.

Note: AES Passthrough set to **On** overrides normal audio routing. Gain and polarity control is not available when AES passthrough is enabled.

Card-edge Control Menu: Aud

1	2	3	4
AES	PASS	AES #	Apply to AES pair (1-8)
		Off	Passthrough disabled
		On	Passthrough enabled

AES

Zero Delay Embedding

Pair 1

Off

Pair 2

On

•

•

Pair 8

Off

Card-edge Control Menu: Aud

1

2

3

4

AES

ODLY

AES #

Apply to AES pair (1-8)

Off

Zero-Delay embedding is disabled

On

Zero-Delay Embedding enabled

Status Displays

AES

Status

Pair 1

Not Present

Pair 2

Present, Professional

•

•

Pair 8

Not Present

Embedded Group 1

Channel 1

Status

Present, Professional

•

•

Embedded Group 4

Channel 16

Status

Present, Dolby E

(continued)

Individual AES Zero-Delay Embedding On/Off control for each AES pair (1 thru 8) disables or enables Zero-Delay Embedding as follows:

• Off: Disables Zero-Delay Embedding for the selected AES input pair. Zero-delay embedding is set to Off by default.

• On: The selected pair directly embeds into its corresponding group (AES Pair 1 embeds into embedded channels 1 and 2; AES pair 2 embeds into embedded channels 3 and 4, and so on) with the normal frame sync audio delay being bypassed.

Note: Zero Delay Embedding overrides the standard audio routing system. For example, if AES Pair 1 is selected, then the controls to route into embedded channels 1 and 2 will not apply. Gain and polarity control is not available when zero-delay embedding is enabled.

Individual signal status displays for AES pairs 1-8, and embedded audio channels 1-16 as follows:

• Not Present: Indicates AES pair or embedded channel does not contain recognized audio PCM data.

Note: Channel displaying Not Present may still carry usable audio data with Not Present being displayed due to invalid headers.

• Present, Professional: Indicates AES pair or embedded channel contains recognized AES audio PCM data.






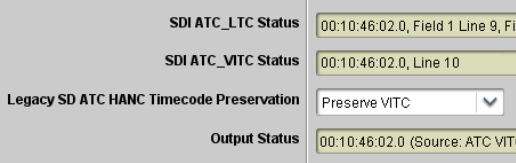
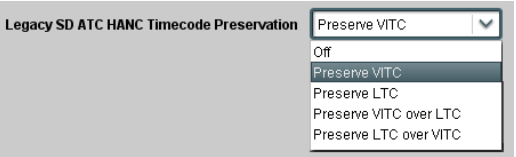
• Present, Consumer: Indicates AES pair or embedded channel contains audio PCM data other than AES (for example, S/PDIF).

• Present, Dolby E: Indicates AES pair or embedded channel contains Dolby® E encoded data.

• Present, Dolby Digital: Indicates AES pair or embedded channel contains Dolby® Digital encoded data.

Note: Dolby status displays shown to the left only occur for valid Dolby® signals meeting SMPTE 337M standard.

When Dolby® E or Dolby® Digital™ is present on a discrete AES pair or an embedded audio pair, the decoder can provide up to 10 decoded channels (according to the Dolby® sub-format and received metadata). All channels are available as inputs to audio routing.

	(continued)
<p>Embedded Unity Channel Selection</p> 	<p>Selects unity reset of Embedded Audio Group 1/2 and 3/4 controls and re-establishes default 1-to-1 routing as follows:</p> <ul style="list-style-type: none"> • Embedded: Routes Embedded Ch 1 thru Ch 16 as sources to destination channels Embedded Ch 1 thru Embedded Ch 16. • AES: Routes AES Ch 1 thru Ch 16 as sources to destination channels Embedded Ch 1 thru Embedded Ch 16.
<p>AES Unity Channel Selection</p> 	<p>Selects unity reset of AES Outputs Pairs 1-4 and 5-8 controls and re-establishes default 1-to-1 routing as follows:</p> <ul style="list-style-type: none"> • Embedded: Routes Embedded Ch 1 thru Ch 16 as sources to destination channels AES Ch 1 thru AES Ch 16. • AES: Routes AES Ch 1 thru Ch 16 as sources to destination channels AES Ch 1 thru AES Ch 16.
<p>Apply Audio Channel Selection</p> 	<p>Applies embedded and AES unity channel selection (as set in the above drop-down lists). To apply the selections, click the Confirm button. When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> • Click Yes to proceed with the unity reset. • Click No to reject unity reset. <p>For any selection following confirm, the destination channel controls are default reset as follows:</p> <ul style="list-style-type: none"> • Gain is to unity • Phase control is set to Normal • Channel is set to Unmuted
<p>Tie AES and Embedded Controls</p> 	<p>When set to Enabled, gangs Gain, Phase, and Mute controls for same-numbered Embedded and AES channels. Ganging is bilateral, with embedded channel control settings affecting corresponding AES channel controls, and vice-versa.</p>
<p>HANC Timecode Controls</p> 	<p>Where ATC_LTC or ATC_VITC timecode data is present on input video HANC space (which can be affected by audio processing), allows extracting and preserving HANC timecode data, with re-direction of the timecode data safely to the VANC space.</p>
<p>HANC Timecode Preservation Selection</p> 	<p>Using the drop-down list, selects the action to take in presence or absence of HANC ATC_VITC and/or ATC_LTC timecode data.</p> <p>Note: For 525i2994 SD_ATC, field 1 and field 2 timecode data is redirected to VANC lines 12 and 275. For 625i50 SD_ATC, field 1 and field 2 timecode data is redirected to VANC lines 8 and 321.</p> <p>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data. Refer to the section "Ancillary Data Line Number Locations and Ranges" on page 3-14 for more information.</p>

<div>Video Proc</div>	Provides the following Video Proc parametric controls.
<div><div>Video Proc</div><div>Video Proc On</div></div> <div>Card-edge Control Menu: Vid<div><div>1Proc</div><div>2Enbl</div><div>3OnOff</div></div><div>Video Proc on</div><div>Video Proc off</div></div>	<div>Video Proc (On/Off) provides master on/off control of all Video Proc functions.</div> <div><div>When set to Off, all processing is bypassed.</div><div>When set to On, currently displayed parameter settings take effect.</div></div>
<div><div>Reset to Unity</div><div>Reset to Unity Confirm</div></div> <div>Card-edge Control Menu: Vid<div><div>1Proc</div><div>2Unty</div><div>3Y?</div></div><div>Move toggle switch in either direction to confirm unity reset. Reject reset by pressing Exit Menu pushbutton.</div></div>	<div>Reset to Unity provides unity reset control of all Video Proc functions.</div> <div>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</div> <div><div>Click Yes to proceed with the unity reset.</div><div>Click No to reject unity reset.</div></div>
<div><div>Luma Gain</div><div>Luma Gain0.0</div></div> <div>Card-edge Control Menu: Vid<div><div>1Proc</div><div>2Gain</div><div>3(value)</div></div><div>Luma gain in percent</div></div>	<div>Adjusts gain percentage applied to Luma (Y channel).</div> <div>(0% to 200% range in 0.1% steps; unity = 100%)</div>
<div><div>Luma Lift</div><div>Luma Lift-100.0</div></div> <div>Card-edge Control Menu: Vid<div><div>1Proc</div><div>2Lift</div><div>3(#)</div></div><div>Luma lift in percent</div></div>	<div>Adjusts lift applied to Luma (Y-channel).</div> <div>(-100% to 100% range in 0.1% steps; null = 0.0%)</div>

<div>Video Proc</div>	(continued)
<div>Color Gain</div> <div><div>Color Gain</div><div>0.0</div></div> <div>Card-edge Control Menu: Vid</div> <div><div>1</div><div>2</div><div>3</div></div> <div><div>Proc</div><div>Sat</div><div>(value)</div></div> <div><div></div><div></div><div>Color gain in percent</div></div>	Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)
<div>Color Phase</div> <div><div>Color Phase</div><div>-360.0</div></div> <div>Card-edge Control Menu: Vid</div> <div><div>1</div><div>2</div><div>3</div></div> <div><div>Proc</div><div>Phas</div><div>(value)</div></div> <div><div></div><div></div><div>Color phase angle applied in degrees</div></div>	Adjusts phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)
<div>Gang Luma and Color Gain</div> <div><div>Gang Luma and Color Gain</div><div>On</div></div> <div>Card-edge Control Menu: Vid</div> <div><div>1</div><div>2</div><div>3</div></div> <div><div>Proc</div><div>Gang</div><div>On</div></div> <div><div></div><div></div><div>Off</div></div> <div><div></div><div></div><div>Ganging on</div></div> <div><div></div><div></div><div>Ganging off</div></div>	When set to On , changing either the Luma Gain or Color Gain controls increases or decreases both the Luma and Chroma levels by equal amounts.

<div><div>AFD</div></div>	Allows assignment of AFD (Active Format Description) codes to the SDI output video.																																																								
<p>Note: This function only marks the SDI output with an AFD code. Actual AFD processing must be performed by a downstream card or system that recognizes an AFD code assigned here.</p>																																																									
<div><div>Incoming AFD</div><div>16:9 coded frame - 1010 - 16:9 (image protected)</div></div>	<div>Displays incoming AFD setting as follows:</div> <div><div><div>If AFD code is present, one of the 11, four-bit AFD codes is displayed (as shown in the example to the left). Also displayed is the VANC line number of the incoming AFD code.</div><div>If no AFD setting is present in the video signal, No AFD Present is displayed.</div></div></div>																																																								
<div><div>Output Mode</div><div><div>Pass If Present, Else Insert</div><div>Pass If Present, Else Insert</div><div>Pass Incoming Code</div><div>Replace Incoming Code</div></div></div>	Drop-down selection determines action to take in presence or absence of existing AFD code on input video.																																																								
<div><div>Output Code</div><div><div>No AFD</div><div>4:3 - 0000 - Undefined</div><div>4:3 - 0010 - Box 16:9 (top)</div><div>4:3 - 0011 - Box 14:9 (top)</div><div>.</div><div>.</div><div>16:9 - 1111 - 16:9 (w/alt 4:3 center)</div></div></div>	<div>Drop-down list assigns desired AFD to output SDI.</div> <div><div><div>4:3 Coded Frame</div><table><tr><th>AFD Code¹</th><th>Description</th><th>AFD Code¹</th><th>Description</th></tr><tr><td>–</td><td>No code present</td><td>1001</td><td>Full frame</td></tr><tr><td>0000</td><td>Undefined</td><td>1010</td><td>16:9 (center)</td></tr><tr><td>0010</td><td>Box 16:9 (top)</td><td>1011</td><td>14:9 (center)</td></tr><tr><td>0011</td><td>Box 14:9 (top)</td><td>1101</td><td>4:3 (with alternate 14:9 center)</td></tr><tr><td>0100</td><td>Box > 16:9 (center)</td><td>1110</td><td>16:9 (with alternate 14:9 center)²</td></tr><tr><td>1000</td><td>Full frame</td><td>1111</td><td>16:9 (with alternate 4:3 center)²</td></tr></table><div>16:9 Coded Frame</div><table><tr><th>AFD Code¹</th><th>Description</th><th>AFD Code¹</th><th>Description</th></tr><tr><td>–</td><td>No code present</td><td>1001</td><td>4:3 (center)</td></tr><tr><td>0000</td><td>Undefined</td><td>1010</td><td>16:9 (image protected)²</td></tr><tr><td>0010</td><td>Full frame</td><td>1011</td><td>14:9 (center)</td></tr><tr><td>0011</td><td>4:3 (center)</td><td>1101</td><td>4:3 (with alternate 14:9 center)</td></tr><tr><td>0100</td><td>Box > 16:9 (center)</td><td>1110</td><td>16:9 (with alternate 14:9 center)²</td></tr><tr><td>1000</td><td>Full frame</td><td>1111</td><td>16:9 (with alternate 4:3 center)²</td></tr></table></div></div> <div><div>1: AFD codes numbering and definitions conform to SMPTE 2016-1-2007.</div><div>2: Image Protected implies picture content that must not be cropped by conversion processes or display devices. Alternate center formats may have protected center areas, with areas outside of the protected area not containing mandatory content.</div></div>	AFD Code ¹	Description	AFD Code ¹	Description	–	No code present	1001	Full frame	0000	Undefined	1010	16:9 (center)	0010	Box 16:9 (top)	1011	14:9 (center)	0011	Box 14:9 (top)	1101	4:3 (with alternate 14:9 center)	0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ²	1000	Full frame	1111	16:9 (with alternate 4:3 center) ²	AFD Code ¹	Description	AFD Code ¹	Description	–	No code present	1001	4:3 (center)	0000	Undefined	1010	16:9 (image protected) ²	0010	Full frame	1011	14:9 (center)	0011	4:3 (center)	1101	4:3 (with alternate 14:9 center)	0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ²	1000	Full frame	1111	16:9 (with alternate 4:3 center) ²
AFD Code ¹	Description	AFD Code ¹	Description																																																						
–	No code present	1001	Full frame																																																						
0000	Undefined	1010	16:9 (center)																																																						
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0011	Box 14:9 (top)	1101	4:3 (with alternate 14:9 center)																																																						
0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ²																																																						
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AFD Code ¹	Description	AFD Code ¹	Description																																																						
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0100	Box > 16:9 (center)	1110	16:9 (with alternate 14:9 center) ²																																																						
1000	Full frame	1111	16:9 (with alternate 4:3 center) ²																																																						
<div><div>Output Line</div><div>9</div></div>	<div>Allows selecting the line location of the AFD data within the video signal Ancillary Data space. (Range is 9 thru 41.)</div> <div><div>Note: Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Refer to the section "Ancillary Data Line Number Locations and Ranges" on page 3-14 for more information.</div><div>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.</div></div>																																																								

<div>Framesync</div>	Provides video Frame Sync offset and audio re-sync tools.																				
<div>Framesync Enable</div> <div><div>Framesync Enable</div><div>Reference 1</div><div>Off</div><div>Reference 1</div><div>Reference 2</div><div>Input Video</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td></tr><tr><td>Enbl</td><td></td></tr><tr><td></td><td>Off</td></tr><tr><td></td><td>Ref1</td></tr><tr><td></td><td>Ref2</td></tr><tr><td></td><td>V-In</td></tr><tr><td></td><td>Frame Sync Off (disabled)</td></tr><tr><td></td><td>Reference 1 selected</td></tr><tr><td></td><td>Reference 2 selected</td></tr><tr><td></td><td>Input Video reference</td></tr></table></div>	1	2	Enbl			Off		Ref1		Ref2		V-In		Frame Sync Off (disabled)		Reference 1 selected		Reference 2 selected		Input Video reference	<div>Disables the Frame Sync function, or selects from choices below.</div> <div><div>Off:</div> Disables Frame Sync function; output video timing matches the input video timing.</div> <div><div>Reference 1:</div> Allows Frame Sync function to use external Reference 1 as the reference standard.</div> <div><div>Reference 2:</div> Allows Frame Sync function to use external Reference 2 as the reference standard.</div> <div><div>Note:</div> If Reference 1 or Reference 2 is selected and an appropriate external reference is not received, the Frame Sync indication <div>Frame Sync</div> <div>Reference Invalid</div> appears in the Card Info status portion of DashBoard, indicating invalid frame sync reference error. (Additionally, the card-edge ERR indicator illuminates indicating the same.) External reference signals Reference 1 and Reference 2 are distributed to the FSD-8240 and other cards via a frame bus.</div> <div><div>Input Video:</div> Uses the input video signal as the reference standard.</div> <div><div>Note:</div> If Input Video is used for framesync, any timing instability on the input video will result in corresponding instability on the output video.</div>
1	2																				
Enbl																					
	Off																				
	Ref1																				
	Ref2																				
	V-In																				
	Frame Sync Off (disabled)																				
	Reference 1 selected																				
	Reference 2 selected																				
	Input Video reference																				
<div>Vertical Delay Control</div> <div><div>Vertical Delay (Lines)</div><div>-1124</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td></tr><tr><td>VOS</td><td></td></tr><tr><td></td><td>(value)</td></tr><tr><td></td><td>Vertical delay value (in number of lines)</td></tr></table></div>	1	2	VOS			(value)		Vertical delay value (in number of lines)	<div>When Framesync is enabled, sets vertical delay (in number of lines of output video/format) between the output video and the frame sync reference.</div> <div>(Range is -1124 thru 1124 lines.)</div> <div><div>Note:</div> Lines refer to lines in the output video format, and not to the reference format.</div>												
1	2																				
VOS																					
	(value)																				
	Vertical delay value (in number of lines)																				
<div>Horizontal Delay Control</div> <div><div>Horizontal Delay (us)</div><div>-64.000</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td></tr><tr><td>HOS</td><td></td></tr><tr><td></td><td>(value)</td></tr><tr><td></td><td>Horizontal delay value</td></tr></table></div>	1	2	HOS			(value)		Horizontal delay value	<div>When Framesync is enabled, sets (in usec of output video timing) horizontal delay between the output video and the frame sync reference.</div> <div>(Range is -64.000 thru 64.000 usec)</div> <div><div>Note:</div> When an external framesync reference is used, the card will not produce a framesync reset until the variance between framesync reference and output video exceeds ± 2 clock periods. Therefore, a framesync reset will not result if offsets within this window are applied.</div> <div>To apply an offset/framesync reset within this window, first apply a relatively large offset, then apply the target smaller offset.</div> <div>Example: To apply a 1-period offset, first apply a 10-period positive offset and then apply a 9-period negative offset. This results in the target 1-period offset being applied to the output video.</div>												
1	2																				
HOS																					
	(value)																				
	Horizontal delay value																				

<div data-bbox="305 191 652 254" data-label="Section-Header"> <h2>Framesync</h2> </div>	(continued)								
<div data-bbox="313 336 578 359" data-label="Section-Header"> <h3>Minimum Latency Control</h3> </div> <div data-bbox="305 375 683 464" data-label="Figure"> <p>Minimum Latency (Frames) 0</p> </div> <div data-bbox="282 512 711 642" data-label="Table"> <table> <tr> <th colspan="2">Card-edge Control Menu: FS</th></tr> <tr> <td>1</td><td>2</td></tr> <tr> <td>LATF</td><td></td></tr> <tr> <td>(value)</td><td>Min. Latency (in frames)</td></tr> </table> </div>	Card-edge Control Menu: FS		1	2	LATF		(value)	Min. Latency (in frames)	<p>When Framesync is enabled, specifies the smallest amount of latency allowed by the frame sync (latency measurement in output video frames). The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).</p> <p>(Maximum range is 0 to 13; default = 1.)</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format. For example, with a 1080i59.94 output, the maximum allowed setting is 5. For a 1080i film (23.98) output, the maximum allowed setting is 3. Conversely, greater maximum settings are allowed for SD formats such as 525i59.94, where the practical maximum limit is 13.</p> <p>When using this control, be sure to check the Framesync Status display as follows:</p> <div data-bbox="786 718 972 749" data-label="Text"> <p>Framesync Status On</p> </div> <ul style="list-style-type: none"> • Latency frames selection within limits. <div data-bbox="786 810 1424 837" data-label="Text"> <p>Framesync Status Minimum Latency Frames set to 3 the maximum amount for this standard</p> </div> <ul style="list-style-type: none"> • Latency frames selection exceeds limits.
Card-edge Control Menu: FS									
1	2								
LATF									
(value)	Min. Latency (in frames)								
<div data-bbox="313 909 703 932" data-label="Section-Header"> <h3>Audio Hard Resync Threshold Control</h3> </div> <div data-bbox="305 945 724 1029" data-label="Figure"> <p>Audio Hard Resync Threshold (Frames) 1.5</p> </div>	<p>Sets threshold at which hard resync is applied if audio-video offset exceeds threshold (see below). Hard resync provides fastest sync-up suitable for off-air manipulation. Conversely, a threshold setting that avoids hard resync allows glitch-free on-air manipulation.</p> <p>(Range is 1.5 to 13.0 frames in 0.1 frame increments)</p>								



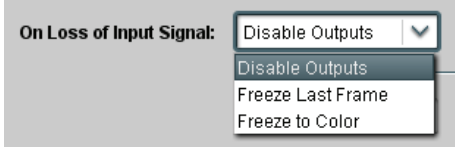
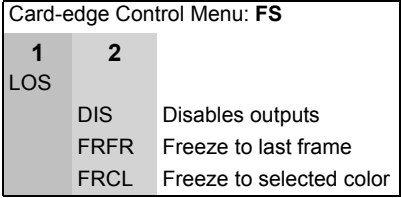
With offset **less than** selected hard resync threshold, resync is progressively applied in many small steps to provide a seamless, glitch-free retiming. After the successive steps, the audio is synchronized with the video (in this example, 40 msec). (Progressive correction is applied at 1 msec/sec appr. rate.)

In this example, initial offset of 200 msec (appr. 6 frames) is **below** 9 frame threshold and results in soft resync being progressively applied.






With offset **greater than** selected hard resync threshold, resync is immediately applied.

In this example, initial offset of 400 msec (appr. 12 frames) is **above** 9 frame threshold and results in immediate hard resync.

<div>Framesync</div>	(continued)									
<div>Audio Offset Control</div> <div><div>Audio Offset from Video (ms)</div><div>-575.0</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>ADLY</td><td>ADJ</td><td></td></tr><tr><td></td><td>(value)</td><td>Delay value</td></tr></table></div>	1	2	3	ADLY	ADJ			(value)	Delay value	<p>When Framesync is enabled, adds or reduces (offsets) audio delay from the matching video delay (audio delay offset setting adds or removes delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays.</p> <p>(-575.0 msec to 575.0 msec range; null = 0.0 msec)</p> <p>Note: Delay offset values of less than approximately 1 frame are progressively applied by the card to provide a seamless, glitch-free retiming. However, delay offset values exceeding 1-1/2 frames may result in a slight audio discontinuity at the moment when the offset is applied using this control if the Audio Hard Resync Threshold control is not at a setting greater than the delay offset.</p> <p>To prevent this condition during an on-air manipulation, it is recommended that the Audio Hard Resync Threshold control be set high enough such that expected delay offsets exceeding 1-1/2 frames are progressively applied.</p> <p>Note: If using Audio Offset control to perform off-air corrections, it is recommended to temporarily set the Audio Hard Resync Threshold control to its minimum setting, thereby allowing the offset to be assessed and corrected as fast as possible.</p>
1	2	3								
ADLY	ADJ									
	(value)	Delay value								
<div>Current Audio Delay Display</div> <div><div>Current Audio Delay</div><div>2.02 ms / 0 Frames 31 lines</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>ADLY</td><td>DVAL</td><td></td></tr><tr><td></td><td>(value)</td><td>Delay value (in msec)</td></tr></table></div>	1	2	3	ADLY	DVAL			(value)	Delay value (in msec)	<p>Displays the current input-to-output audio delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p> <p>Note: Value shown in column 3 is displayed value only. No control is available in this mode.</p>
1	2	3								
ADLY	DVAL									
	(value)	Delay value (in msec)								
<div>Video Delay Display</div> <div><div>Video Delay</div><div>0.06 ms / 0 Frames 1 lines</div></div> <div><div>Card-edge Control Menu: FS</div><table><tr><td>1</td><td>2</td></tr><tr><td>VDLY</td><td></td></tr><tr><td>(value)</td><td>Delay value (in msec)</td></tr></table></div>	1	2	VDLY		(value)	Delay value (in msec)	<p>Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).</p> <p>Note: Value shown in column 2 is displayed value only. No control is available in this mode.</p>			
1	2									
VDLY										
(value)	Delay value (in msec)									

	(continued)
<p>Framesync Status Display</p> 	<p>Displays the current framesync status as follows:</p> <p>Framesync Status On</p> <ul style="list-style-type: none"> • Framesync status OK. <p>Framesync Status Off</p> <ul style="list-style-type: none"> • Framesync source off or not connected. <p>Framesync Status Off no valid reference detected</p> <ul style="list-style-type: none"> • Improper or missing framesync reference. <p>Framesync Status Minimum Latency Frames set to 3 the maximum amount for this standard</p> <ul style="list-style-type: none"> • Latency frames selection exceeds limits. <p>Note: See Minimum Latency Frames Control above for more information about this message.</p>
<p>Loss of Input Signal Selection</p>  	<p>In the event of input video Loss of Signal (LOS), determines action to be taken as follows:</p> <ul style="list-style-type: none"> • Disable Outputs: Disable all outputs. • Freeze Last Frame: Freeze image to last good frame (last frame having valid SAV and EAV codes). • Freeze to Color: Freeze image to a color raster (as selected using Framesync LOS Freeze Color control).

<div data-bbox="274 191 623 254" data-label="Image"> </div>	<p>(continued)</p>																												
<div data-bbox="284 333 586 361" data-label="Section-Header"> <p>Framesync LOS Freeze Color</p> </div> <div data-bbox="258 369 717 728" data-label="Image"> </div> <div data-bbox="269 772 665 1255" data-label="Table"> <p>Card-edge Control Menu: FS</p> <table> <tr> <th>1</th><th>2</th></tr> <tr> <td>LOSC</td><td></td></tr> <tr> <td>WHT</td><td>White</td></tr> <tr> <td>YELO</td><td>Yellow</td></tr> <tr> <td>CYAN</td><td>Cyan</td></tr> <tr> <td>GRN</td><td>Green</td></tr> <tr> <td>MAGE</td><td>Magenta</td></tr> <tr> <td>RED</td><td>Red</td></tr> <tr> <td>BLUE</td><td>Blue</td></tr> <tr> <td>GR10</td><td>Gray 10%</td></tr> <tr> <td>GR25</td><td>Gray 25%</td></tr> <tr> <td>GR50</td><td>Gray 50%</td></tr> <tr> <td>BLK</td><td>Black</td></tr> <tr> <td>CSTM</td><td>Custom</td></tr> </table> </div>	1	2	LOSC		WHT	White	YELO	Yellow	CYAN	Cyan	GRN	Green	MAGE	Magenta	RED	Red	BLUE	Blue	GR10	Gray 10%	GR25	Gray 25%	GR50	Gray 50%	BLK	Black	CSTM	Custom	<p>In the event of LOS with Freeze to Color enabled above, sets the image raster color from choices shown to the left.</p>
1	2																												
LOSC																													
WHT	White																												
YELO	Yellow																												
CYAN	Cyan																												
GRN	Green																												
MAGE	Magenta																												
RED	Red																												
BLUE	Blue																												
GR10	Gray 10%																												
GR25	Gray 25%																												
GR50	Gray 50%																												
BLK	Black																												
CSTM	Custom																												
<div data-bbox="284 1289 477 1316" data-label="Section-Header"> <p>Custom Color Hue</p> </div> <div data-bbox="284 1327 568 1419" data-label="Image"> </div> <div data-bbox="269 1461 665 1617" data-label="Table"> <p>Card-edge Control Menu: FS</p> <table> <tr> <th>1</th><th>2</th></tr> <tr> <td>CHUE</td><td></td></tr> <tr> <td>(value)</td><td>Custom freeze color hue (in degrees)</td></tr> </table> </div>	1	2	CHUE		(value)	Custom freeze color hue (in degrees)	<p>Adjusts raster hue (phase angle) for custom LOS color. (-360° to 360° range in 0.1° steps; null = 0°)</p>																						
1	2																												
CHUE																													
(value)	Custom freeze color hue (in degrees)																												

	(continued)						
<p>Custom Color Saturation</p>  <p>Card-edge Control Menu: FS</p> <table border="1" data-bbox="297 510 695 663"> <tr> <td>1</td><td>2</td></tr> <tr> <td>CSAT</td><td></td></tr> <tr> <td>(value)</td><td>Color saturation level (in percent)</td></tr> </table>	1	2	CSAT		(value)	Color saturation level (in percent)	<p>Adjusts raster saturation level for custom LOS color.</p> <p>(0% to 100% range in 0.1% steps)</p>
1	2						
CSAT							
(value)	Color saturation level (in percent)						
<p>Custom Color Y Level</p>  <p>Card-edge Control Menu: FS</p> <table border="1" data-bbox="297 863 695 995"> <tr> <td>1</td><td>2</td></tr> <tr> <td>CVAL</td><td></td></tr> <tr> <td>(value)</td><td>Luma level</td></tr> </table>	1	2	CVAL		(value)	Luma level	<p>Adjusts raster luma level for custom LOS color.</p> <p>(64 to 940 range)</p>
1	2						
CVAL							
(value)	Luma level						
<p>Resync Video and Reference</p>  <p>Card-edge Control Menu: FS</p> <table border="1" data-bbox="297 1178 695 1392"> <tr> <td>1</td><td>2</td></tr> <tr> <td>RSYN</td><td></td></tr> <tr> <td>Y?</td><td>Move toggle switch left (or up) to confirm reset. Reject resync by pressing Exit Menu pushbutton.</td></tr> </table>	1	2	RSYN		Y?	Move toggle switch left (or up) to confirm reset. Reject resync by pressing Exit Menu pushbutton.	<p>Resyncs video with external reference.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> Click Yes to resync. Click No to reject resync.
1	2						
RSYN							
Y?	Move toggle switch left (or up) to confirm reset. Reject resync by pressing Exit Menu pushbutton.						
<p>Reset Framesync</p>  <p>Card-edge Control Menu: FS</p> <table border="1" data-bbox="297 1591 695 1785"> <tr> <td>1</td><td>2</td></tr> <tr> <td>RSET</td><td></td></tr> <tr> <td>Y?</td><td>Move toggle switch left (or up) to confirm reset. Reject reset by pressing Exit Menu pushbutton.</td></tr> </table>	1	2	RSET		Y?	Move toggle switch left (or up) to confirm reset. Reject reset by pressing Exit Menu pushbutton.	<p>Resets the frame sync, clearing any buffered audio and video.</p> <p>When Confirm is clicked, a Confirm? pop-up appears, requesting confirmation.</p> <ul style="list-style-type: none"> Click Yes to reset the frame sync. Click No to reject reset.
1	2						
RSET							
Y?	Move toggle switch left (or up) to confirm reset. Reject reset by pressing Exit Menu pushbutton.						

Embedded Audio Group 1/2

Selects the audio source for each embedded audio channel 1 thru 8 (Embedded Audio Groups 1 and 2). Also provides Gain, Phase Invert, and Muting controls for each channel.

SD Audio Depth **20 bit**

Group Enable **On**

Destination	Embedded Ch 1	Embedded Ch 2	Embedded Ch 3	Embedded Ch 4
Source	Embed Ch 12	Embed Ch 14	AES Ch 1	AES Ch 3
Gain (dB)	40.0 0.0 -40.0 -80.0 0.0	40.0 0.0 -40.0 -80.0 0.0	40.0 0.0 -40.0 -80.0 0.0	40.0 0.0 -40.0 -80.0 0.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

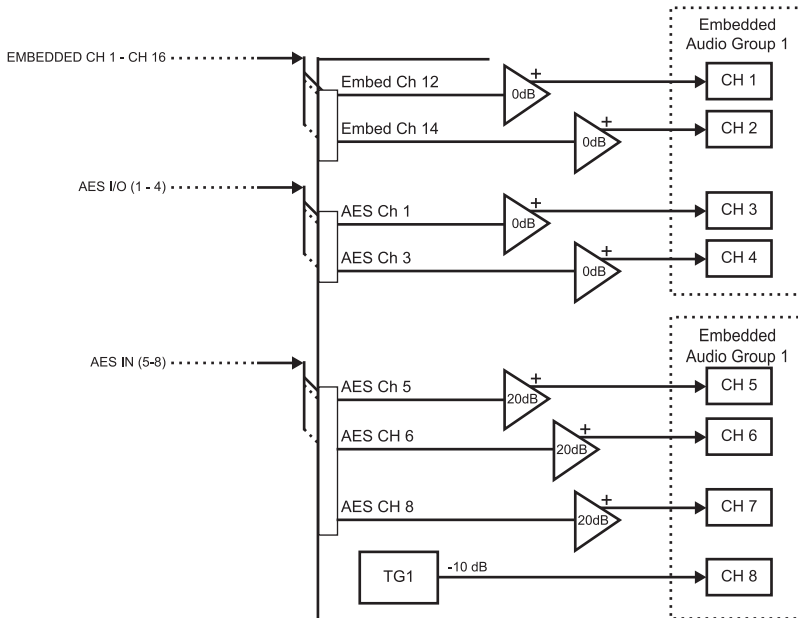
Group Enable **On**

Destination	Embedded Ch 5	Embedded Ch 6	Embedded Ch 7	Embedded Ch 8
Source	AES Ch 5	AES Ch 6	AES Ch 8	Tone 1
Gain (dB)	40.0 0.0 -40.0 -80.0 20.0	40.0 0.0 -40.0 -80.0 20.0	40.0 0.0 -40.0 -80.0 15.0	40.0 0.0 -40.0 -80.0 -10.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Invert	Normal

The example above shows various Source selections and individual audio control settings for various audio sources fed to the Destination channels **Embedded Ch 1** thru **Embedded Ch 8** in Embedded Audio Groups 1 and 2, with the resulting setup (right).

The source-to-destination correlation shown here is only an example; **any** of the sources on the left can connect to **any** of the destinations on the right, or to Embedded Audio Groups 3 and 4 (not shown here). Additional sources not shown here are also available. These are described on the following pages.

The controls shown here are described in detail on the

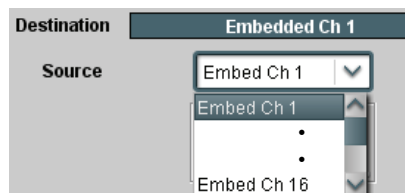


<div>Embedded Audio Group 1/2</div>	(continued)
<div><div><div>SD Audio Depth</div><div><div>SD Audio Depth</div><div>20 bit</div></div><div><div>SD Audio Depth</div><div>24 bit</div></div></div></div>	<div>Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5).</div> <div><div>Note: If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data.</div><div>Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.</div></div>
<div><div><div>Group Enable</div><div><div>Group Enable</div><div>On</div></div></div><div><div>Card-edge Control Menu: Aud</div><div><div><div><div>1</div><div>Embd</div></div><div><div>2</div><div>Grp1</div></div><div><div>3</div><div>Enbl</div></div><div><div>4</div><div>On</div><div>Enabled</div><div>Off</div><div>Disabled</div></div></div><div>Group 1 selected</div></div></div></div>	<div>When enabled (On), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 1 or Embedded Audio Group 2).</div> <div><div>Embedded Audio Group 1 consists of embedded channels 1 thru 4.</div><div>Embedded Audio Group 2 consists of embedded channels 5 thru 8.</div></div> <div>Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 1 and Embedded Audio Group 2.</div> <div>Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.</div>
<div><div>Note: Embedded Ch 2 thru Embedded Ch 8 have controls identical to the Source, Gain, Mute, and Phase controls described here for Embedded Ch 1. Therefore, only the Embedded Ch 1 controls are shown here.</div><div>For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.</div></div>	
<div><div><div>Embedded Channel Source</div><div><div>Destination</div><div>Embedded Ch 1</div></div><div><div>Source</div><div>Embed Ch 1</div><div></div></div></div><div><div>Card-edge Control Menu: Aud</div><div><div><div><div>1</div><div>Embd</div></div><div><div>2</div><div>Grp</div></div><div><div>3</div><div>Ch#</div></div><div><div>4</div><div>Src</div><div>Destination channel</div><div>Set up to select Source</div></div></div></div></div></div>	<div>Using the Source drop-down list, selects the audio input source to be embedded in the corresponding embedded channel from the choices described below.</div>

Embedded Audio Group 1/2

(continued)

Embedded Ch 1 thru Ch 16 as Source



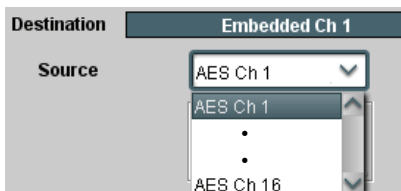
Embed Ch 1 thru Embed Ch 16 range in Source drop-down list enables an embedded channel (Ch 1 thru Ch 16) to be the source for the selected destination Embedded Audio Group channel.

(In this example, Embed Ch 1 (embedded Ch 1) is the source for destination Embedded Ch 1)

Card-edge Control Menu: Aud

1	2	3	4
Embd	Grp	Ch#	Src
			Em# Source; Embedded Channel (1 -16)

AES Ch 1 thru AES Ch 16 as Source



AES Ch 1 thru AES Ch 16 range in Source drop-down list enables a discrete AES channel (Ch 1 thru Ch 16) to be the source for the selected destination Embedded Audio Group channel.

(In this example, AES Ch 1 is the source for destination Embedded Ch 1)

Card-edge Control Menu: Aud

1	2	3	4
Embd	Grp	Ch#	Src
			Ae# Source; AES Channel (1 -16)

Down Mix Left or Right as Source



Down Mix Left and **Down Mix Right** selections in Source drop-down list allow either downmixer left or right channel to be the source for the selected destination Embedded Audio Group channel.

(In this example, the Down Mix Left channel is the source for destination Embedded Ch 1)

Note: Down Mix Left and Down Mix Right channels are a stereo pair derived from the L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information.

Refer to Audio Mixing function description on page 3-51 for more information.

Card-edge Control Menu: Aud

1	2	3	4
Embd	Grp	Ch#	Src
			DM L Downmix L channel
			DM R Downmix R channel

<div>Embedded Audio Group 1/2</div>		(continued)
<div><div>Mono Mix as Source</div><div><div>Destination</div><div>Embedded Ch 1</div><div>Source</div><div>Mono</div></div></div> <div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Src</div><div>Mono</div><div>Mono mix selection as source</div></div></div>	<div><div>Mono</div> selection in Source drop-down list allows mono mix content to be the source for the selected destination Embedded Audio Group channel. (In this example, the mono content is the source for destination Embedded Ch 1)</div> <div><div>Note:</div> Mono mix content is set up using Mono Mixer Selection in the Audio Mixing function). Refer to Audio Mixing function description on page 3-51 for more information.</div>	
<div><div>Dolby® Decoded Channel as Source</div><div><div>Destination</div><div>Embedded Ch 1</div><div>Source</div><div>Dolby Ch 1</div><div>Dolby Ch 1</div><div>Dolby Mix 2</div></div></div> <div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Src</div><div>Db (#)</div><div>Source; Dolby® Channel (1 thru M2) selection as source</div></div></div>	<div><div>Dolby Ch 1</div> thru <div>Dolby Ch 8</div> range in Source drop-down list enables a Dolby® decoded channel to be the source for the selected destination Embedded Audio Group channel. (In this example, Dolby® decoded Ch 1 is the source for destination Embedded Ch 1)</div> <div><div>Note:</div> Drop-down choices of Ch 1 thru Ch 8 and Mix 1/Mix 2 represent maximum channels available. Actual active channel complement is per received Dolby® format and upstream encoding. Inactive channels should not be used.</div> <div>Refer to Dolby Metadata function description on page 3-42 for more information.</div> <div>Refer to the section “Dolby® E Processing and Routing Example” on page 3-58 for an example of using Dolby® decoding.</div>	
<div><div>Tone Generator 1 thru 4 as Source</div><div><div>Destination</div><div>Embedded Ch 1</div><div>Source</div><div>Tone 1</div><div>Tone 1</div><div>Tone 2</div><div>Tone 3</div><div>Tone 4</div></div></div> <div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Src</div><div>TG#</div><div>Source; TG 1-4</div></div></div>	<div><div>Tone Generator 1</div> thru <div>Tone Generator 4</div> range in Source drop-down list enables one of four tone generators (Tone 1 thru Tone 4) to be the source for the selected destination Embedded Audio Group channel. (In this example, Tone 1 (tone generator 1) is the source for destination Embedded Ch 1)</div> <div><div>Note:</div> Tone generator frequencies can be independently set for the four tone generator sources.</div> <div>Refer to Tone Generator function description on page 3-53 for more information.</div>	

<div>Embedded Audio Group 1/2</div>	<div>(continued)</div>
<div><div>Silence (Mute) as Source</div><div><div>Destination</div><div>Embedded Ch 1</div><div>Source</div><div>Silence</div><div>Silence</div></div></div>	<div><div>Silence</div> selection in Source drop-down list mutes the selected destination Embedded Audio Group channel. Use this setting for unused destination channels. (In this example, silence (muting) is applied to Embedded Ch 1)</div>
<div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Src</div><div>Off</div><div>Channel Silence</div></div></div>	
<div><div>Gain (dB) Control</div><div><div>Gain (dB)</div><div><div>40.0</div><div>0.0</div><div>-40.0</div><div>-80.0</div><div>21.0</div></div></div></div>	<div><div>Adjusts and displays relative gain (in dB) applied to the corresponding destination Embedded Audio Group channel.</div><div>(-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)</div></div>
<div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Gain</div><div>(value)</div><div>Gain value (in dB)</div></div></div>	
<div><div>Mute Control</div><div><div>Channel is</div><div>Unmuted</div><div>Channel is</div><div>Muted</div></div></div>	<div><div>Allows pushbutton On/Off channel muting while saving all other settings.</div></div>
<div><div>Card-edge Control Menu: Aud</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>Embd</div><div>Grp</div><div>Ch#</div><div>Mute</div><div>Off</div><div>Unmuted</div><div>On</div><div>Muted</div></div></div>	

<div>Embedded Audio Group 1/2</div>	(continued)																
<div><div>Phase Control</div><div><div>Phase</div><div><div>Normal</div><div>Invert</div><div>Normal</div></div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Embd</td><td>Grp</td><td>Ch#</td><td>Pol</td></tr><tr><td></td><td></td><td></td><td>Norm Non-inverted</td></tr><tr><td></td><td></td><td></td><td>Inv Inverted</td></tr></table></div>	1	2	3	4	Embd	Grp	Ch#	Pol				Norm Non-inverted				Inv Inverted	<div>Selects between Normal and Invert phase (relative to source original phase) for the destination Embedded Audio Group channel.</div>
1	2	3	4														
Embd	Grp	Ch#	Pol														
			Norm Non-inverted														
			Inv Inverted														

Embedded Audio Group 3/4

Selects the audio source for each embedded audio channel 9 thru 16 (Embedded Audio Groups 3 and 4). Also provides Gain, Phase Invert, and Muting controls for each channel.

SD Audio Depth **20 bit**

Group Enable **On**

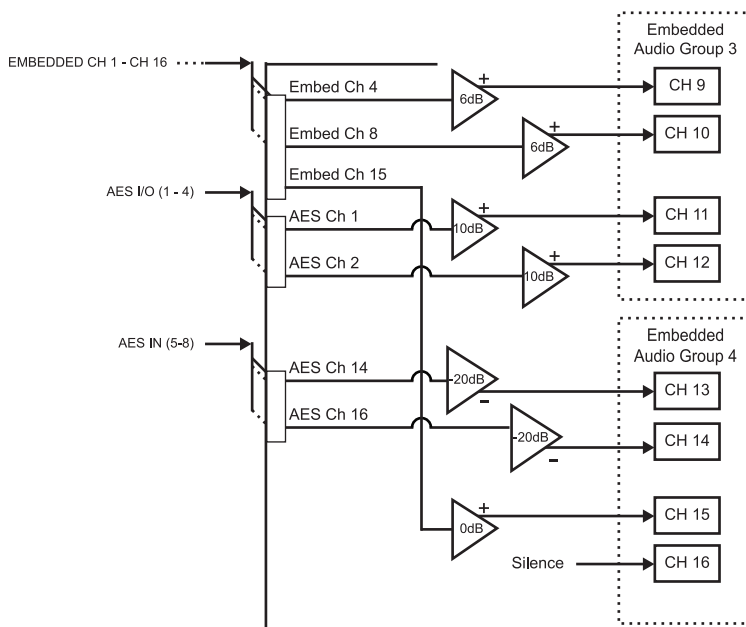
Destination	Embedded Ch 9	Embedded Ch 10	Embedded Ch 11	Embedded Ch 12
Source	Embed Ch 4	Embed Ch 8	AES Ch 1	AES Ch 2
Gain (dB)				
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

Group Enable **On**

Destination	Embedded Ch 13	Embedded Ch 14	Embedded Ch 15	Embedded Ch 16
Source	AES Ch 14	AES Ch 16	Embed Ch 15	Silence
Gain (dB)				
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Invert	Normal	Normal	Normal

The example above shows various Source selections and individual audio control settings for various audio sources fed to the Destination channels **Embedded Ch 9** thru **Embedded Ch 16** in Embedded Audio Groups 3 and 4, with the resulting setup (right).

The source-to-destination correlation shown here is only an example; any of the sources on the left can connect to any of the destinations on the right, or to Embedded Audio Groups 1 and 2 (not shown here). Additional sources not shown here are also available.



<div>Embedded Audio Group 3/4</div>	(continued)																
<div><div>SD Audio Depth</div><div><div>SD Audio Depth</div><div>20 bit</div></div><div><div>SD Audio Depth</div><div>24 bit</div></div></div>	<p>Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5).</p> <p>Note: If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data.</p> <p>Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.</p>																
<div><div>Group Enable</div><div><div>Group Enable</div><div>On</div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Embd</td><td>Grp1</td><td>Enbl</td><td>Group 1 select (range is Group 1-4)</td></tr><tr><td></td><td></td><td>On</td><td>Enabled</td></tr><tr><td></td><td></td><td>Off</td><td>Disabled</td></tr></table></div>	1	2	3	4	Embd	Grp1	Enbl	Group 1 select (range is Group 1-4)			On	Enabled			Off	Disabled	<p>When enabled (On), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 3 or Embedded Audio Group 4).</p> <ul style="list-style-type: none">Embedded Audio Group 3 consists of embedded channels 9 thru 12.Embedded Audio Group 4 consists of embedded channels 13 thru 16. <p>Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 3 and Embedded Audio Group 4.</p> <p>Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.</p>
1	2	3	4														
Embd	Grp1	Enbl	Group 1 select (range is Group 1-4)														
		On	Enabled														
		Off	Disabled														
<p>Note: Embedded Ch 9 thru Embedded Ch 16 have controls that are identical to the Source, Gain, Mute, and Phase controls described for Embedded Ch 1. Refer to Embedded Audio Group 1/2 on page 3-28 for descriptions of these controls.</p> <p>For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.</p>																	

AES Audio Out Pairs 1-4

Routes audio sources to discrete AES output channels 1 thru 8 (AES Audio Out Pairs 1-4). Also provides Gain, Phase Invert, and Muting controls for each channel.

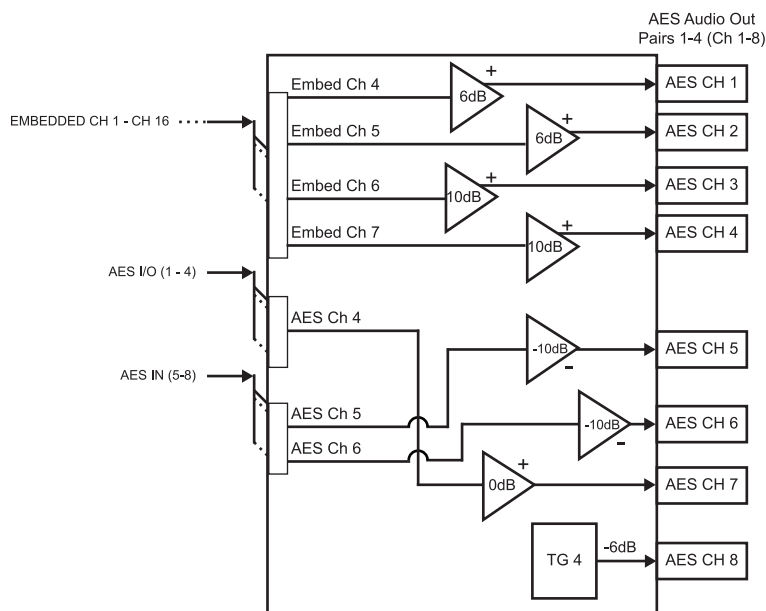
Destination	AES Ch 1	AES Ch 2	AES Ch 3	AES Ch 4
Source	Embed Ch 4	Embed Ch 5	Embed Ch 6	Embed Ch 7
Gain (dB)	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>6.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>6.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>10.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>10.0</div>
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

Destination	AES Ch 5	AES Ch 6	AES Ch 7	AES Ch 8
Source	AES Ch 5	AES Ch 6	AES Ch 4	Tone 4
Gain (dB)	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>-10.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>-10.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>0.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>-6.0</div>
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Invert	Normal	Normal	Normal

The example above shows various Source selections and individual audio control settings for various audio sources fed to the Destination channels **AES Ch 1** thru **AES Ch 8**, with the resulting setup (right).

The source-to-destination correlation shown here is only an example; any of the sources on the left can connect to any of the destinations on the right.

The controls shown here are described in detail on the



<div>AES Audio Out Pairs 1-4</div>		(continued)																
<p>Note: AES Ch 2 thru AES Ch 8 have controls that are identical to the Source, Gain, Mute, and Phase controls described here for AES Ch 1. Therefore, only the AES Ch 1 controls are shown here.</p> <p>For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.</p>																		
<div><div>AES Channel Source</div><div><div>Destination</div><div>AES Ch 1</div></div><div><div>Source</div><div>Embed Ch 1</div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td></td></tr><tr><td>AES</td><td>Ch#</td><td></td><td>Destination channel number</td></tr><tr><td></td><td></td><td>Src</td><td>Set up to select Source</td></tr></table></div>	1	2	3		AES	Ch#		Destination channel number			Src	Set up to select Source	<p>Using the Source drop-down list, selects the audio source to be routed to the corresponding AES output channel from the choices described below.</p>					
1	2	3																
AES	Ch#		Destination channel number															
		Src	Set up to select Source															
<div><div>Embedded Ch 1 thru Ch 16 as Source</div><div><div>Destination</div><div>AES Ch 1</div></div><div><div>Source</div><div>Embed Ch 1</div><div>Embed Ch 1</div><div>.</div><div>.</div><div>Embed Ch 16</div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td></td><td></td></tr><tr><td></td><td></td><td>Src</td><td></td></tr><tr><td></td><td></td><td></td><td>Em# Source; Embedded Channel (1-16)</td></tr></table></div>	1	2	3	4	AES	Ch#					Src					Em# Source; Embedded Channel (1-16)	<p>Embed Ch 1 thru Embed Ch 16 range in Source drop-down list enables an embedded channel (Ch 1 thru Ch 16) to be the source for the selected destination AES channel.</p> <p>(In this example, Embed Ch 1 (embedded Ch 1) is the source for destination AES Ch 1)</p>	
1	2	3	4															
AES	Ch#																	
		Src																
			Em# Source; Embedded Channel (1-16)															
<div><div>AES Ch 1 thru AES Ch 16 as Source</div><div><div>Destination</div><div>AES Ch 1</div></div><div><div>Source</div><div>AES Ch 5</div><div>AES Ch 5</div><div>.</div><div>.</div><div>AES Ch 16</div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td></td><td></td></tr><tr><td></td><td></td><td>Src</td><td></td></tr><tr><td></td><td></td><td></td><td>Ae# Source; AES Channel (1-16)</td></tr></table></div>	1	2	3	4	AES	Ch#					Src					Ae# Source; AES Channel (1-16)	<p>AES Ch 1 thru AES Ch 16 range in Source drop-down list enables a discrete AES channel (Ch 1 thru Ch 16) to be the source for the selected destination AES channel.</p> <p>(In this example, AES Ch 5 is the source for destination AES Ch 1)</p>	
1	2	3	4															
AES	Ch#																	
		Src																
			Ae# Source; AES Channel (1-16)															

AES Audio Out Pairs 1-4

(continued)

Down Mix Left or Right as Source

Destination

AES Ch 1

Source

Down Mix Left

Down Mix Left

Down Mix Right

Card-edge Control Menu: Aud			
1	2	3	4
AES	Ch#	Src	
		DML	Downmix L channel
		DMR	Downmix R channel

Down Mix Left and **Down Mix Right** selections in Source drop-down list allow either downmix left or right channel to be the source for the selected destination AES channel.

(In this example, the Down Mix Left channel is the source for destination AES Ch 1)

Note: Down Mix Left and Down Mix Right channels are a stereo pair derived from the L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information.

Refer to Audio Mixing function description on page 3-51 for more information.

Mono Mix as Source

Destination

AES Ch 1

Source

Mono

Card-edge Control Menu: Aud			
1	2	3	4
AES	Ch#	Src	
		Mono	Mono mix selection as source

Mono selection in Source drop-down list allows mono mix content to be the source for the selected destination AES channel.

(In this example, the mono content is the source for destination AES Ch 1)

Note: Mono mix content is set up using Mono Mixer Selection in the Audio Mixing function). Refer to Audio Mixing function description on page 3-51 for more information.

Dolby® Decoded Channel as Source

Destination

AES Ch 1

Source

Dolby Ch 1

Dolby Ch 1

•

•

Dolby Mix 2

Card-edge Control Menu: Aud			
1	2	3	4
AES	Ch#	Src	
		Db(#)	Source; Dolby® channel (1-M2)

Dolby Ch 1 thru Dolby Ch 8 range in Source drop-down list enables a Dolby® decoded channel to be the source for the selected destination AES channel.

(In this example, Dolby® decoded Ch 1 is the source for destination AES Ch 1)

Note: Drop-down choices of Ch 1 thru Ch 8 and Mix 1/Mix 2 represent maximum channels available. Actual active channel complement is per received Dolby® format and upstream encoding. Inactive channels should not be used.

Refer to Dolby Metadata function description on page 3-42 for more information.

Refer to Dolby® E Processing and Routing Example on page 3-58 for an example of using Dolby® decoding.

<div>AES Audio Out Pairs 1-4</div>		(continued)											
<div><div>Tone Generator 1 thru 4 as Source</div><div><div><div>Destination</div><div>AES Ch 1</div></div><div><div>Source</div><div><div>Tone 1</div><div>Tone 1</div><div>Tone 2</div><div>Tone 3</div><div>Tone 4</div></div></div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td>Src</td><td>TG#</td></tr><tr><td></td><td></td><td></td><td>Source; Tone Generator (1-4)</td></tr></table></div>	1	2	3	4	AES	Ch#	Src	TG#				Source; Tone Generator (1-4)	<div><div>Tone Generator 1 thru Tone Generator 4 range in Source drop-down list enables one of four tone generators (Tone 1 thru Tone 4) to be the source for the selected destination AES channel.</div><div>(In this example, Tone 1 (tone generator 1) is the source for destination AES Ch 1)</div><div><div>Note: Tone generator frequencies can be independently set for the four tone generator sources.</div><div>Refer to Tone Generator function description on page 3-53 for more information.</div></div></div>
1	2	3	4										
AES	Ch#	Src	TG#										
			Source; Tone Generator (1-4)										
<div><div>Silence (Mute) as Source</div><div><div><div>Destination</div><div>AES Ch 1</div></div><div><div>Source</div><div><div>Silence</div><div>Silence</div></div></div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td>Src</td><td>Off</td></tr><tr><td></td><td></td><td></td><td>Channel Silence</td></tr></table></div>	1	2	3	4	AES	Ch#	Src	Off				Channel Silence	<div><div>Silence selection in Source drop-down list mutes the selected destination AES channel. Use this setting for unused destination channels.</div><div>(In this example, silence (muting) is applied to AES Ch 1)</div></div>
1	2	3	4										
AES	Ch#	Src	Off										
			Channel Silence										
<div><div>Gain (dB) Control</div><div><div><div>Gain (dB)</div><div><div><div>40.0</div><div>0.0</div><div>-40.0</div><div>-80.0</div></div><div><div>21.0</div></div></div></div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td>Gain</td><td>(value)</td></tr><tr><td></td><td></td><td></td><td>Gain value (in dB)</td></tr></table></div>	1	2	3	4	AES	Ch#	Gain	(value)				Gain value (in dB)	<div><div>Adjusts and displays relative gain (in dB) applied to the corresponding destination AES channel.</div><div>(-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)</div></div>
1	2	3	4										
AES	Ch#	Gain	(value)										
			Gain value (in dB)										

<div>AES Audio Out Pairs 1-4</div>	(continued)																
<div><div>Mute Control</div><div><div>Channel is</div><div>Unmuted</div></div><div><div>Channel is</div><div>Muted</div></div></div>	Allows pushbutton On/Off channel muting while saving all other settings.																
<div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td>Mute</td><td></td></tr><tr><td></td><td></td><td>Off</td><td>Unmuted</td></tr><tr><td></td><td></td><td>On</td><td>Muted</td></tr></table></div>	1	2	3	4	AES	Ch#	Mute				Off	Unmuted			On	Muted	
1	2	3	4														
AES	Ch#	Mute															
		Off	Unmuted														
		On	Muted														
<div><div>Phase Control</div><div><div>Phase</div><div><div>Normal</div><div>Invert</div><div>Normal</div></div></div></div> <div><div>Card-edge Control Menu: Aud</div><table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>AES</td><td>Ch#</td><td>Pol</td><td></td></tr><tr><td></td><td></td><td>Norm</td><td>Non-invert</td></tr><tr><td></td><td></td><td>Inv</td><td>Inverted</td></tr></table></div>	1	2	3	4	AES	Ch#	Pol				Norm	Non-invert			Inv	Inverted	Selects between Normal and Invert phase (relative to source original phase) for the destination AES output channel.
1	2	3	4														
AES	Ch#	Pol															
		Norm	Non-invert														
		Inv	Inverted														

AES Audio Out Pairs 5-8

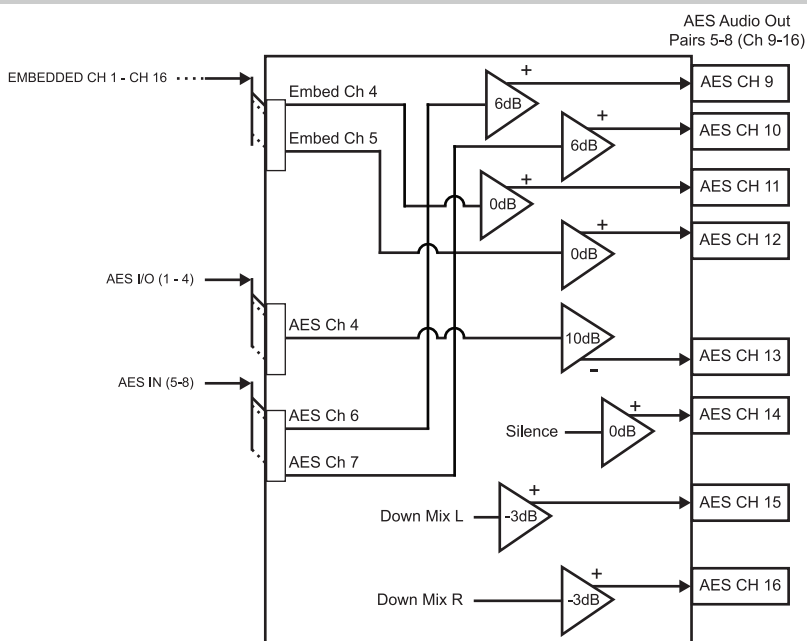
Routes audio sources to AES output channels 9 thru 16 (AES Audio Out Pairs 5-8). Also provides Gain, Muting, and Phase Invert controls for each channel.

Destination	AES Ch 9	AES Ch 10	AES Ch 11	AES Ch 12
Source	AES Ch 6	AES Ch 7	Embed Ch 4	Embed Ch 5
Gain (dB)	40.0 0.0 -40.0 -80.0 6.0	40.0 0.0 -40.0 -80.0 6.0	40.0 0.0 -40.0 -80.0 0.0	40.0 0.0 -40.0 -80.0 0.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

Destination	AES Ch 13	AES Ch 14	AES Ch 15	AES Ch 16
Source	AES Ch 4	Silence	Down Mix Left	Down Mix Right
Gain (dB)	40.0 0.0 -40.0 -80.0 10.0	40.0 0.0 -40.0 -80.0 0.0	40.0 0.0 -40.0 -80.0 -3.0	40.0 0.0 -40.0 -80.0 -3.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Invert	Normal	Normal	Normal

The example above shows various Source selections and individual audio control settings for various audio sources fed to the Destination channels **AES Ch 9** thru **AES Ch 16**, with the resulting setup (right).

The source-to-destination correlation shown here is only an example; any of the sources on the left can connect to any of the destinations on the right, or receive sources. Available sources also include up to four



Note: AES Ch 9 thru AES Ch 16 have controls that are identical to the **Source**, **Gain**, **Mute**, and **Phase** controls described for AES Ch 1. Refer to **AES Audio Out Pairs 1-4** on page 3-36 for descriptions of these controls.

For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the Silence selection.



Routes a Dolby® encoded pair to the Dolby® decoder, and provides Dolby® configuration display and metadata handling controls.

Note: The Dolby tab controls described here appear only on card equipped with Dolby Decoder option (-DEC).

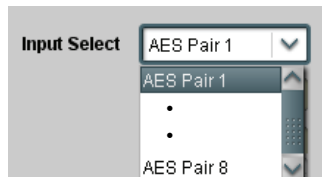
If necessary, refer to the section “**Dolby® E Processing and Routing Example**” on page 3-58 for an example of using and routing Dolby® decoding.

Decoded channels shown in DashBoard correlate to typical channel designations as shown below. Note that channel designations are a function of encoding. Based on encoding, actual channel designations may vary from the examples shown here.

Decoder Channels	E5.1+2	E7.1+2	E8x1
Ch 1	LF	LF	Ch 1
Ch 2	RF	RF	Ch 2
Ch 3	C	C	Ch 3
Ch 4	LFE	LFE	Ch 4
Ch 5	LS	LS	Ch 5
Ch 6	RS	RS	Ch 6
Ch 7	Aux 1	LB	Ch 7
Ch 8	Aux 2	RB	Ch 8
Mix 1	Lo	Lo	Mono Mix 1
Mix 2	Ro	Ro	Mono Mix 2

See other important notes in this subsection regarding the proper use of metadata embedding tools available with the decoder function.

AES Pair as Input



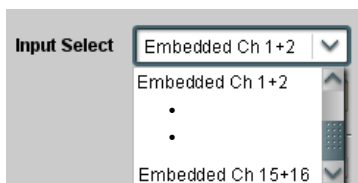
AES Pair 1 thru **AES Pair 8** range in Input Select drop-down list selects an AES Pair (1 thru 8) to be the input for the Dolby® decoder.

(In this example, AES Pair 1 is the input for the Dolby® decoder)

Card-edge Control Menu: Aud



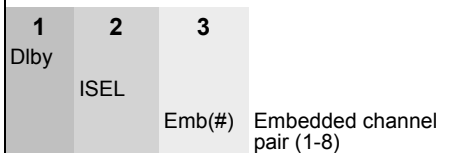
Embedded Channel Pair as Input




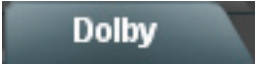
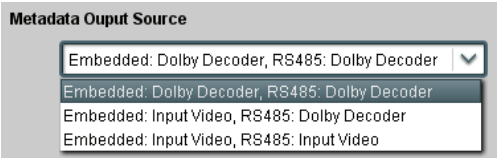

Embedded Ch 1+2 thru **Ch 15+16** range in Input Select drop-down list selects an embedded channel pair (1+2 thru 15+16) to be the input for the Dolby® decoder.

(In this example, embedded channel pair 1+2 is the input for the Dolby® decoder)

Card-edge Control Menu: Aud



	(continued)
<p>Decoder Mode</p> <p>Decoder Mode Auto Detect Format and Decode (Pass PCM) ▾</p> <ul style="list-style-type: none"> Auto Detect Format and Decode (Pass PCM) Only Decode Dolby E else Mute Only Decode Dolby Digital else Mute 	<p>Using the drop-down list, selects the action to take in presence or absence of Dolby® E or Digital source from the choices shown on the left.</p>
<p>Dolby® Mode Display</p> <p>Bitstream Format Dolby E 20-bit</p> <p>Dolby E Program Configuration 5.1 + 2</p>	<p>Shows specific bitstream information and Dolby® decoding type (Dolby® E or Dolby® Digital) for input applied to Dolby® decoder.</p> <p>(In this example, Dolby® E 20-bit with 5.1+2 decoded channel configuration is being decoded)</p> <p>If selected input has invalid or missing Dolby® data (such as if wrong channels are applied to decoder), PCM / No Dolby Stream is displayed.</p> <p>(In this case, PCM data passes undecoded and is present on Dolby Ch 1 and Dolby Ch 2 channels.)</p>
<p>Dolby® Digital Channel and Dynamic Range Controls</p> <p>Dolby Digital 16-bit Channel Select Channel 1 ▾</p> <ul style="list-style-type: none"> Channel 1 Channel 2 <p>Dolby Digital Dynamic Range Control Line Mode ▾</p> <ul style="list-style-type: none"> Line Mode RF Mode Custom Bypass 	<p>Channel Select drop-down list sets the channel carrying the Dolby® Digital encoded signal for D1/0 formats as shown from choices on the left.</p> <p>Dynamic Range Control drop-down list selects from audio level compression scheme choices as shown to the left. (Line Mode is typical setting; RF Mode is used where signal may be fed through low-cost video/audio RF modulator, in which case RF Mode helps prevent over modulation. Refer to ATSC A/52B for more information.)</p>
<p>Metadata Embedding</p> <p>Metadata Embedding On</p>	<p>Metadata Embedding (On/Off) controls SMPTE 2020-1 metadata embedding in the SDI video output.</p> <ul style="list-style-type: none"> When set to On, metadata from selected source is embedded in the output SDI video. When set to Off, metadata is not embedded in the output SDI video. <p>Note: Metadata Embedding should only be set to “On” if new metadata is to be embedded. Existing metadata on the SDI input is passed through the card unaffected, requiring no operator intervention.</p>

	(continued)
<p>Metadata Output Source</p> 	<p>Drop-down list allows embedding and RS485 metadata routing to the choices shown to the left and described below.</p> <ul style="list-style-type: none"> • Embedded: Dolby Decoder, RS485: Dolby Decoder: Dolby Decoder – Routes the metadata from the Dolby® decoder to both embedding on the output SDI and the RS485 port on card so equipped. • Embedded: Input Video, RS485: Dolby Decoder: Dolby Decoder – Preserves input metadata and directly re-routes it to the output SDI. Routes the metadata from the Dolby® decoder to only the RS485 port on card so equipped. • Embedded: Input Video, RS485: Input Video: Input Video – Routes the preserved input metadata to both embedding on the output SDI and the RS485 port on card so equipped. <p>Note: Typically, Metadata Output Source should be set to Embedded: Dolby Decoder, RS485: Dolby Decoder, since this is the new metadata produced by the card decoder and should also be made available in the SDI stream and to any other external systems. If embedding new metadata, make certain to set its line number such that any old metadata for the same purpose is overwritten (i.e., new metadata set to the same line number as the old metadata to be replaced).</p>
<p>Metadata Output Line</p> 	<p>Allows selection of SMPTE 2020-1 metadata line location within the VANC space for source embedding selected above.</p> <p>(Range is 9 thru 41; default is line #13.)</p> <p>Note: Although the output line drop-down will allow any choice within the 9 thru 41 range, the actual range is automatically clamped (limited to) certain ranges to prevent inadvertent conflict with active picture area depending on video format. Refer to the section "Ancillary Data Line Number Locations and Ranges" on page 3-14 for more information.</p> <p>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data unless existing metadata is to be intentionally overwritten.</p>

Dolby E Metadata

Displays the status and programming details for each Dolby® E AC-3 program dictated by the received external metadata.

Note: This display is read-only. No changes can be made to the settings. All displays are reports per the received metadata. Information provided here is intended as an overview of the screen. Displayed parameters are per ATSC A/52B definitions. Refer to ATSC A/52B for detailed descriptions and background.

Updates the external metadata status and program configuration display screen. The display always shows the last initiated metadata transaction; to refresh screen for any changes, click **Update**.

Note: Metadata does not continuously report. Use this button to report new metadata. When clicked, the button stays in the “depressed” position while updating. When the button displays the “out” position, update is complete and all displays are current.

Where AC-3 programs exist for the current metadata coding, the columns show the details for the individual AC-3 programs

Where AC-3 programs do not exist for the current metadata coding, the columns are collapsed

Update Metadata		Dolby E AC-3 Metadata							
		1	2	3	4	5	6	7	8
Bitstream Mode	Complete Main	Complete Main							
Audio Coding Mode	3/2 (L,C,R,Ls,Rs)	2/0 (L,R)							
Center Mix Level	Attenuation is -3dB	Attenuation is -3dB							
Surround Mix Level	Attenuation is -3dB	Attenuation is -3dB							
Dolby Surround Mode	Not Indicated	Not Indicated							
LFE Enable	LFE is On (coded)	LFE is Off (not coded)							
Dialog Normalization	-27 dBFS	-27 dBFS							
Audio Production Information	Not Present	Not Present							
Mix Level	80 dB	80 dB							
...									
DC Highpass Filter	Bypassed	Bypassed							
Bandwidth Lowpass Filter	Bypassed	Bypassed							
LFE Channel Lowpass Filter	Bypassed	Bypassed							
Surround Channel 90 Degrees Phase Shift Filter	Bypassed	Bypassed							
Surround Channel -3 dB Attenuation	Bypassed	Bypassed							
Compression Words	Not Present	Not Present							
Compression Profile	Film: Standard	Film: Standard							
Dynamic Range Compression Words	Not Present	Not Present							
Dynamic Range Compression Profile	Film: Standard	Film: Standard							

Dolby D Metadata

Displays the status and programming details for Dolby® Digital program dictated by the received external metadata.

Note: This display is read-only. No changes can be made to the settings. All displays are reports per the received metadata. Information provided here is intended as an overview of the screen. Displayed parameters are per ATSC A/52B definitions. Refer to ATSC A/52B for detailed descriptions and background.

Updates the external metadata status and program configuration display screen. The display always shows the last initiated metadata transaction; to refresh screen for any changes, click **Update**.

Note: Metadata does not continuously report. Use this button to report new metadata. When clicked, the button stays in the "depressed" position while updating. When the button displays the "out" position, update is complete and all displays are current.

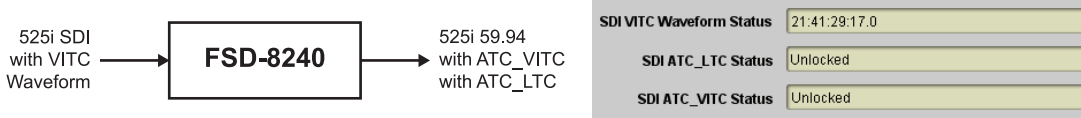
Update Metadata	Update
Bitstream Mode	Complete Main
Audio Coding Mode	2/0 (L,R)
Center Mix Level	Attenuation is -3dB
Surround Mix Level	Attenuation is -3dB
Dolby Surround Mode	Not Indicated
LFE Enable	LFE is Off (not coded)
Dialog Normalization	-27 dBFS
Audio Production Information	Present
Mix Level	105 dB
Room Type	Small Room (Flat EQ)
Copyright Bit	Copyright Protected
Original Bitstream	Original

•
•
•

LoRo Center Mix Level	Level is Adjusted +3.0 dB
LoRo Surround Mix Level	Level is Adjusted +3.0 dB
Extended Bitstream Group 2	Not Included
Dolby Surround EX Mode	Not Indicated
Compression Words	Present
Compression Profile	Unknown
Dynamic Range Compression Words	Present
Dynamic Range Compression Profile	None
Dynamic Range Compression Words	Present
Dynamic Range Compression Profile	None

<div data-bbox="318 191 665 254" data-label="Section-Header"> <h2>Timecode</h2> </div>	<p>Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.</p>
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Shown below is an example in which received SDI video with SDI VITC waveform timecode is to be converted to SDI ATC_VITC and SDI ATC_LTC timecode data. Each Timecode control is fully described on the pages that follow.



- A** Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (**SDI VITC**) as a choice. This extracts VITC Waveform timecode data from the incoming video.

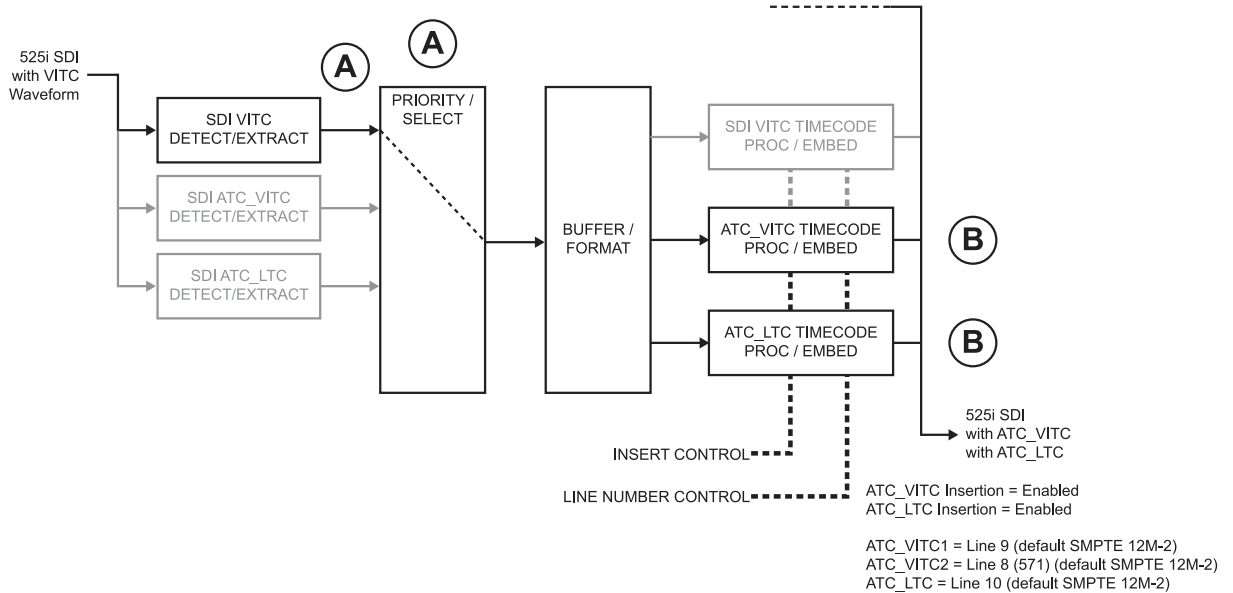
Source Priority 1	SDI VITC
Source Priority 2	ATC_VITC
Source Priority 3	None
Source Priority 4	None

- B** In this example, it is desired to provide both SDI ATC_VITC and ATC_LTC timecode data in the converted HD output video. As such, set both **HD ATC VITC Insertion** and **HD ATC LTC Insertion** to **Enabled**.

HD ATC VITC Insertion Enabled	
HD ATC VITC Insertion Line Field 1	9 - SMPTE 12M-2-2008 Recommended
HD ATC VITC Insertion Line Field 2	8 (571) - SMPTE 12M-2-2008 Recommended

In the example here, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.

HD ATC LTC Insertion Enabled	
HD ATC LTC Insertion Line	10 - SMPTE 12M-2-2008 Recommended



<div data-bbox="289 191 636 254" data-label="Section-Header"> <h2>Timecode</h2> </div>	(continued)																																
<div data-bbox="289 287 628 312" data-label="Section-Header"> <h3>Timecode Source Status Displays</h3> </div> <div data-bbox="219 321 727 445" data-label="Form"> <table> <tr> <td>SDI VITC Waveform Status</td><td>Unlocked</td></tr> <tr> <td>SDI ATC VITC Status</td><td>00:10:46:02.0, Field 1 Line 9, Field 2 Line 571</td></tr> <tr> <td>SDI ATC LTC Status</td><td>00:10:46:02.0, Line 10</td></tr> </table> </div>	SDI VITC Waveform Status	Unlocked	SDI ATC VITC Status	00:10:46:02.0, Field 1 Line 9, Field 2 Line 571	SDI ATC LTC Status	00:10:46:02.0, Line 10	<p>Displays the current status and contents of the three supported timecode formats shown to the left.</p> <ul style="list-style-type: none"> • If a format is receiving timecode data, the current content (timecode running count and line number) is displayed. • If a format is not receiving timecode data, Unlocked is displayed. 																										
SDI VITC Waveform Status	Unlocked																																
SDI ATC VITC Status	00:10:46:02.0, Field 1 Line 9, Field 2 Line 571																																
SDI ATC LTC Status	00:10:46:02.0, Line 10																																
<div data-bbox="289 478 682 504" data-label="Section-Header"> <h3>Incoming ATC Packet Removal Control</h3> </div> <div data-bbox="280 514 678 575" data-label="Form"> <div> Incoming ATC Packet Removal <input type="button" value="Disabled"/> </div> </div> <div data-bbox="269 615 665 779" data-label="Form"> <table> <tr> <th colspan="2">Card-edge Control Menu: TC</th> </tr> <tr> <th>1</th><th>2</th></tr> <tr> <td>Rmvl</td><td></td></tr> <tr> <td>Off</td><td>Packet removal disabled</td></tr> <tr> <td>On</td><td>Packet removal enabled</td></tr> </table> </div>	Card-edge Control Menu: TC		1	2	Rmvl		Off	Packet removal disabled	On	Packet removal enabled	<p>Enables or disables removal of existing input video ATC timecode packets from the output. This allows removal of undesired existing timecodes from the output, resulting in a “clean slate” where only desired timecodes are then re-inserted into the output. (For example, if both SD VITC Waveform and SD ATC_VITC timecode data are present on the input video, and only ATC_VITC is desired, using the Removal control will remove both timecodes from the output. The ATC_VITC timecode by itself can then be re-inserted on the output using the other controls discussed here.)</p> <p>Note: When the Scaler is enabled, ATC packets are automatically removed. The Timecode function must be used to re-insert the timecode data into the output video.</p>																						
Card-edge Control Menu: TC																																	
1	2																																
Rmvl																																	
Off	Packet removal disabled																																
On	Packet removal enabled																																
<div data-bbox="289 819 440 842" data-label="Section-Header"> <h3>Source Priority</h3> </div> <div data-bbox="277 852 672 1071" data-label="Form"> <table> <tr> <td>Source Priority 1</td><td><input type="button" value="v"/></td></tr> <tr> <td>Source Priority 2</td><td><input type="button" value="v"/></td></tr> <tr> <td>Source Priority 3</td><td><input type="button" value="v"/></td></tr> <tr> <td>Source Priority 4</td><td><input type="button" value="v"/></td></tr> </table> </div> <div data-bbox="263 1110 669 1339" data-label="Form"> <table> <tr> <th colspan="2">Card-edge Control Menu: TC</th> </tr> <tr> <th>1</th><th>2</th></tr> <tr> <td>PRI (#)</td><td>Priority (1 thru 4)</td></tr> <tr> <td>None</td><td>No source selected</td></tr> <tr> <td>SVIT</td><td>SDI VITC</td></tr> <tr> <td>ATCL</td><td>ATC LTC</td></tr> <tr> <td>ATCV</td><td>ATC_VITC</td></tr> </table> </div>	Source Priority 1	<input type="button" value="v"/>	Source Priority 2	<input type="button" value="v"/>	Source Priority 3	<input type="button" value="v"/>	Source Priority 4	<input type="button" value="v"/>	Card-edge Control Menu: TC		1	2	PRI (#)	Priority (1 thru 4)	None	No source selected	SVIT	SDI VITC	ATCL	ATC LTC	ATCV	ATC_VITC	<p>As described here, selects the priority assigned to each of the four supported formats in the event the preferred source is unavailable.</p> <p>Each of the four Source Priority selection lists allows assignment of source priority from the following choices:</p> <div data-bbox="774 1010 967 1180" data-label="Form"> <table> <tr> <td>SDI VITC</td><td><input type="button" value="v"/></td></tr> <tr> <td>None</td><td></td></tr> <tr> <td>SDI VITC</td><td></td></tr> <tr> <td>ATC LTC</td><td></td></tr> <tr> <td>ATC VITC</td><td></td></tr> </table> </div> <p>Source Priority 1 thru Source Priority 4 select the preferred format to be used in descending order (i.e., Source Priority 2 selects the second-most preferred format, and so on).</p>	SDI VITC	<input type="button" value="v"/>	None		SDI VITC		ATC LTC		ATC VITC	
Source Priority 1	<input type="button" value="v"/>																																
Source Priority 2	<input type="button" value="v"/>																																
Source Priority 3	<input type="button" value="v"/>																																
Source Priority 4	<input type="button" value="v"/>																																
Card-edge Control Menu: TC																																	
1	2																																
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SDI VITC	<input type="button" value="v"/>																																
None																																	
SDI VITC																																	
ATC LTC																																	
ATC VITC																																	
<div data-bbox="289 1379 509 1402" data-label="Section-Header"> <h3>Output Status Display</h3> </div> <div data-bbox="238 1423 699 1478" data-label="Form"> <div> Output Status 00:04:46:06.1 (Source: SDI VITC) </div> </div>	<p>Displays the current content and source being used for the timecode data as follows:</p> <div data-bbox="756 1440 1149 1484" data-label="Form"> <div> Output Status 00:04:46:06.1 (Source: SDI VITC) </div> </div> <ul style="list-style-type: none"> • Output status OK (in this example, running SDI VITC timecode received and outputted). <div data-bbox="756 1575 1037 1617" data-label="Form"> <div> Output Status No Output Available </div> </div> <ul style="list-style-type: none"> • Timecode not available due to lack of appropriate input timecode data on enabled formats. <p>Note: Timecode output requires that source and priority are appropriately selected (as described above in Source Priority). Also, video input must contain appropriate timecode data.</p> <div data-bbox="756 1768 1032 1810" data-label="Form"> <div> Output Status Insertion Disabled </div> </div> <ul style="list-style-type: none"> • Timecode Insertion button set to Disabled; output insertion disabled. 																																


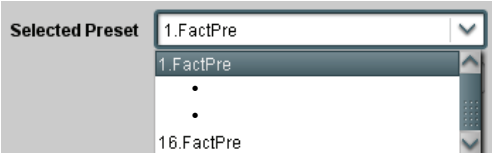


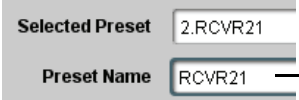

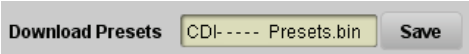
<div data-bbox="318 191 667 254" data-label="Section-Header"> <h2>Timecode</h2> </div>	(continued)								
<div data-bbox="313 336 599 361" data-label="Section-Header"> <h3>VITC Waveform Output Line</h3> </div> <div data-bbox="287 384 750 476" data-label="Form"> <p>VITC Waveform Output 1 Line Number <input type="text" value="14"/></p> <p>VITC Waveform Output 2 Line Number <input type="text" value="16"/></p> </div> <div data-bbox="256 518 737 669" data-label="Form"> <p>Card-edge Control Menu: TC</p> <table border="1"> <thead> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>VITO</td> <td>(#)</td> </tr> <tr> <td></td> <td>VITC output 1 line number only (6 thru 22)</td> </tr> </tbody> </table> </div>	1	2	VITO	(#)		VITC output 1 line number only (6 thru 22)	<p>Selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC data is inserted when the output is SD. (The default is line #14/16.)</p> <p>Note: Although the output line drop-down will allow any choice within the 6 thru 22 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Refer to the section "Ancillary Data Line Number Locations and Ranges" on page 3-14 for more information.</p> <p>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.</p> <p>If only one output line is to be used, set both controls for the same line number.</p>		
1	2								
VITO	(#)								
	VITC output 1 line number only (6 thru 22)								
<div data-bbox="313 714 686 739" data-label="Section-Header"> <h3>SD VITC Waveform Insertion Control</h3> </div> <div data-bbox="313 762 704 802" data-label="Form"> <p>SD VITC Waveform Insertion <input type="button" value="Disabled"/></p> </div> <div data-bbox="256 840 737 1003" data-label="Form"> <p>Card-edge Control Menu: TC</p> <table border="1"> <thead> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>SDVC</td> <td></td> </tr> <tr> <td>Off</td> <td>SD VITC TC insertion disabled</td> </tr> <tr> <td>On</td> <td>SD VITC TC insertion enabled</td> </tr> </tbody> </table> </div>	1	2	SDVC		Off	SD VITC TC insertion disabled	On	SD VITC TC insertion enabled	<p>Enables or disables VITC waveform timecode insertion into the SD-SDI output stream.</p> <p>Note: SD VITC Waveform Insertion control only affects VITC waveforms inserted (or copied to a new line number) by this function. An existing VITC waveform on the SDI input is not affected by this control and in all cases is passes on the SDI output.</p>
1	2								
SDVC									
Off	SD VITC TC insertion disabled								
On	SD VITC TC insertion enabled								
<div data-bbox="313 1041 573 1064" data-label="Section-Header"> <h3>SD ATC Insertion Control</h3> </div> <div data-bbox="313 1089 609 1127" data-label="Form"> <p>SD ATC Insertion <input type="button" value="Disabled"/></p> </div> <div data-bbox="256 1167 737 1331" data-label="Form"> <p>Card-edge Control Menu: TC</p> <table border="1"> <thead> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>SDAT</td> <td></td> </tr> <tr> <td>Off</td> <td>SD ATC TC insertion disabled</td> </tr> <tr> <td>On</td> <td>SD ATC TC insertion enabled</td> </tr> </tbody> </table> </div>	1	2	SDAT		Off	SD ATC TC insertion disabled	On	SD ATC TC insertion enabled	<p>For SD output, enables or disables SD ATC_VITC timecode insertion into the video stream.</p> <p>Note: SD ATC_VITC is locked to line 12. The card does not check for conflicts on a given line number. Make certain this line is available if SD ATC_VITC is to be used. Refer to the section "Ancillary Data Line Number Locations and Ranges" on page 3-14 for more information.</p>
1	2								
SDAT									
Off	SD ATC TC insertion disabled								
On	SD ATC TC insertion enabled								
<div data-bbox="313 1371 634 1394" data-label="Section-Header"> <h3>HD ATC_VITC Insertion Control</h3> </div> <div data-bbox="313 1419 646 1459" data-label="Form"> <p>HD ATC VITC Insertion <input type="button" value="Disabled"/></p> </div> <div data-bbox="256 1501 737 1707" data-label="Form"> <p>Card-edge Control Menu: TC</p> <table border="1"> <thead> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>HFVC</td> <td></td> </tr> <tr> <td>Off</td> <td>HD ATC_VITC TC insertion disabled</td> </tr> <tr> <td>On</td> <td>HD ATC_VITC TC insertion enabled</td> </tr> </tbody> </table> </div>	1	2	HFVC		Off	HD ATC_VITC TC insertion disabled	On	HD ATC_VITC TC insertion enabled	<p>For HD output, enables or disables SD ATC_VITC timecode insertion into the video stream.</p>
1	2								
HFVC									
Off	HD ATC_VITC TC insertion disabled								
On	HD ATC_VITC TC insertion enabled								

<div data-bbox="289 189 636 252" data-label="Section-Header"> <h2>Timecode</h2> </div>	(continued)												
<div data-bbox="284 333 667 357" data-label="Section-Header"> <h3>HD ATC_VITC Line Insertion Controls</h3> </div> <div data-bbox="217 371 727 441" data-label="Form"> <div> <div>HD ATC_VITC Insertion Line Field 1</div> <div>9 - SMPTE 12M-2-2008 Recommended</div> </div> <div> <div>HD ATC_VITC Insertion Line Field 2</div> <div>8 (571) - SMPTE 12M-2-2008 Recommended</div> </div> </div>	<p>For HD ATC_VITC timecode output, selects the line number for ATC_VITC1 and ATC_VITC2.</p> <p>Note: Although the output line drop-down will allow any choice within the 8 thru 20 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Refer to the section “Ancillary Data Line Number Locations and Ranges” on page 3-14 for more information.</p> <p>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.</p> <p>If only one output line is to be used, set both controls for the same line number.</p>												
<div data-bbox="284 653 596 674" data-label="Section-Header"> <h3>HD ATC_LTC Insertion Control</h3> </div> <div data-bbox="284 699 610 735" data-label="Form"> <div> <div>HD ATC LTC Insertion</div> <div>Disabled</div> </div> </div> <div data-bbox="227 787 508 810" data-label="Section-Header"> <h4>Card-edge Control Menu: TC</h4> </div> <div data-bbox="227 819 708 993" data-label="Form"> <table> <tr> <td>1</td><td>2</td></tr> <tr> <td>HDLT</td><td></td></tr> <tr> <td></td><td>Off</td></tr> <tr> <td></td><td>On</td></tr> <tr> <td></td><td>HD ATC LTC timecode insertion disabled</td></tr> <tr> <td></td><td>HD ATC LTC timecode insertion enabled</td></tr> </table> </div>	1	2	HDLT			Off		On		HD ATC LTC timecode insertion disabled		HD ATC LTC timecode insertion enabled	<p>For HD output, enables or disables ATC_LTC timecode insertion into the video stream.</p>
1	2												
HDLT													
	Off												
	On												
	HD ATC LTC timecode insertion disabled												
	HD ATC LTC timecode insertion enabled												
<div data-bbox="284 1037 646 1060" data-label="Section-Header"> <h3>HD ATC_LTC Line Insertion Control</h3> </div> <div data-bbox="233 1075 727 1121" data-label="Form"> <div> <div>HD ATC_LTC Insertion Line</div> <div>10 - SMPTE 12M-2-2008 Recommended</div> </div> </div>	<p>For HD timecode output, selects the line number for ATC_LTC timecode data.</p> <p>Note: Although the output line drop-down will allow any choice within the 9 thru 20 range, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. Refer to the section “Ancillary Data Line Number Locations and Ranges” on page 3-14 for more information.</p> <p>The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.</p>												
<div data-bbox="284 1302 639 1325" data-label="Section-Header"> <h3>ATC_VITC Legacy Support Control</h3> </div> <div data-bbox="284 1350 651 1394" data-label="Form"> <div> <div>ATC VITC Legacy Support</div> <div>Disabled</div> </div> </div> <div data-bbox="227 1444 508 1467" data-label="Section-Header"> <h4>Card-edge Control Menu: TC</h4> </div> <div data-bbox="227 1476 708 1648" data-label="Form"> <table> <tr> <td>1</td><td>2</td></tr> <tr> <td>AVLS</td><td></td></tr> <tr> <td></td><td>Off</td></tr> <tr> <td></td><td>On</td></tr> <tr> <td></td><td>ATC VITC legacy support disabled</td></tr> <tr> <td></td><td>ATC VITC legacy support enabled</td></tr> </table> </div>	1	2	AVLS			Off		On		ATC VITC legacy support disabled		ATC VITC legacy support enabled	<p>When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling).</p> <p>Note: Non-toggling VITC1 and VITC2 packets do not conform to SMPTE 12M-2-2008 preferences. As such, ATC_VITC Legacy Support should be enabled only if required by downstream equipment.</p>
1	2												
AVLS													
	Off												
	On												
	ATC VITC legacy support disabled												
	ATC VITC legacy support enabled												

<div data-bbox="290 189 693 252" data-label="Section-Header"> <h2>Audio Mixing</h2> </div>	<p>Provides down-mix audio routing selections that multiplexes any five embedded, or AES audio channel sources into a stereo pair (Down Mix Left and Down Mix Right), or selection of any two audio sources to be mono-mixed to serve as a monaural source.</p> <p>With an optional upmixer licensable feature activated, any normal PCM stereo pair can be fed to the upmixer to generate 5.1 surround sound audio which in turn can be applied to six user-selectable channels.</p>
<div data-bbox="315 344 535 365" data-label="Section-Header"> <h3>Down Mixer Selection</h3> </div> <div data-bbox="302 384 693 693" data-label="Form"> <p>Down Mixer Selection</p> <p>Left Embed Ch 1 ▾</p> <p>Right Embed Ch 2 ▾</p> <p>Center Embed Ch 3 ▾</p> <p>Left Surround Embed Ch 4 ▾</p> <p>Right Surround Embed Ch 5 ▾</p> </div>	<p>Separate drop-down lists for Left, Right, Center, Left Surround (Ls), and Right Surround (Rs) inputs allow embedded, or AES channel audio source selection for each of the five inputs as shown below.</p> <div data-bbox="787 422 1088 678" data-label="Form"> <p>Down Mixer Selection</p> <p>Embed Ch 1 ▾</p> <p>Embed Ch 16 ▾</p> <p>AES Ch 1 ▾</p> <p>AES Ch 16 ▾</p> <p>Silence ▾</p> </div> <p>The example below shows selection from various sources and the resulting stereo pair DM-L and DM-R. The two signals comprising the pair can be routed and processed the same as any other audio input source.</p> <div data-bbox="787 766 1437 1108" data-label="Diagram"> </div> <p>Note: The stereo pair are basic L/R PCM signals with no additional encoded information.</p>
<div data-bbox="315 1194 566 1215" data-label="Section-Header"> <h3>Center Mix Ratio Control</h3> </div> <div data-bbox="306 1230 633 1312" data-label="Form"> <p>Center Mix Ratio (dB)</p> <p>-10.0</p> </div>	<p>Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none"> Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Center channel content is restored as in-phase center-channel content with no attenuation, making center-channel content more predominate in the overall mix. Maximum attenuation setting (-10.0 dB) applies a -10 dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content at a -10 dB ratio relative to overall level, making center-channel content less predominate in the overall mix. <p>(0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB)</p> <p>Note: Default setting of -3.0 dB is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.</p>

<div data-bbox="269 191 672 254"><p>Audio Mixing</p></div>	<p>(continued)</p>
<div data-bbox="277 331 623 457"><p>Surround Mix Ratio Control</p><p>Surround Mix Ratio (dB)</p><p>-10.0</p></div>	<p>Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix.</p> <ul style="list-style-type: none">• Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Surround-channel content is restored with no attenuation, making Lo and Ro content more predominate in the overall mix.• Maximum attenuation setting (-10.0 dB) applies a -10 dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -10 dB ratio relative to overall level, making surround-channel content less predominate in the overall mix. <p>(0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB)</p> <p>Note: Default setting of -3.0 dB is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.</p>
<div data-bbox="277 726 685 907"><p>Mono Mixer Selection</p><p>Mono Mixer Selection</p><p>Left Embed Ch 12</p><p>Right Embed Ch 16</p></div>	<p>Separate drop-down lists for Left and Right inputs allow selected embedded, AES, or the DM-L / DM-R input channels to provide an additional mono-mixed channel.</p> <p>The resulting mono mix (Mono) is available as an audio source for any of the 32 destination embedded or AES output channels as shown below.</p> <div data-bbox="756 877 1435 1108"><p>Destination Embedded Ch 1</p><p>Mono</p><p>Analog Ch 8</p><p>Down Mix Left</p><p>Down Mix Right</p><p>Mono</p><p>Tone 1</p><p>EMBED CH1 - CH16</p><p>AES CH1 - CH16</p><p>EMBEDDED CH 12</p><p>EMBEDDED CH 16</p><p>L</p><p>R</p><p>Σ</p><p>MONO</p></div> <p>Note: Selection of any two channels for mono mixing in no way affects the source channels themselves.</p>
<div data-bbox="228 1213 716 1665"><p>Auto Crossfade Speed Controls</p><p>Auto Crossfade Speed Upmix to Bypass</p><p>Very Slow</p><p>Very Slow</p><p>Slow</p><p>Medium</p><p>Quick</p><p>Very Quick</p><p>Instant</p><p>Auto Crossfade Speed Bypass to Upmix</p><p>Very Slow</p><p>Very Slow</p><p>Slow</p><p>Medium</p><p>Quick</p><p>Very Quick</p><p>Instant</p></div>	<p>Individual controls select the relative crossfade transition speed between Upmix to Bypass (going to inactive; from 5.1 to 2.0) and Bypass to Upmix (going to active; from 2.0 to 5.1) when upmixer enable is set to Auto and the active threshold (as set by the 5.1 Detection Threshold control) is crossed in either direction.</p> <p>To suit program material and production aesthetic preferences, several choices are available as shown to the left. Slower settings allow for a more gradual transition between modes, however with a longer interval before levels stabilize. Faster settings conversely allow for a smaller interval before levels stabilize, however with greater perceived abruptness.</p>

<div>Tone Generator</div>	Sets the test tone frequency for each of four tone generators (Tone Generator 1 thru 4).
<div><div>Frequency Selection Lists</div><div><div>Tone Generator 1 Frequency1 KHz</div><div>Tone Generator 4 Frequency1 KHz</div></div><div><div>Card-edge Control Menu: Aud</div><div><div><div>1</div><div>2</div><div>3</div></div><div><div>Tone</div><div>TG1</div><div>...</div><div>TG4</div></div><div><div>Select Tone Generator (1-4)</div><div>50</div><div>...</div><div>16K</div></div><div><div>Select frequency for selected tone generator (in Hz)</div></div></div></div></div>	<div>Selects the frequency for each of the four tone generators. 18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz).</div> <div>Note: Unity-gain signal level is equivalent to -20 dBu.</div>
<div>Presets</div>	Allows up to 16 card user settings configuration presets to be saved in a Preset and then recalled (loaded) as desired. All current settings (including list selections and scalar (numeric) control settings such as Gain, etc.) are saved when a Preset Save is invoked.
<div><div><div>Card NameRCVR21</div><div>Selected Preset1.FactPre</div><div>Preset NameFactPre</div><div>Preset SaveConfirm</div><div>Preset LoadConfirm</div><div>Reset Current PresetConfirm</div><div>Download PresetsCDI- ---- Presets.binSave</div></div></div>	<div>The Preset Name field and Preset Save button allow custom user setting configurations to be labeled and saved to a Preset for future use.</div> <div>The Preset Load button and the Selected Preset drop-down list allow saved presets to be selected and loaded as desired. When a preset is loaded, it immediately becomes active with all user settings now automatically set as directed by the preset.</div> <div>Saved presets can be uploaded to a computer for use with other FSD-8240 cards.</div> <div>Each of the items to the left are described in detail on the following pages.</div>
<div><div>Preset Save and Load</div><div><div>Preset SaveConfirm</div><div>Preset LoadConfirm</div></div></div>	<div><div><div><div><div>• Preset Save stores all current card control settings to the currently selected preset.</div><div>(For example, if Preset 1 is selected in the Selected Preset drop-down list, clicking and confirming Preset Save will then save all current card control settings to Preset 1)</div></div><div><div><div>• Preset Load loads (applies) all card control settings defined by whatever preset (Preset 1 thru Preset 16) is currently selected in the Selected Preset drop-down list.</div><div>(For example, if Preset 3 is selected in the Selected Preset drop-down list, clicking and confirming Preset Load will then apply all card control settings defined in Preset 3)</div></div></div></div><div>The above buttons have a Confirm? pop-up that appears, requesting confirmation.</div><div>Note: Applying a change to a preset using the buttons described above rewrites the previous preset contents with the invoked contents. Make certain change is desired before confirming preset change.</div></div></div>

	(continued)												
<p>Selected Preset</p> 	<p>Selected Preset 1 thru Selected Preset 16 range in drop-down list selects one of 16 stored presets as ready for Save (being written to) or for Load (being applied to the card).</p> <p>Note: The preset names shown to the left are the default (unnamed) preset names. All 16 presets in this case are loaded identically with the factory default settings.</p>												
<p>Card Name</p> 	<p>Text entry field provides for optional entry of card name, function, etc. (as shown in this example).</p> <p>Note: Card name can be 31 ASCII characters maximum.</p>												
<p>Preset Name</p> 	<p>With one of 16 presets selected, provides for entry of custom name for the preset (as shown in example below).</p> <div data-bbox="805 779 1101 877">  </div> <p>Entering text in Preset Name field (in this example, "RCVR21") applies custom name to selected Preset (in this example, Preset 2)</p> <p>Note: Preset name can be seven ASCII characters maximum.</p> <p>The Preset ID number does not need to be entered; it is added automatically.</p>												
<p>Reset Current Preset</p> 	<ul style="list-style-type: none"> • Reset Current Preset resets all parameters (including preset custom name entered) of the currently selected Preset (as displayed in the Selected Preset field) to factory default settings. <p>The above button has a Confirm? pop-up that appears, requesting confirmation.</p> <p>The factory default settings are as follows:</p> <table border="1" data-bbox="813 1278 1448 1654"> <thead> <tr> <th>Function</th><th>Parameter/Setting</th></tr> </thead> <tbody> <tr> <td>Audio Mapping</td><td>Audio mapping reset for simultaneous embedding and de-embedding: <ul style="list-style-type: none"> • Discrete AES input channels 1-16 are mapped to embedded audio output channels 1-16. • Embedded audio input channels 1-16 are mapped to discrete AES output channels 1-16. </td></tr> <tr> <td>Audio Input Controls</td><td>AES SRC, Passthrough, and Zero Delay Embedding are all disabled.</td></tr> <tr> <td>Audio controls (all audio functions)</td><td>All Gain and Phase (polarity) controls are set to unity and normal, respectively.</td></tr> <tr> <td>Video Proc</td><td>All parameters set to unity/null settings.</td></tr> <tr> <td>Framesync</td><td>Framesync is disabled; Reference 1 or 2 must be selected to enable the frame sync.</td></tr> </tbody> </table>	Function	Parameter/Setting	Audio Mapping	Audio mapping reset for simultaneous embedding and de-embedding: <ul style="list-style-type: none"> • Discrete AES input channels 1-16 are mapped to embedded audio output channels 1-16. • Embedded audio input channels 1-16 are mapped to discrete AES output channels 1-16. 	Audio Input Controls	AES SRC, Passthrough, and Zero Delay Embedding are all disabled.	Audio controls (all audio functions)	All Gain and Phase (polarity) controls are set to unity and normal, respectively.	Video Proc	All parameters set to unity/null settings.	Framesync	Framesync is disabled; Reference 1 or 2 must be selected to enable the frame sync.
Function	Parameter/Setting												
Audio Mapping	Audio mapping reset for simultaneous embedding and de-embedding: <ul style="list-style-type: none"> • Discrete AES input channels 1-16 are mapped to embedded audio output channels 1-16. • Embedded audio input channels 1-16 are mapped to discrete AES output channels 1-16. 												
Audio Input Controls	AES SRC, Passthrough, and Zero Delay Embedding are all disabled.												
Audio controls (all audio functions)	All Gain and Phase (polarity) controls are set to unity and normal, respectively.												
Video Proc	All parameters set to unity/null settings.												
Framesync	Framesync is disabled; Reference 1 or 2 must be selected to enable the frame sync.												
<p>Download Presets</p> 	<p>Download Presets allows all 16 presets to be stored to a specified location on a network computer for use with other FSD-8240 cards.</p>												

Audio Routing Example Using DashBoard

Figure 3.11 shows an example of using the FSD-8240 Embedded Audio Group and AES Output Pairs functions to de-embed audio, route the audio to discrete outputs for post-production processing, and finally re-embed the audio into the SDI video output. Additionally, the example shows how internal tone generator sources can be embedded into the SDI output.

Note that the source and destination correlations shown here are only examples; any source can route to any destination.

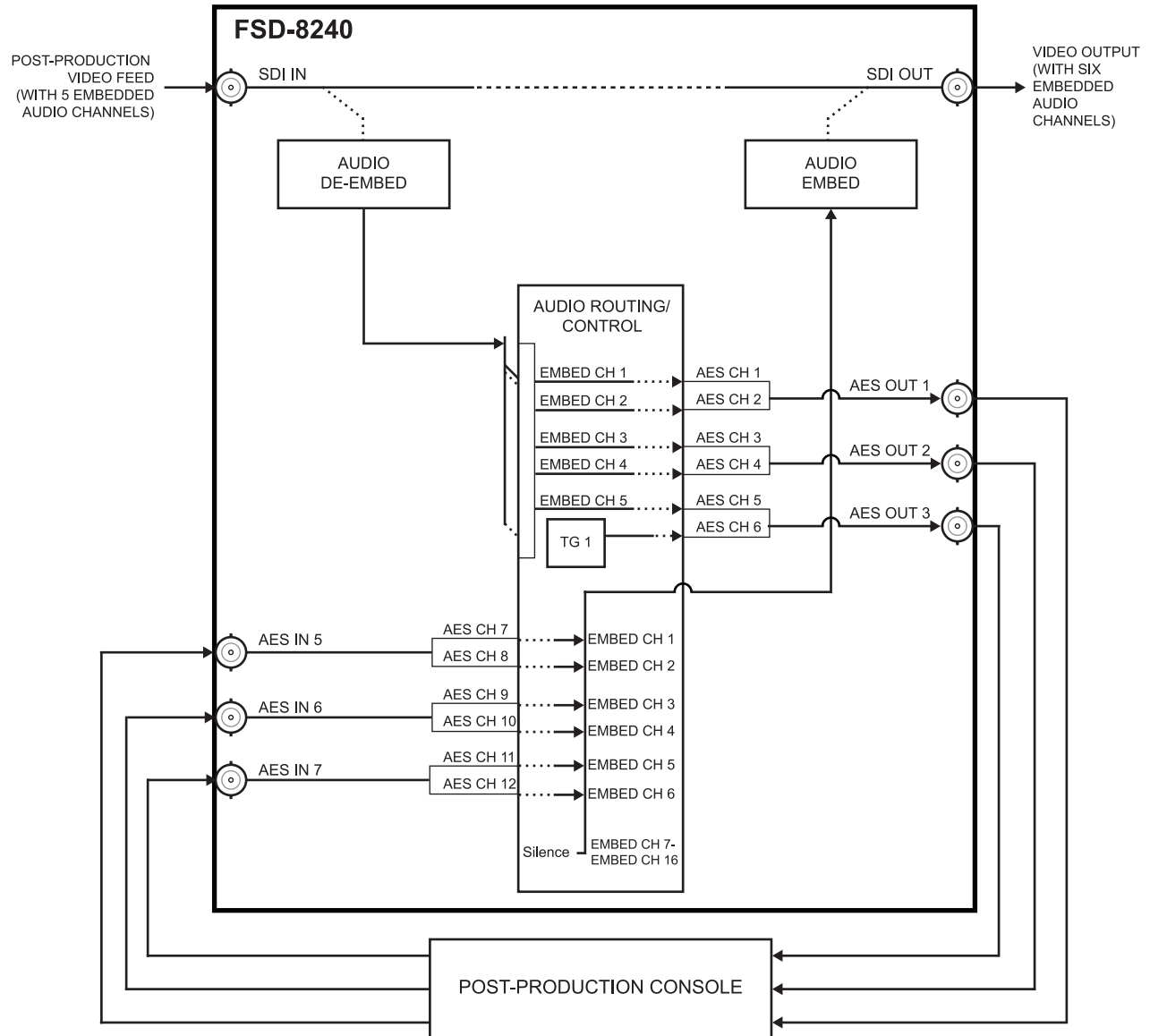


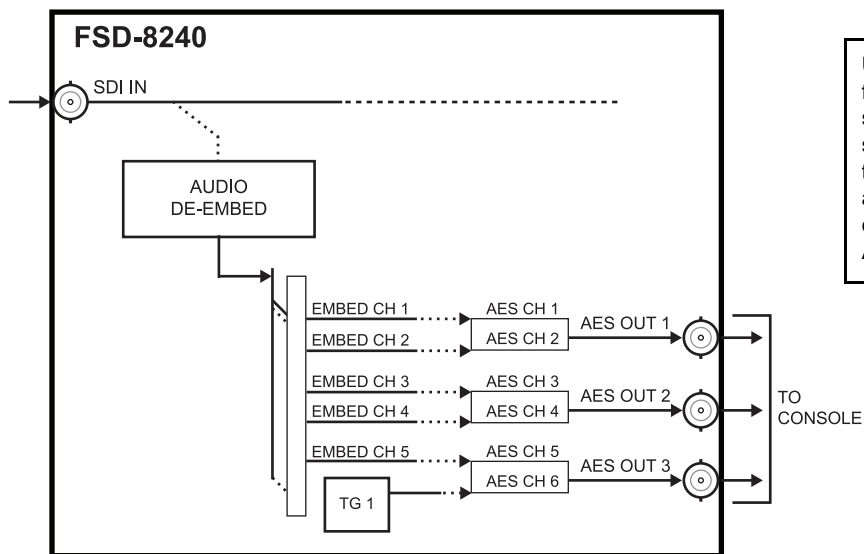
Figure 3.11 Audio Routing Example (1 of 3)

In the example here, Embedded Channels 1 thru 5 are de-embedded from the input SDI data and routed to discrete AES channels 1 thru 5. Also, an internal tone generator (TG1) is routed to AES channels 6 thru 8, respectively. **Figure 3.11** shows the FSD-8240 DashBoard control settings that result in this routing.

AES Audio Out Pairs 1-4

Destination	AES Ch 1	AES Ch 2	AES Ch 3	AES Ch 4
Source	Embed Ch 1	Embed Ch 2	Embed Ch 3	Embed Ch 4
Gain (dB)	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>6.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>6.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>10.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>10.0</div>
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

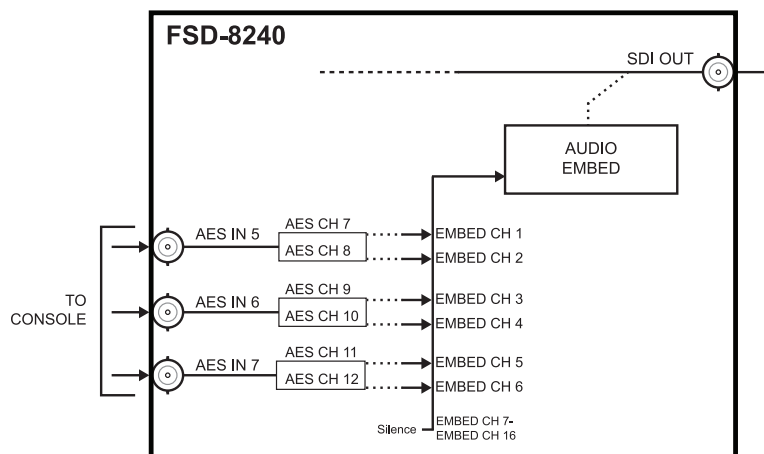
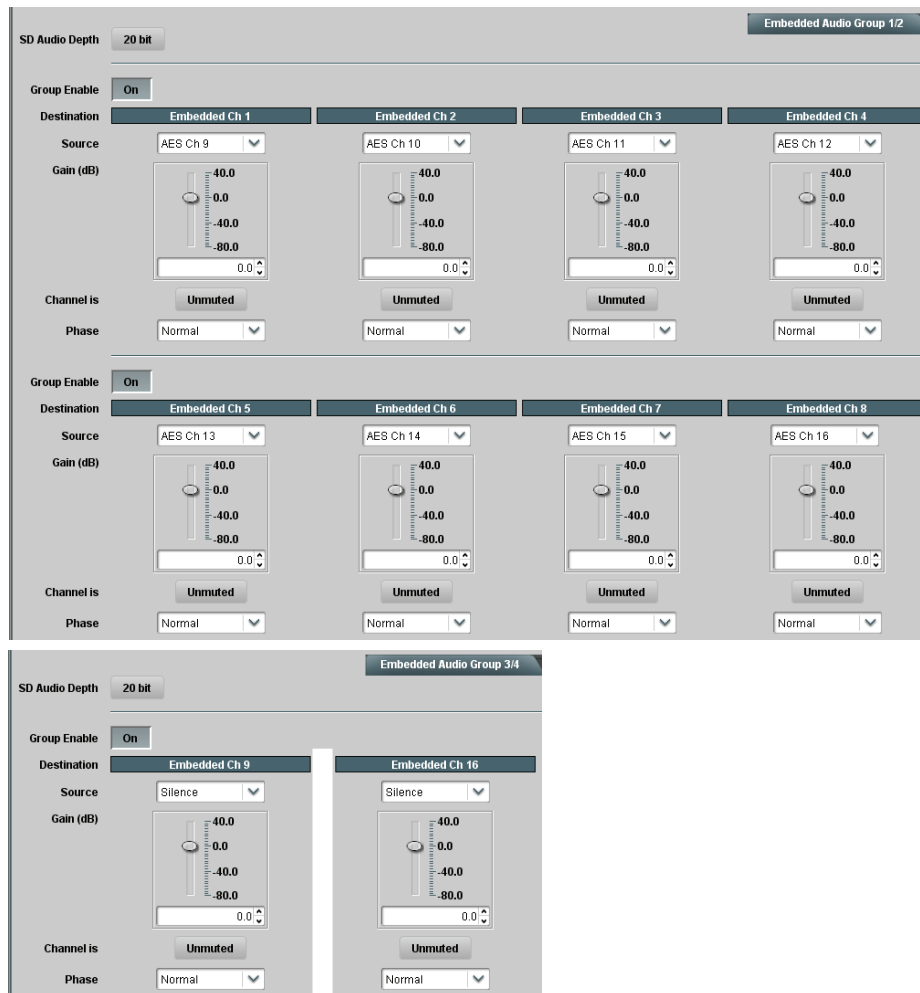
Destination	AES Ch 5	AES Ch 6	AES Ch 7	AES Ch 8
Source	Embed Ch 5	Tone 1	Silence	Silence
Gain (dB)	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>0.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>0.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>0.0</div>	<div> <div>40.0</div> <div>0.0</div> <div>-40.0</div> <div>-80.0</div> </div> <div>0.0</div>
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal



Using the **AES Audio Out Pairs 1-4** function, the Source selections shown above route the selected sources to discrete AES channels 1 through 6. These discrete outputs are then available on the FSD-8240 card Rear Module **AES OUT 1** thru **AES OUT 4** BNC connectors.

Figure 3.12 Audio Routing Example (2 of 3)

The discrete AES audio on AES channels 7 thru 16 is now re-embedded using the FSD-8240 control settings shown in **Figure 3.11**.



Using the **Embedded Audio Group 1/2 and 3/4** function, the **Source** selections shown above route the discrete AES audio signals received on the FSD-8240 card Rear Module **AES IN 5** thru **AES IN 7** BNC connectors to embedded channels 1 thru 6. Unused embedded channels 7 thru 16 are set to Silence (mute).

Figure 3.13 Audio Routing Example (3 of 3)

Dolby® E Processing and Routing Example

Figure 3.14 shows an example of using the FSD-8240 **Audio Input Controls**, **Dolby Decoder**, and **Embedded Audio Group 1/2** functions to decode a received Dolby® E encoded pair and route the decoded channels. The example also shows routing the metadata to the FSD-8240 **DOLBY META** output.

Note that the source and destination correlations shown here are only examples; any embedded channel pair carrying encoded Dolby® data can be decoded. Decoded Dolby® channels can in turn be routed route to any embedded channel destination.

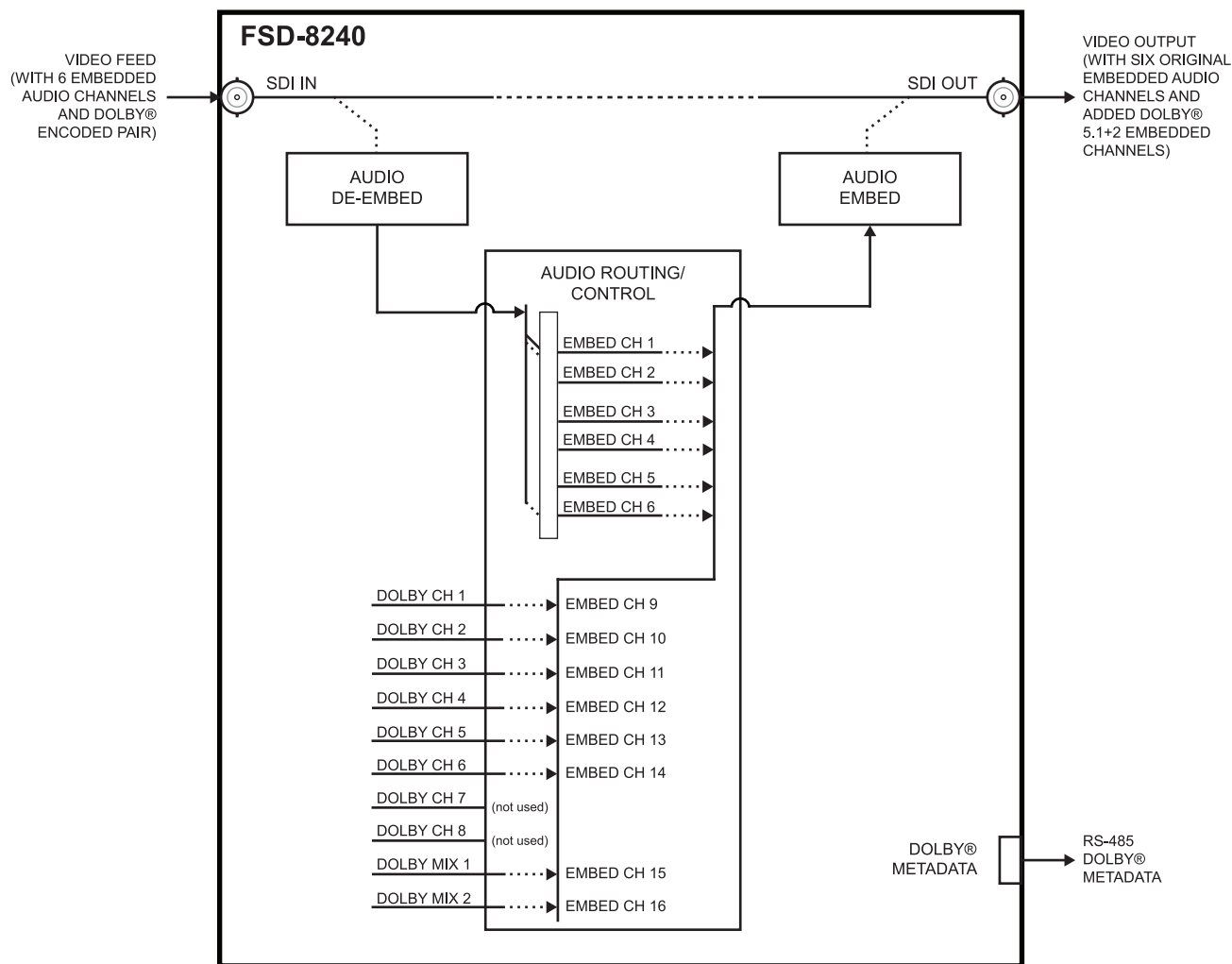


Figure 3.14 Dolby® E Processing Example (1 of 2)

In the example here, Dolby® E 5.1+2 data on embedded pair 7/8 is to be decoded and embedded (using spare embedded channels 9 thru 16) along with the existing embedded audio channels (embedded channels 1 thru 6). Figure 3.14, sheet 2 shows the FSD-8240 control settings (using DashBoard) that result in this routing.

Using the Status display in the Audio Input Controls function, embedded channel pair 7+8 shows Dolby® E data.

Audio Input Controls				
Embedded Group 1	Channel 1	Channel 2	Channel 3	Channel 4
Status	Present, Professional	Present, Professional	Present, Professional	Present, Professional
Embedded Group 2	Channel 5	Channel 6	Channel 7	Channel 8
Status	Not Present	Not Present	Present, Dolby E	Present, Dolby E

Card Info: CAT552 v1.2.0.12

Input Select: Embedded Ch 7+8

Decoder Mode: Auto Detect Format and Decode (Pass PCM)

Bitstream Format: Dolby E 20-bit

Dolby E Program Configuration: 5.1 + 2

Dolby Digital Program Configuration: No Dolby Digital Present

Dolby Digital 16-bit Channel Select: Channel 1

Dolby Digital Dynamic Range Control: Line Mode

Metadata Embedding: On

Metadata Output Line: 13

Metadata Output Source: Embedded: Dolby Decoder, RS485: Dolby Decoder

Embedded pair 7+8 can then be selected as the Dolby Decoder Input Select source. The Bitstream Format and Dolby E Program Configuration displays also show this signal as Dolby® E; 5.1+2

Metadata Embedding = On allows decoder metadata embedding into the SDI stream (on line 13 as shown).

Metadata Output Source can be set to **Embedded: Dolby Decoder, RS485: Dolby Decoder** to select the decoder metadata as the source for embedded and RS485 metadata.

SD Audio Depth: 24 bit

Group Enable: On

Destination	Embedded Ch 9	Embedded Ch 10	Embedded Ch 11	Embedded Ch 12
Source	Dolby Ch 1	Dolby Ch 2	Dolby Ch 3	Dolby Ch 4
Gain (dB)	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

Destination	Embedded Ch 13	Embedded Ch 14	Embedded Ch 15	Embedded Ch 16
Source	Dolby Ch 5	Dolby Ch 6	Dolby Mix 1	Dolby Mix 2
Gain (dB)	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0	40.0 0.0 -40.0 -80.0
Channel is	Unmuted	Unmuted	Unmuted	Unmuted
Phase	Normal	Normal	Normal	Normal

In this example, since the decoder displays a "5.1+2" configuration, the eight channels comprising this configuration can be embedded using eight spare embedded channels.

As such, the eight total decoded channels produced (Dolby Ch 1 thru Dolby Ch 6, and Dolby Mix 1 / Dolby Mix 2 corresponding to L, R, C, LFE, LS, RS, and Lo/Ro monitors) can be respectively routed to embedded channels 9 thru 16 as shown to the left using the **Embedded Audio Group 3/4** function.

(Note that decoder channels 7 and 8 are not used in this format.)

Figure 3.15 Dolby® E Processing Example (2 of 2)

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the FSD-8240 card and its remote control interface. The FSD-8240 card requires no periodic maintenance in its normal operation; if any error indication (as described in this section) occurs, use this section to correct the condition.

Error and Failure Indicator Overview

The FSD-8240 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the FSD-8240 card is being used (i.e, standalone or network controlled through DashBoard), check all available indications in the event of an error or failure condition.

The various card and remote control error and failure indicators are individually described below.

The descriptions below provide general information for the various status and error indicators. For specific failures, also use the appropriate subsection listed below.

- “**Basic Troubleshooting Checks**” on page 3-64
- “**Processing Error Troubleshooting**” on page 3-64

Card-edge Status/Error Indicators and Display

Figure 3.16 shows and describes the FSD-8240 card-edge status indicators and display. These indicators and the display show status and error conditions relating to the card itself and remote (network) communications (where applicable). Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

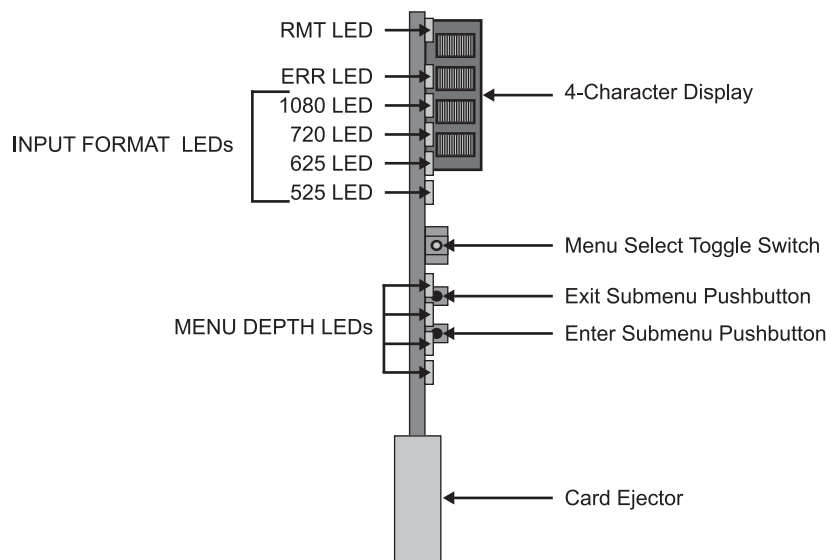


Figure 3.16 Card-edge Status Indicators and Display

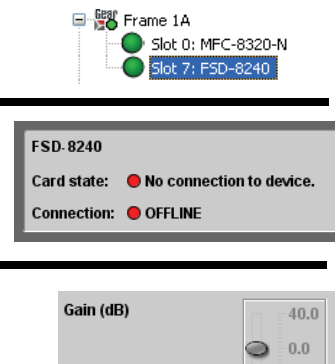
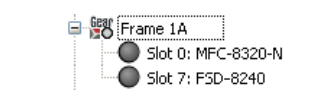
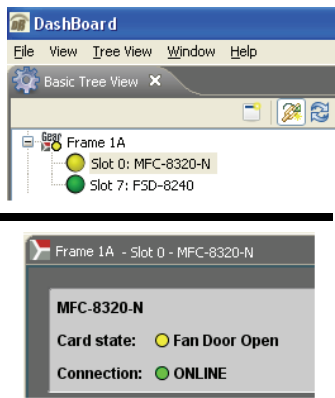
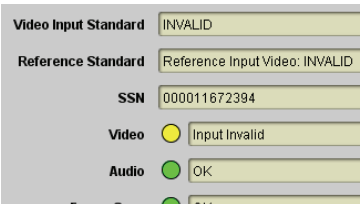
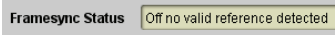
Table 3.5 LEDs on the FSD-8240

LED	Display and Description
Alphanumeric Display	Displays 4-digit alphanumeric code indicating status or errors as follows: <ul style="list-style-type: none">• E0XX: Video Errors• E002: Video Acquiring Lock• E1XX: Audio Errors• E2XX: Frame Sync Errors• E200: Reference is Incompatible with Input Video• E201: Reference Standard is Invalid/No Reference Present• E202: Reference Standard is 720p 2398 (a reference standard not supported by the framesync)• E203: Reference Standard is 720p 2997 (a reference standard not supported by the framesync)
RMT	Blue LED flashes when FSD-8240 is receiving control message from remote network control (e.g., DashBoard)
REF	Blue LED illuminates indicating FSD-8240 is receiving valid reference when set up for framesync operation.
ERR	Red LED illuminates when FSD-8240 unable to lock to framesync, or unable to lock to input standard.
Input Format LEDs	Four blue LEDs indicate the input signal raster format being received and locked onto by the FSD-8240 (1080, 720, 625, 525). Continuous cycling of the LEDs indicates the FSD-8240 has not locked onto a particular format (as in the case of no signal input).

DashBoard Status/Error Indicators and Displays

Table 3.6 shows and describes the DashBoard status indicators and displays. These indicator icons and displays show status and error conditions relating to the FSD-8240 card itself and remote (network) communications.

Table 3.6 DashBoard Status/Error Indicators and Displays

Indicator Icon or Display	Error Description
	<p>Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the FSD-8240 card in slot 7).</p> <p>Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating FSD-8240 card is not connecting to frame/LAN).</p> <p>If the FSD-8240 card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).</p>
	<p>Gray indicator icon in Card Access/Navigation Tree pane shows card(s) are not being seen by DashBoard due to lack of connection to frame LAN (in this example, both a FSD-8240 card in slot 7 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).</p>
	<p>Yellow indicator icon in Card Access/Navigation Tree pane shows card with Alert condition (in this example, the Card Access/Navigation Tree pane shows a general alert issued by the MFC-8320-N Network Controller Card).</p> <p>Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-8320-N”) opens the Card Info pane for the selected card. In this example, a “Fan Door Open” specific error is displayed.</p>
	<p>Yellow indicator icon in FSD-8240 Card Info pane shows error alert, along with cause for alert (in this example, the FSD-8240 is receiving no video input, or a video input that is invalid for the card and/or its current settings).</p>
	<p>Where available, error messages within a function submenu pane show highly specific information relating to detected errors (in this example, message shows an invalid or missing Framesync Enable reference selection).</p>

Access Card Info panes for specific cards by clicking the card slot position in the Card Access/Navigation Tree pane (as shown in the example in **Figure 3.17**).

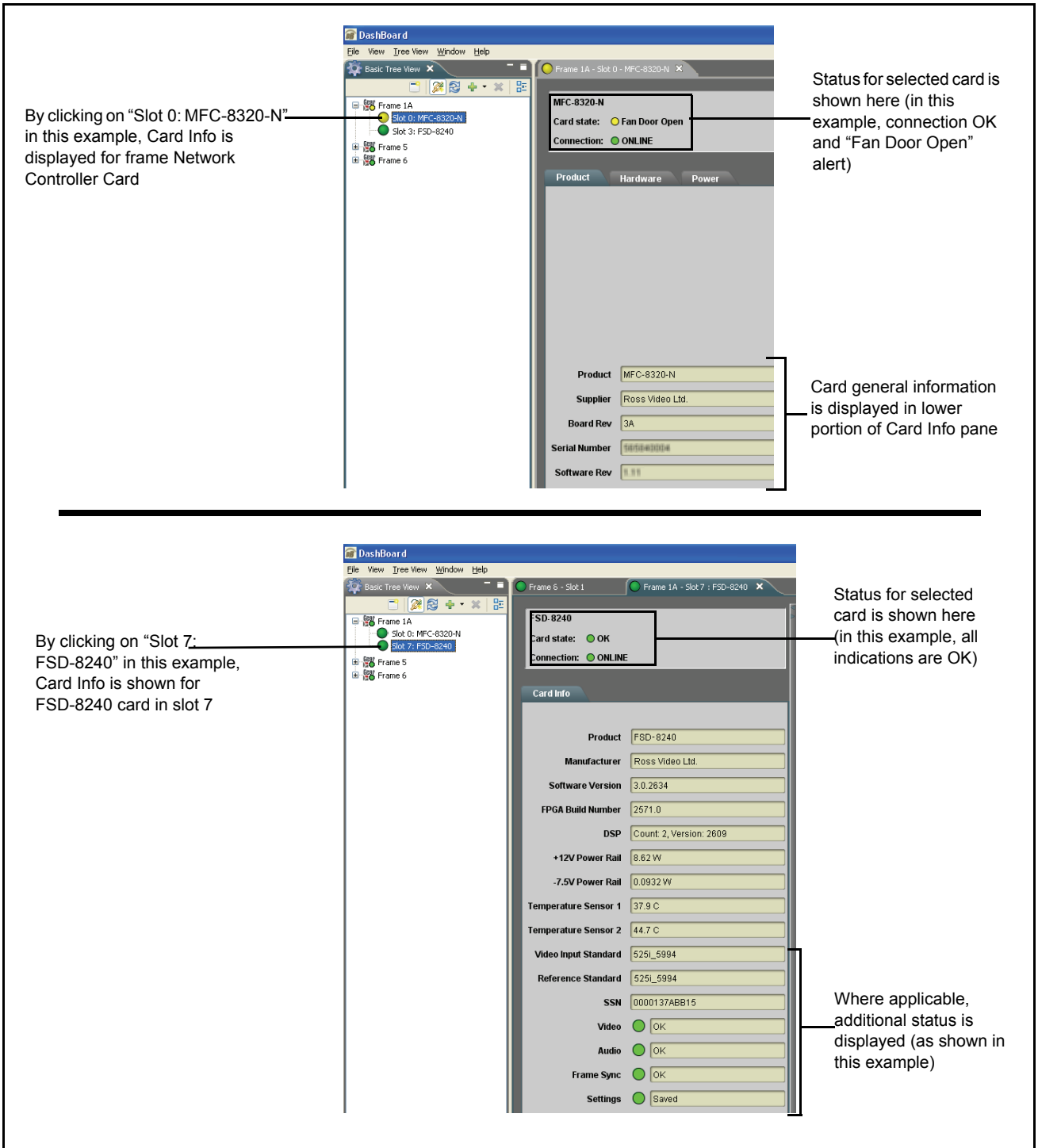


Figure 3.17 Selecting Specific Cards for Card Info Status Display

Basic Troubleshooting Checks

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross inoperability errors are best addressed first by performing basic checks before proceeding further. **Table 3.7** provides basic system checks that typically locate the source of most general problems. If required and applicable, perform further troubleshooting in accordance with the other troubleshooting tables in this section.

Table 3.7 Basic Troubleshooting Checks

Item	Checks
Verify power presence and characteristics	<p>On both the frame Network Controller Card and the FSD-8240, in all cases when power is being properly supplied there is always at least one indicator illuminated. Any card showing no illuminated indicators should be cause for concern.</p> <p>Check the Power Consumed indications for both the +12 V and -7.5 V supply rails for the FSD-8240 card. This can be observed using the DashBoard Card Info pane, or using the card-edge controls and indicators as shown in Figure 3.8 on page 3-13.</p> <ul style="list-style-type: none">• If either of the rail supplies show no power being consumed, either the frame power supply, connections, or the FSD-8240 card itself is defective.• If either of the rail supplies show excessive power being consumed (refer to the section “Technical Specifications” on page 4-2), the FSD-8240 card may be defective.
Check Cable connection secureness and connecting points	<p>Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). Also, make certain all connecting points are as intended. Make certain the selected connecting points correlate to the intended card inputs and/or outputs. Cabling mistakes are especially easy to make when working with large I/O modules.</p>
Card seating within slots	<p>Make certain all cards are properly seated within its frame slot. (It is best to assure proper seating by ejecting the card and reseating it again.)</p>
Check status indicators and displays	<p>On both DashBoard and the FSD-8240 card-edge indicators, red indications signify an error condition. If a status indicator signifies an error, proceed to the following tables in this section for further action.</p>
Troubleshoot by substitution	<p>All cards within the frame can be hot-swapped, replacing a suspect card or module with a known-good item.</p>

Processing Error Troubleshooting

Table 3.8 provides FSD-8240 processing troubleshooting information. If the FSD-8240 card exhibits any of the symptoms listed in **Table 3.8**, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the FSD-8240 is not appropriately set for the type of signal being received by the card.

The error indications shown below are typical for the corresponding error conditions listed. Other error indications not specified here may also be displayed on DashBoard and/or the FSD-8240 card-edge status indicators.

Where errors are displayed on both the FSD-8240 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3.8 Troubleshooting Processing Errors by Symptom



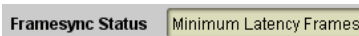
Symptom	Error/Condition	Corrective Action
<ul style="list-style-type: none"> DashBoard shows Video yellow icon and Input Invalid message in FSD-8240 Card Info pane.  <ul style="list-style-type: none"> card-edge Input Format LEDs show continuous cycling. 	No video input present	Make certain intended video source is connected to appropriate FSD-8240 card video input. Make certain BNC cable connections between frame rear module for the card and signal source are OK.
<ul style="list-style-type: none"> DashBoard shows Frame Sync red icon and Reference Invalid message in FSD-8240 Card Info pane.  <ul style="list-style-type: none"> card-edge red ERR indicator illuminated. 	Frame sync reference not properly selected or not being received	<ul style="list-style-type: none"> If external frame sync reference is not intended to be used, make certain the Framesync Enable selection list is set to Off or Input Video as desired. If external frame sync reference is intended to be used, make certain selected external frame sync reference is active on frame sync frame bus. (External reference signals Reference 1 and Reference 2 are distributed to the FSD-8240 and other cards via a frame bus.) Refer to Framesync function submenu tab on page 3-22 for more information.
<p>DashBoard shows Framesync Status error message in FSD-8240 Framesync function submenu screen.</p> 	Specified Minimum Latency Frames setting exceeds FSD-8240 card buffer space for the selected output video format	<p>Reduce the Minimum Latency Frames setting as specified in the error message to correct the error.</p> <p>Note: Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected.</p> <p>For example, with a 1080i 5994 output, the maximum setting is 5. For a 1080i film (2398) output, the maximum setting is 3 (due to the increased buffer space needed for the slower frame rate). Conversely, greater maximum settings are allowed for SD formats such as 525i 5994, where the practical maximum limit is 13.</p>
Video/audio synchronization or delay noted.	Source synchronization condition	<p>Use the Audio Offset from Video control to compensate for video/audio delay.</p> <p>Refer to Framesync function submenu tab on page 3-22 for more information.</p>
Ancillary data (closed captioning, timecode, Dolby® metadata, AFD) not transferred through FSD-8240.	Control(s) not enabled	Make certain respective control is set to On or Enabled (as appropriate).
	VANC line number conflict between two or more ancillary data items	Make certain each ancillary data item to be passed is assigned a unique line number. Refer to the section “ Ancillary Data Line Number Locations and Ranges ” on page 3-14.

Table 3.8 Troubleshooting Processing Errors by Symptom (Continued)

Symptom	Error/Condition	Corrective Action
Dolby® data indicated as Present on Audio Input Controls Status display does not process, or cannot be accessed as an audio source	Input Select in Dolby Decoder function selection not set for pair carrying locked Dolby® data	Make certain intended channels carrying locked Dolby® data are selected as the input for the Dolby® decoder.
	Upstream metadata not enabled	Check upstream device or system and enable as required.
Audio signal(s) do not route as expected. Parameter control not available as expected.	Audio Input Controls AES Passthrough or Zero Delay Embedding mode may inadvertently be enabled	When either of these modes is enabled, flexible routing and parametric controls are not available. When either of these modes is not intended for use, make sure they are disabled. Refer to Audio Input Controls function submenu tab on page 3-16 for more information. Note: Routing and parametric controls may appear functional when either of these mode are enabled, although the controls will not be functional.
Audio not processed or passed through card.	Input audio of type that cannot be locked by FSD-8240 card	AES discrete and embedded audio must be nominal 48 kHz input. Note: Although the Status Displays in Audio Input Controls function submenu tab will show audio formats other than “Present, Professional” as being locked (such as “Present, Consumer”), in any case the audio must be at nominal 48 kHz rate for lock and processing to occur.
	Enable control not turned on	Group Enable button for Embedded Audio Group 1/2 or Embedded Audio Group 3/4 function submenu must be turned on for sources to be embedded into respective embedded channels.
Audio not processed or passed through card	AES pairs 1 thru 4 switch not set for Input (factory default) mode	If any of AES IN 1 thru AES IN 4 are to be used as inputs, the respective DIP switch must be set to the default INPUT mode position. Refer to the section “ Setting I/O Switches for AES I/O (1-4) Ports ” on page 2-3 for more information.

In Case of Problems

Should any problem arise with this product that was not solved by the information in this section, please contact Ross Video Technical Support.

Specifications

In This Chapter

This chapter provides the technical specification information for the FSD-8240. Note that technical specifications are subject to change without notice.

The following topics are discussed:

- Technical Specifications

Technical Specifications

This section provides technical specifications for the FSD-8240.

Table 4.1 FSD-8240 Technical Specifications

Category	Parameter	Specification
SDI Inputs	Number of Inputs	
	SMPTE Standards Accommodated	SMPTE 292 HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps SMPTE 259M-C SD-SDI: 270 Mbps
	Impedance	75W terminating
	Return Loss	>15dB at 5MHz – 1.485GHz
	Equalization	HD: 328ft (100m) Belden 1694A SD: 1000ft (305m) Belden 1694A
Post-Processor Serial Digital Video Outputs	Number of Outputs	Two HD/SD-SDI BNC per IEC 60169-8 Amendment 2
	Impedance	75W
	Return Loss	> 15dB at 5MHz – 270MHz > 12dB at 270MHz – 1.485GHz
	Signal Level	800mV ± 10%
	DC Offset	0V ± 50mV
	Jitter	HD: <0.15UI (all outputs) SD: <0.10UI (all outputs)
	Overshoot	< 0.2% of amplitude
Pre-Processor (Reclocked) Serial Digital Video Outputs	Number of Outputs	Two HD/SD-SDI BNC per IEC 60169-8 Amendment 2
	Impedance	75 W
AES Audio Inputs	Number of Inputs (maximum)	8 unbalanced
	SMPTE Standards Accommodated	SMPTE 276M
	Input Level	0.1 to 2.5Vp-p (5Vp-p tolerant)
	Input Impedance	75W
	Return Loss	> 12dB at 100kHz to 6Hz
	Resolution	24-bit only
	Sample Rate	48kHz
AES Audio Outputs	SRC	32-channel; 142dB S/N
	Number of Outputs (maximum)	8 unbalanced
	SMPTE Standards Accommodated	SMPTE 276M
	Impedance	75W
	Return Loss	> 30dB 100kHz to 6MHz
	Sample Rate	48 kHz

Table 4.1 FSD-8240 Technical Specifications

Category	Parameter	Specification
Dolby® Metadata Output	Connection	2-wire RS-485 and/or embedded into SDI video output (user selectable)
Reference Video Input	Number of Inputs	Two non-terminating (looping) Frame Reference inputs
	SMPTE Standards Accommodated	HD: 720p 24; 25; 29.97; 30; 50; 59.94 1080i 25; 29.97 1080p 23.98; 24; 25; 29.97; 30 1080p/sF 23.98; 24
		SD: 486i 29.97 (NTSC); 575i 25 (PAL)
	Signal Level	1Vp-p nominal
	Signal Type	Analog video sync (black burst or tri-level)
	Impedance	75W
	Return Loss	> 30dB to 30MHz
	Allowable Maximum DC on Ref Input	±1.0V
Other	Internal Tone Generators	Four built-in tone generators, each configurable for 18 discrete sine wave frequencies ranging from 50Hz to 16kHz Generator source signal level is equivalent to -20dBu
	Resolution	10-bit video data path
	Frame Communication	10/100Mbps Ethernet with Auto-MDIX
Environment	Operating Temperature	32°F - 104°F (0°C - 40°C)
	Relative Humidity (operating or storage)	<95%, non-condensing
Power	Maximum Power Consumption	< 15W

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your FSD-8240, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed under the “**Contact Us**” section.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Re-seat the Card in the Frame** — Eject the card and re-insert it into the frame.
4. **Check Control Settings** — Refer to the Installation and User Controls sections of this manual to verify all user-adjustable component settings
5. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Unit Exchange** — Exchanging a suspect unit with a unit that is known to be working correctly is an efficient method for localizing problems to individual units.

Warranty and Repair Policy

The FSD-8240 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your FSD-8240 proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this FSD-8240 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This FSD-8240 User Manual provides all pertinent information for the safe installation and operation of your openGear Product. Ross Video policy dictates that all repairs to the FSD-8240 are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your FSD-8240, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your FSD-8240. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

PHONE	General Business Office and Technical Support	613 • 652 • 4886
	After Hours Emergency	613 • 349 • 0006
	Fax	613 • 652 • 4425
E-MAIL	General Information	solutions@rossvideo.com
	Technical Support	techsupport@rossvideo.com
POSTAL SERVICE	Ross Video Limited	8 John Street, Iroquois, Ontario, Canada K0E 1K0
	Ross Video Incorporated	P.O. Box 880, Ogdensburg, New York, USA 13669-0880

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