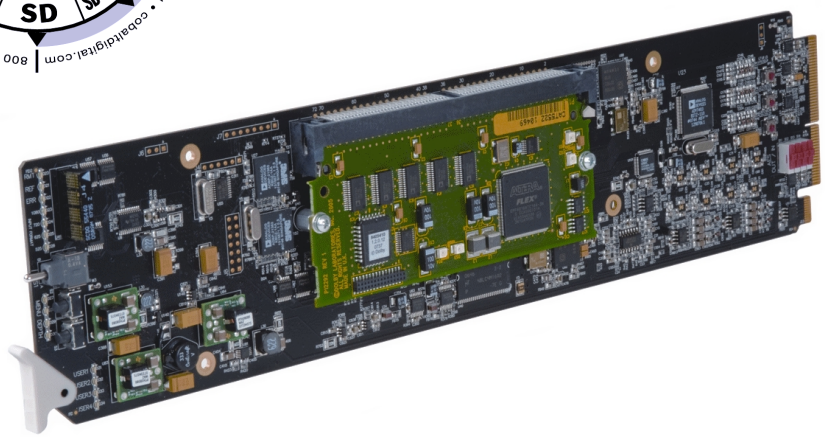
9035



HD/SD-SDI – Analog In Frame Sync
with Audio Embedding/De-Embedding and Dolby® Decoding Option

Product Manual

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9035-OM (V4.4)

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Trademark Information

Congratulations on choosing the Cobalt® 9035 HD/SD-SDI – Analog In Frame Sync with Audio Embedding/ De-Embedding and Dolby® Decoding Option. The 9035 is part of a full line of modular processing and conversion gear for broadcast TV environments. The Cobalt Digital Inc. line includes video decoders and encoders, audio embedders and de-embedders, distribution amplifiers, format converters, remote control systems and much more. Should you have questions pertaining to the installation or operation of your 9035, please contact us at the contact information on the front cover.

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Chapter 1

Introduction

Overview

This manual provides installation and operating instructions for the 9035 HD/SD-SDI – Analog In Frame Sync with Audio Embedding/ De-Embedding and Dolby® Decoding Option card (also referred to herein as the 9035).

Note: This manual also covers the 9035-DEC, which is the 9035 card equipped with Dolby® decoding as an option. Where applicable, descriptions related exclusively to the either the 9035 or the 9035-DEC are respectively denoted by **(9035 only)** or **(9035-DEC only)**. In all other aspects, both the 9035 and 9035-DEC function identically as described in this manual.

This manual consists of the following chapters:

- **Chapter 1, "Introduction"** – Provides information about this manual and what is covered. Also provides general information regarding the 9035.
- **Chapter 2, "Installation and Setup"** – Provides instructions for installing the 9035 in a frame, and optionally installing 9035 Rear I/O Modules.
- **Chapter 3, "Operating Instructions"** – Provides overviews of operating controls and instructions for using the 9035.

This chapter contains the following information:

- **9035 Card Software Versions and this Manual (p. 1-2)**
- **Manual Conventions (p. 1-3)**
- **Safety Summary (p. 1-4)**
- **9035 Functional Description (p. 1-5)**
- **Technical Specifications (p. 1-22)**
- **Warranty and Service Information (p. 1-27)**
- **Contact Cobalt Digital Inc. (p. 1-28)**

9035 Card Software Versions and this Manual

When applicable, Cobalt Digital Inc. provides for continual product enhancements through software updates. As such, functions described in this manual may pertain specifically to cards loaded with a particular software build.

The Software Version of your card can be checked by viewing the **Card Info** menu in DashBoard™. See Checking 9035 Card Information (p. 3-7) in Chapter 3, “Operating Instructions” for more information. You can then check our website for the latest software version currently released for the card as described below.

Check our website and proceed as follows if your card’s software does not match the latest version:

Card Software **earlier** than latest 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 with new Update software by going to the **Support>Firmware Downloads** link at www.cobaltdigital.com. Download “Firmware Update Guide”, which provides simple instructions for downloading the latest firmware for your card onto your computer, and then uploading it to your card through DashBoard™. **Software updates are field-installed without any need to remove the card from its frame.**
Card Software **newer** than version in manual	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 the **Support>Documents>Product Information and Manuals** link at www.cobaltdigital.com.

Cobalt Reference Guides

From the Cobalt® web home page, go to **Support>Documents>Reference Guides** for easy to use guides covering network remote control, card firmware updates, and other topics.

Manual Conventions

In this manual, display messages and connectors are shown using the exact name shown on the 9035 itself. Examples are provided below.

- Card-edge display messages are shown like this:

  Ch01

- Connector names are shown like this: **AES IN 1**

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

- **9035** refers to the 9035 HD/SD-SDI – Analog In Frame Sync with Audio Embedding/De-Embedding and Dolby® Decoding Option card.
- **Frame** refers to the HPF-9000, OG3-FR, 8321, or similar 20-slot frame that houses Cobalt® or other cards.
- **Device** and/or **Card** refers to a COMPASS® card.
- **System** and/or **Video System** refers to the mix of interconnected production and terminal equipment in which the 9061 and other COMPASS® cards operate.
- Functions and/or features that are available only as an option are denoted in this manual like this:

  Option

Warnings, Cautions, and Notes

Certain items in this manual are highlighted by special messages. The definitions are provided below.

Warnings

Warning messages indicate a possible hazard which, if not avoided, could result in personal injury or death.

Cautions

Caution messages indicate a problem or incorrect practice which, if not avoided, could result in improper operation or damage to the product.

Notes

Notes provide supplemental information to the accompanying text. Notes typically precede the text to which they apply.

Labeling Symbol Definitions

	Attention, consult accompanying documents.
	Electronic device or assembly is susceptible to damage from an ESD event. Handle only using appropriate ESD prevention practices. If ESD wrist strap is not available, handle card only by edges and avoid contact with any connectors or components.
	Symbol (WEEE 2002/96/EC) For product disposal, ensure the following: • Do not dispose of this product as unsorted municipal waste. • Collect this product separately. • Use collection and return systems available to you.

Safety Summary

Warnings

! WARNING ! **To reduce risk of electric shock do not remove line voltage service barrier cover on frame equipment containing an AC power supply. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**

Cautions

CAUTION **This device is intended for environmentally controlled use only in appropriate video terminal equipment operating environments.**

CAUTION **This product is intended to be a component product of an openGear® frame. Refer to the openGear® frame Owner's Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.**

CAUTION **Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9035 has a moderate power dissipation (15 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.**

CAUTION **If required, make certain Rear I/O Module(s) are installed before installing the 9035 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.**

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

9035 Functional Description

Figure 1-1 shows a functional block diagram of the 9035. The 9035 includes includes a full 16-channel audio embedder/de-embedder, a 12-bit analog-to-digital video converter, an 8-channel, 24-bit balanced analog-to-digital audio converter, and a full video frame synchronizer. The 9035 also handles timecode insertion, closed captioning support, and transfer of Dolby® metadata. The video source can be either an HD/SD-SDI input or an HD/SD analog video input.

The 9035-DEC also performs Dolby® E and Dolby® Digital™ decoding.

Note: Some of the functions described below are available only when using the DashBoard™, or Cobalt® OGCP-9000 or OGCP-9000/CC Control Panels user interfaces. Refer to User Control Interface (p. 1-17) for user interface descriptions.

9035 Input/Output Formats

The 9035 provides the following inputs and outputs:

- **Inputs:**
  - **HD/SD SDI IN** – dual-rate HD/SD-SDI input
  - **Y/Cmpst IN**, **Pr/C IN**, **Pb IN** – component video inputs
  - **AES I/O (1-4)** – user-switchable as AES inputs or AES outputs
  - **AES IN (5-8)** – dedicated AES inputs
  - **AN-AUD IN (1-8)** – balanced analog audio inputs
- **Outputs:**
  - **SDI OUT** – two dual-rate HD/SD-SDI buffered video outputs
  - **AES OUT (1-8)** – dedicated AES outputs
  - **AES I/O (1-4)** – user-switchable as AES inputs or AES outputs
  - **DOLBY META** – **(9035-DEC only)** RS-485 Dolby® metadata output
  - **RS-485** – RS485 Dolby® metadata output (with option +LTC, also provides RS-485 LTC I/O)

Note: The input/output complement listed above represents the maximum capability of the 9035. The practical input/output complement is determined by the particular Rear I/O Module used with the 9035. Refer to 9035 Rear I/O Modules (p. 1-19) for more information.

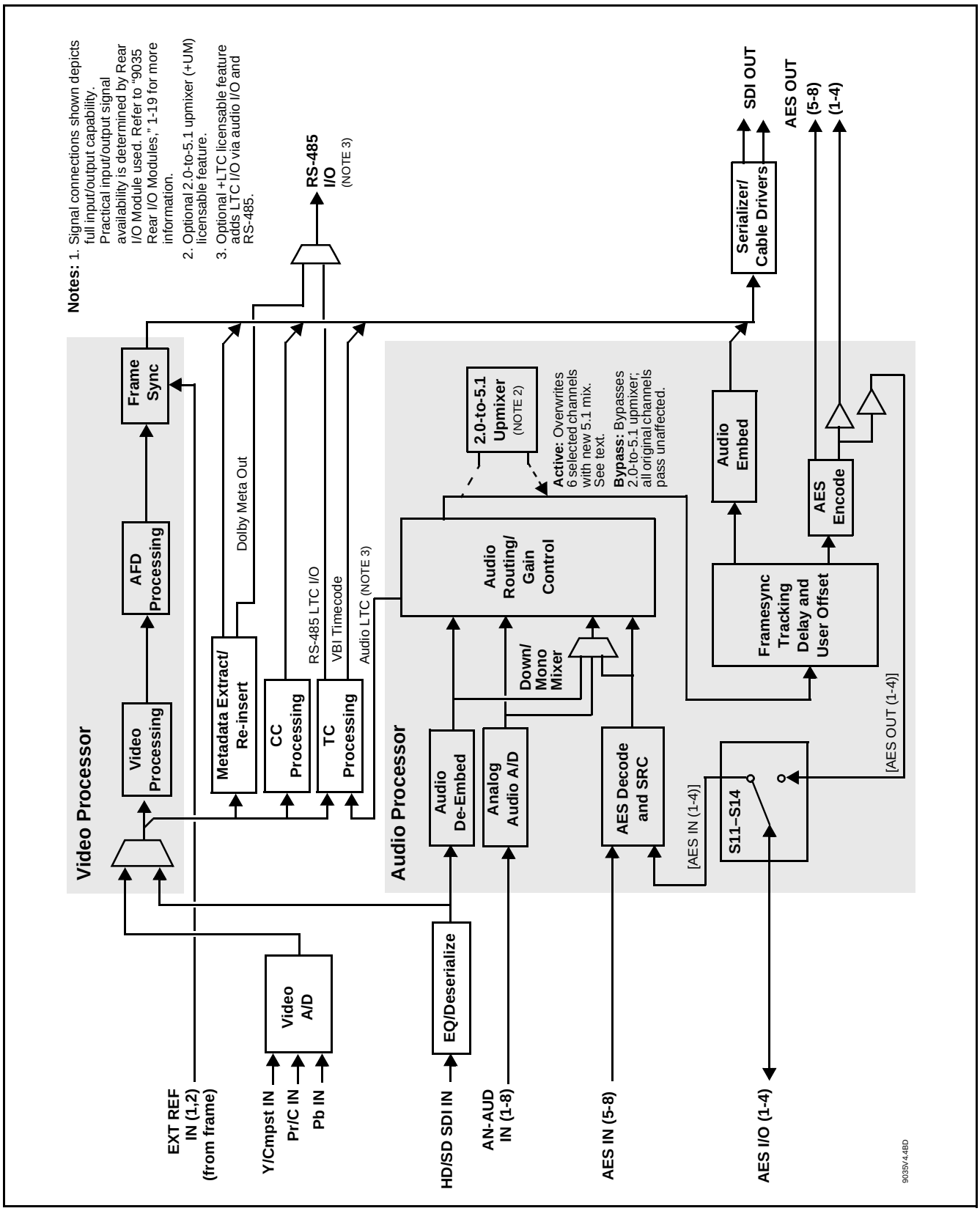

Figure 1-1 9035 Functional Block Diagram

Video Processor Description

The 9035 video subsystem also provides the functions described below.

Video Processor

The 9035 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. Framesync Reference 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 9035 re-establishes video/audio sync following framesync changes by applying an offset in small, progressive amounts to provide a seamless, glitch-free retiming.

In the event of framesync loss of signal, this function provides for disabling the video or going to a desired color raster.

(9035-DEC only) When Dolby® data is received and actively routed into embedded or discrete 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.

Timecode Inserter

(See Figure 1-2.) This function provides for the enable or disable of timecode insertion, and selects and prioritizes among analog VITC, SDI VITC, and SDI ATC timecode sources.

The function also allows the selection of the ancillary data line number where the HD-SDI ATC data is stored when the output is HD.

Option Option +LTC allows bidirectional transfer and conversion between VBI formats over SDI and audio LTC, as well as RS-485 LTC. Audio LTC can be received or sent over a selected balanced analog audio input, or as digital audio over a selected embedded or AES input.

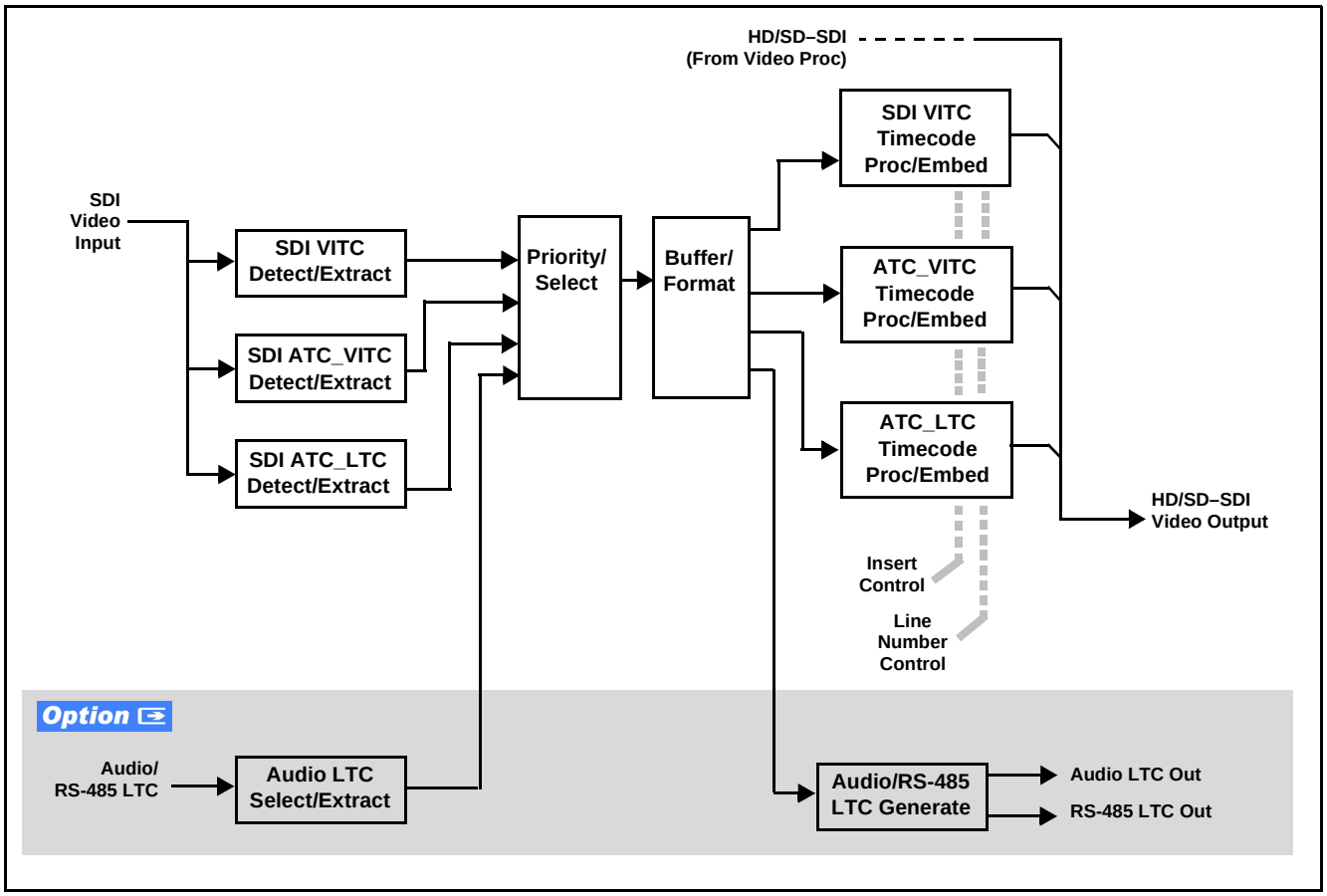

Figure 1-2 Timecode Processor

Closed Captioning Inserter

This function provides support for closed captioning setup. When enabled, the function selects from current input video, analog SD, or SDI as the video format that is to receive the Closed Captioning (CC) video stream. Selection from these choices can be prioritized as desired.

The function also allows the selection of the ancillary data line number where the ancillary closed caption data is stored when the output is HD.

Audio Processor Description

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

- 16 channels of embedded AES from the SDI video
- 16 channels (8 pairs) of discrete AES input
- 8 channels of balanced analog audio input
- Four independent internal tone generators (described below)
- Digital silence (mute) setting
- Down Mix Left (DM-L) and Down Mix Right (DM-R) (described below)
- **(9035-DEC only)** Decoded Dolby® channels

The router function provides the following audio outputs:

- 16 channels of embedded AES 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 40 (16 embedded AES, 16 discrete AES, 8 analog) input channel sources, four internal tone generators, or the Down Mix Left and/or the Down Mix-Right mixer outputs. Unused output channels can be mapped to a “Silence” source. Each output also provides gain adjustment and selectable polarity inversion.

(9035-DEC only) In addition to the audio sources described above, the up to 10 decoded Dolby® channels are available as input sources.

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 9035.) The sample rate converters are disabled by default. Output AES is always precisely synchronized with the output video. The balanced analog audio input is sampled at 48 kHz with a +24 dBu clipping level (+24 dBu => 0 dBFS).

Note: As shown in Figure 1-1, the 9035 is equipped with eight discrete AES input pair ports and eight discrete AES output pair ports. On Rear I/O 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 9035 card.

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 audio embedded and AES discrete audio channels. Other sources and/or destinations for each channel are selected (from the choices listed above) using the card edge controls or a remote control system.

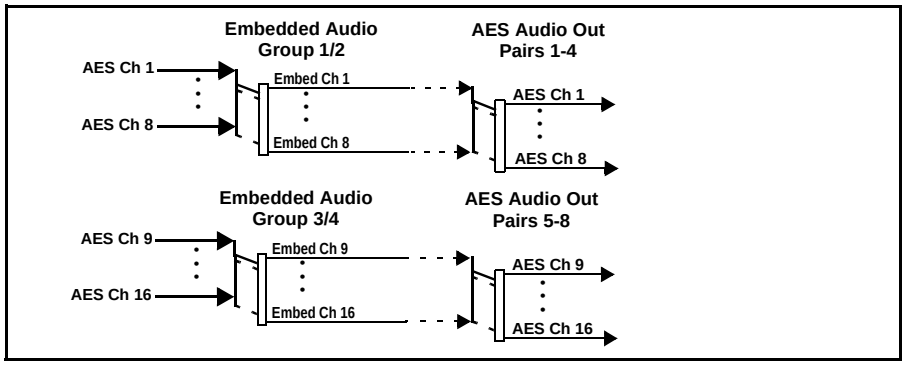

Figure 1-3 Default Embed/De-Embed Audio Routing

Audio Mixing Function

(See Figure 1-4.) The Audio Mixing function provides for the selection of any five AES embedded or discrete audio sources serving as Left (**L**), Right (**R**), Center (**C**), Left Rear (**LR**), and Right Rear (**RR**) individual signals to be multiplexed into a stereo pair (Down Mix Left (**DM-L**) and Down Mix Right (**DM-R**)). 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.

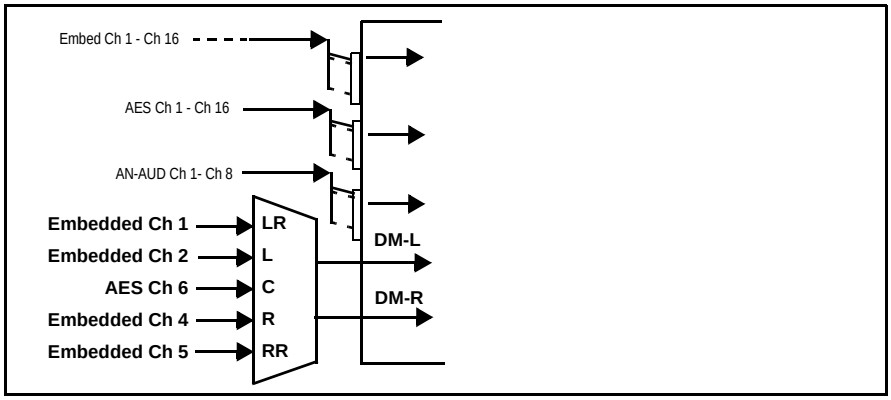

Figure 1-4 Audio Mixing Functional Block Diagram with Example Sources

2.0-to-5.1 Upmix Function Option

Note: Upmix function is an optional licensable feature. This function and its controls appear only when a license key is entered and activated. (This option (identified in Cobalt® price lists as **+UM**) can be purchased upon initial order, or field-activated using a key string which is sent to you when this option is purchased.)

The 2.0-to-5.1 upmixer function receives a normal PCM stereo pair from the Audio Routing/Gain Control function and upmixes the pair to provide 5.1 channels (Left (**L**), Right (**R**), Center (**C**), Low Frequency Effects (**LFE**), Left Surround (**Ls**), and Right Surround (**Rs**)). Whenever the upmixer is active, it overwrites the six selected channels with the new 5.1 upmix signals (including replacing the original source stereo **L** and **R** inputs with new **L** and **R** signals).

The 2.0-to-5.1 upmixer can be set to up mix in any of three modes: Always upmix, Bypass upmix, or Auto enable/bypass upmixing. The Auto upmixing mode looks at the signal levels on the selected channels and compares them to a selectable level threshold. It then determines whether or not to generate 5.1 upmixing from the stereo pair as follows:

- If the upmixer detects signal level **below** a selected threshold on **all four** of the selected channels designated as **C**, **LFE**, **Ls**, and **Rs**, this indicates to the upmixer that these channels are not carrying 5.1. In this case, the upmixer overwrites all six selected channels with the new 5.1 content.
- If the upmixer detects signal level **above** a selected threshold on **any** of the four selected channels designated as **C**, **LFE**, **Ls**, and **Rs**, this indicates to the upmixer that the channel(s) are already carrying viable 5.1 content. In this case, the upmixer is bypassed, allowing the original channels to pass unaffected.

The examples in Figure 1-5 show the automatic enable/disable up-mixing function applied to example selected channels **Emb Ch 1** thru **Emb Ch 6**. As shown and described, the processing is contingent upon the signal levels of the channels selected to carry the new 5.1 upmix relative to the selected threshold (in this example, -60 dBFS). Note also that this function is applied **after** the Audio Routing/Gain Control function. Because all audio inputs pass through the Audio Routing/Gain Control function before the up mixer, the up mixer can use embedded, AES discrete, and/or analog audio sources.

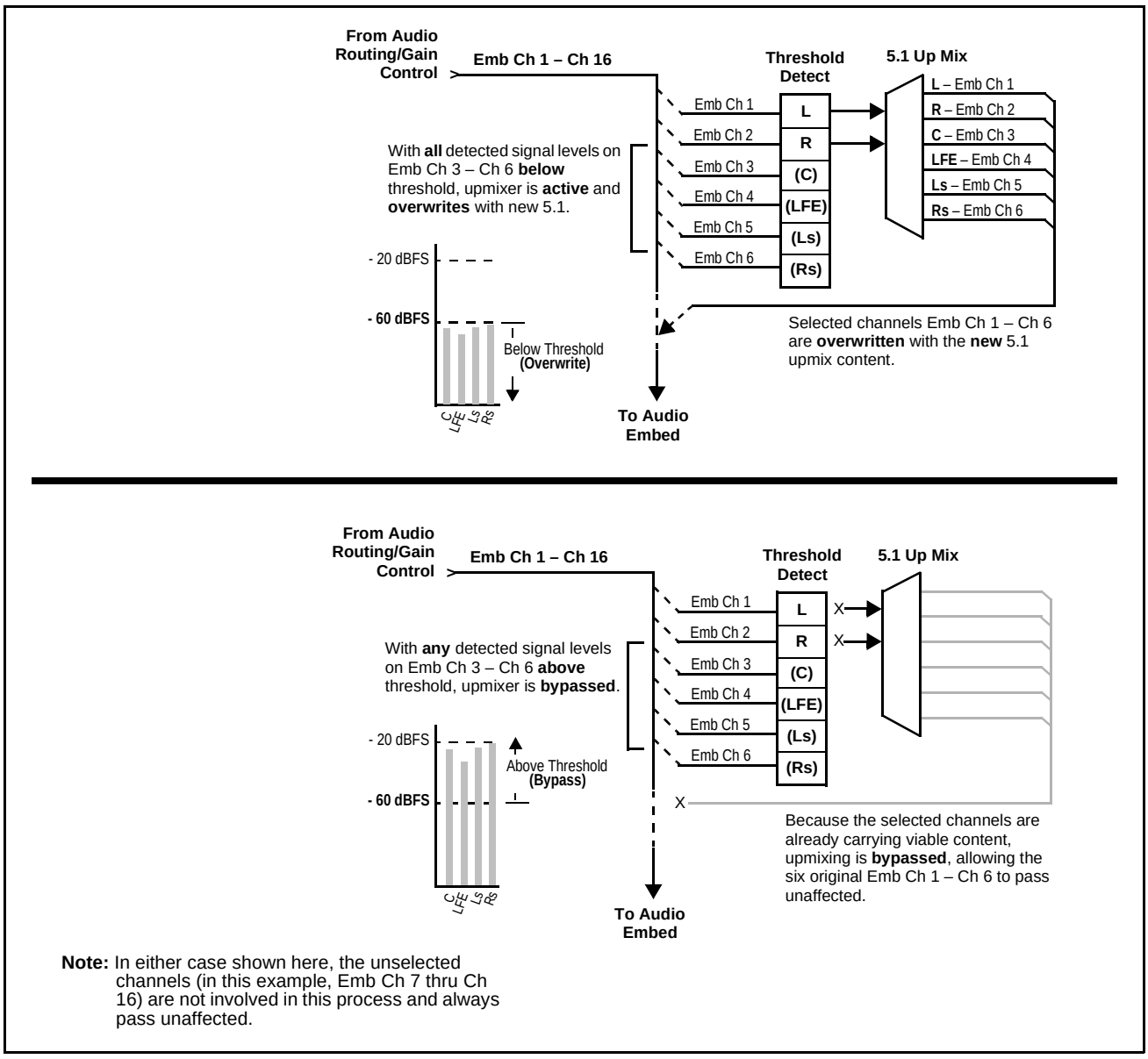

Figure 1-5 Up Mix Auto Enable/Bypass with Example Sources

Loudness Processor (Option +LP) Option

Note: Loudness processor function is an optional licensable feature. This function and its controls appear only when a license key is entered and activated. (This option (identified in Cobalt® price lists as **+LP**) can be purchased upon initial order, or field-activated using a key string which is sent to you when this option is purchased.)

If your card was purchased with option **+LP**, loudness processor manual supplement "5.1 and Stereo Loudness Processing Options for Compass® Cards (+LP51, +LP20) Manual Supplement" (OPT-SW-LP-MS) is included in your documentation package. Supplement OPT-SW-LP-MS can be downloaded from our website or requested using the Cobalt contact information in this manual.

Tone Generator Function

The 9035 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 9035 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 external analog sources can be embedded into the SDI output (in this example, a provision for local station ID voice-over analog).

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

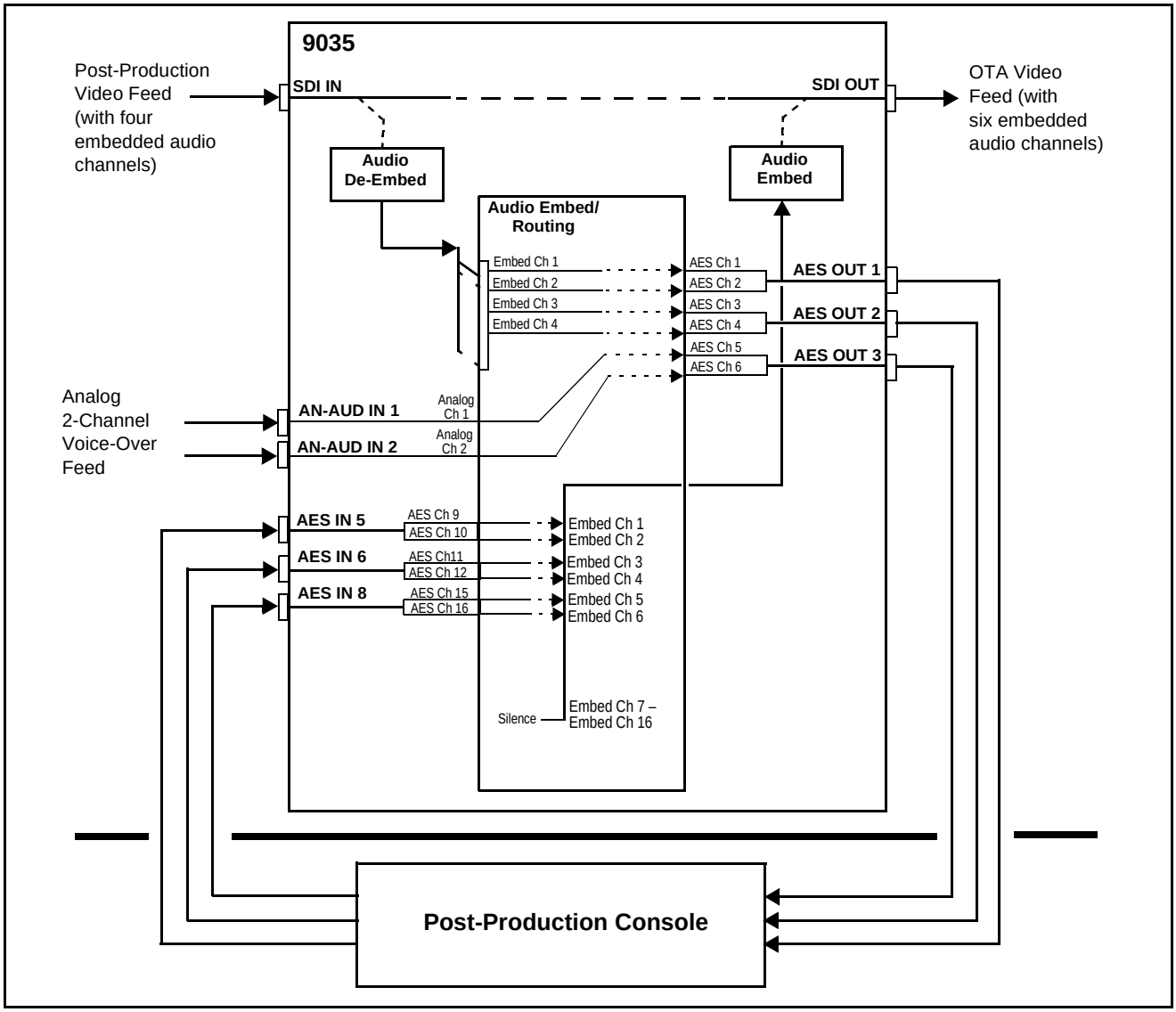

Figure 1-6 Audio Routing Example

AES Audio Input Advanced Features

AES Sample Rate Converter

The 9035 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 undecoded, non-PCM 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-DEClay Audio Embedding

In cases where additional delay must be avoided, it may be desirable to embed AES with minimum latency. Using zero-DEClay embedding, the video can then be delayed by one frame to account for any remaining audio delay. In this manner, any delay between video and audio can be cleanly contained and managed within one frame period.

When zero-DEClay 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-DEClay audio embedding is set to Off by default.

Low-Latency AES Passthrough

This function is similar to zero-DEClay 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 (9035-DEC only) Option

Note: Although the 9035-DEC Dolby® decoder can provide Dolby® Digital™ (AC-3) decoding, discussion and examples here describe only Dolby® E decoding.

When Dolby® E or Dolby® Digital™ is present on a discrete AES pair or 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

(See Figure 1-7.) All AES pairs and embedded channels are checked by the 9035-DEC for valid Dolby® status. When a valid Dolby® encoded embedded or discrete AES pair is detected, the channel pair carrying the Dolby® format is displayed as “Locked Dolby E” or “Locked Dolby Digital”, as applicable. (The decoder always uses the metadata associated with its respective AES 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 9035-DEC can embed metadata on the SDI output, sourced from either SDI input video or from the decoder as desired. Similarly, the 9035-DEC **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

(See Figure 1-7.) 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**). Each channel can be routed just as any other audio channel described in this section.

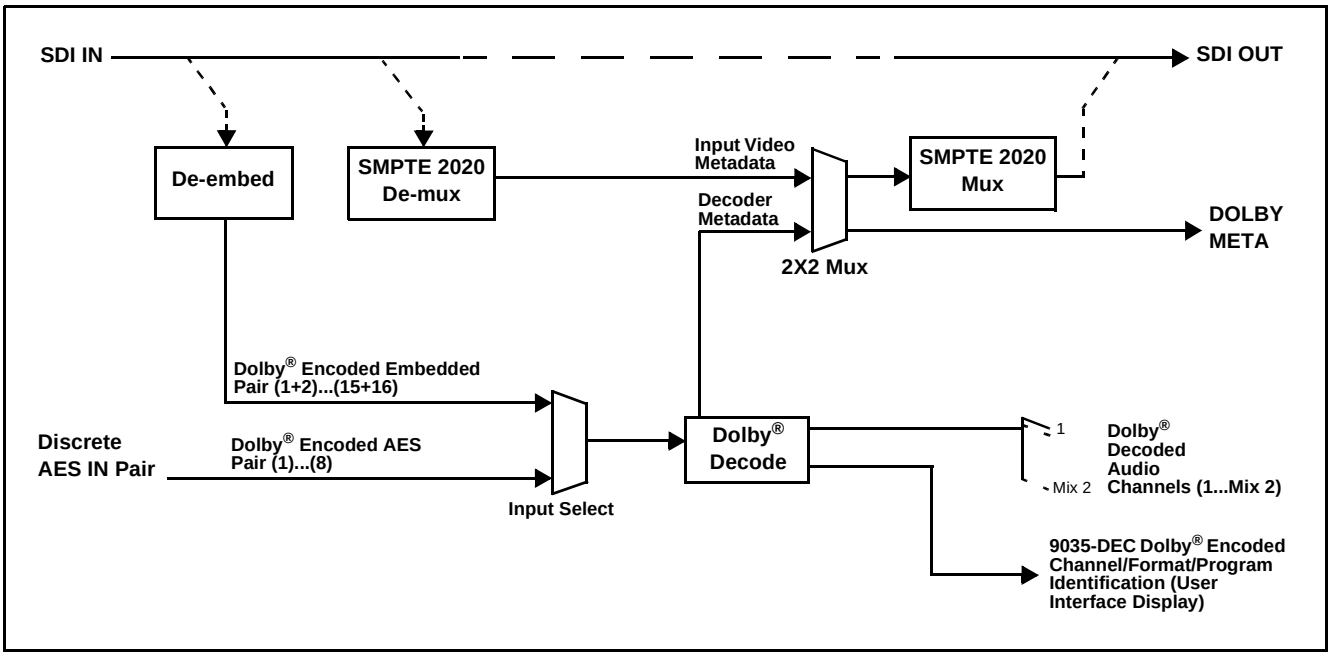

Figure 1-7 Dolby® Decoding and Metadata Output Processing

User Control Interface

Figure 1-8 shows the user control interface options for the 9035. These options are individually described below.

Note: 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.

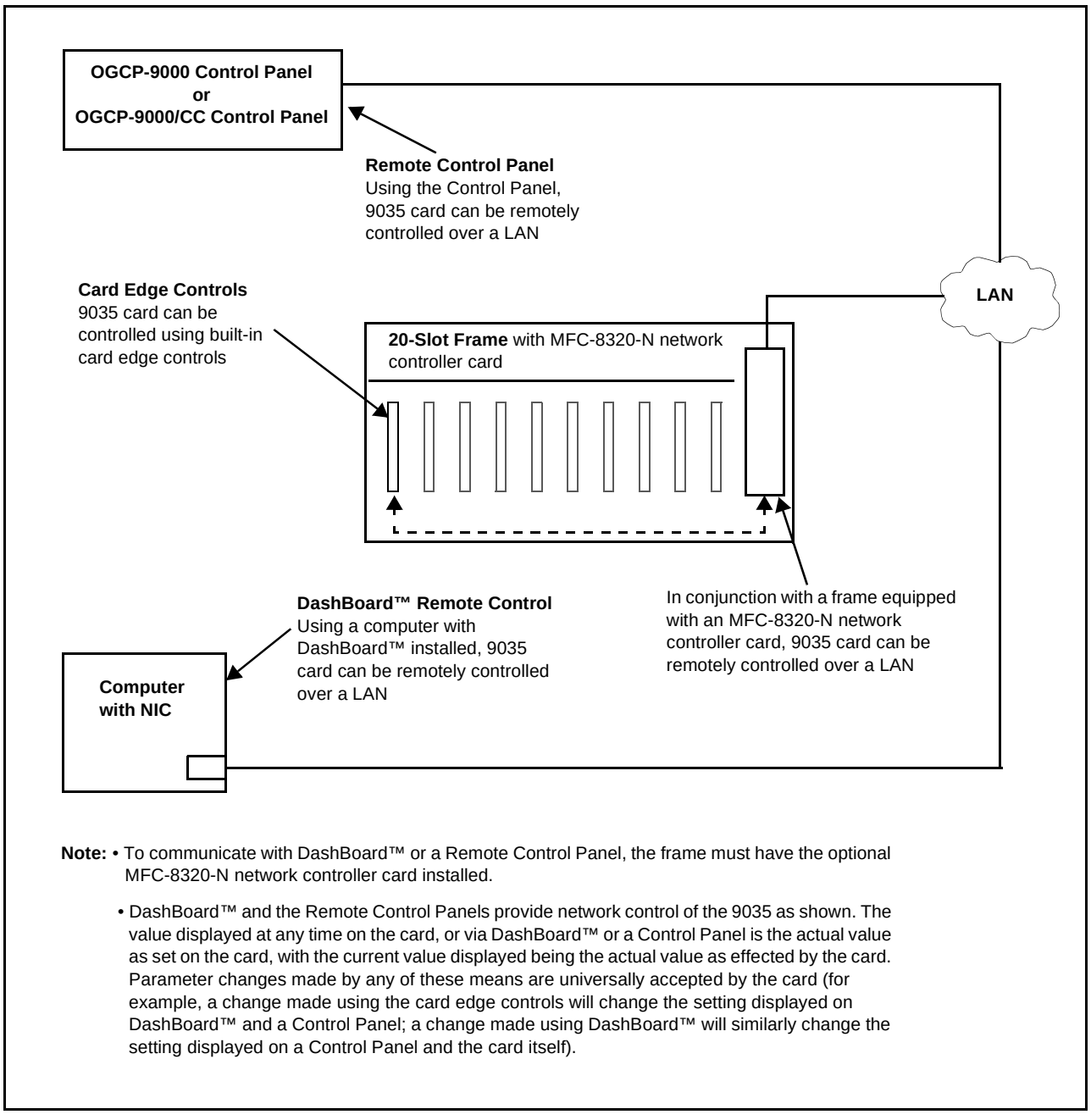

Figure 1-8 9035 User Control Interface

- **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 Chapter 3,“Operating Instructions”.

Note: Some of the 9035 functions described in this manual are available only when using the DashBoard™, or Cobalt® OGCP-9000 or OGCP-9000/CC Remote Control Panel user interfaces.

- **DashBoard™ User Interface** – Using DashBoard™, the 9061 and other cards installed in openGear®[1] frames such as the Cobalt® HPF-9000 or 8321 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 Cobalt Digital Inc. website: www.cobaltdigital.com (enter “DashBoard” in the search window). The DashBoard™ user interface is described in Chapter 3,“Operating Instructions”.

Note: If network remote control is to be used for the frame and the frame has not yet been set up for remote control, Cobalt® reference guide **Remote Control User Guide (PN 9000RCS-RM)** provides thorough information and step-by-step instructions for setting up network remote control of COMPASS® cards using DashBoard™. (Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panel product manuals have complete instructions for setting up remote control using a Remote Control Panel.)

Download a copy of this guide by clicking on the **Support>Documents> Reference Guides** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-28).

- **Cobalt® OGCP-9000, OGCP-9000/CC and WinOGCP Remote Control Panels** – The OGCP-9000, OGCP-9000/CC, and WinOGCP Remote Control Panels conveniently and intuitively provide parameter monitor and control of the cards within the 20-slot frame.

  The remote control panels allow quick and intuitive access to hundreds of cards in a facility, and can monitor and allow adjustment of multiple parameters at one time.

  The remote control panels are totally compatible with the openGear® control software DashBoard™; any changes made with either system are reflected on the other.

1. openGear® is a registered trademark of Ross Video Limited. DashBoard™ is a trademark of Ross Video Limited.

9035 Rear I/O Modules

The 9035 physically interfaces to system video and audio connections using a Rear I/O Module. Figure 1-9 shows a typical 9035 Rear I/O Module.

All inputs and outputs shown in the 9035 Functional Block Diagram (Figure 1-1) enter and exit the card via the card edge backplane connector. The Rear I/O Module breaks out the 9035 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 I/O Module that best suits the requirements. The required input and outputs are broken out to the industry standard connectors on the Rear I/O Module; the unused inputs and outputs remain unterminated and not available for use.

The full assortment of 9035 Rear I/O Modules is shown and described in 9035 Rear I/O Modules (p. 2-5) in Chapter 2, “Installation and Setup”.

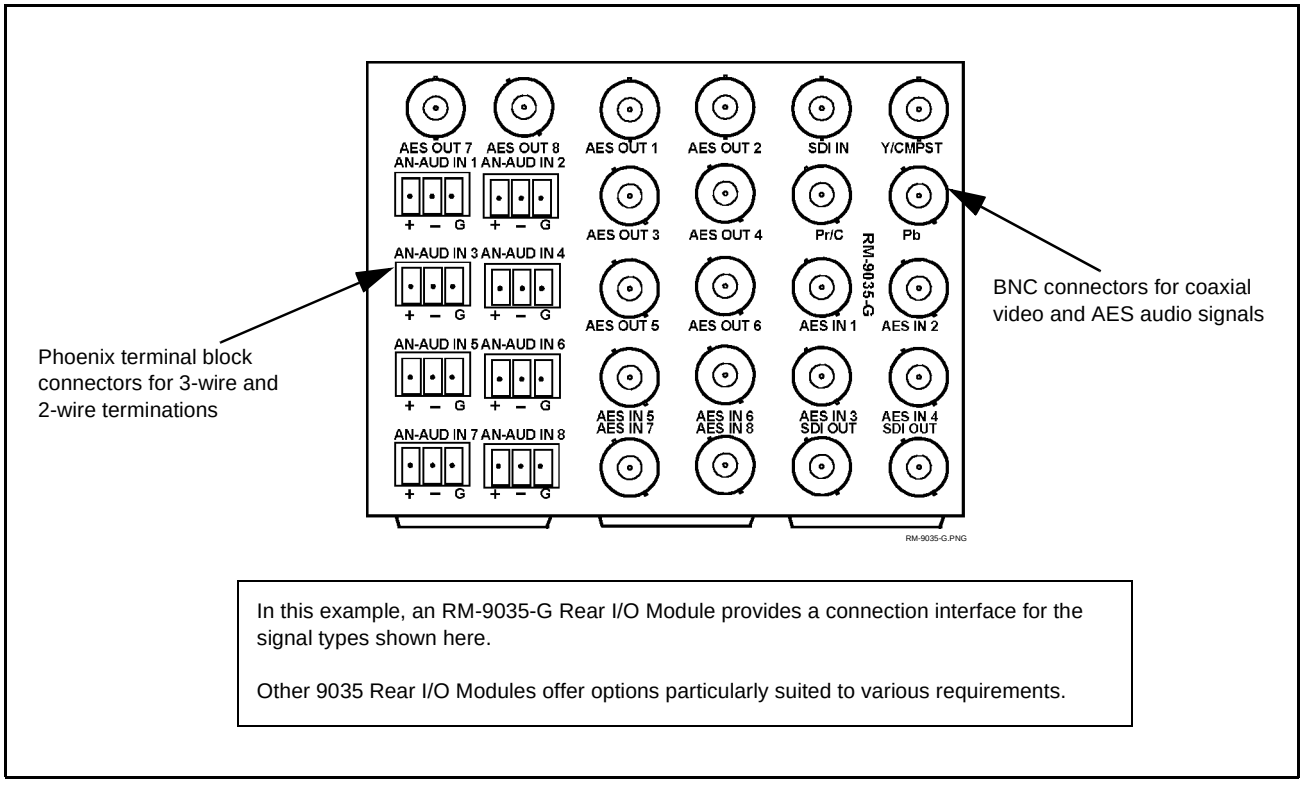

Figure 1-9 Typical 9035 Rear I/O Module

Figure 1-10 shows a 9035 card using an RM-9035-B Rear I/O Module. Using this Rear I/O Module, this module provides industry standard break-out connections for the following inputs and outputs required by this application:

- **Inputs:**
  - **HD/SD SDI IN** – dual-rate HD/SD-SDI input
  - **Y/Cmpst IN**, **Pr/C IN**, **Pb IN** – component video inputs
  - **AN-AUD IN (1-4)** – balanced analog audio inputs (inputs 5-8 unused)
- **Outputs:**
  - **SDI OUT** – HD/SD-SDI buffered video outputs

The other 9035 inputs and outputs not accommodated by this Rear I/O Module (shown in gray in Figure 1-10) remain unterminated.

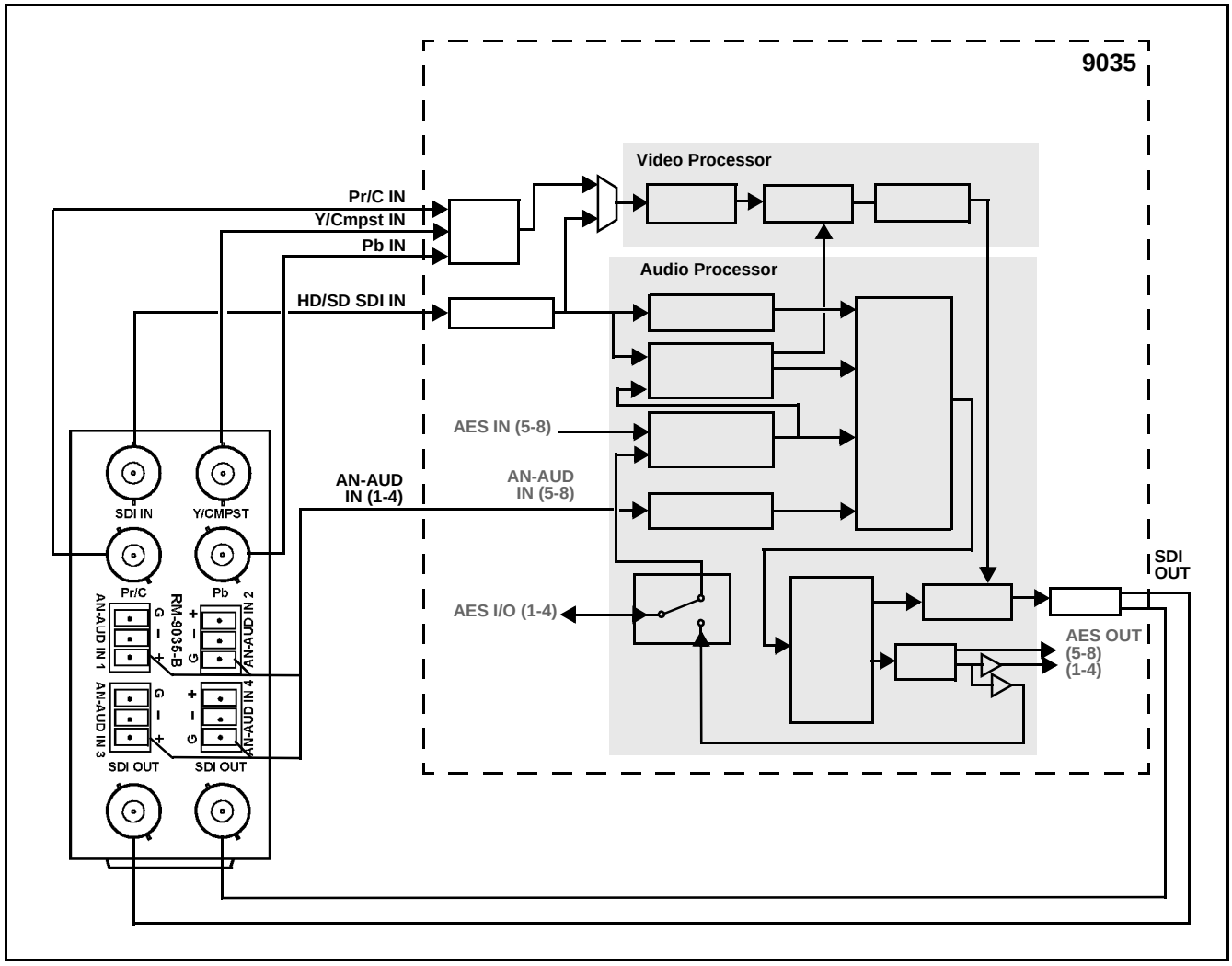

Figure 1-10 9035 with RM-9035-B Rear I/O Module

Audio and Video Formats Supported by the 9035

The 9035 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 9035.

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 (2); 24 (2); 25; 29.97; 30; 50; 59.94; 60
	486i (1)	29.97
	575i (1)	25
Embedded Audio	The 9035 supports all four groups (16 channels) of embedded audio at full 24-bit resolution in both SD (with extended data packets) and HD.	
Analog Audio	The 9035 supports 8 channels of balanced (differential) analog audio. The analog audio is encoded such that a +24 dBu input is equivalent to digital 0 dBFS.	
Discrete AES Audio Input	The 9035 can accept 16 channels (8 pairs) of discrete AES audio on 75Ω 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 48 kHz. The 9035 does not support AES input at 32 kHz, 44.1 kHz, 96 kHz or 192 kHz rates.	
Discrete AES Audio Output	The 9035 can provide 16 channels (8 pairs) of discrete AES audio on 75Ω BNC connections.	
(9035-DEC only) Dolby® E/ Dolby Digital™ Audio Input Decode	The 9035-DEC provides up to 10 decoded AES channels when valid Dolby® E or Dolby® Digital™ audio is received on either discrete AES or embedded audio inputs with corresponding metadata.	

(1) All rates displayed as frame rates; interlaced (“i”) field rates are two times the rate value shown.

(2) Not supported as analog video input formats.

Technical Specifications

Table 1-2 lists the technical specifications for the 9035 HD/SD Frame Sync with Audio Embedding/De-Embedding and Dolby® Decoding Option card.

Table 1-2 Technical Specifications

Item	Characteristic
Part number, nomenclature	• 9035 HD/SD-SDI – Analog In Frame Sync with Audio Embedding/De-Embedding • 9035-DEC HD/SD-SDI – Analog In Frame Sync with Audio Embedding/De-Embedding and Dolby® Decoding Option
Installation/usage environment	Intended for installation and usage in frame meeting openGear modular system definition.
Power consumption	< 15 Watts maximum
Environmental: Operating temperature: Relative humidity (operating or storage):	 32° – 104° F (0° – 40° C) < 95%, non-condensing
Frame communication	10/100 Mbps Ethernet with Auto-MDIX.
Indicators	Card edge display and indicators as follows: • 4-character alphanumeric display • Status/Error LED indicator • Input Format LED indicator
Controls	Card edge switches as follows: • Menu Enter pushbutton switch • Menu exit pushbutton switch • Up/down selection toggle switch
Internal Tone Generators	Four built-in tone generators, each configurable for 18 discrete sine wave frequencies ranging from 50 Hz to 16 kHz. Generator source signal level is equivalent to -20 dBu.
A/D Process	HD: 4:4:4 SD: 8:8:8
Resolution:	12-bit A/D and 10-bit video data path
SD Comb Filter:	5-line adaptive
Serial Digital Video Input	Data Rates Supported: SMPTE 292 HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps SMPTE 259M-C SD-SDI: 270 Mbps Impedance: 75 Ω terminating Equalization (HD): 328 ft (100 m) Belden 1694A

Table 1-2 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Input (cont.)	Equalization (SD): 1000 ft (305 m) Belden 1694A Return Loss: > 18dB at 5 MHz – 1.485 GHz
Analog Video Input	Input Complement: Separate component Y/composite, Pr/C, and Pb inputs Input Type: Differential; Common Mode Rejection = 5 VAC Video Input Types: HD: Component YPbPr and RGB SMPTE SD: Composite, Component YPbPr (BetaCam™, MII™, SMPTE/N10), RGB, and Y/C Conversion Bit Depth: 12 bits SD Color Separation: 5-Line Adaptive Comb or Notch Filter Frequency Response (HD): Y: 0 – 25 MHz ± 0.3 dB Pb/B: 0 – 13.5 MHz ± 0.3 dB Pr/R: 0 – 13.5 MHz ± 0.3 dB Frequency Response (SD): 0 – 5.2 MHz ± 0.25dB Differential Phase (SD): < ± 0.4° typical Differential Gain (SD): < ± 0.4% typical Analog Front-End Crosstalk: Within noise floor measurement Return Loss: > 20 dB to 30 MHz
Serial Digital Video Outputs	Number of Outputs: Two HD/SD-SDI BNC per IEC 60169-8 Amendment 2 Impedance: 75 Ω

Table 1-2 Technical Specifications — continued

Item	Characteristic
Serial Digital Video Outputs (cont.)	Return Loss: > 15 dB at 5 MHz – 270 MHz > 12 dB at 270 MHz – 1.485 GHz Signal Level: 800 mV ± 10% DC Offset: 0 V ± 50 mV Jitter (HD): < 0.15 UI (all outputs) Jitter (SD): < 0.06 UI (all outputs) Overshoot: < 0.2% of amplitude
AES Audio Input	Standard: SMPTE 276M Number of Inputs (maximum): 8 unbalanced Input Level: 0.1 to 2.5 Vp-p (5 Vp-p tolerant) Input Impedance: 75 Ω Return Loss: > 12 dB 100 kHz to 6 MHz Resolution: 24-bit only Sample Rate: 48 kHz SRC: 32-channel; 142 dB S/N
AES Audio Output	Standard: SMPTE 276M Number of Outputs (maximum): 8 unbalanced

Table 1-2 Technical Specifications — continued

Item	Characteristic
AES Audio Output (cont.)	Output Impedance: 75 Ω Return Loss: > 30 dB 100 kHz to 6 MHz Sample Rate: 48 kHz
Audio/RS-485 LTC Support (+LTC option only)	Balanced analog audio or AES/embedded PCM equivalent conforming to SMPTE 12M-1; § 9.6; RS-485 LTC
Dolby® RS485 Metadata Output (+DEC option only)	Metadata extracted from input video (per SMPTE 2020-1-2008) or Dolby decoder on RS-485 interface; 3-wire balanced via Phoenix terminal block connector.
Analog Audio Input	Number of Inputs (maximum): Eight, 3-wire balanced analog audio using Phoenix connectors with removable screw terminal blocks (Phoenix PN 1803581; Cobalt PN 5000-0013-000R) Sampling Rate: 48 kHz (locked to video input) Signal Level: +24 dBu => 0 dBFS A/D Frequency Response: 20 – 20 kHz ± 0.25 dB

Table 1-2 Technical Specifications — continued

Item	Characteristic
Reference Video Input	Number of Inputs: Two non-terminating (looping) Frame Reference inputs Standards Supported (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 Standards Supported (SD): 486i 29.97 (NTSC) 575i 25 (PAL) Signal Level: 1 Vp-p nominal Signal Type: Analog video sync (black burst or tri-level) Impedance: 75 Ω Return Loss: > 30 dB to 30 MHz Allowable Maximum DC on Ref Input: ±1.0 V

Warranty and Service Information

Cobalt Digital Inc. Limited Warranty

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from the date of shipment to the original purchaser, except that 4000, 5000, 6000, 8000 series power supplies, and Dolby® modules (where applicable) are warranted to be free from defects in material and workmanship for a period of one (1) year.

Cobalt Digital Inc.'s (“Cobalt”) sole obligation under this warranty shall be limited to, at its option, (i) the repair or (ii) replacement of the product, and the determination of whether a defect is covered under this limited warranty shall be made at the sole discretion of Cobalt.

This limited warranty applies only to the original end-purchaser of the product, and is not assignable or transferrable therefrom. This warranty is limited to defects in material and workmanship, and shall not apply to acts of God, accidents, or negligence on behalf of the purchaser, and shall be voided upon the misuse, abuse, alteration, or modification of the product. Only Cobalt authorized factory representatives are authorized to make repairs to the product, and any unauthorized attempt to repair this product shall immediately void the warranty. Please contact Cobalt Technical Support for more information.

To facilitate the resolution of warranty related issues, Cobalt recommends registering the product by completing and returning a product registration form. In the event of a warrantable defect, the purchaser shall notify Cobalt with a description of the problem, and Cobalt shall provide the purchaser with a Return Material Authorization (“RMA”). For return, defective products should be double boxed, and sufficiently protected, in the original packaging, or equivalent, and shipped to the Cobalt Factory Service Center, postage prepaid and insured for the purchase price. The purchaser should include the RMA number, description of the problem encountered, date purchased, name of dealer purchased from, and serial number with the shipment.

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- Product information and pricing
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Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

- Setting I/O Switches for AES I/O (1-4) Ports (p. 2-1)
- Installing the 9035 Into a Frame Slot (p. 2-2)
- Installing a Rear I/O Module (p. 2-4)
- Setting Up 9035 Network Remote Control (p. 2-11)

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

Note: This procedure is applicable only if any of the four AES I/O (1-4) ports on the 9035 are to be used as **outputs** (the switches are set to input mode by factory default). The 9035 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.

Note: 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 I/O Module having dedicated **AES OUT (1-8)** BNC connectors.

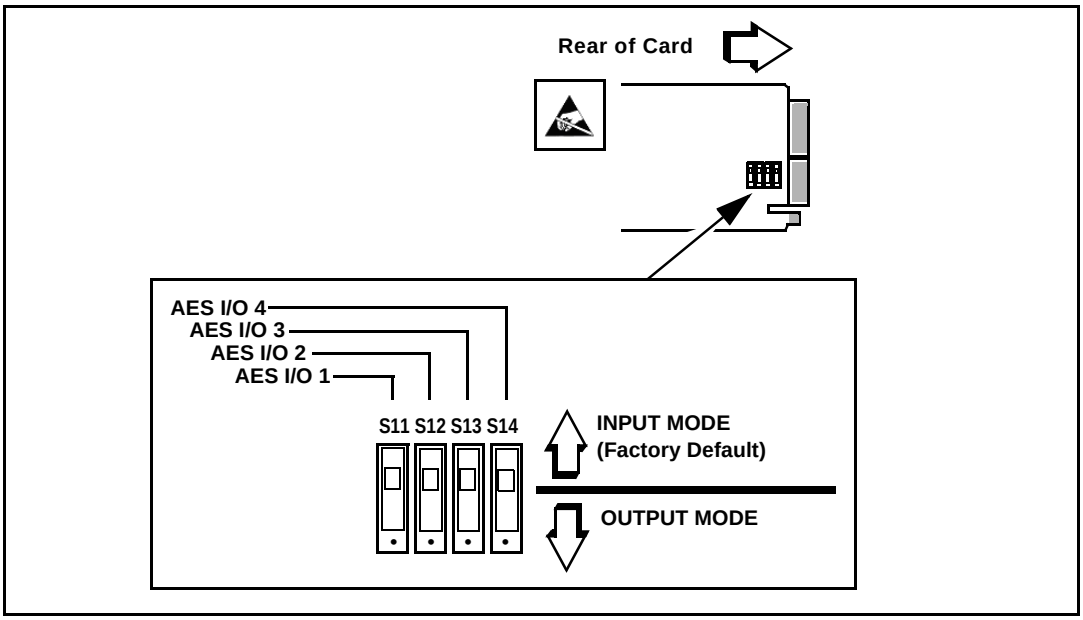


Figure 2-1 9035 AES I/O (1-4) Mode Switches

Installing the 9035 Into a Frame Slot

CAUTION

Heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using only convection cooling. The 9035 has a moderate power dissipation (15 W max.). As such, avoiding placing the card adjacent to other cards with similar dissipation values if possible.

CAUTION

	This device 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. **Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always use proper ESD handling precautions and equipment when working on circuit boards and related equipment.**

Note:
- If installing the 9035 in a slot already equipped with a suitable I/O module, proceed to card installation steps below.
- **If installing the 9035 in a slot with no rear I/O module, a Rear I/O Module is required** before cabling can be connected. Refer to Installing a Rear I/O Module (p. 2-4) for rear I/O module installation procedure.

CAUTION

If required, make certain Rear I/O Module(s) are installed before installing the 9035 into the frame slot. Damage to card and/or Rear I/O Module can occur if module installation is attempted with card already installed in slot.

Note: Check the packaging in which the 9035 was shipped for any extra items such as a Rear I/O Module connection label. In some cases, this label is shipped with the card and to be installed on the Rear I/O connector bank corresponding to the slot location of the card.

Install the 9035 into a frame slot as follows:

1. Determine the slot in which the 9035 is to be installed.
2. Open the frame front access panel.
3. While holding the card by the card edges, align the card such that the plastic ejector tab is on the bottom.
4. Align the card with the top and bottom guides of the slot in which the card is being installed.
5. 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 I/O module mating connector.

CAUTION

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

6. Verify that the card is fully engaged in rear I/O module mating connector.
7. Close the frame front access panel.
8. Connect the input and output cables as follows:
   - If the 9035 is being installed in a PN 8310-BNC or 8310-C-BNC frame, refer to the label on the connector bank corresponding to the card's slot location for connector designations.
   - If the 9035 is being installed in a frame using a 9035 Rear I/O Module (PN RM20-9035-A thru RM20-9035-G), connect cabling in accordance with the appropriate diagram shown in Table 2-1, "9035 Rear I/O Modules" (p. 2-6).
9. Repeat steps 1 through 8 for other 9035 cards.

Note: External frame sync reference signals are received by the card over a reference bus on the card frame, and not on any card rear I/O module connectors. The frame has BNC connectors labeled **REF 1** and **REF 2** which receive the reference signal from an external source such as a house distribution.

Note: The 9035 BNC inputs are internally 75-ohm terminated. It is not necessary to terminate unused BNC inputs or outputs.

Note: To remove a card, press down on the ejector tab to unseat the card from the rear I/O module mating connector. Evenly draw the card from its slot.

10. If network remote control is to be used for the frame and the frame has not yet been set up for remote control, perform setup in accordance with Setting Up 9035 Network Remote Control (p. 2-11).

Note: 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.

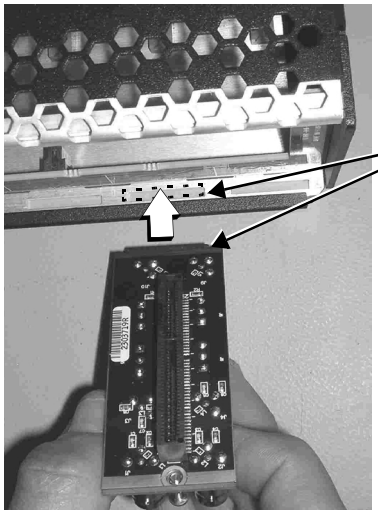
Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9035 is to be installed.

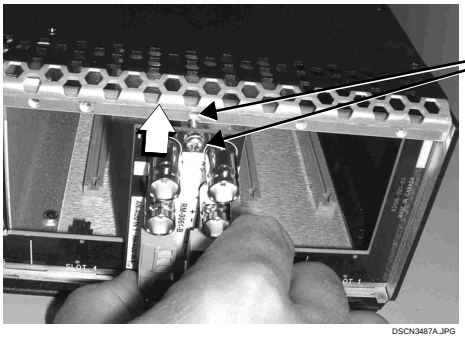
If installing the 9035 in a slot already equipped with a suitable I/O module, omit this procedure.

The full assortment of 9035 Rear I/O Modules is shown and described in 9035 Rear I/O Modules (p. 2-5). Install a Rear I/O Module as follows:

1. On the frame, determine the slot in which the 9035 is to be installed.
2. In the mounting area corresponding to the slot location, install Rear I/O Module as shown in Figure 2-2.



1 Align and engage mounting tab on Rear I/O Module with the module seating slot on rear of frame chassis.



2 Hold top of Rear I/O Module flush against frame chassis and start the captive screw. Lightly tighten captive screw.

Note: Rear I/O Modules RM20-9035-C, -D, -E, and -F occupy two rear module slot mounting locations and use two captive screws.
Rear I/O Module RM20-9035-G occupies three rear module slot mounting locations and uses three captive screws.

Figure 2-2 Rear I/O Module Installation

9035 Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9035.

Note: Rear I/O Modules equipped with 3-wire Phoenix connectors are supplied with removable screw terminal block adapters. For clarity, the adapters are omitted in the drawings below.

Table 2-1 9035 Rear I/O Modules

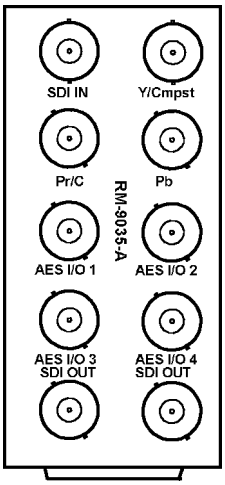
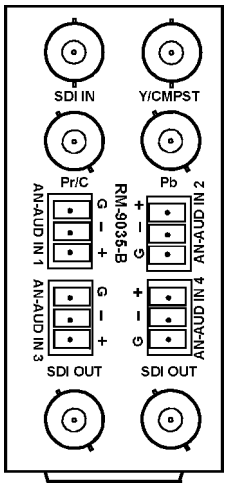
9035 Rear I/O Module	Description
RM20-9035-A 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable) • Two buffered SDI coaxial outputs (**SDI OUT**)
RM20-9035-B 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 4**) • Two buffered SDI coaxial outputs (**SDI OUT**)

Table 2-1 9035 Rear I/O Modules — continued

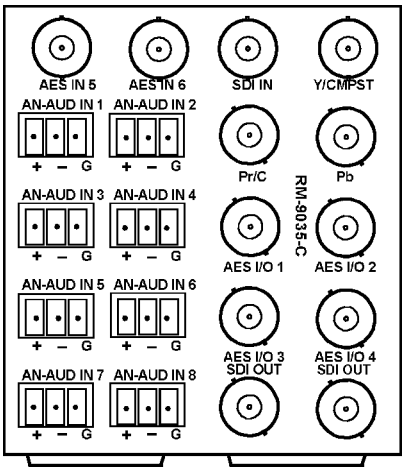
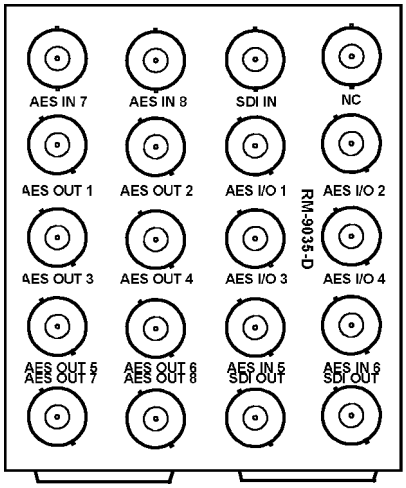
9035 Rear I/O Module	Description
RM20-9035-C 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable) • Two dedicated AES coaxial audio inputs (**AES IN 5** and **AES IN 6**) • Eight analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 8**) • Two buffered SDI coaxial outputs (**SDI OUT**)
RM20-9035-D 	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) • Four dedicated AES coaxial audio inputs (**AES IN 5** thru **AES IN 8**) • Eight dedicated AES coaxial audio outputs (**AES OUT 1** thru **AES OUT 8**) • Two buffered SDI coaxial outputs (**SDI OUT**) **Note: AES OUT 1** thru **AES OUT 4** on RM20-9035-D Rear I/O Module always function as outputs regardless of whether **AES I/O 1** thru **AES I/O 4** are used as inputs or outputs.

Table 2-1 9035 Rear I/O Modules — continued

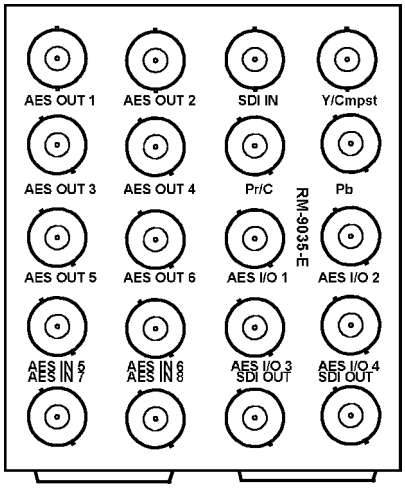
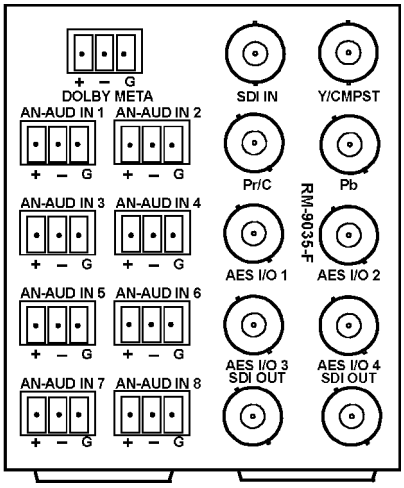
9035 Rear I/O Module	Description
RM20-9035-E 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable) • Four dedicated AES coaxial audio inputs (**AES IN 5** thru **AES IN 8**) • Six dedicated AES coaxial audio outputs (**AES OUT 1** thru **AES OUT 6**) • Two buffered SDI coaxial outputs (**SDI OUT**) **Note: AES OUT 1** thru **AES OUT 4** on RM20-9035-E Rear I/O Module always function as outputs regardless of whether **AES I/O 1** thru **AES I/O 4** are used as inputs or outputs.
RM20-9035-F 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • 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) • Eight analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 8**) • Dolby® RS-485 metadata output (**DOLBY META**) • Two buffered SDI coaxial outputs (**SDI OUT**)

Table 2-1 9035 Rear I/O Modules — continued

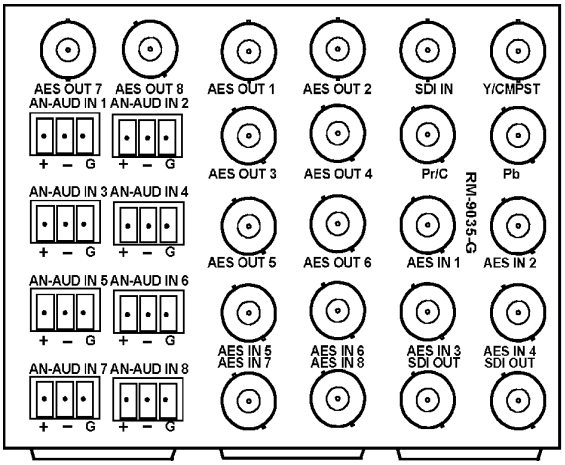
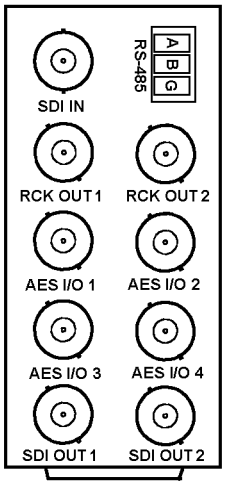
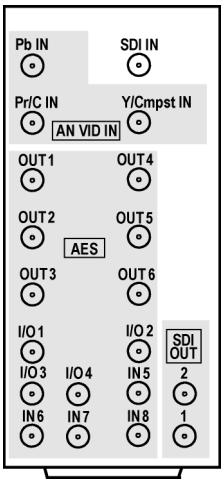
9035 Rear I/O Module	Description
RM20-9035-G 	Provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Eight dedicated AES coaxial audio inputs (**AES IN 1** thru **AES IN 8**) **Note:** For **AES IN 1** thru **AES IN 4** on RM20-9035-G Rear I/O Module to function as inputs, AES I/O switches S11 – S14 must be set to Input (factory default). See Setting I/O Switches for AES I/O (1-4) Ports (p. 2-1) for more information. • Eight analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD IN 8**) • Eight dedicated AES coaxial audio outputs (**AES OUT 1** thru **AES OUT 8**) • Two buffered SDI coaxial outputs (**SDI OUT**)
RM20-9035-H 	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) • RS-485 metadata/LTC I/O output (**DOLBY META**) • Two buffered SDI coaxial outputs (**SDI OUT 1** and **SDI OUT 2**)

Table 2-1 9035 Rear I/O Modules — continued

9035 Rear I/O Module	Description
RM20-9035-E-DIN-HDBNC 	High-density rear modules provides the following connections: • HD/SD-SDI coaxial input (**SDI IN**) • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four dedicated AES coaxial audio inputs (**AES IN 5** thru **AES IN 8**) • 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) • Six dedicated AES coaxial audio outputs (**AES OUT 1** thru **AES OUT 6**) • Two buffered SDI coaxial outputs (**SDI OUT**) **Note:** Available equipped with High-Density BNC (HDBNC) or DIN1.0/2.3 connectors as: RM20-9035-E-HDBNC or RM20-9035-E-DIN, respectively.

COBALT
RM20-9001-B/S-DIN

SAMPLE-NOT FOR USE

Due to the density of connector placement on Rear Modules using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.)

Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.

Setting Up 9035 Network Remote Control

Perform remote control setup in accordance with Cobalt® reference guide "COMPASS™ Remote Control User Guide" (PN 9000RCS-RM).

Note:

- If network remote control is to be used for the frame and the frame has not yet been set up for remote control, Cobalt® reference guide "COMPASS™ Remote Control User Guide" (PN 9000RCS-RM) provides thorough information and step-by-step instructions for setting up network remote control of COMPASS™ cards using DashBoard™. (Cobalt® OGCP-9000 and OGCP-9000/CC Remote Control Panel product manuals have complete instructions for setting up remote control using a Remote Control Panel.)

  Download a copy of this guide by clicking on the **DashBoard Control and Monitoring** link at www.cobaltdigital.com and then select DashBoard Remote Control Manual as a download, or contact Cobalt® as listed in Contact Cobalt Digital Inc. (p. 1-28).

- 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.

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Chapter 3

Operating Instructions

Overview

If you are already familiar with using DashBoard or a Cobalt Remote Control Panel to control Cobalt cards, please skip to 9035 Function Submenu List and Descriptions (p. 3-9).

This chapter contains the following information:

- Control and Display Descriptions (p. 3-1)
- Accessing the 9035 Card via Remote Control (p. 3-5)
- Checking 9035 Card Information (p. 3-7)
- Ancillary Data Line Number Locations and Ranges (p. 3-8)
- 9035 Function Submenu List and Descriptions (p. 3-9)
- Troubleshooting (p. 3-52)

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9035 card. The 9035 functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9035 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 9035 functions (and the controls, indicators, and displays related to a particular function) follows a general arrangement of Function Submenus under which related controls can be accessed (as described in Function Submenu/Parameter Submenu Overview below).

Note: DashBoard™ and the Remote Control Panel provide greatly simplified user interfaces as compared to using the card edge controls. For this reason, **it is strongly recommended** that DashBoard™ or a Remote Control Panel be used for all card applications other than the most basic cases. Card edge control codes are not included in this manual. If card-edge control is to be used, obtain a copy of "Manual Supplement – Card-Edge Control Reference Master List and Instructions for Using Compass® Card-edge (Local) Control Codes" (989CEC-MS.pdf) at **www.cobaltdigital.com>Support>Documents>Reference Guides**.

Note: When a setting is changed, settings displayed on DashBoard™ (or a Remote Control Panel) are the settings as effected by the 9035 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 9035 card are organized into function **submenus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9035 card and its submenus are organized, and also provides an overview of how navigation is performed between cards, function submenus, and parameters.

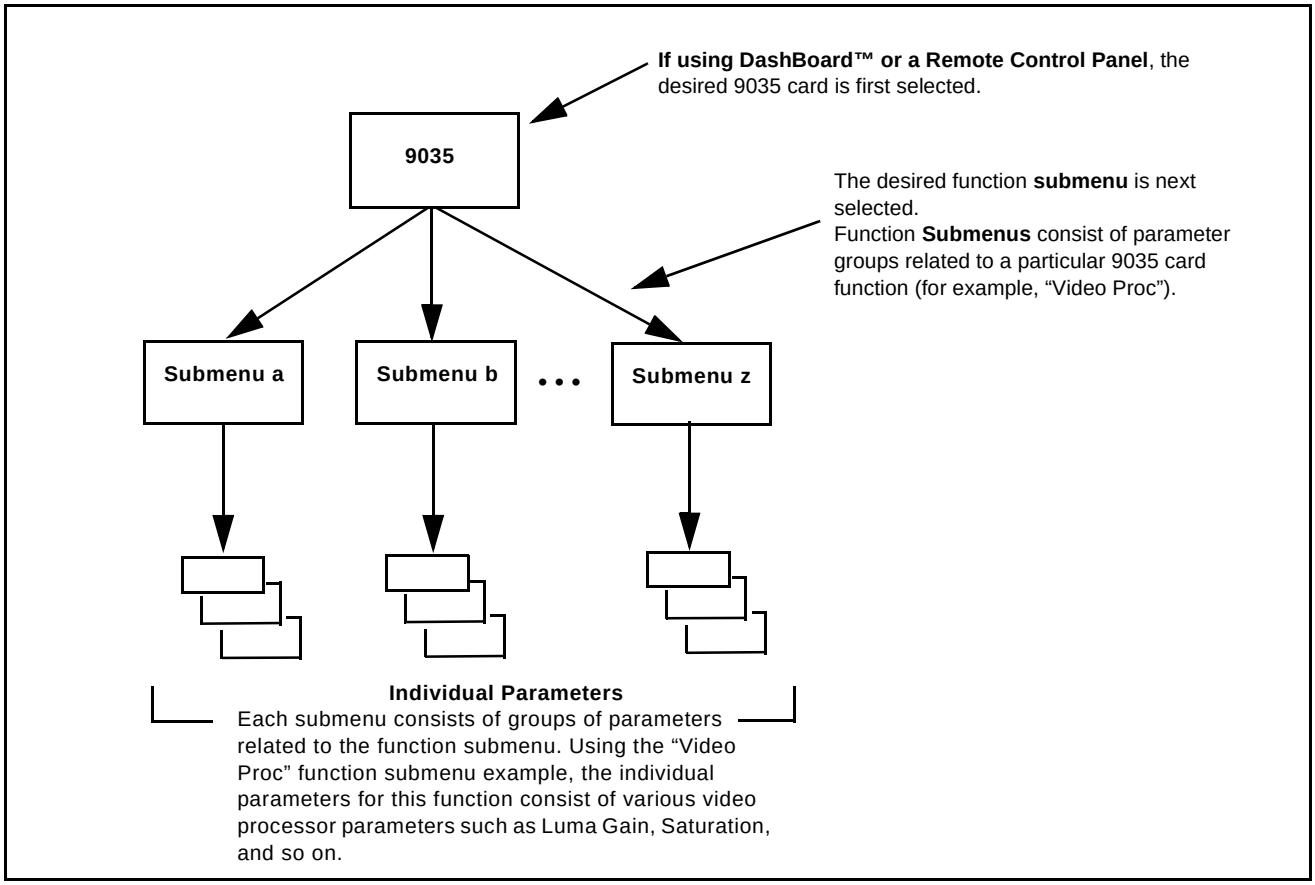


Figure 3-1 Function Submenu/Parameter Submenu Overview

DashBoard™ User Interface

(See Figure 3-2.) The 9035 function submenus are organized in DashBoard™ using tabs. 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 9035 card edge controls.)

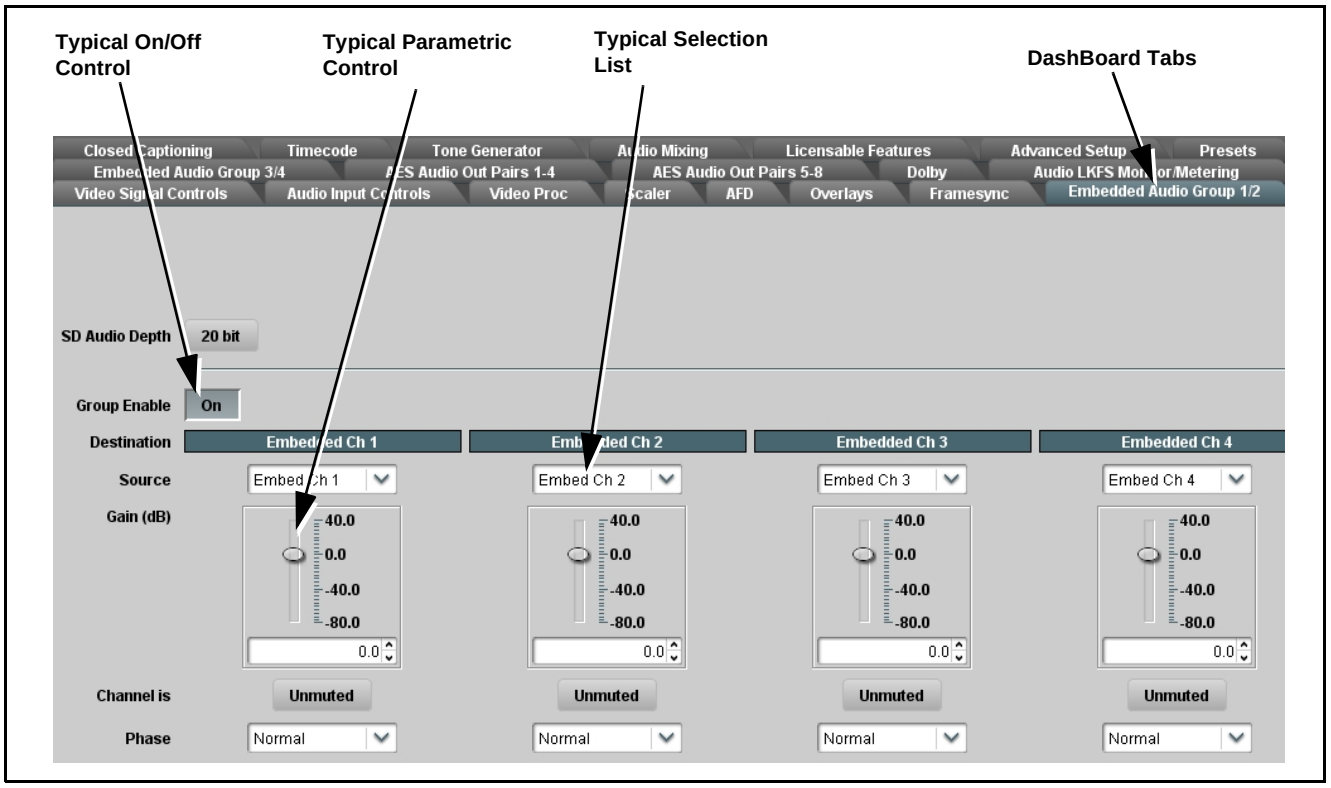


Figure 3-2 Typical DashBoard Tabs and Controls

Cobalt® Remote Control Panel User Interfaces

(See Figure 3-3.) Similar to the function submenu tabs using DashBoard™, the Remote Control Panels have a Select Submenu key that is used to display a list of function submenus. From this list, a control knob on the Control Panel is used to select a function from the list of displayed function submenu items.

When the desired function submenu 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 control knobs, which act like a potentiometer. Items in a list can then be selected using the control knobs which correspondingly act like a rotary switch. (In this manner, the setting effected using controls and selection lists displayed on the Control Panel are comparable to the submenu items accessed and committed using the 9035 card edge controls.)

Figure 3-3 shows accessing a function submenu and its parameters (in this example, “Video Proc”) using the Control Panel.

Note: Refer to “OGCP-9000 Remote Control Panel User Manual” (PN OGCP-9000-OM) or “OGCP-9000/CC Remote Control Panel User Manual” (PN OGCP-9000/CC-OM) for complete instructions on using the Control Panels.

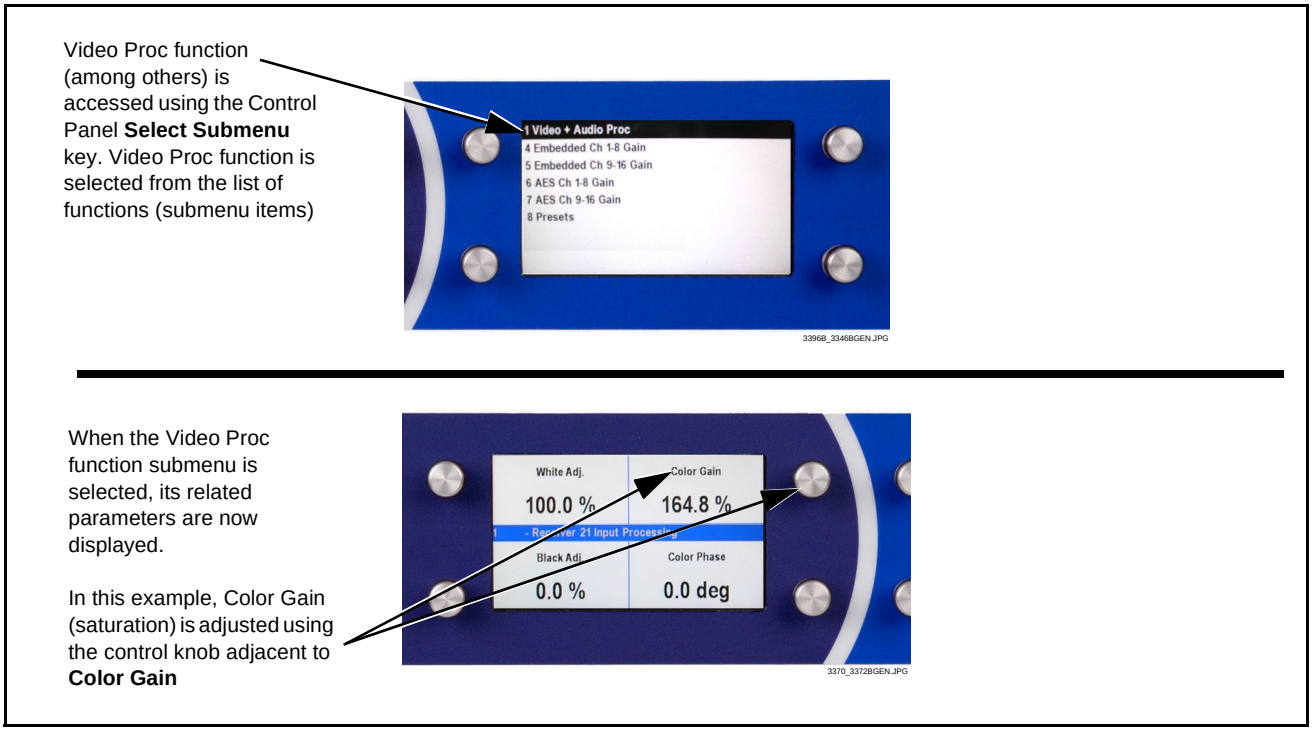


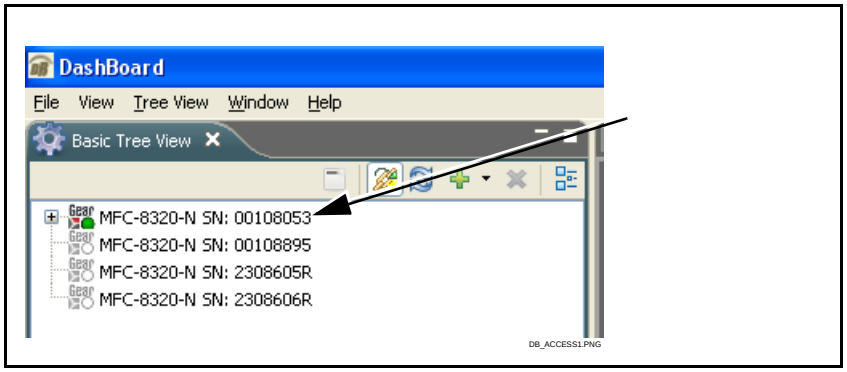
Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Accessing the 9035 Card via Remote Control

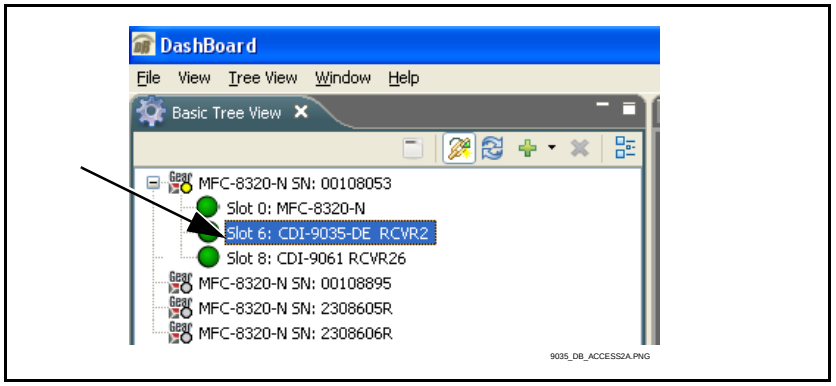
Access the 9035 card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9035 Card Using 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 Network Controller Card associated with the frame containing the 9035 card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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 6: CDI-9035-DEC RCVR2”).



As shown on the next page, 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™).

Accessing the 9035 Card Using a Cobalt® Remote Control Panel

Press the **Select Device** key and select a card as shown in the example below.

This display shows the list order number of the device that is ready for selection

This display shows the devices assigned to the Control Panel.

- Rotate any knob to select from the list of devices. The device selected using a knob is displayed with a reversed background (in this example, “1 9035 - Receiver 21 Input Processing”).
- Directly enter a device by entering its list number using the numeric keypad, and then pressing **Enter** or pressing in any knob).

Checking 9035 Card Information

The operating status and software version the 9035 card can be checked using DashBoard™ or the card edge control user interface. Figure 3-4 shows and describes the 9035 card information screen using DashBoard™ and accessing card information using the card edge control user interface.

Note: Proper operating status in DashBoard™ is denoted by green icons for the status indicators shown in Figure 3-4. Yellow or red icons respectively indicate an alert or failure condition. Refer to Troubleshooting (p. 3-52) for corrective action.

The **Tree View** shows the cards seen by DashBoard™. In this example, Network Controller Card MFC-8320-N (serial number ...8055) is hosting a 9035 card in slot 10.

Software Release Number and Software Build Number
Refer to these numbers to check that documentation (such as this manual) matches the card's Software Release Number and Software Build Number. Use these numbers also when communicating to Cobalt® regarding this card.

Power Consumption Display
This display shows the power consumed by the 9035 for both the +12V and -7.5V rails.

Status Displays
These displays show the status the signal being received by the 9035. Green Settings icon shows that any changes made on DashBoard™ are sucessfully saved on the card's memory.

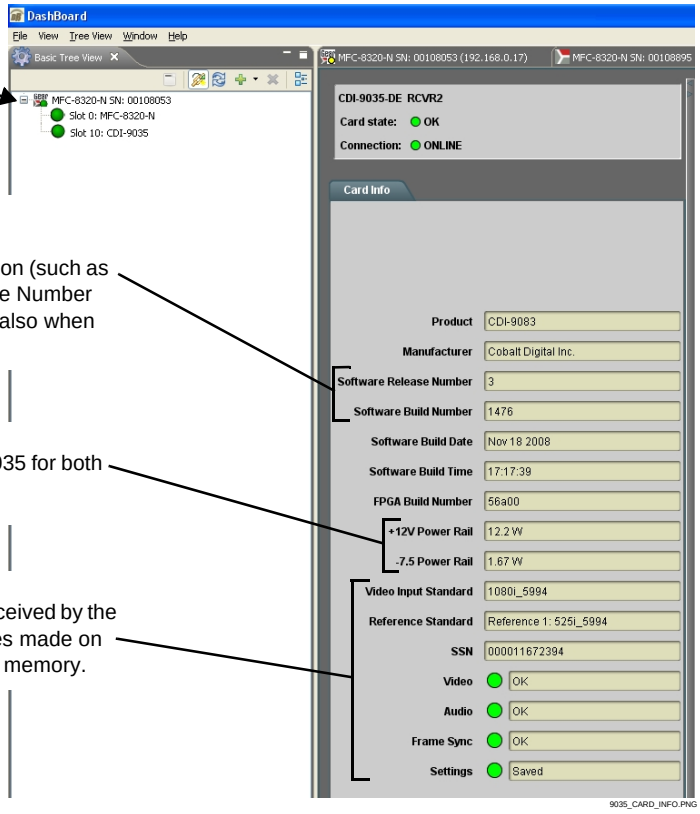


Figure 3-4 9035 Card Info Utility

Ancillary Data Line Number Locations and Ranges

Table 3-1 lists typical default output video VANC line number locations for various ancillary data items that may be passed or handled by the card.

Table 3-1 Typical Ancillary Data Line Number Locations/Ranges

Item	Default Line No. / Range	
	SD	HD
AFD	12 (Note 2)	9 (Note 2)
ATC_VITC	13 (Note 2)	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 3-5 shows an example of improper and corrected VANC allocation within an HD-SDI stream.

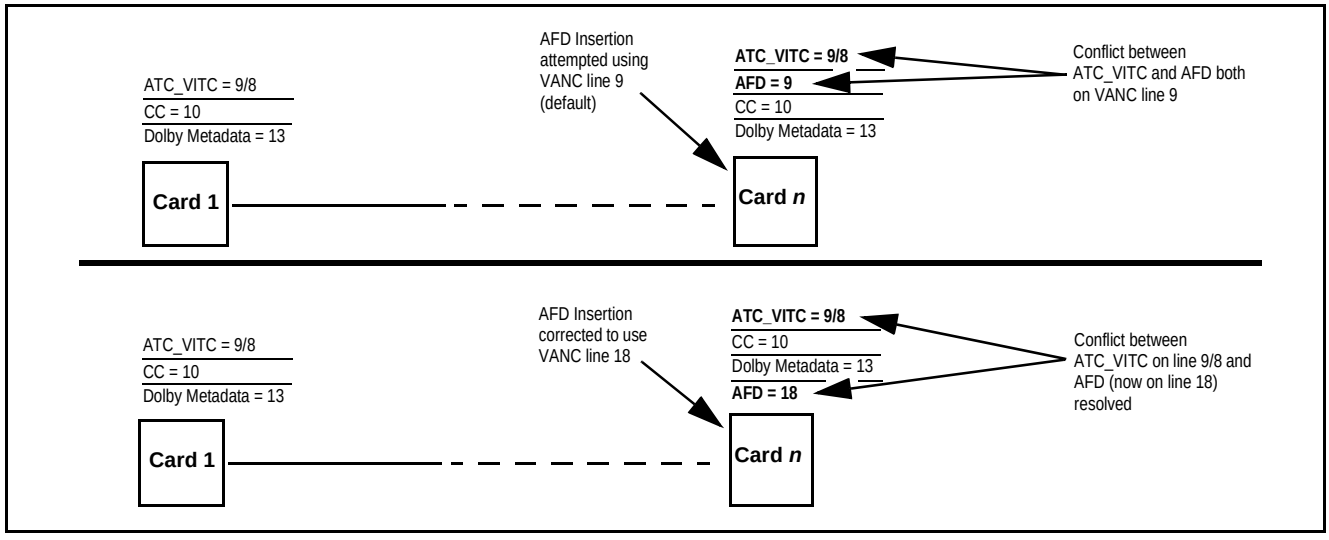


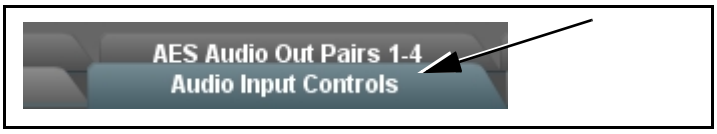
Figure 3-5 Example VANC Line Number Allocation Conflict and Resolution

9035 Function Submenu List and Descriptions

Table 3-2 individually lists and describes each 9035 function submenu and its related list selections, controls, and parameters. Where helpful, examples showing usage of a function are also provided. Table 3-2 is primarily based upon using DashBoard™ to access each function and its corresponding submenus and parameters.

Note: 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.)

On DashBoard™ itself and in Table 3-2, 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
Video Signal Controls	3-10	AES Audio Out Pairs 5-8	3-31
Audio Input Controls	3-11	Dolby Decoder **(9035-DEC only)**	3-32
Video Proc	3-14	Closed Captioning	3-34
Framesync	3-16	Timecode	3-35
Embedded Audio Group 1/2	3-21	Tone Generator	3-39
Embedded Audio Group 3/4	3-25	Audio Mixing	3-39
AES Audio Out Pairs 1-4	3-27	Presets	3-44

Table 3-2 9035 Function Submenu List

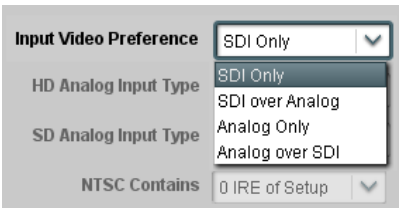
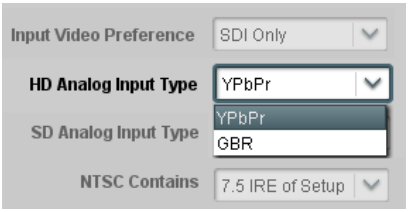
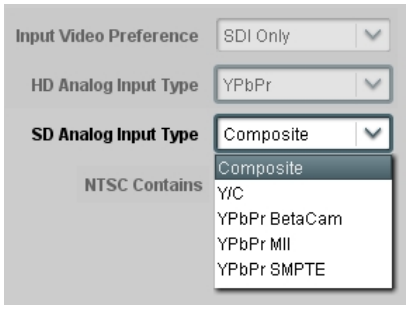
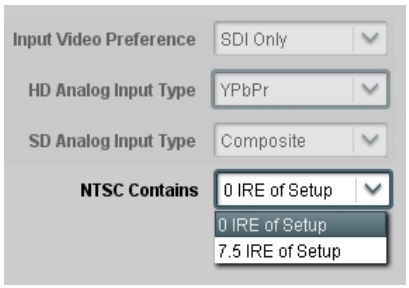
Video Signal Controls	This function sets the 9035 video signal input type and preference and priority
• Input Video Preference 	Sets the input video preference and priority for SDI and analog video inputs as follows: • **SDI Only:** Sets the video input to accept **only** SDI input. Blocks all analog video inputs. • **SDI over Analog:** Sets the video input to accept SDI over composite/component analog video inputs. Blocks analog video inputs when valid signal is received by SDI input. • **Analog Only:** Sets the video input to accept **only** composite and/or component analog video inputs. Blocks SDI input. • **Analog over SDI:** Sets the video input to accept composite/ component analog over SDI video inputs. Blocks SDI input when valid signal is received by composite and/or component analog video inputs.
• HD Analog Input Type 	When receiving analog video input, sets the 9035 HD input video type to accept received input signal from choices shown. **Note:** Input type must be appropriately set for the 9035 to correctly process the received input.
• SD Analog Input Type 	When receiving analog video input, sets the 9035 SD input video type to accept received input signal from choices shown. **Note:** Input format must be appropriately set for the 9035 to correctly lock to the input.
• NTSC Contains 	This setting tells the 9035 how much setup (pedestal) needs to be **removed** from an NTSC-formatted input. • **0 IRE of Setup:** No setup removed. • **7.5 IRE of Setup:** Removes 7.5 IRE of setup. This is typically preferred when analog signals containing 7.5 IRE pedestal are converted to SDI.

Table 3-2 9035 Function Submenu List — continued

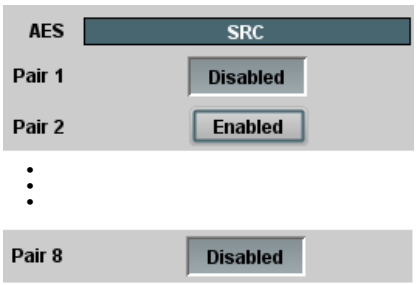
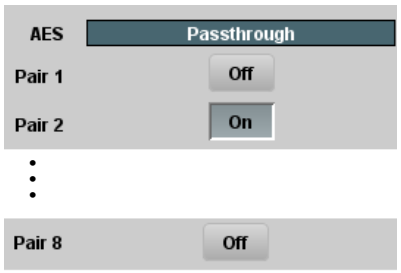
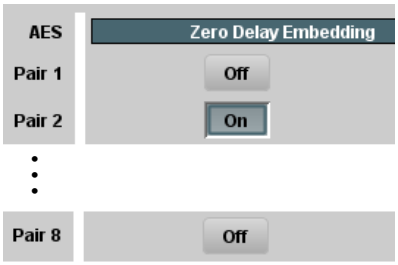
Audio Input Controls	Controls the AES Audio Input features for the eight AES pairs, and displays signal status for the AES pairs and the 16 embedded audio channels. Also provides global unity routing/ parameter control resets. **Note:** Also refer to AES Audio Input Advanced Features (p. 1-19) in Chapter 1,"Introduction" for detailed information regarding these functions.
• **AES SRC** 	Individual SRC **Disable/Enable** control for each AES pair (1 thru 8) disables or enables Sample Rate Conversion (SRC) bypass as follows: • **Disabled:** In this mode, AES SRC for the corresponding AES pair is **bypassed**. 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 undecoded, non-PCM AES audio such a Dolby® E or Dolby Digital™ audio streams. **Note:** • In this mode AES rate must match the input video rate or audio dropouts will occur. • AES audio must be nominally 48 kHz. • SRC is automatically disabled when Dolby® E is received. • **Enabled:** In this mode, AES SRC for the corresponding AES input pair is **enabled**. This allows the 9035 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.
• **AES Passthrough** 	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 the normal audio routing and delay. Gain and polarity control is not available when AES passthrough is enabled.
• **AES Zero Delay Embedding** 	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.

Table 3-2 9035 Function Submenu List — continued

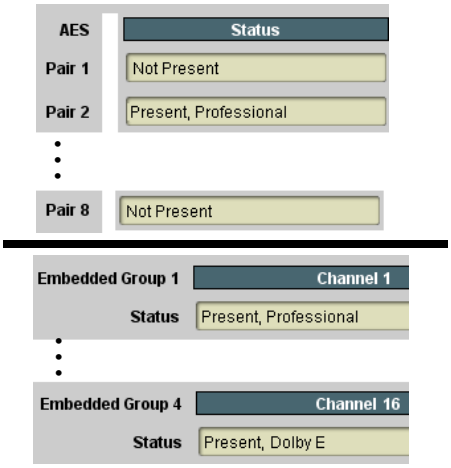
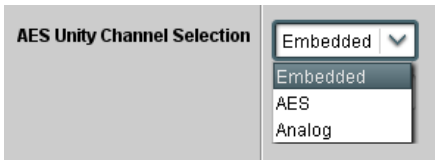
Audio Input Controls	(continued)
• **Status Displays** 	Individual signal status displays for AES pairs 1-8, and embedded audio channels 1-16 as follows: • **Not Present:** Indicates AES pair or embedded channel does not contain recognized audio PCM data. **Note:** Channel displaying Not Present may 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. **(9035 only)** The 9035 card does not perform Dolby® processing on the signal. Although the 9035 controls will appear to be usable for this signal tag, the signal is passed with 1-to-1 routing and all related gain and polarity controls set to unity. **(9035-DEC only)** 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 the audio router.
• **Embedded Unity Channel Selection** 	Selects unity reset of Embedded Audio Group 1/2 and 3/4 controls and re-establishes default 1-to-1 routing as follows: • **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. • **Analog:** Routes Analog Ch 1 thru Ch 8 as sources to destination channels Embedded Ch 1 thru Embedded Ch 8. Sets Embedded Ch 9 thru Ch 16 to Silence.
• **AES Unity Channel Selection** 	Selects unity reset of AES Outputs Pairs 1-4 and 5-8 controls and re-establishes default 1-to-1 routing as follows: • **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. • **Analog:** Routes Analog Ch 1 thru Ch 8 as sources to destination channels AES Ch 1 thru AES Ch 8. Sets AES Ch 9 thru Ch 16 to Silence.

Table 3-2 9035 Function Submenu List — continued

Audio Input Controls	(continued)
• **Apply Audio Channel Selection** 	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. • Click **Yes** to proceed with the unity reset. • Click **No** to reject unity reset. For any selection following confirm, the destination channel controls are default reset as follows: • Gain is to unity • Phase control is set to Normal • Channel is set to Unmuted
• **Tie AES and Embedded Controls** 	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.

Table 3-2 9035 Function Submenu List — continued

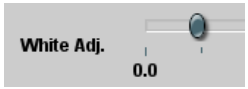
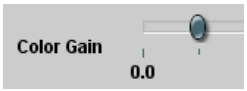
	This function provides the following Video Proc parametric controls
• **Video Proc** 	**Video Proc (On/Off)** provides master on/off control of all Video Proc functions. • When set to **Off**, all processing is bypassed. • When set to **On**, currently displayed parameter settings take effect.
• **Reset to Unity** 	**Reset to Unity** provides unity reset control of all Video Proc functions. When Confirm is clicked, a **Confirm?** pop-up appears, requesting confirmation. • Click **Yes** to proceed with the unity reset. • Click **No** to reject unity reset.
• **White Adj.** 	Adjusts and displays gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Black Adj.** 	Adjusts and displays lift applied to Y (Luma). (-100% to 100% range in 0.1% steps; null = 0.0%)
• **Color Gain** 	Adjusts and displays gain percentage (saturation) applied to C (Chroma). (0% to 200% range in 0.1% steps; unity = 100%)
• **Color Phase** 	Adjusts and displays phase angle applied to Chroma. (-360° to 360° range in 0.1° steps; null = 0°)
• **Gang Luma and Color Gain** 	When set to **On**, changing either the **Color Gain** or **White Adj.** controls increases or decreases both the Video and Chroma levels by equal amounts.

Table 3-2 9035 Function Submenu List — continued

Allows assignment of AFD (Active Format Description) codes to the SDI output video.

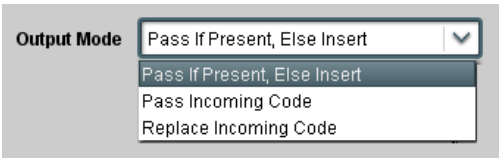
Note: This function only marks the SDI output with an AFD code. Actual AFD processing must be performed by a downstream card or system that recognizes an AFD code assigned here.

• Incoming AFD

Displays incoming AFD setting as follows:

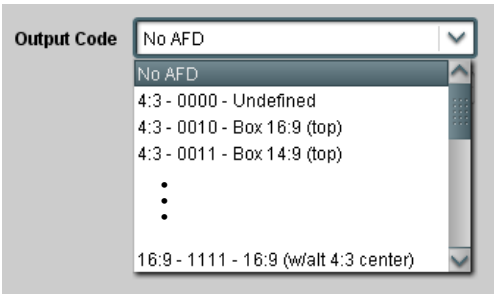
- If AFD code is present, one of the 11, four-bit AFD codes is displayed (as shown in the example to the left). Also displayed is the VANC line number of the incoming AFD code.
- If no AFD setting is present in the video signal, **No AFD Present** is displayed.

• Output Mode



Drop-down selection determines action to take in presence or absence of existing AFD code on input video.

• Output Code



Drop-down list assigns desired AFD to output SDI.

4:3 Coded Frame			
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]

16:9 Coded Frame			
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]

1: AFD codes numbering and definitions conform to SMPTE 2016-1-2007.

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.

• Output Line

Allows selecting the line location of the AFD data within the video signal Ancillary Data space. (Range is 9 thru 41.)

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. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information.

• The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.

Table 3-2 9035 Function Submenu List — continued

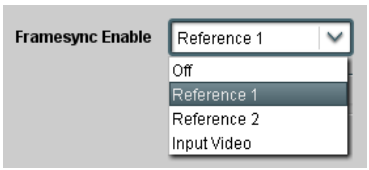
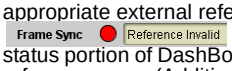
	Provides video Frame Sync delay control and audio re-sync tools.
• **Framesync Enable** 	Disables the Frame Sync function, or selects from choices below. • **Off:** Video path bypasses frame sync entirely; output video timing tracks with input video timing. • **Reference 1:** Allows Frame Sync function to use external Reference 1 as the reference (“house”) standard. • **Reference 2:** Allows Frame Sync function to use external Reference 2 as the reference (“house”) standard. **Note:** If Reference 1 or Reference 2 is selected and an appropriate external reference is not received, the  indication 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 card and other cards via a frame bus. • **Input Video:** Allows full framesync functionality (such as delay offset), but instead uses the input video signal as the reference standard. **Note:** • If **Input Video** is used for framesync, any timing instability on the input video will result in corresponding instability on the output video. This setting should only be used where syncing to input video is known to be reliable. • Negative vertical or horizontal delay values (using the controls below) should **not** be used when using I**nput Video** mode. This may result in image motion “jerkiness”. To add an offset in this case, instead apply a positive value that results in the desired net offset.
• **Vertical Delay Control** 	When Framesync is enabled, sets vertical delay (in number of lines of **output video timing**) between the output video and the frame sync reference. (Range is -1124 thru 1124 lines.) **Note:** Lines refer to lines in the output video format, and not to the reference format.
• **Horizontal Delay Control** 	When Framesync is enabled, sets (in µsec of **output video timing**) horizontal delay between the output video and the frame sync reference. (Range is -64.000 thru 64.000 µsec) **Note:** 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. To apply an offset/framesync reset within this window, first apply a relatively large offset, then apply the target smaller offset. **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.

Table 3-2 9035 Function Submenu List — continued

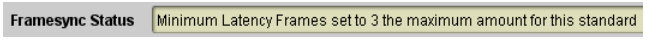
Framesync	**(continued)**
• Input Video Mode Fixed Delay Control 	When Framesync is enabled and set to **Input Video**, allows adding video delay. This is useful when compensating for processes which result in large audio delays. (Range is 0.0000 thru 300.0 msec.)
• Framesync Audio SRC On/Off Control 	When Framesync is enabled and set to **Input Video**, allows disabling audio SRC. This is required if the card is to pass non-PCM audio such as Dolby® audio to downstream devices.
• Minimum Latency Frames Control 	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).** (Maximum range is 0 to 32.) **Note:** Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. For example, with a 525i59.94 output, the practical maximum limit is 13. When using this control, be sure to check the **Framesync Status** display as follows:  • Latency frames selection within limits.  • Latency frames selection exceeds limits.

Table 3-2 9035 Function Submenu List — continued

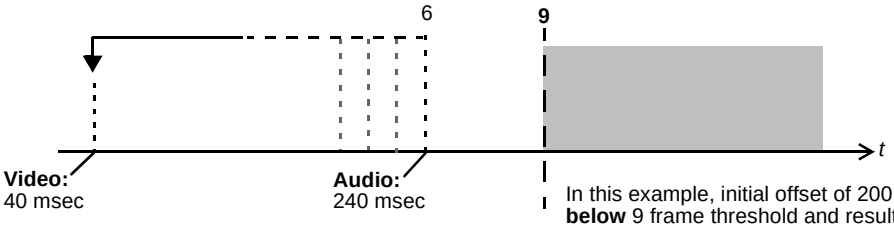
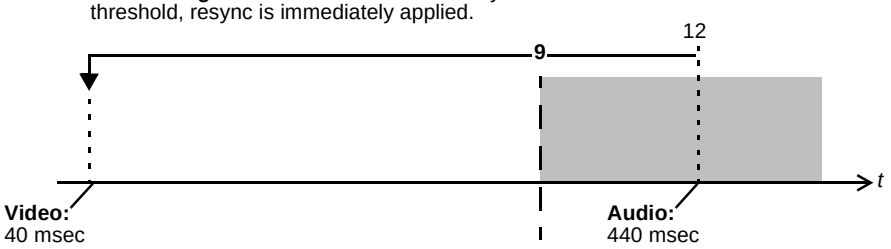
Framesync	(continued)
• **Audio Hard Resync Threshold Control** 	Sets threshold at which hard resync is applied if audio-video offset exceeds threshold (see below). Hard resync provides fastest snyc-up suitable for off-air manipulation. Conversely, a threshold setting high enough to accommodate normal on-air offsets allows on-air resync that is glitch-free. (Range is 1.5 to 13.0 frames in 0.1 frame increments)
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.	
• **Audio Offset Control** 	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. (-575.0 msec to 575.0 msec range; null = 0.0 msec) **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. 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. **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.

Table 3-2 9035 Function Submenu List — continued

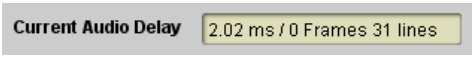
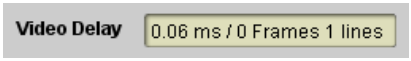
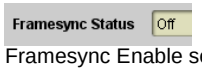
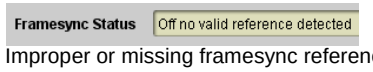
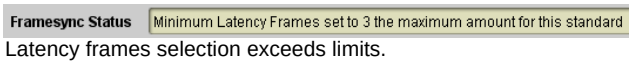
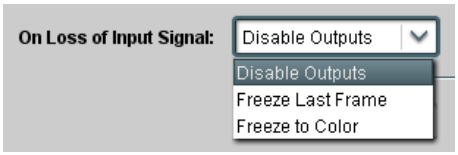
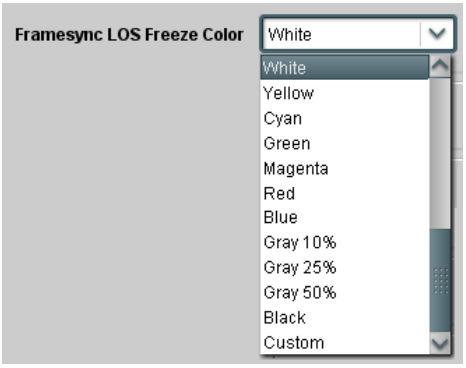
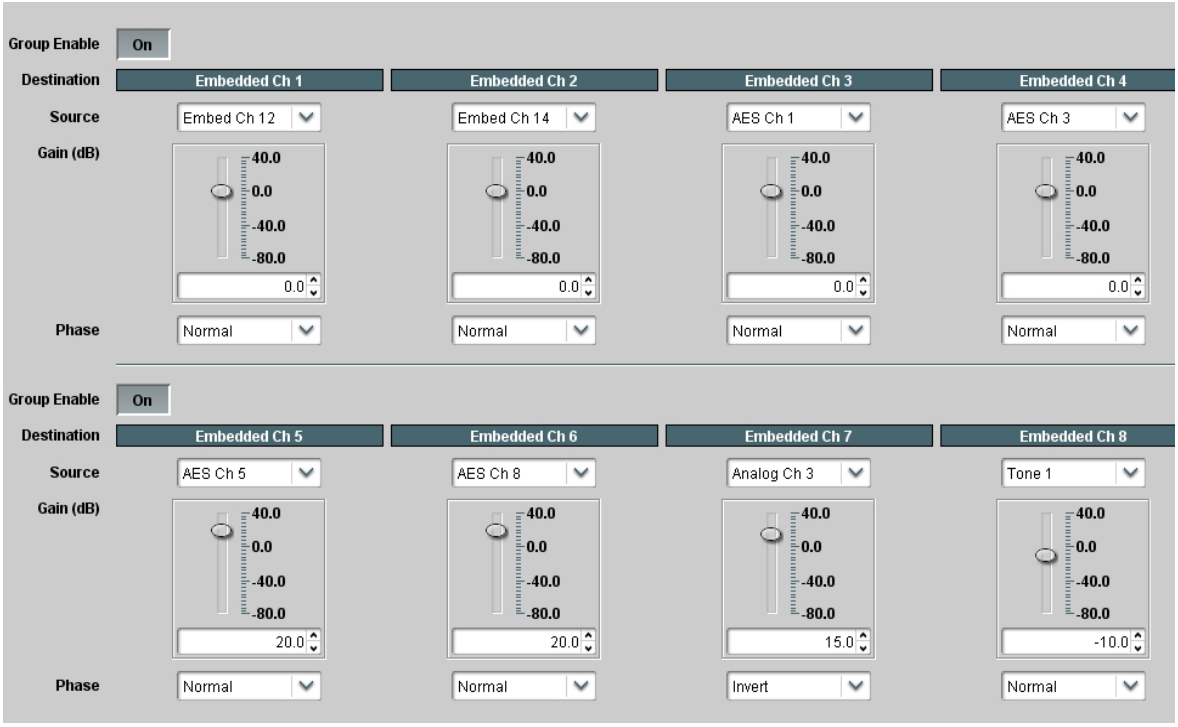
Framesync	**(continued)**
• **Current Audio Delay Display** 	Displays the current input-to-output audio delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).
• **Video Delay Display** 	Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines).
• **Framesync Status Display** 	Displays the current framesync status as follows:  • Framesync status OK.  • Framesync Enable set to **Off**.  • Improper or missing framesync reference.  • Latency frames selection exceeds limits. **Note:** See **Minimum Latency Frames Control** (p. 3-17) for more information about this message.
• **Loss of Input Signal Selection** 	In the event of input video Loss of Signal (LOS), determines action to be taken as follows: • **Disable Outputs:** Disable all outputs. • **Freeze Last Frame:** Freeze image to last good frame (for SDI, last frame having valid SAV and EAV codes; for analog, last frame free of timing errors). • **Freeze to Color:** Freeze image to a color raster (as selected using Framesync LOS Freeze Color control). **Note:** Freeze Last Frame and Freeze to Color choices are functional only when frame sync is set to lock to valid reference.
• **Framesync LOS Freeze Color** 	In the event of LOS with **Freeze to Color** enabled above, sets the image raster color from choices shown to the left.

Table 3-2 9035 Function Submenu List — continued

Framesync	(continued)
• **Custom Color Hue** 	Adjusts raster hue (phase angle) for custom LOS color. (-360° to 360° range in 0.1° steps; null = 0°)
• **Custom Color Saturation** 	Adjusts raster saturation level for custom LOS color. (0% to 100% range in 0.1% steps)
• **Custom Color Y Level** 	Adjusts raster luma level for custom LOS color. (64 to 940 range)
• **Reset/Resync Framesync**  	**Reset Framesync** resets the frame sync, clearing any buffered audio and video. **Resync Video and Reference** resets the input processing paths for video and reference. When Confirm is clicked, a **Confirm?** pop-up appears, requesting confirmation. • Click **Yes** to reset the frame sync. • Click **No** to reject reset. **Note:** These controls are not normally used or required when the card is receiving a stable, continuous frame sync reference.

Table 3-2 9035 Function Submenu List — continued

Embedded Audio Group 1/2	This function selects the audio source for each embedded audio channel 1 thru 8 (Embedded Audio Groups 1 and 2). It also provides Gain and Phase Invert controls for each channel.



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 following pages. Refer to Audio Routing Example Using DashBoard™ (p. 3-47) for more examples of using these controls.

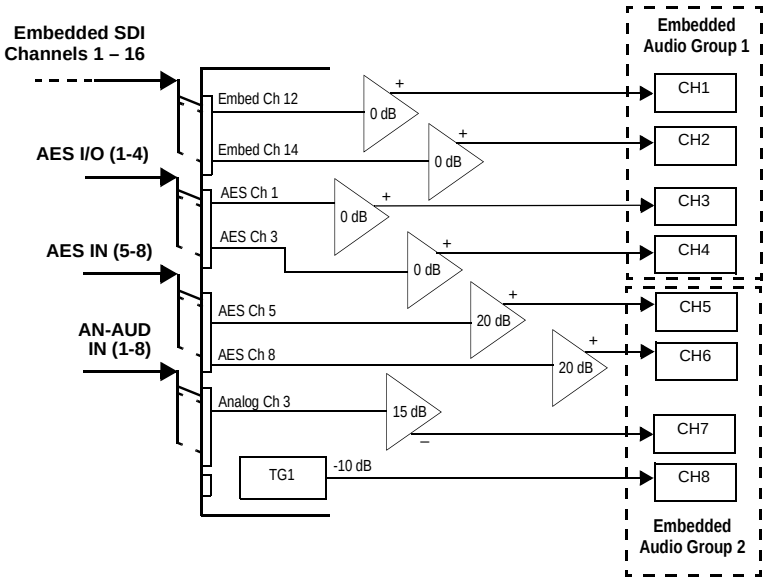


Table 3-2 9035 Function Submenu List — continued

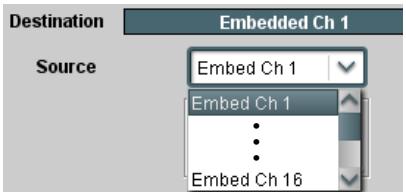
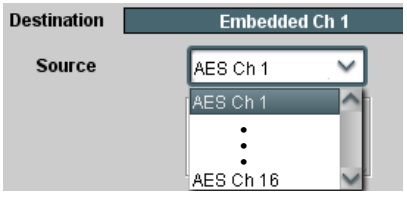
Embedded Audio Group 1/2	(continued)
• **SD Audio Depth** 	Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5). **Note:** • If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data. • Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.
• **Group Enable** 	When enabled (**On**), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 1 or Embedded Audio Group 2). • Embedded Audio Group 1 consists of embedded channels 1 thru 4. • Embedded Audio Group 2 consists of embedded channels 5 thru 8. Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 1 and Embedded Audio Group 2. Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.
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. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the **Silence** selection.	
• **Embedded Channel Source** 	Using the **Source** drop-down list, selects the audio input source to be embedded in the corresponding embedded channel from the choices described below.
• **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)
• **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)

Table 3-2 9035 Function Submenu List — continued

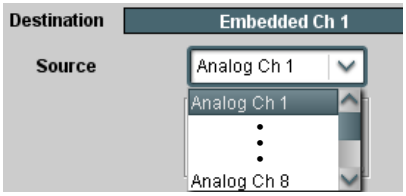
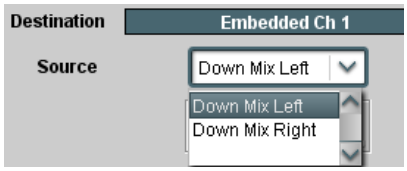
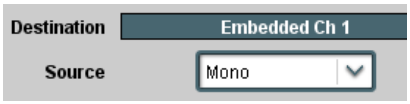
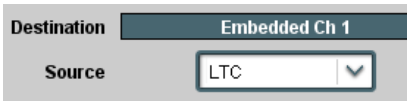
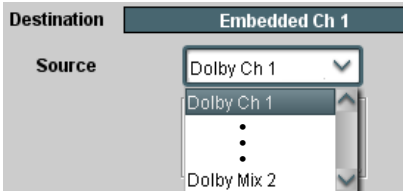
Embedded Audio Group 1/2	(continued)
• Analog Ch 1 thru Ch 8 as Source 	**Analog Ch 1** thru **Analog Ch 8** range in Source drop-down list enables a balanced-input analog channel (Ch 1 thru Ch 8) to be the source for the selected destination Embedded Audio Group channel. (In this example, Analog Ch1 is the source for destination Embedded Ch 1)
• 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. This stereo pair is a basic L/R PCM signals with no additional encoded information. Refer to **Audio Mixing** function description on page 3-39 for more information.
• Mono Mix as Source 	**Mono** 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) **Note:** Mono mix content is set up using Mono Mixer Selection in the **Audio Mixing** function). Refer to **Audio Mixing** function description on page 3-39 for more information.
• Audio LTC as Source  Option	**LTC** selection in Source drop-down list allows any timecode format received by the card to be outputted as audio LTC over an embedded audio output (destination) channel. (In this example, audio LTC is the source for destination Embedded Ch 1) **Note:** • When LTC is selected as source, **Gain** and **Mute** controls are disabled. • Refer to **Timecode** function description on page 3-35 for more information.
• Dolby® Decoded Channel as Source  Option	**(9035-DEC only) 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 Embedded Audio Group channel. (In this example, Dolby® decoded Ch 1 is the source for destination Embedded 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 Decoder** function description on page 3-32 for more information. Refer to Dolby® E Processing and Routing Example on page 3-50 for an example of using Dolby® decoding.

Table 3-2 9035 Function Submenu List — continued

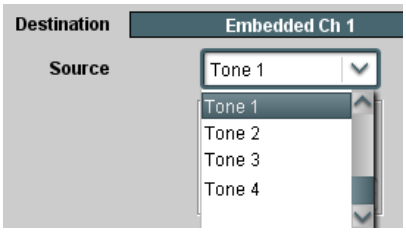
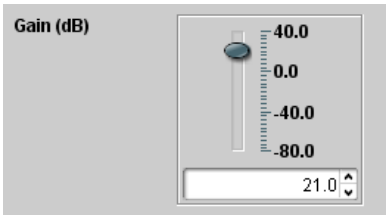
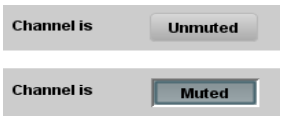
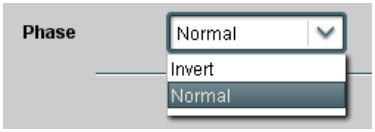
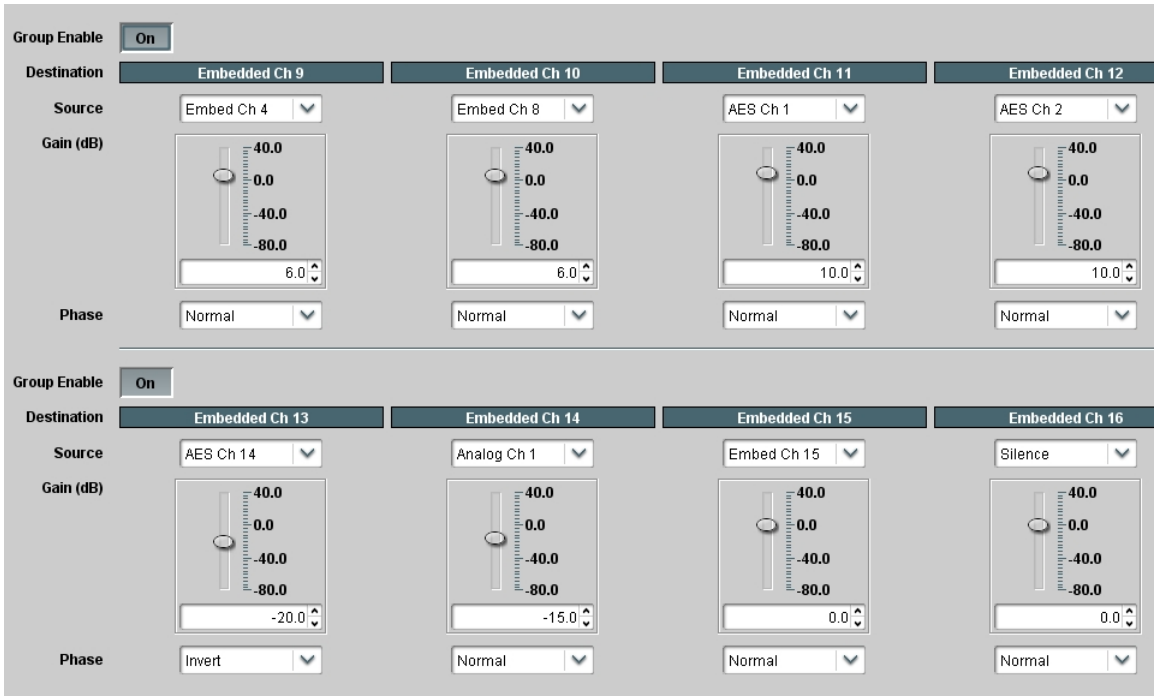
Embedded Audio Group 1/2	(continued)
• **Tone Generator 1 thru 4 as Source** 	**Tone Generator 1** thru **Tone Generator 4** range in Source drop-down list enables one of four tone generators (Tone 1 thru Tone 4) to be the source for the selected destination Embedded Audio Group channel. (In this example, Tone 1 (tone generator 1) is the source for destination Embedded Ch 1) **Note:** Tone generator frequencies can be independently set for the four tone generator sources. Refer to **Tone Generator** function description on page 3-39 for more information.
• **Silence (Mute) as Source** 	**Silence** 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)
• **Gain (dB) Control** 	Adjusts and displays relative gain (in dB) applied to the corresponding destination Embedded Audio Group channel. (-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)
• **Mute Control** 	Allows pushbutton On/Off channel muting while saving all other settings.
• **Phase Control** 	Selects between **Normal** and **Invert** phase (relative to source original phase) for the destination Embedded Audio Group channel.

Table 3-2 9035 Function Submenu List — continued

Embedded Audio Group 3/4	This function selects the audio source for each embedded audio channel 9 thru 16 (Embedded Audio Groups 3 and 4). It also provides Gain and Phase Invert controls for each channel.



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. These are described on the following pages.

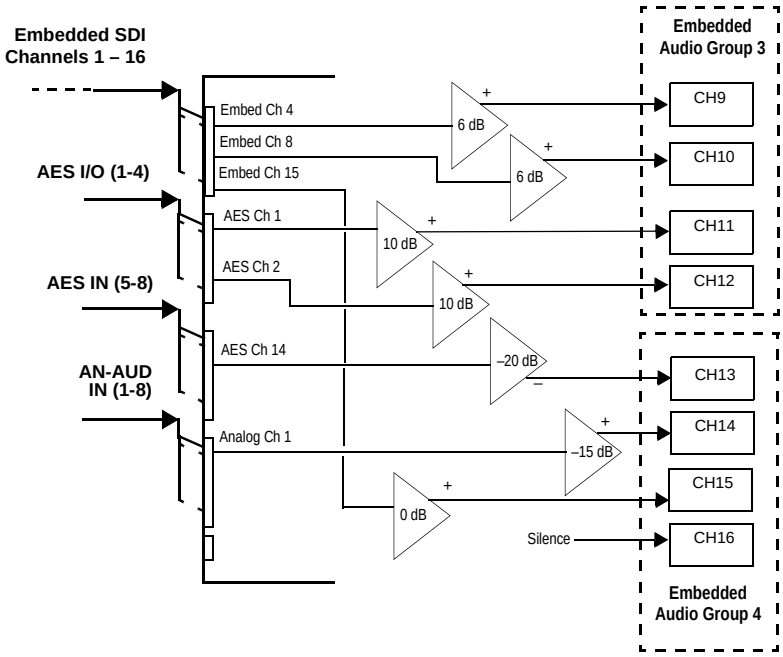


Table 3-2 9035 Function Submenu List — continued

Embedded Audio Group 3/4	(continued)
• **SD Audio Depth** 	Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5). **Note:** • If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data. • Depth control setting applied here affects both Embedded Audio Group 1/2 and 3/4.
• **Group Enable** 	When enabled (**On**), enables the embedding of the corresponding embedded audio group (Embedded Audio Group 3 or Embedded Audio Group 4). • Embedded Audio Group 3 consists of embedded channels 9 thru 12. • Embedded Audio Group 4 consists of embedded channels 13 thru 16. Two Group Enable buttons correspondingly enable or disable Embedded Audio Group 3 and Embedded Audio Group 4. Disabling a group removes the entire group of embedded audio channels while preserving the settings of the channels belonging to the group.
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 3-21 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.	

Table 3-2 9035 Function Submenu List — continued

AES Audio Out Pairs 1-4	This function routes audio sources to discrete AES output channels 1 thru 8 (AES Audio Out Pairs 1-4). It also provides Gain and Phase Invert controls for each channel.

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 following pages. Refer to Audio Routing Example Using DashBoard™ (p. 3-47) for more examples of using these controls.

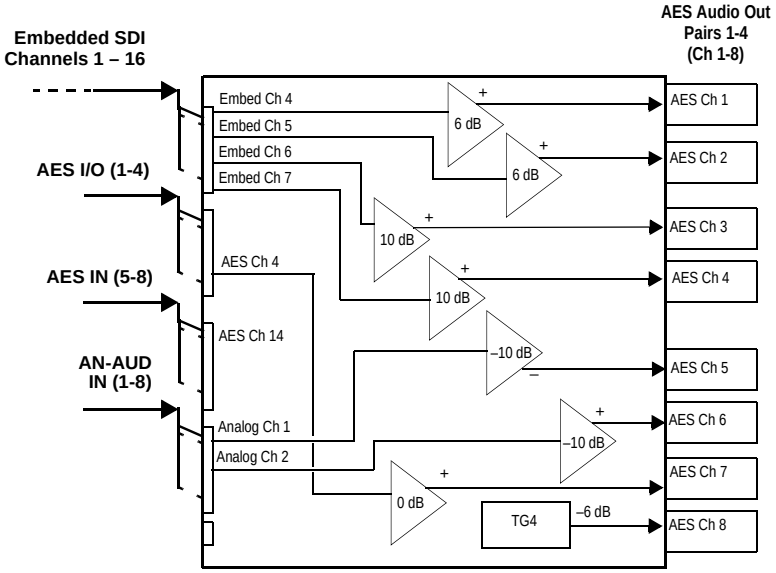


Table 3-2 9035 Function Submenu List — continued

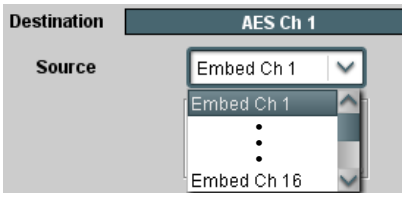
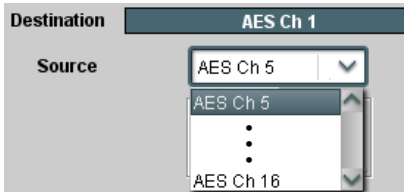
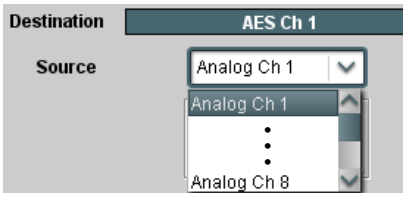
AES Audio Out Pairs 1-4	**(continued)**
Note: • **AES Ch 2** thru **AES Ch 8** have controls that are identical to the **Source**, **Gain**, **Mute**, and **Phase** controls described here for **AES Ch 1**. Therefore, only the **AES Ch 1** controls are shown here. • For each channel, its source and destination should be considered and appropriately set. Unused destination channels should be set to the **Silence** selection.	
• **AES Channel Source** 	Using the **Source** drop-down list, selects the audio source to be routed to the corresponding AES output channel from the choices described below.
• **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 AES channel. (In this example, Embed Ch 1 (embedded Ch 1) is the source for destination AES Ch 1)
• **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 AES channel. (In this example, AES Ch 5 is the source for destination AES Ch 1)
• **Analog Ch 1 thru Ch 8 as Source** 	**Analog Ch 1** thru **Analog Ch 8** range in Source drop-down list enables a balanced-input analog channel (Ch 1 thru Ch 8) to be the source for the selected destination AES channel. (In this example, Analog Ch1 is the source for destination AES Ch 1)
• **Down Mix Left or Right as Source** 	**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 LF, C, RF, LR, and RR channel inputs selected using the Audio Mixing function. This stereo pair is a basic L/R PCM signals with no additional encoded information. Refer to **Audio Mixing** function description on page 3-39 for more information.

Table 3-2 9035 Function Submenu List — continued

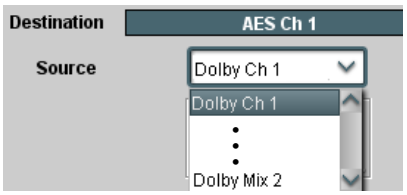
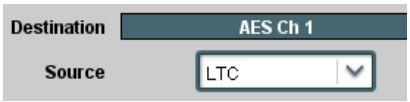
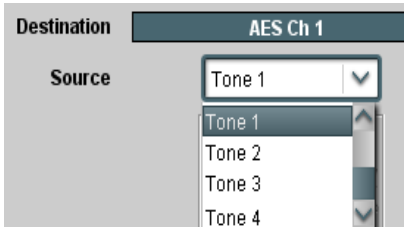
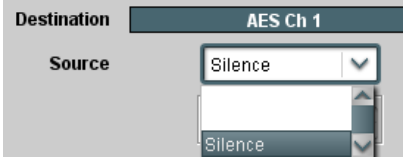
AES Audio Out Pairs 1-4	**(continued)**
• Dolby® Decoded Channel as Source  Option	**(9035-DEC only) Dolby Ch 1** thru **Dolby Ch 8** range in Source drop-down list enables a Dolby® decoded channel to be the source for the selected destination AES channel. (In this example, Dolby® decoded Ch 1 is the 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 Decoder** function description on page 3-32 for more information. Refer to Dolby® E Processing and Routing Example on page 3-50 for an example of using Dolby® decoding.
• Mono Mix 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 3-39 for more information.
• Audio LTC as Source  Option	**LTC** selection in Source drop-down list allows any timecode format received by the card to be outputted as audio LTC over an AES audio output (destination) channel. (In this example, audio LTC is the source for destination AES Ch 1) **Note:** • When LTC is selected as source, **Gain** and **Mute** controls are disabled. • Refer to **Timecode** function description on page 3-35 for more information.
• Tone Generator 1 thru 4 as Source 	**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. (In this example, Tone 1 (tone generator 1) is the source for destination AES Ch 1) **Note:** Tone generator frequencies can be independently set for the four tone generator sources. Refer to **Tone Generator** function description on page 3-39 for more information.
• Silence (Mute) as Source 	**Silence** selection in Source drop-down list mutes the selected destination AES channel. **Use this setting for unused destination channels.** (In this example, silence (muting) is applied to AES Ch 1)

Table 3-2 9035 Function Submenu List — continued

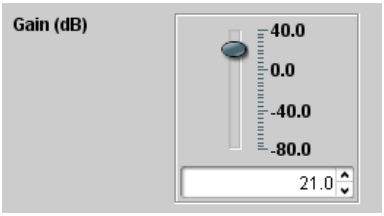
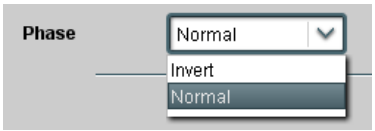
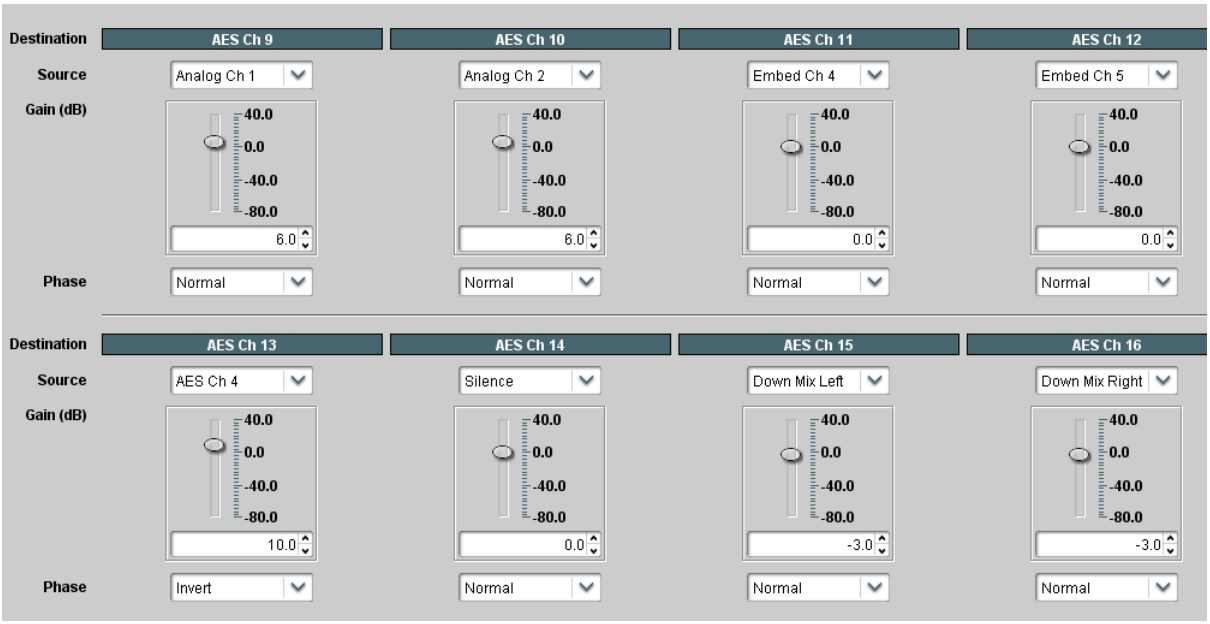
AES Audio Out Pairs 1-4	**(continued)**
• **Gain (dB) Control** 	Adjusts and displays relative gain (in dB) applied to the corresponding destination AES channel. (-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)
• **Mute Control** 	Allows pushbutton On/Off channel muting while saving all other settings.
• **Phase Control** 	Selects between **Normal** and **Invert** phase (relative to source original phase) for the destination Embedded Audio Group channel.

Table 3-2 9035 Function Submenu List — continued

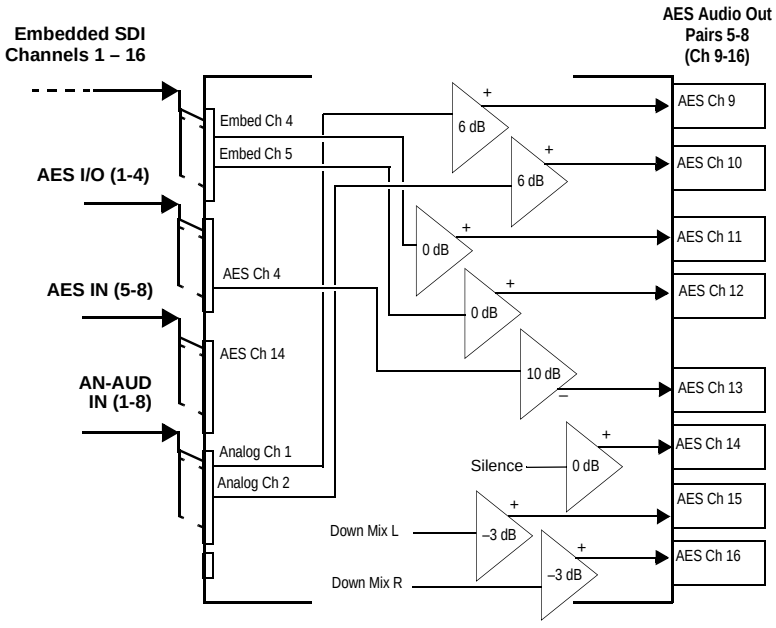
AES Audio Out Pairs 5-8

This function routes audio sources to AES output channels 9 thru 16 (AES Audio Out Pairs 5-8). It also provides Gain and Phase Invert controls for each channel.



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 tone generators (not shown here).



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 3-27 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.

Table 3-2 9035 Function Submenu List — continued

Dolby Decoder **Option** **(9035-DEC only)**	This function routes a Dolby® encoded AES pair or embedded audio source to the Dolby® decoder, and provides Dolby® configuration display and metadata handling controls.

Note: • If necessary, see Dolby® E Processing and Routing Example on page 3-50 for an example of using 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.

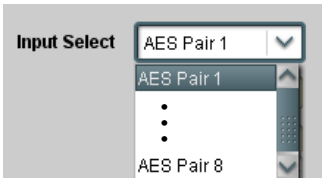
Decoder Channels	E5.1+2	E7.1+2	E8x1
Ch 1	LF	LF	Ch 1
Ch 2	RF	RF	Ch 2
Ch 3	C	C	Ch 3
Ch 4	LFE	LFE	Ch 4
Ch 5	LS	LS	Ch 5
Ch 6	RS	RS	Ch 6
Ch 7	Aux 1	LB	Ch 7
Ch 8	Aux 2	RB	Ch 8
Mix 1	Lo	Lo	Mono Mix 1
Mix 2	Ro	Ro	Mono Mix 2

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

• Input Select

Using the **Input Select** drop-down list, routes an audio source containing locked Dolby® data to the Dolby® decoder input from the choices below.

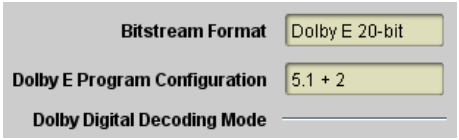
• AES Pair as Input



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)

• Dolby® Mode Display



Shows specific bitstream information and Dolby® decoding type (Dolby® E or Dolby® Digital) for input applied to Dolby® decoder.

(In this example, Dolby® E 20-bit with 5.1+2 decoded channel configuration is being decoded)

If selected input has invalid or missing Dolby® data (such as if wrong channels are applied to decoder), PCM / No Dolby Stream is displayed.

In this case, PCM data passes undecoded and is present on **Dolby Ch 1** and **Dolby Ch 2** channels.

Table 3-2 9035 Function Submenu List — continued

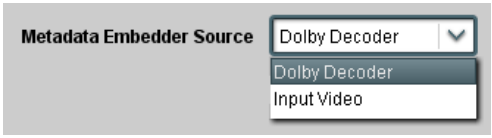
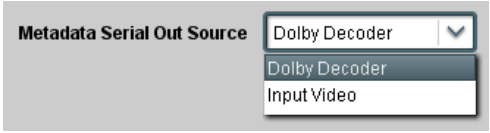
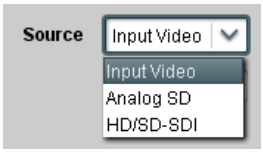
Dolby Decoder	**(continued)**
• **Metadata Embedding** 	**Metadata Embedding (On/Off)** controls SMPTE 2020-1 metadata embedding in the SDI video output. • When set to **On**, metadata from selected source is embedded in the output SDI video. • When set to **Off**, metadata is not embedded in the output SDI video. **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.
• **Metadata Embedder Source** 	When metadata embedding is enabled, selects the metadata source to be embedded. • **Dolby Decoder:** Selects 9035-DEC Dolby® decoder metadata as the metadata source. (For example, when adding or replacing old metadata with new metadata generated by the decoder.) • **Input Video:** This setting is currently not needed for normal use of the 9035-DEC. **Note:** Typically, Metadata Embedder Source should be set to "Dolby Decoder", since this is the new metadata produced by the 9035-DEC decoder and should also be made available in the SDI stream. If embedding new metadata, make certain to set its line number such that 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).
• **Metadata Serial Out Source** 	Selects the metadata source to be sent to the 9035-DEC **DOLBY META** RS-485 port. • **Dolby Decoder:** Selects 9035-DEC Dolby® decoder metadata as the metadata source. (For example, when decoder metadata is desired for other local systems.) • **Input Video:** Selects SMPTE 2020-1 metadata from the input SDI video as the metadata source. (This can be used to extract existing SDI metadata and make it available on the 9035-DEC RS-485 output.) **Note:** Typically, Metadata Serial Out Source should be set to "Dolby Decoder", since this is the new metadata produced by the 9035-DEC decoder.

Table 3-2 9035 Function Submenu List — continued

Closed Captioning	This function provides support for closed captioning setup
Note: When receiving HD-SDI, both CEA 608 and CEA 708 are supported.	
• Closed Captioning On/Off 	Turns on or turns off the Closed Captioning output.
• Closed Captioning Source 	Selects the video format that carries the Closed Captioning (CC) video stream as follows: • **Input Video:** Sets the 9035 to receive CC stream from the currently selected input format (as selected using the **Video Signal Controls** functions. • **Analog SD:** Sets the 9035 to receive analog SD CC stream on the analog inputs (Y/composite, Pr/C, and Pb inputs) regardless of video input source. • **HD/SD-SDI:** Sets the 9035 to receive either HD or SD CC stream on the SDI input regardless of video input source.
• Closed Captioning Input Status 	Displays incoming Closed Captioning status as follows: • If closed captioning is present, a message similar to the example shown left is displayed. Also displayed is the VANC line number of the incoming closed captioning packet (or SD waveform-based VANC line number). • If no closed captioning is present in the video signal, **Not Present** or **Disabled** is displayed. **Note:** • Packet closed captioning status **Captioning Rejected Due To** message can appear due to the items described below. The closed captioning function assesses *cdp_identifier*, *cdp_frame_rate*, *ccdata_present*, and *caption_service_active* items contained in the packet header to make the determinations listed below. Refer to CEA-708-B for more information.
• Closed Captioning HD Output Line 	Selects the VANC line number (9 thru 41) for the closed caption data when the output is HD. **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. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information.

Message	Description
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the card.
Data Not Present	Packet is marked from closed captioning source external to the card that no data is present.
No Data ID	Packet from closed captioning source external to the card is not properly identified with 0x9669 as the first word of the header (unidentified packet).

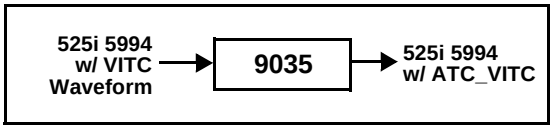
• **caption service is marked as inactive** display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal.

• The closed captioning function does not support PAL closed captioning standards.

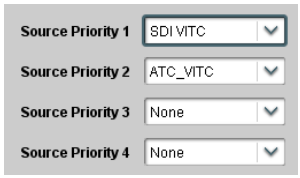
Table 3-2 9035 Function Submenu List — continued

Timecode	Provides timecode data extraction from various sources, and provides formatting and re-insertion controls for inserting the timecode into the output video.

Shown below is an example in which received SDI video with SDI VITC waveform timecode is to be converted to SDI ATC_VITC timecode data. Each Timecode control is fully described on the pages that follow.

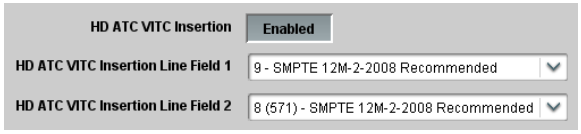


A Noting that the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (**SDI VITC**) as a choice. This extracts VITC Waveform timecode data from the incoming video.



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

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



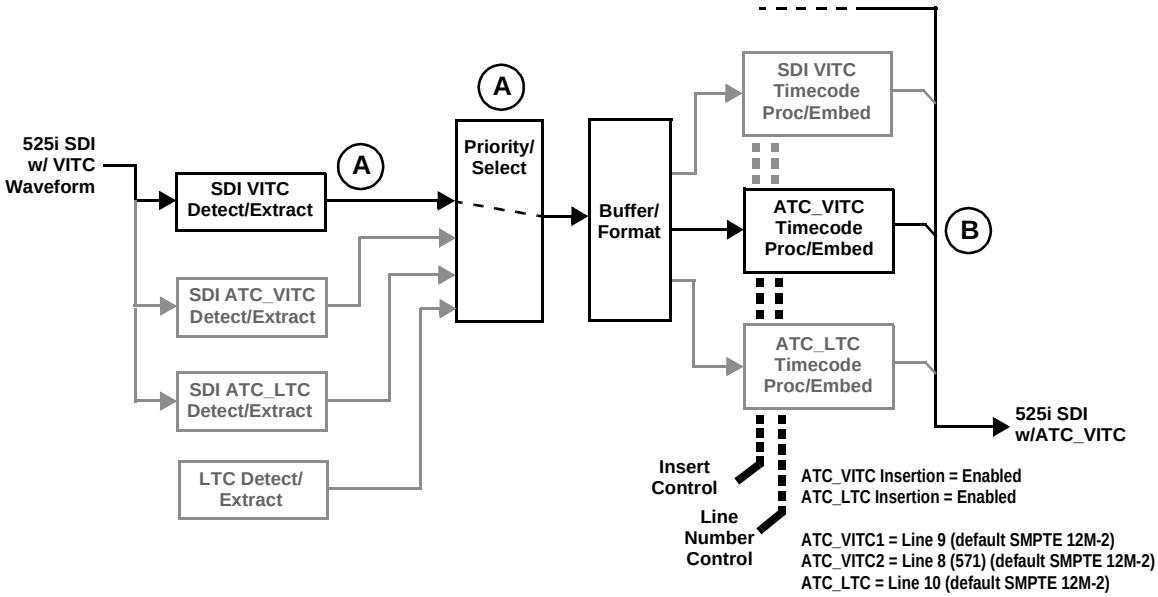
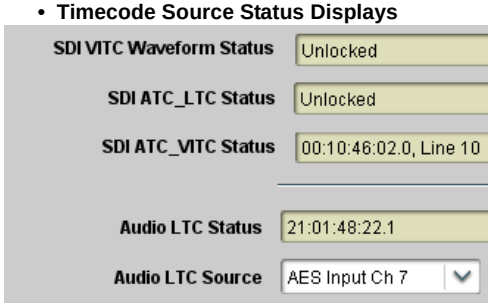


Table 3-2 9035 Function Submenu List — continued

Timecode	**(continued)**
Option **Audio LTC** and **RS-485 LTC** controls described below only appear on cards with +LTC licensed optional feature. This feature allows bidirectional conversion between VBI-based timecode and LTC timecode on audio and RS-485 interfaces.	

• **Timecode Source Status Displays**
 
	Displays the current status and contents of the supported timecode formats shown to the left.
	• 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.
	• If Audio LTC is being received, the timecode running count is displayed.
	• **Audio LTC Source** selects audio source to be used by card audio LTC function as listed below.
	  • Emb Ch 1 thru Ch 16
	  • AES Ch 1 thru Ch 16
	  • Analog audio Ch 1 thru Ch 8
	Note: Audio LTC Source must be appropriately set for card to receive and process audio LTC.

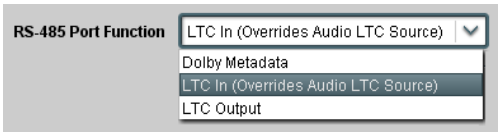
• **RS-485 Port LTC Control** 	Allows RS-485 port to be used to receive LTC, or send LTC over RS-485 port as follows: • If **RS-485 LTC** is to be **received** via the shared RS-485 port, set the **RS-485 Port Function** control to **LTC In**. • If **RS-485 LTC** is to be **outputted** via the shared RS-485 port, set the **RS-485 Port Function** control to **LTC Output**. The timecode string carried on the LTC output is that selected using the **Source Priority** controls described on the next page.
• **Incoming ATC Packet Removal Control** 	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.)

Table 3-2 9035 Function Submenu List — continued

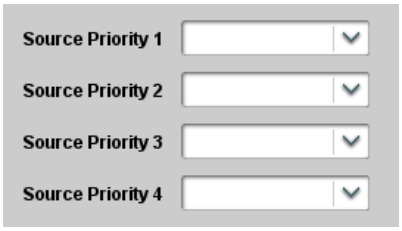
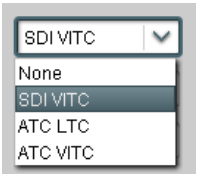
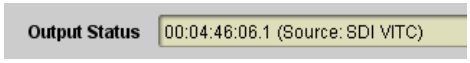
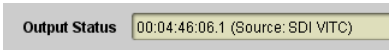
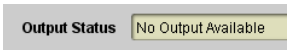
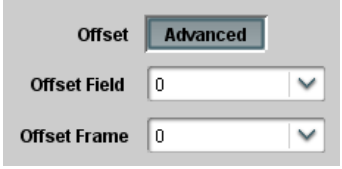
	**(continued)**
• **Source Priority** 	As described here, selects the priority assigned to each of the four supported formats in the event the preferred source is unavailable. Each of the four Source Priority selection lists allows assignment of source priority from the following choices:  **Source Priority 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.
• **Output Status Display** 	Displays the current content and source being used for the timecode data as follows:  • Output status OK (in this example, running SDI VITC timecode received and outputted).  • Timecode not available due to lack of appropriate input timecode data on enabled formats. **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.  • **Timecode Insertion** button set to **Disabled**; output insertion disabled. **Note:** • If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode. • Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows: 0.0 Frame 0 0.1 Frame 1 1.0 Frame 2 1.1 Frame 3 • • • 29.1 Frame 59
• **Offset Controls** 	Allows the current timecode count to be advanced or delayed on the output video. • **Offset Advance** or **Delay** selects offset advance or delay. • **Offset Field** delays or advances or delays timecode by one field. • **Offset Frame** delays or advances or delays timecode by up to 5 frames. **Note:** Default settings are null, with both controls set at zero as shown.

Table 3-2 9035 Function Submenu List — continued

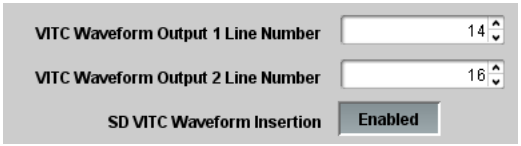
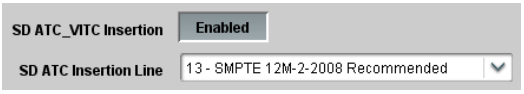
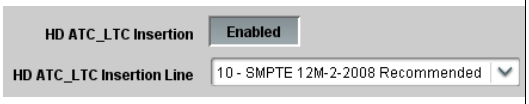
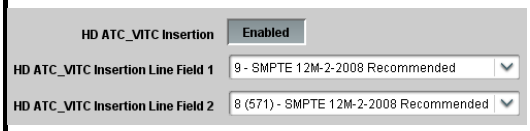
Timecode	**(continued)**
Note: • Although the output line drop-down on the controls described below will allow a particular range of choices, the actual range is automatically clamped (limited) to certain ranges to prevent inadvertent conflict with active picture area depending on video format. See Ancillary Data Line Number Locations and Ranges (p. 3-8) for more information. • The card does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.	
• SD VITC Waveform Insertion Controls 	For SD output, enables or disables SD VITC waveform timecode insertion into the output video, and selects the VITC1 and VITC2 line numbers (6 thru 22) where the VITC waveform is inserted. **Note:** • If only one output line is to be used, set both controls for the same line number. • **SD VITC Waveform Insertion** control only affects VITC waveforms inserted (or copied to a new line number) by this function.
• SD ATC Insertion Control 	For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.
• HD ATC_LTC Insertion Control 	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.
• HD ATC_VITC Insertion Control 	For HD output, enables or disables ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC1 and ATC_VITC2. **Note:** If only one output line is to be used, set both controls for the same line number.
• ATC_VITC Legacy Support Control 	When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling). **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.

Table 3-2 9035 Function Submenu List — continued

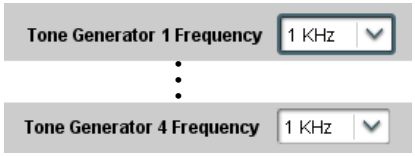
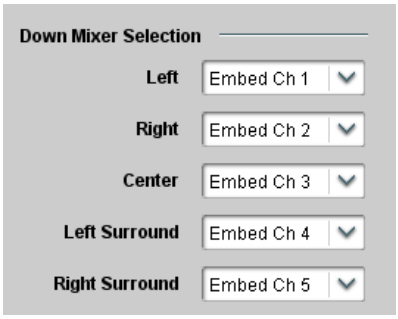
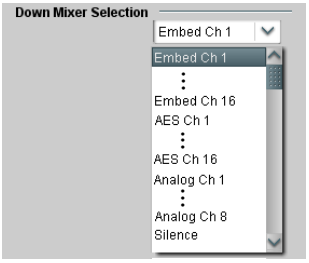
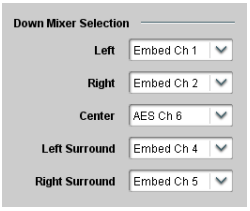
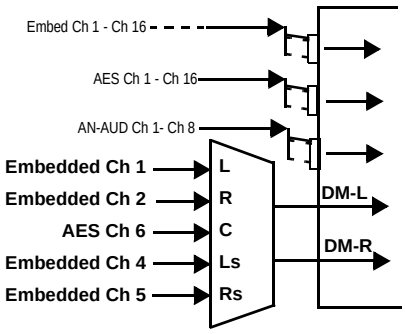
Tone Generator	This function sets the test tone frequency for each of four tone generators (Tone Generator 1 thru 4).
• Frequency Selection Lists 	Selects the frequency for each of the four tone generators. 18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz). **Note:** Unity-gain signal level is equivalent to -20 dBu.
Audio Mixing	This function provides down-mix audio routing selections that multiplexes any five embedded audio channel or AES channel sources into a stereo pair (Down Mix Left and Down Mix Right)
• Down Mixer Selection 	Separate drop-down lists for **Left**, **Right**, **Center**, **Left Surround (Ls)**, and **Right Surround (Rs)** inputs allow embedded, AES, or analog channel audio source selection for each of the five inputs as shown below.  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.   **Note:** The stereo pair consists of basic L/R PCM signals with no additional encoded information.

Table 3-2 9035 Function Submenu List — continued

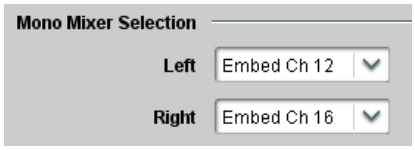
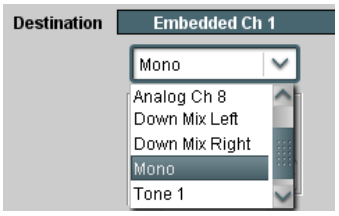
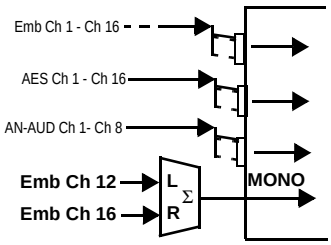
Audio Mixing	(continued)
• **Center Mix Ratio Control** 	Adjusts the attenuation ratio of center-channel content from 5-channel source that is re-applied as Lt and Rt content to the DM-L and DM-R stereo mix. • Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Center channel content 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. (0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB) **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.
• **Surround Mix Ratio Control** 	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. • 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. (0.0 dB to -10.0 dB range in 0.1 dB steps; default = -3 dB) **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.
• **Mono Mixer Selection** 	Separate drop-down lists for **Left** and **Right** inputs allow selected embedded, AES, analog, or the DM-L / DM-R input channels to provide an additional mono-mixed channel. 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.   **Note:** Selection of any two channels for mono mixing in no way affects the source channels themselves.

Table 3-2 9035 Function Submenu List — continued

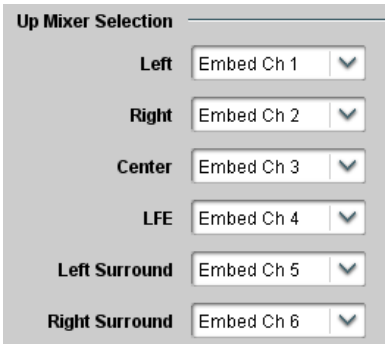
Audio Mixing	**(continued)**

Option

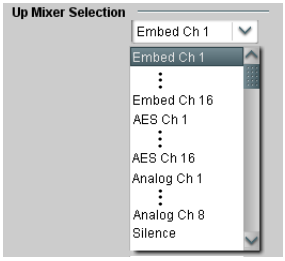
Note: • 2.0-to-5.1 upmixer function is an optional licensable feature. This function and its controls appear only when a license key is entered and activated. Refer to **Licensable Features** function description on page 3-44 for more information.

- Channel sources used by the upmixer are post-processed signals received from the Audio Routing/Gain Control function. When active, the channel selections made using this function are **directly embedded in the output SDI or AES discrete pairs**. Refer to 2.0-to-5.1 Upmix Function (p. 1-15) in Chapter 1, “Introduction” for detailed functional description and signal flow.
- For any six channels selected for this function, the **Left** and **Right** channel selections always serve as the stereo input pair.

• 2.0-to-5.1 Up Mixer Selection



Separate drop-down lists for **Left**, **Right**, **Center**, **LFE, Left Surround**, and **Right Surround** allow embedded, AES, or analog channel audio source selection, and embedded or AES discrete channel assignments for the six generated 5.1 channels.



The example below shows selection of embedded channels 1 and 2 as the received stereo source (Embed Ch1 and Ch 2 for **Left** and **Right** drop-down list selections in the Up Mixer Selection tool).

Using the setup shown in the example, when upmix is active the embedded channel 1/2 stereo pair is overwritten with the new stereo pair L/R on channels 1/2. As selected in the example, the additional 5.1 channels C, LFE, Left Surround (Ls), and Right Surround (Rs) overwrite Emb Ch 3 – Ch 6, respectively.

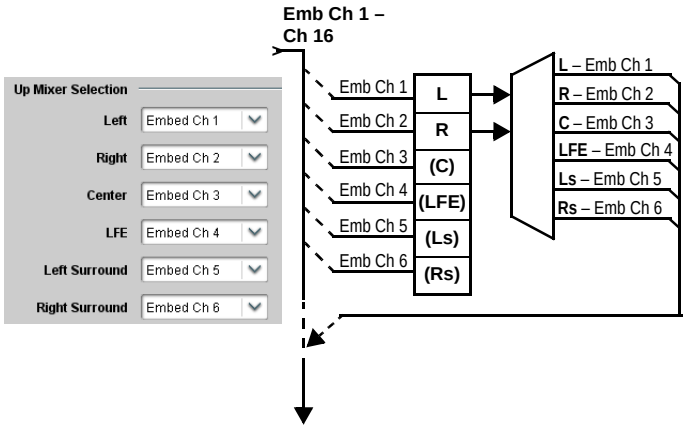
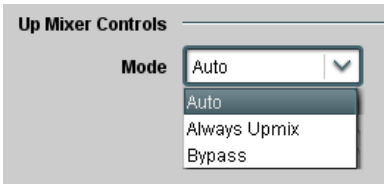


Table 3-2 9035 Function Submenu List — continued

Audio Mixing	(continued)

• Up Mixer Mode Control
 
	Enables or bypasses upmixer as follows:
	• **Auto:** Automatic enable/bypass of 5.1 upmix function as follows:
	  • If detected signal level on **all four** of the selected channels designated as **Center**, **LFE**, **Left Surround**, and **Right Surround** are **below** the level threshold set using the **5.1 Detection Threshold** control, upmixer overwrites all six selected channels with the new 5.1 content generated by the upmixer.
	  • If detected signal level on **any of the four** of the selected channels designated as **Center**, **LFE**, **Left Surround**, and **Right Surround** is **above** the level threshold set using the **5.1 Detection Threshold** control, upmixer is bypassed and the original channels pass unaffected.
	• **Always Upmix:** Manual enable turns on upmixer and overwrites content on all six selected channels with new 5.1 content generated by the upmixer regardless of original signal level or content.
	• **Bypass:** Manual disable bypasses the upmixer. When bypassed, the six embedded audio channels pass unaffected.

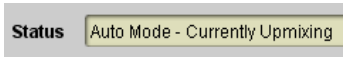
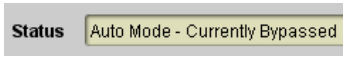
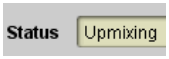
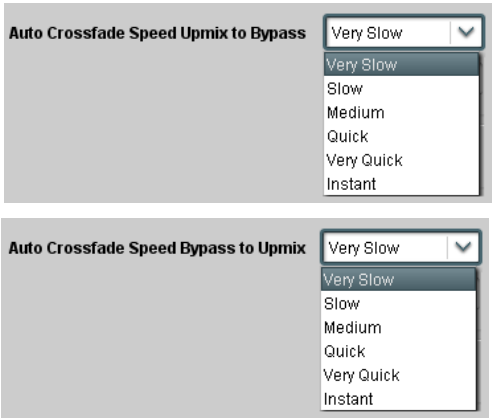
• Up Mixer Status Display    	Shows activity status of upmixer processing as follows: • **Auto Mode - Currently Upmixing:** With upmixer enable set to **Auto**, indicates selected channels designated as **Center**, **LFE**, **Left Surround**, and **Right Surround** are clear for use (as described above); upmixer is currently up-mixing received stereo pair and overwriting the six selected channels with new 5.1 upmix. • **Auto Mode - Currently Bypassed:** With upmixer enable set to **Auto**, indicates selected channels designated as **Center**, **LFE**, **Left Surround**, and **Right Surround** have content (such as existing original 5.1 or other content); upmixer is bypassed (disabled) and allows normal passage of six selected channels. • **Upmixing:** Indicates upmixer is manually enabled (set to Always Upmix) and is currently up-mixing received stereo pair and overwriting the six selected channels with new 5.1 upmix. • **Bypassed:** Indicates upmixer is manually disabled (set to Bypass) and is currently passing all selected channels unaffected.
• Auto Crossfade Speed Controls 	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. 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.

Table 3-2 9035 Function Submenu List — continued

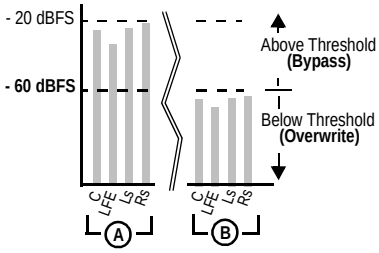
Audio Mixing	**(continued)**
• 5.1 Detection Threshold Control 	Adjusts the threshold at which selected channels designated as C, LFE, Ls, and Rs are considered to have viable content, or at which signal levels can be considered insignificant when upmixer enable is set to **Auto**. Setting affects automatic enable/bypass of 5.1 upmix function as follows: • If detected signal level on **all four** of the selected channels designated as Center, LFE, Left Surround, and Right Surround are **below** the level threshold set using the **5.1 Detection Threshold** control, upmixer allows **overwrite** of all six selected channels with the new 5.1 signal complement. • If detected signal level on **any of the four** of the selected channels designated as Center, LFE, Left Surround, and Right Surround is **above** the level threshold set using the **5.1 Detection Threshold** control, upmixer is **bypassed**, thereby releasing the selected six channels and allowing the original channels to pass unaffected. (Range is -150 dB to 0 dB in 0.1dB steps; 0 dB equivalent to +24 dBu=> 0 dBFS) Typically, the **5.1 Detection Threshold** control should be set to provide a usable threshold that maintains a threshold at which valid levels large enough over the threshold **disable** the auto upmix (Ⓐ, left), while nuisance levels considerably below the threshold (Ⓑ, left) are rejected, allowing the upmixer to stay locked in the enabled mode and **overwrite** these signals with the new signals.  Optimum setting is dependent on program material general overall levels. A -60 dB setting is recommended for material closely adhering to the SMPTE -20 dBFS Alignment level for normal material such as dialog.
• Center Width Control 	Adjusts center channel content (in terms of percentage) applied to L and R channels. • Minimum setting keeps all L+R (mono) content confined to center (C) channel, with any center channel content removed from L and R channels. • Higher settings progressively blend respective L and R mono content back into L and R channels, with 100% setting resulting in center channel level going to zero and L/R channels becoming normal L/R channels containing some mono content. (0% to 100% range in 0.1% steps; default = 0%)
• Surround Depth Control 	Adjusts surround channel content (in terms of percentage) applied to Ls and Rs channels. • Maximum setting results in greatest surround channel levels. • Lower settings progressively diminish surround channel levels, with 0% setting resulting in no Ls or Rs level, with Ls and Rs content progressively folded back into L and R, respectively. (0% to 100% range in 0.1% steps; default = 100%)

Table 3-2 9035 Function Submenu List — continued

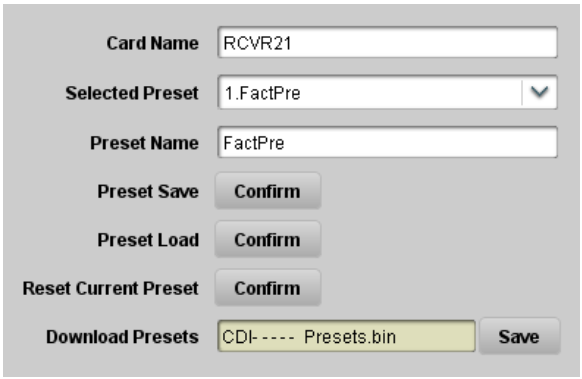
Licensable Features	Allows activation of optional licensed features.
Note: For card pre-ordered with licensed feature(s), the activation steps described below are not required; the feature will already be installed activated. To order features and obtain a license key, contact Cobalt® sales at sales@cobaltdigital.com or at the contact information in Contact Cobalt Digital Inc. in Chapter 1, "Introduction". Please provide the "SSN" number of your card (displayed in the Card Info pane) when contacting us for your key.	
• License Feature and Key Entry window 	Activate licensable feature as described below. 1. Enter the feature key string in the **Feature Key** box. Press return or click outside of the box to acknowledge entry. **Note:** Entry string is case sensitive. Do not enter any spaces. 2. In the DashBoard™ Card Info pane, wait for the feature identification to be shown for the card product number (for example, "-UM" appearing after the card part number) and **Valid Key Entered** to be displayed. This indicates the key was correctly entered and recognized by the card. **Note:** If DashBoard™ card function submenu/control pane does not re-appear, close the card and re-open it. 3. Click and confirm **Reboot**. When the card function submenu/control pane appears again, the licensable feature will be available. **Note:** Applying the licensable feature and its reboot has no effect on prior settings. All control settings and drop-down selections are retained.
Presets	This function 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.
	The **Preset Name** field and **Preset Save** button allow custom user setting configurations to be labeled and saved to a Preset for future use. 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. Saved presets can be uploaded to a computer for use with other same-model COMPASS™ cards. Each of the items to the left are described in detail on the following pages.

Table 3-2 9035 Function Submenu List — continued

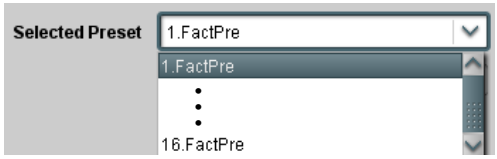
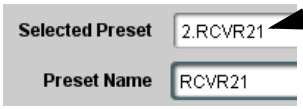
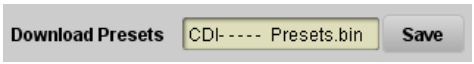
Presets	**(continued)**
• **Preset Save and Load** 	• **Preset Save** stores all current card control settings to the currently selected preset. (For example, if Preset 1 is selected in the Selected Preset drop-down list, clicking and confirming Preset Save will then save all current card control settings to Preset 1) • **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. (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) The above buttons have a **Confirm?** pop-up that appears, requesting confirmation. **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.
• **Selected Preset** 	**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). **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.
• **Card Name** 	Text entry field provides for optional entry of card name, function, etc. (as shown in this example). **Note:** Card name can be 31 ASCII characters maximum.

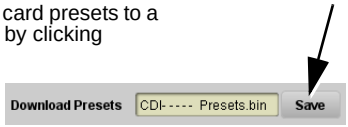
Table 3-2 9035 Function Submenu List — continued

Presets	(continued)
• **Reset Current Preset** 	**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. The above button has a **Confirm?** pop-up that appears, requesting confirmation.
• **Preset Name** 	With one of 16 presets selected, provides for entry of custom name for the preset (as shown in example below).  Entering text in Preset Name field (in this example, "RCVR21") applies custom name to selected Preset (in this example, Preset 2) **Note:** • Preset name can be seven ASCII characters maximum. • The Preset ID number does not need to be entered; it is added automatically.
• **Download Presets** 	Download Presets allows all 16 presets to be stored to a specified location on a network computer for use with other same-model COMPASS® cards.

Download a presets file to a computer on the card's DashBoard network to save presets. Preset files stored on a computer can then be uploaded back to the card.

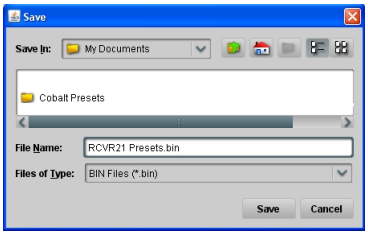
Note also that a presets file can **also be uploaded to other same-model COMPASS® cards**. In this manner, presets built up using a single card can be easily applied to other same-model cards without repeating the setup work on the other cards.

Download (save) card presets to a network computer by clicking **Download Presets – Save** at the bottom of the Presets page.

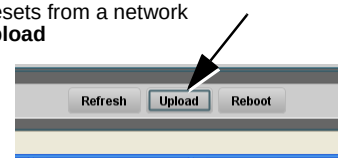


Browse to a desired save location (in this example, *My Documents\Cobalt Presets*).

The file can then be renamed if desired (*RCVR21 Presets* in this example) before saving.

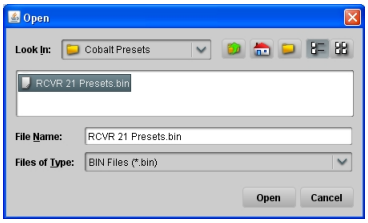


Upload (open) card presets from a network computer by clicking **Upload** at the bottom of DashBoard.



Browse to the location where the file was saved on the computer or drive (in this example, *My Documents\Cobalt Presets*).

Select the desired file and click **Open** to load the file to the card.



To upload presets saved from one card to another same-model card, simply click **Upload** on the other same-model card's DashBoard page and repeat the same steps here.

Note: • Preset transfer between card download and file upload is on a **group** basis (i.e., individual presets cannot be downloaded or uploaded separately).

• After uploading a presets file, engagement of a desired preset is only assured by pressing the Preset Load button for a desired preset.

Audio Routing Example Using DashBoard™

Figure 3-6 shows an example of using the 9035 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 external analog and 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.

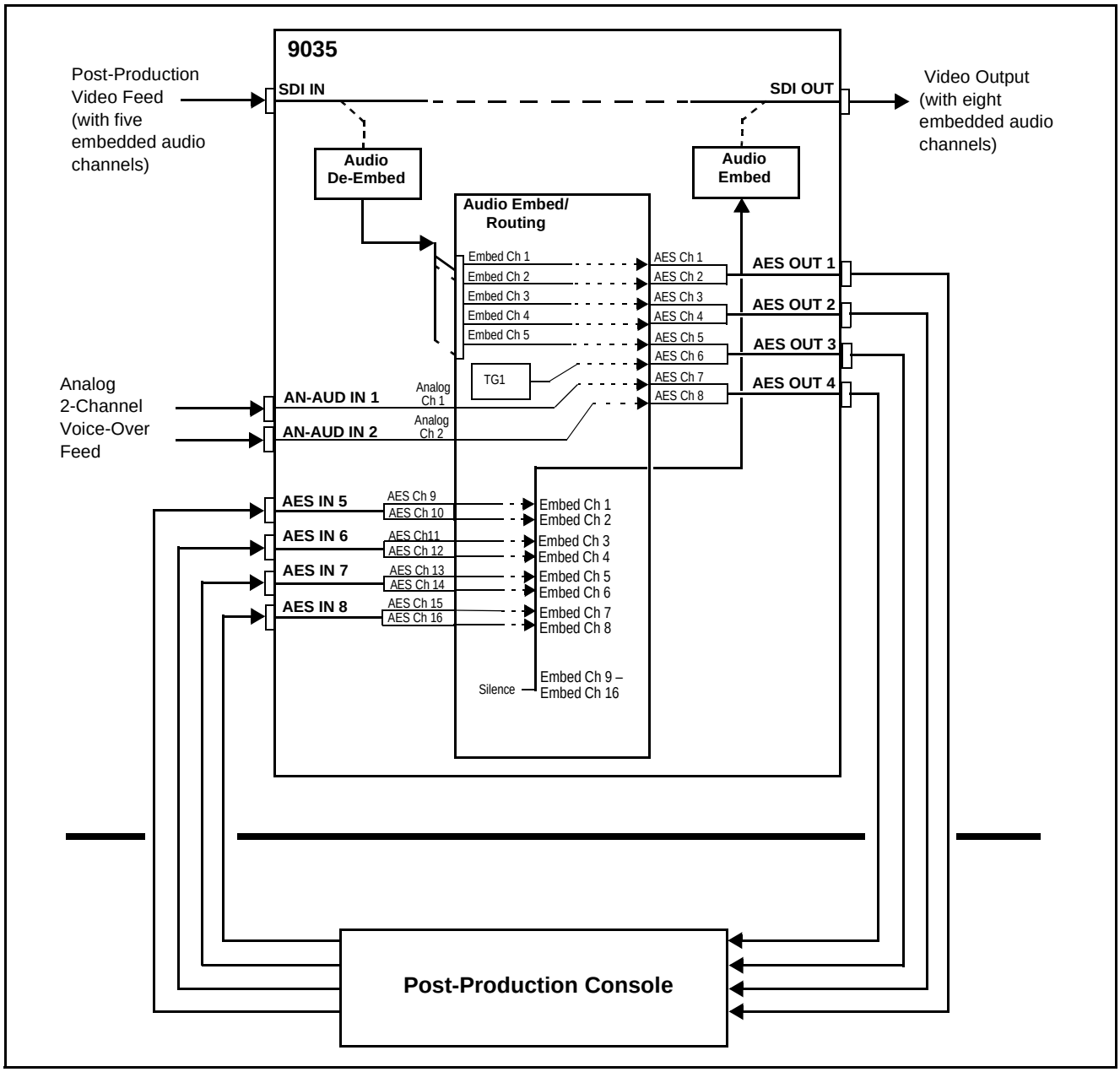
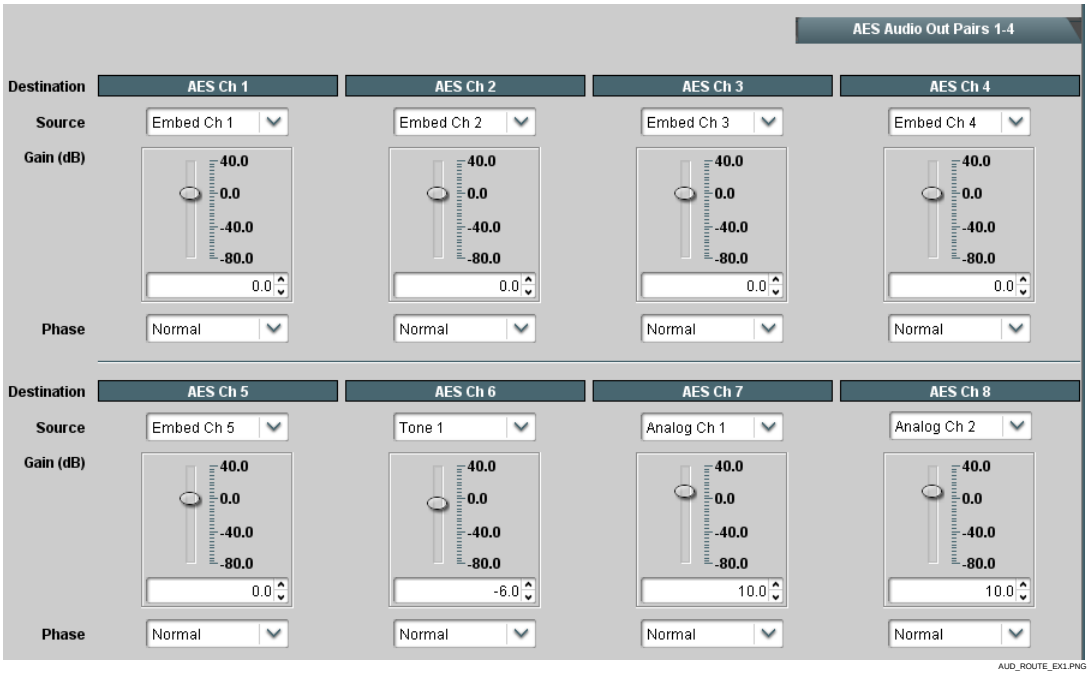
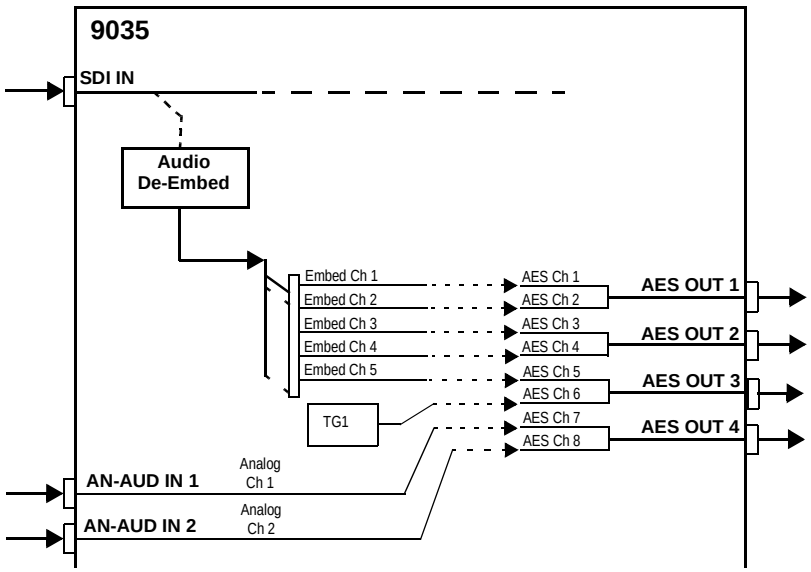


Figure 3-6 Audio Routing Example (Sheet 1 of 3)

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) and two analog inputs are routed to AES channels 6 thru 8, respectively. Figure 3-6 (sheet 2) shows the 9035 control settings (in this example, using the DashBoard™ user interface) that result in this routing.

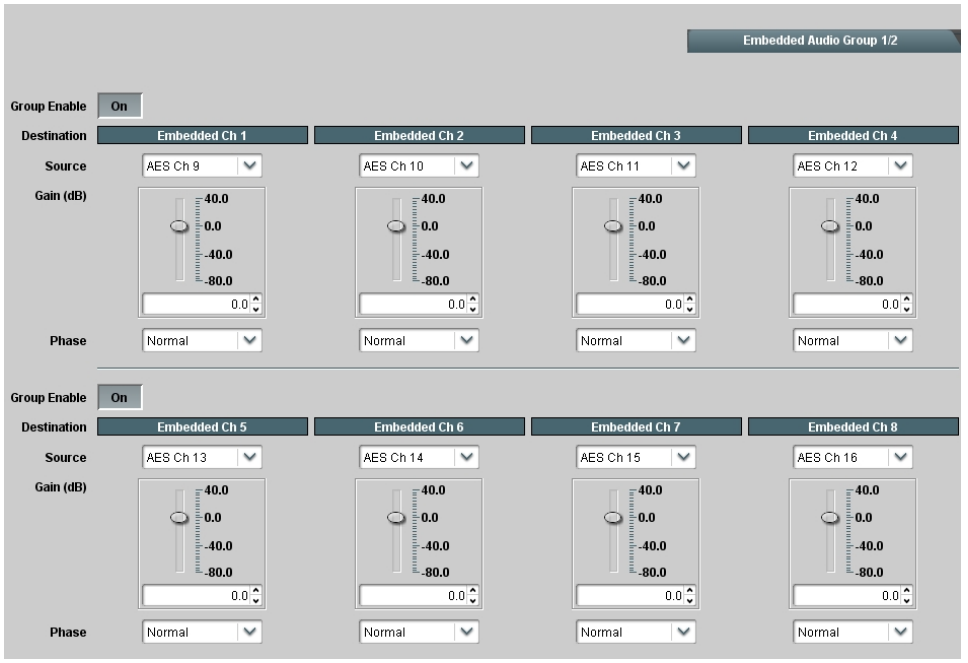


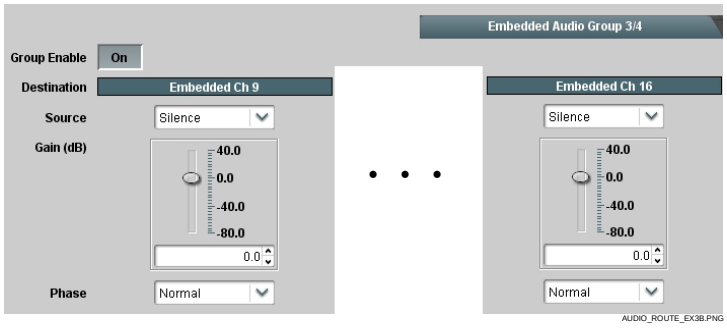


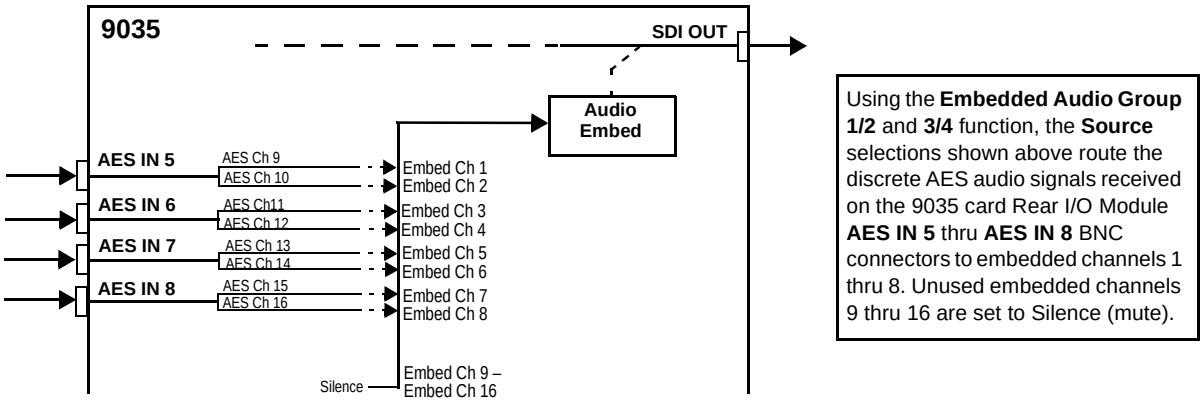
Using the **AES Audio Out Pairs 1-4** function, the **Source** selections shown above route the selected sources to discrete AES channels 1 through 8. These discrete outputs are then available on the 9035 card Rear I/O Module **AES OUT 1** thru **AES OUT 4** BNC connectors.

Figure 3-6 Audio Routing Example (Sheet 2 of 3)

The discrete AES audio on AES channels 9 thru 16 is now re-embedded using the 9035 control settings shown in Figure 3-6 (sheet 3).







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 9035 card Rear I/O Module **AES IN 5** thru **AES IN 8** BNC connectors to embedded channels 1 thru 8. Unused embedded channels 9 thru 16 are set to Silence (mute).

Figure 3-6 Audio Routing Example (Sheet 3 of 3)

Dolby® E Processing and Routing Example (9035-DEC only)

Figure 3-7 shows an example of using the 9035-DEC **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 9035-DEC **DOLBY META** output.

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

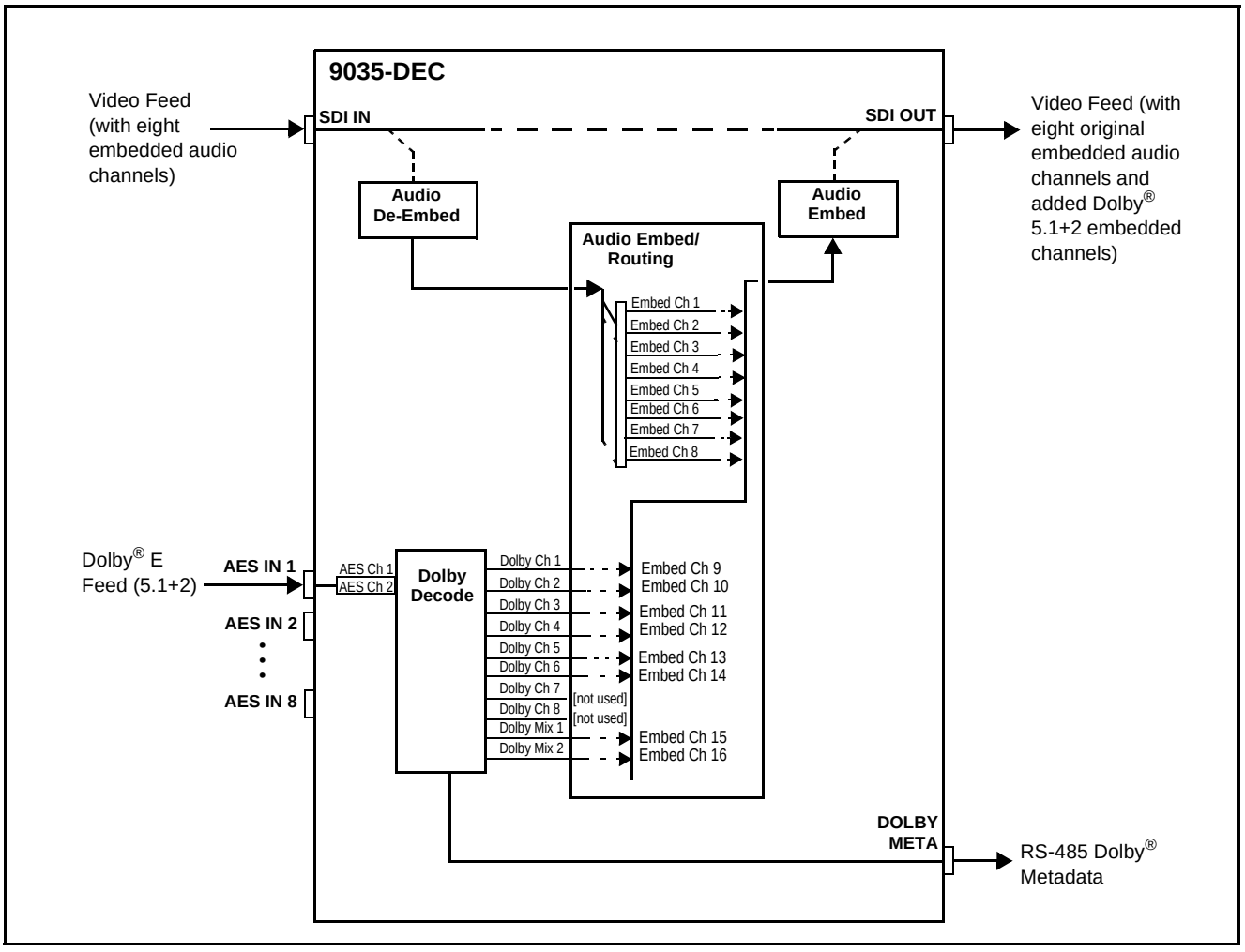
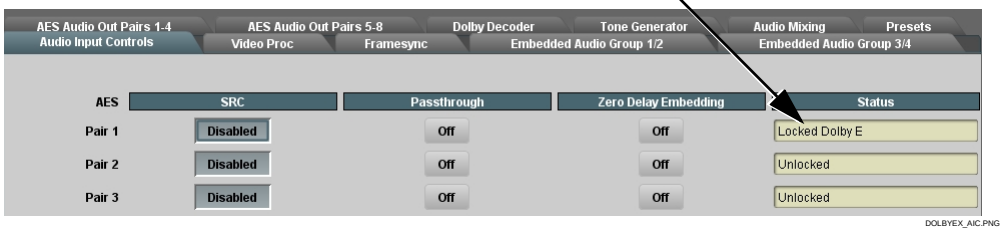
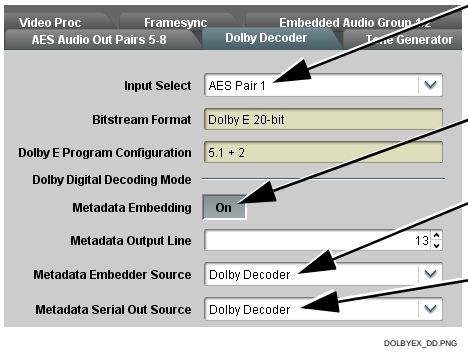


Figure 3-7 Dolby® E Processing Example (Sheet 1 of 2)

In the example here, Dolby® E 5.1+2 data on AES pair 1 is to be decoded and embedded (using spare embedded channels 9 thru 16) along with the existing embedded audio channels (embedded channels 1 thru 8). Figure 3-7, sheet 2 shows the 9035-DEC control settings (using DashBoard™) that result in this routing.

Using the Status display in the **Audio Input Controls** function, AES Pair 1 shows locked Dolby® E data.



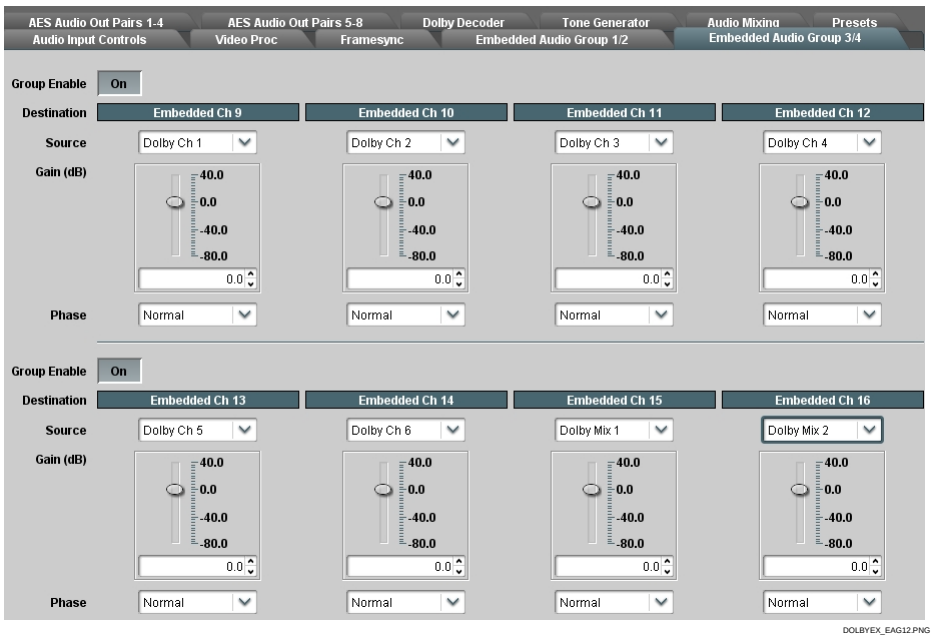


AES Pair 1 is then selected as the **Dolby Decoder** Input Select source. The Bitstream Format and Dolby E Program Configuration displays also show this signal as Dolby® E; 5.1+2

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

Metadata Embedded Source = **Dolby Decoder** selects decoder metadata as the source for embedded metadata.

Metadata Serial Out Source = **Dolby Decoder** selection also routes the decoder metadata to the **DOLBY META** RS-485 output.



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 3-7 Dolby® E Processing Example (Sheet 2 of 2)

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9035 card. The 9035 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 9035 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9035 card is being used (i.e, standalone or network controlled through DashBoard™ or a Remote Control Panel), check all available indications in the event of an error or failure condition.

The various 9035 card and remote control error and failure indicators are individually described below.

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

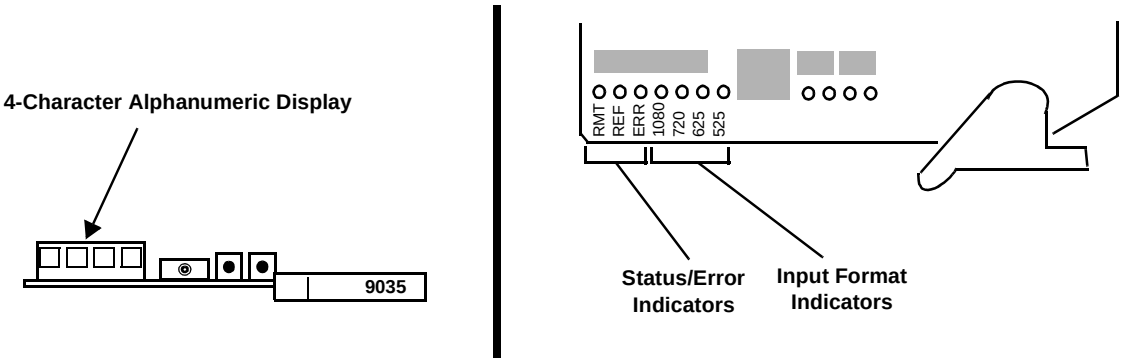
• Basic Troubleshooting Checks (p. 3-56)

• 9035 Processing Error Troubleshooting (p. 3-57)

• Troubleshooting Network/Remote Control Errors (p. 3-60)

9035 Card Edge Status/Error Indicators and Display

Figure 3-8 shows and describes the 9035 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.



Item	Function
Alphanumeric Display	Displays 4-digit alphanumeric code indicating status or errors as follows: • **E0XX:** Video Errors • **E002:** Video Acquiring Lock • **E1XX:** Audio Errors • **E100:** Analog Input Clipping • **E2XX:** Frame Sync Errors • **E200:** Reference is Incompatible with Input Video • **E201:** Reference Standard is Invalid/No Reference Present • **E202:** Reference Standard is 720p2398 (a reference standard not supported by the framesync) • **E203:** Reference Standard is 720p2997 (a reference standard not supported by the framesync)
RMT LED	Blue LED flashes when 9035 is receiving control message from remote network control (e.g., DashBoard™ or Cobalt® Remote Control Panel)
REF LED	Blue LED illuminates indicating 9035 is receiving valid reference when set up for framesync operation.
ERR LED	Red LED illuminates when 9035 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 9035 (1080, 720, 625, 525). Continuous cycling of the LEDs indicates the 9035 has not locked onto a particular format (as in the case of no signal input).

Figure 3-8 9035 Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-9 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9035 card itself and remote (network) communications.

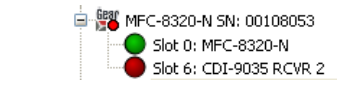
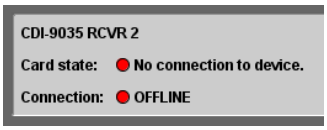
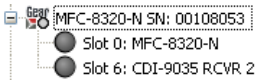
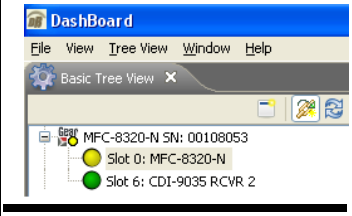
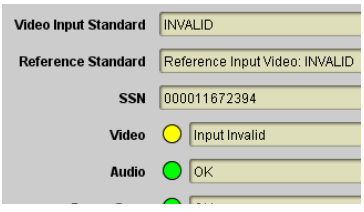
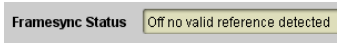
Indicator Icon or Display	Error Description
	Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9035 card in slot 6).
	Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9035 card is not connecting to frame/LAN).
	If the 9035 card is not connecting to the frame or LAN, all controls are grayed-out (as shown in the example here).
	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 9035 card in slot 6 and the MFC-8320-N Network Controller Card for its frame in slot 0 are not being seen).
	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).
	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.
	Yellow indicator icon in 9035 Card Info pane shows error alert, along with cause for alert (in this example, the 9035 is receiving no video input, or a video input that is invalid for the card and/or its current settings).
	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).

Figure 3-9 DashBoard™ Status Indicator Icons and Displays

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 3-10).

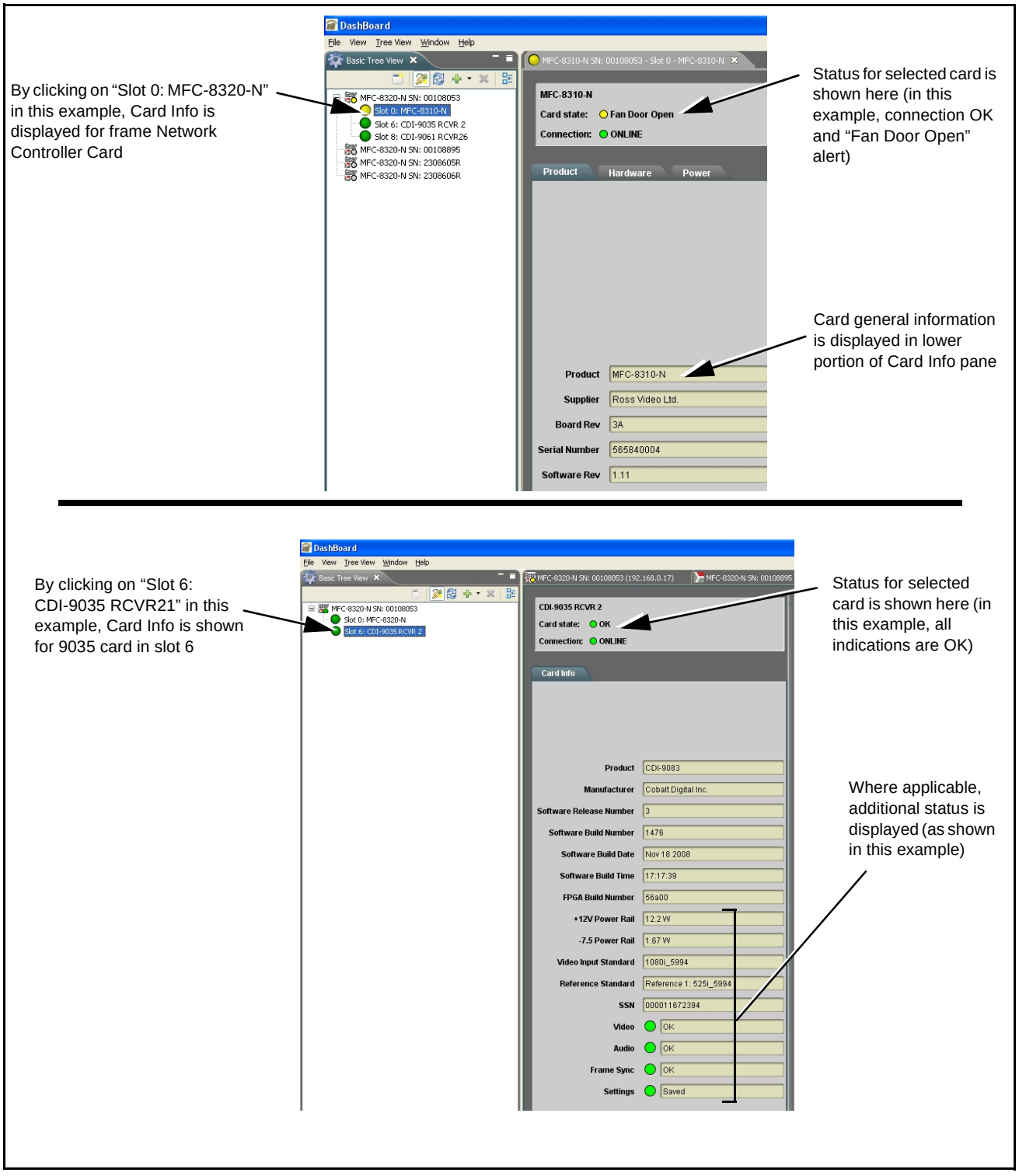


Figure 3-10 Selecting Specific Cards for Card Info Status Display

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 3-3 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 3-3 Basic Troubleshooting Checks

Item	Checks

Verify power presence and characteristics	• On both the frame Network Controller Card and the 9035, 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.
	• Check the Power Consumed indications for both the +12 V and -7.5 V supply rails for the 9035 card. This can be observed using the DashBoard™ Card Info pane, or using the card edge controls and indicators as shown in Figure 3-4 on page 3-7.
	  • If either of the rail supplies show **no** power being consumed, either the frame power supply, connections, or the 9035 card itself is defective.
	  • If either of the rail supplies show **excessive** power being consumed (see Technical Specifications (p. 1-22) in Chapter 1, “Introduction”), the 9035 card may be defective.

Check Cable connection secureness and connecting points	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.
Card seating within slots	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.)
Check status indicators and displays	On both DashBoard™ and the 9035 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.
Troubleshoot by substitution	All cards within the frame can be hot-swapped, replacing a suspect card or module with a known-good item.

9035 Processing Error Troubleshooting

Table 3-4 provides 9035 processing troubleshooting information. If the 9035 card exhibits any of the symptoms listed in Table 3-4, follow the troubleshooting instructions provided.

In the majority of cases, most errors are caused by simple errors where the 9035 is not appropriately set for the type of signal being received by the card.

Note: 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 9035 card edge status indicators.

Note: Where errors are displayed on both the 9035 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
• **DashBoard™** shows **Video** yellow icon and Input Invalid message in 9035 Card Info pane.  • Card edge **Input Format** LEDs show continuous cycling.	• No video input present	• Make certain intended video source is connected to appropriate 9035 card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
	• Input Video Preference selection may be incorrect for received input video	• Make certain input video preference is set to properly accommodate all intended types of video input to be received. Refer to **Video Signal Controls** function submenu tab on page 3-10 for more information.
• **DashBoard™** shows **Frame Sync** red icon and Reference Invalid message in 9035 Card Info pane.  • Card edge red **ERR** indicator illuminated.	Frame sync reference not properly selected or not being received	• 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 20-slot frame bus. (External reference signals Reference 1 and Reference 2 are distributed to the 9035 and other cards via a frame bus.) Refer to **Framesync** function submenu tab on page 3-16 for more information.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

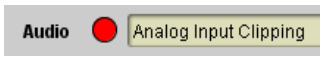
Symptom	Error/Condition	Corrective Action
DashBoard™ shows **Framesync Status** error message in 9035 Framesync function submenu screen. 	Specified Minimum Latency Frames setting exceeds 9035 card buffer space for the selected output video format	• Reduce the Minimum Latency Frames setting as specified in the error message to correct the error. **Note:** Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. 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.
Video/audio synchronization or delay noted.	Source synchronization condition	• Use the **Video Audio Delay Offset Control** to compensate for video/audio delay. Refer to **Framesync** function submenu tab on page 3-16 for more information.
Unsmooth, “jerky” motion observed on video output with Framesync set to lock to input video.	Incompatible negative H/V delay value user setting of Vertical Delay or Hoeizontal Delay controls	Negative vertical or horizontal delay values (using the controls below) should **not** be used when using Input Video mode. To add an offset in this case, instead apply a positive value that results in the desired net offset.
Analog VITC waveform timecode not received and/or processed.	Card erroneously set for NTSC signal with 0 IRE of setup with input containing setup.	If analog VITC timecode source contains 7.5 IRE of setup, make certain **Video Signal Controls** –> **NTSC Contains** is set to **7.5 IRE of Setup**. If this is not done, analog VITC waveform may not be received and processed by the card.
• **DashBoard™** shows red **Audio** icon and Analog Input Clipping message in 9035 Card Info pane.  • Card edge display shows code E101 .	Analog peak audio input on selected input exceeds +24 dBu level	• Reduce analog audio level at the source. **Note:** 9035 audio gain controls cannot be used to correct analog input overload condition. The condition must be corrected at the source.
(9035-DEC only) Dolby® data indicated as **Locked** 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.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
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 3-11 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.
	• **(9035 only)** Embedded or AES audio contains Dolby® E or Dolby Digital encoded signal	• 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 (disabled) along with gain and polarity controls being bypassed (even though controls may appear to be functional). Gain and polarity controls are not available for this signal type. Refer to Status Displays in **Audio Input Controls** function submenu tab on page 3-11 for more information.
Audio not processed or passed through card.	• Input audio of type that cannot be locked by 9035 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 “Locked Professional” as being locked (such as “Consumer Locked”), 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.
	• 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. See Setting I/O Switches for AES I/O (1-4) Ports (p. 2-1) in Chapter 2,“ Installation and Setup” for more information.
	• Dolby-encoded pair not recognized by downstream devices/systems	• If framesync is enabled and using Input Video as source, **Audio SRC** must be set to **Off** to maintain integrity of Dolby pair for downstream devices.

Troubleshooting Network/Remote Control Errors

Refer to Cobalt® reference guide “COMPASS™ Remote Control User Guide” (PN 9000RCS-RM) for network/remote control troubleshooting information.

In Case of Problems

Should any problem arise with this product that was not solved by the information in this section, please contact the Cobalt Digital Inc. Technical Support Department.

If required, a Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions. If required, a temporary replacement item will be made available at a nominal charge. Any shipping costs incurred are the customer’s responsibility. All products shipped to you from Cobalt Digital Inc. will be shipped collect.

The Cobalt Digital Inc. Technical Support Department will continue to provide advice on any product manufactured by Cobalt Digital Inc., beyond the warranty period without charge, for the life of the product.

See Contact Cobalt Digital Inc. (p. 1-28) in Chapter 1, “Introduction“ for contact information.

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