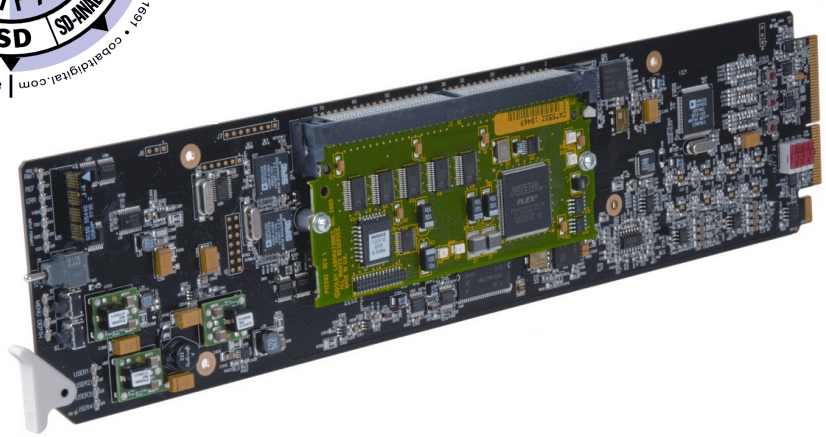
9033



Input Processing Analog to Digital Video Converter with Audio Embedding and Dolby® Decoding Option

Product Manual

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9033-OM (V4.0)

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Trademark Information

Congratulations on choosing the Cobalt® 9033 Input Processing Analog to Digital Video Converter with Audio Embedding. (9033-SD is a functionally identical SD-only version.) The 9033 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 9033, please contact us at the contact information on the front cover.

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Description of product/manual changes:	- New manual design with added GUI sections. - Update to add new Rear I/O Modules. - Revise manual for latest functionality with latest firmware.

Table of Contents

Chapter 1

Introduction

Overview

This manual provides installation and operating instructions for the 9033 Input Processing Analog to Digital Video Converter with Audio Embedding and Dolby® Decoding Option card (also referred to herein as the 9033).

Note: This manual also covers the 9033-DEC, which is the 9033 card equipped with Dolby® decoding as an option. Where applicable, descriptions related exclusively to either the 9033 or the 9033-DEC are respectively denoted by **(9033 only)** or **(9033-DEC only)**. In all other aspects, both the 9033 and 9033-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 9033.
- **Chapter 2, "Installation and Setup"** – Provides instructions for installing the 9033 in a frame, and optionally installing 9033 Rear I/O Modules.
- **Chapter 3, "Operating Instructions"** – Provides overviews of operating controls and instructions for using the 9033.

This chapter contains the following information:

9033 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 9033 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** 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 9033 itself. Examples are provided below.

- Card-edge display messages are shown like this:

  Ch01

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

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

- **9033** refers to the 9033 Input Processing Analog to Digital Video Converter with Audio Embedding and Dolby® Decoding Option card.
- **Frame** refers to the 8321 (or similar) frame that houses the Cobalt® COMPASS® 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 9033 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 9033 has a moderate power dissipation (12 W). 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) is installed before installing the 9033 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.**

9033 Functional Description

Figure 1-1 shows a functional block diagram of the 9033. The 9033 includes a full 16-channel audio embedder that receives either 8-pair AES or 8-channel balanced analog audio inputs. The 9033 can also route any audio source to an 8-pair AES output. The 9033 also handles AFD code insertion and transfer of Dolby® metadata.

(9033-DEC only) The 9033-DEC also performs Dolby® E and Dolby® Digital™ decoding and decoded channel routing.

(9033-SD only) The 9033-SD is functionally equivalent to the 9033, except that it is limited to SD analog video input, processing, and associated controls.

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. 1-14) for user interface descriptions.

9033 Input/Output Formats

The 9033 provides the following inputs and outputs:

- **Inputs:**
  - **Y/Cmpst IN**, **Pr/C IN**, **Pb IN** – analog composite/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** – RS-485 Dolby® metadata output (extracted from input video). **(9033-DEC only)** RS-485 Dolby® metadata output can consist of input video or Dolby® decoder metadata output.

Note: The input/output complement listed above represents the maximum capability of the 9033. The practical input/output complement is determined by the particular Rear I/O Module used with the 9033. Refer to 9033 Rear I/O Modules (p. 1-16) for more information.

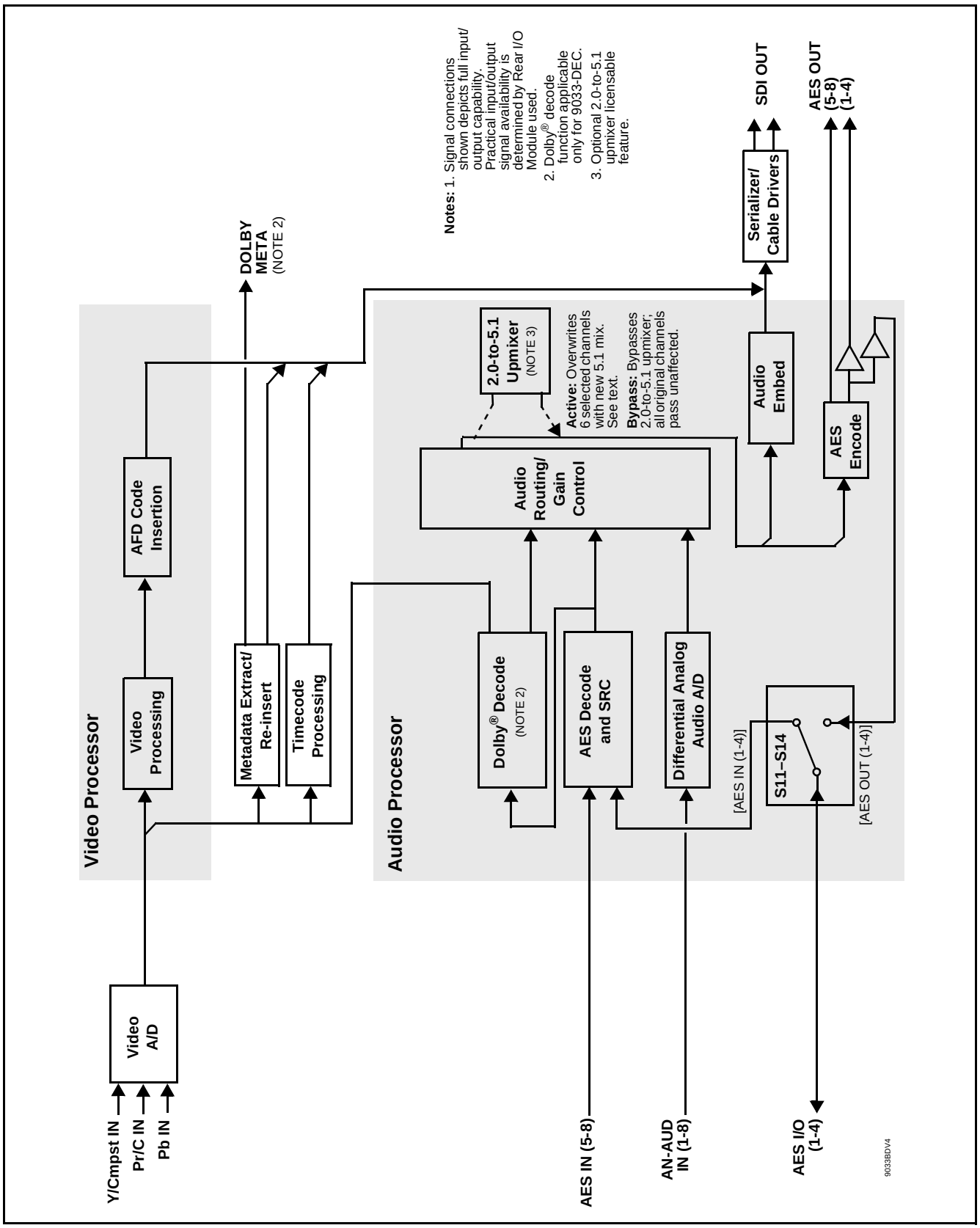

Figure 1-1 9033 Functional Block Diagram

Video Processor Description

Video Processor

The 9033 provides full color processing control (luma gain and lift, chroma saturation, and color phase) of the output video.

AFD Inserter

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

When used in conjunction with a separate downstream card capable of providing AFD-directed scaling, the image can in turn be scaled in accordance with the AFD coding embedded by this card.

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

Dolby® Metadata Extractor/Re-inserter (9033-DEC only)

This function allows Dolby® metadata from the Dolby decoder, to be inserted in the output SDI. The extracted metadata is buffered and then output on a user-selectable line number on the SDI output, and on an RS-485 port on cards equipped with an appropriate Rear I/O Module.

Timecode Processor

(See Figure 1-2.) This function provides for extraction of timecode data from the input video (for SD formats), and in turn re-insertion of timecode data into the output SDI. Timecode insertion (depending on raster format) can select and prioritize among SDI VITC, SDI ATC VITC, and SDI ATC LTC timecode sources.

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

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 AES input.

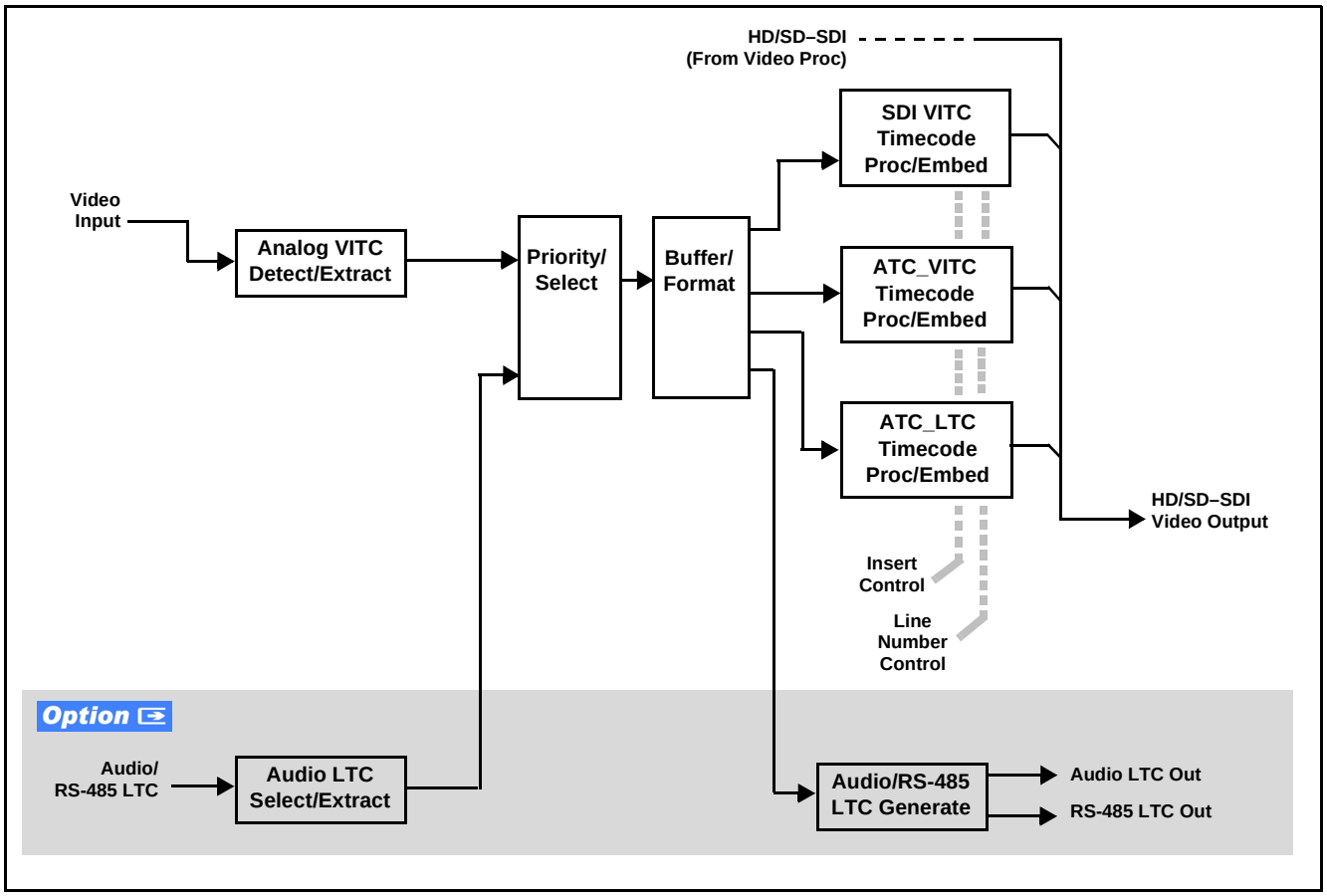

Figure 1-2 Timecode Processor

Audio Processor Description

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

- 16 channels (8 pairs) of discrete AES input
- 8 channels of balanced analog audio input
- Four independent internal tone generators (described below)
- Digital silence (mute) setting
- Internal Down Mix and Mono Mixer outputs (described below)
- **(9033-DEC only)** Decoded Dolby® channels

The router function provides the following audio outputs:

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

The router acts as a full audio cross point. Each of the 32 output channels (16 embedded, 16 discrete AES) can receive signal from any one of the 16 AES or 8 analog input channels, four internal tone generators, or several mixer outputs. Unused output channels can be mapped to a “Silence” source. Each output also provides gain adjustment and selectable polarity inversion.

Output audio rates are always 48 kHz locked to output video, but discrete AES inputs can pass through the sample rate converters to align these inputs with the output timing. (AES must be nominally 48 kHz input; 32, 44.1, 96, and 192 kHz inputs are not compatible with the 9033.) 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 9033 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 9033 card.

Audio Down Mixer and Mono Mixer Function

(See Figure 1-3.) The Audio Down Mixer function provides for the selection of any AES discrete, analog audio (or Dolby decoder where equipped) sources serving as Left (**L**), Right (**R**), Center (**C**), Left Surround (**Ls**), and Right Surround (**Rs**) individual signals to be multiplexed into a stereo pair (Down Mix Left (**DM-L**) and Down Mix Right (**DM-R**)). 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.

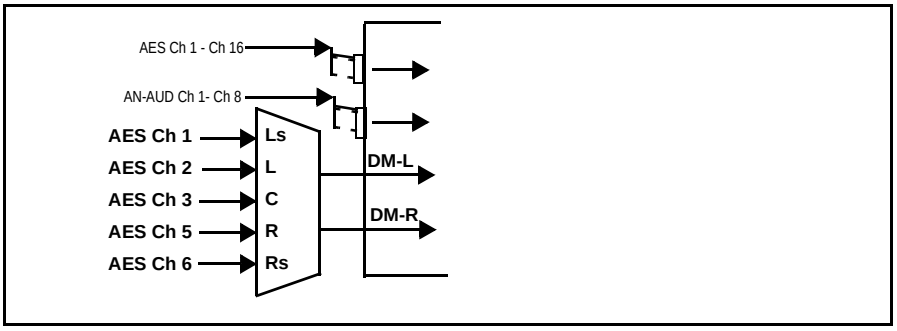

Figure 1-3 Audio Mixing Functional Block Diagram with Example Sources

The Mono Mixer function (Figure 1-4) generates an additional mono-mixed channel from two selected AES, analog (or Dolby decoder where equipped) input channels serving as left and right inputs. The resulting mono mix channel **MONO** can in turn be routed and processed just like any of the other audio sources described earlier.

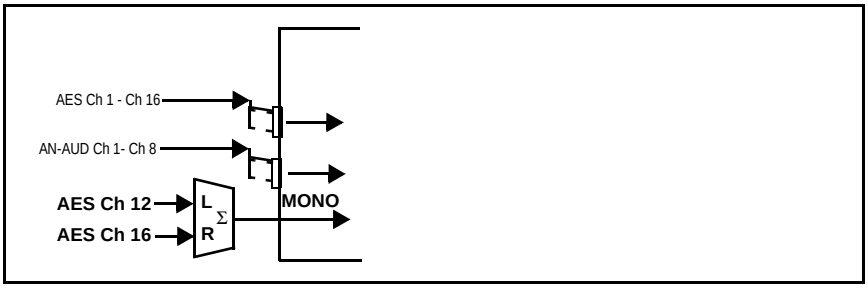

Figure 1-4 Audio Mono Mix Functional Block Diagram with Example Sources

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.

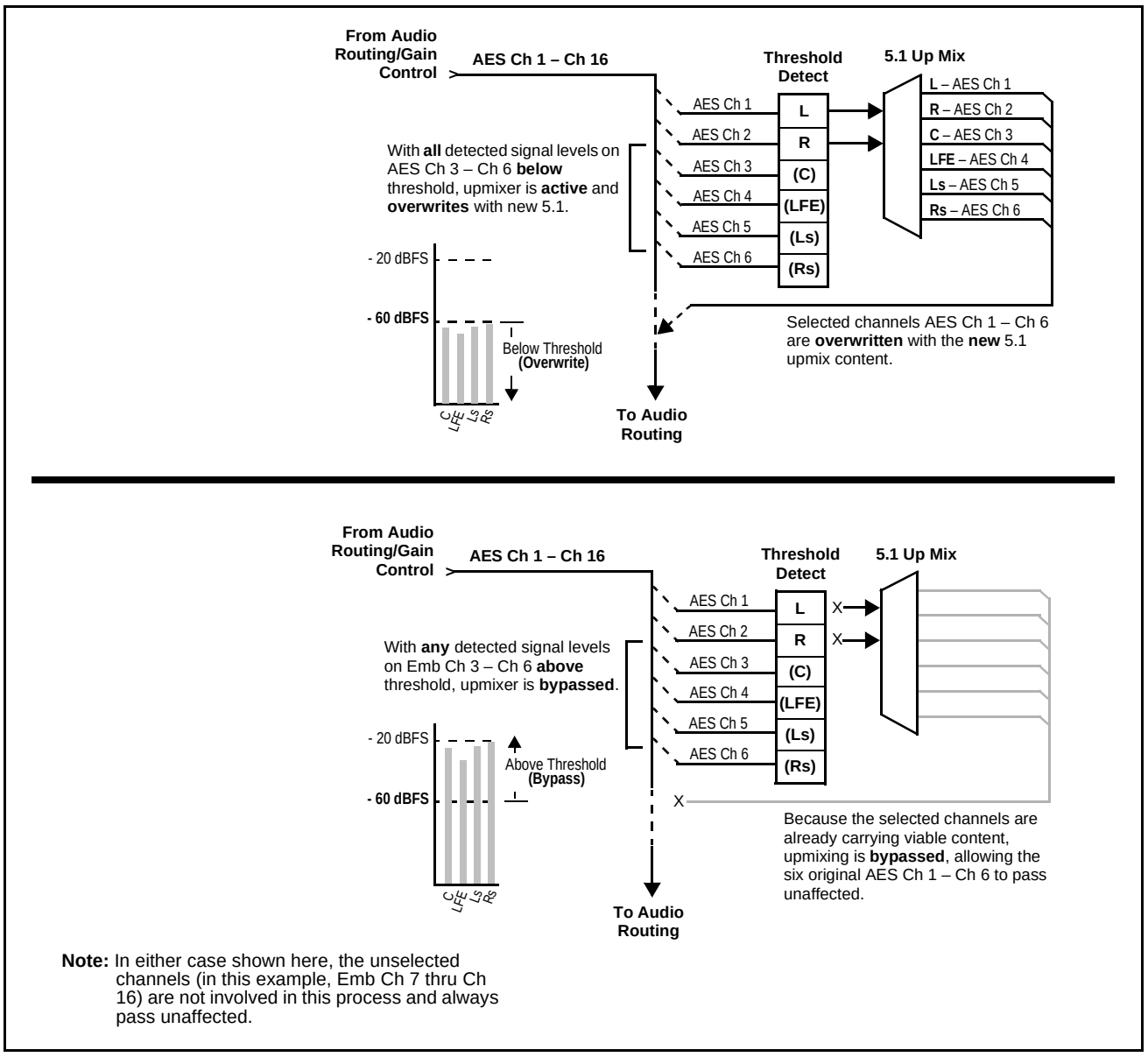

Figure 1-5 Up Mix Auto Enable/Bypass with Example Sources

Tone Generator Function

The 9033 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).

AES Audio Input Advanced Features

AES Sample Rate Converter

The 9033 AES inputs have sample rate converters that can be independently enabled for each AES pair to allow the card to interface with asynchronous AES sources (sources in which AES timing does not match the video input timing). The sample rate converters are set to disabled (bypassed) by default; this is necessary when embedding non-PCM AES audio such as Dolby® E or Dolby® Digital audio streams. When a valid Dolby® E or Dolby® Digital signal (in accordance with SMPTE 337M) is detected on an AES or embedded audio signal, SRC is automatically bypassed along with gain and polarity controls.

Zero-Delay Audio Embedding

In cases where additional delay must be avoided, it may be desirable to embed AES with minimum latency. For example if Dolby® E is to be embedded into video with no latency, additional delay may not be tolerable. Using zero-delay embedding, the video can then be delayed by one frame to account for the Dolby E encoding delay. In this manner, any delay between video and audio can be cleanly contained within one frame period.

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

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

Low-Latency AES Passthrough

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

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

Dolby® Decoding (9033-DEC only) Option

Note: Although the 9033-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 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 1-6.) All AES channels are checked by the 9033-DEC for valid Dolby® status. When a valid Dolby® encoded embedded pair is detected, the channel pair carrying the Dolby® format is displayed as “Present, Dolby E” or “Present, Dolby Digital”, as applicable. (The decoder always uses the metadata associated with its respective pair.) A selected encoded channel pair can then be directed to the Dolby® decoder. The decoder then displays the Dolby® bitstream format and program configuration (for example, “Dolby E 20-bit 5.1+2” indicating 5-channel surround with LFE channel and stereo monitor pair) for the selected pair, as defined by its metadata.

The 9033-DEC can embed metadata on the SDI output. Similarly, the 9033-DEC **DOLBY META** output can provide RS-485 metadata for downstream devices or systems.

Audio Decoding

(See Figure 1-6.) 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.

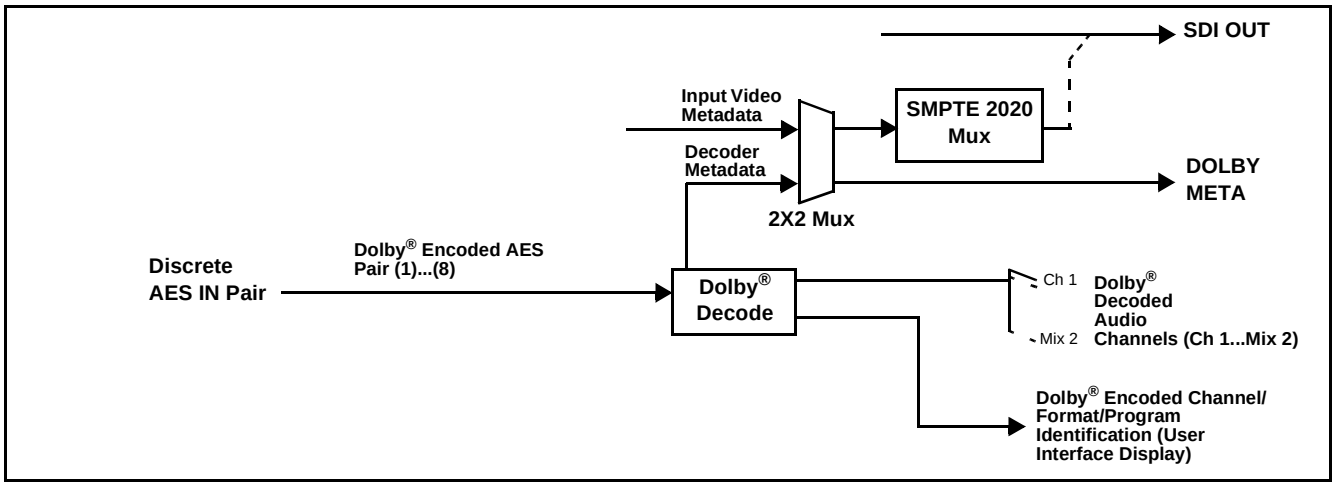

Figure 1-6 Dolby® Decoding and Metadata Output Processing

User Control Interface

Figure 1-7 shows the user control interface options for the 9033. 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.

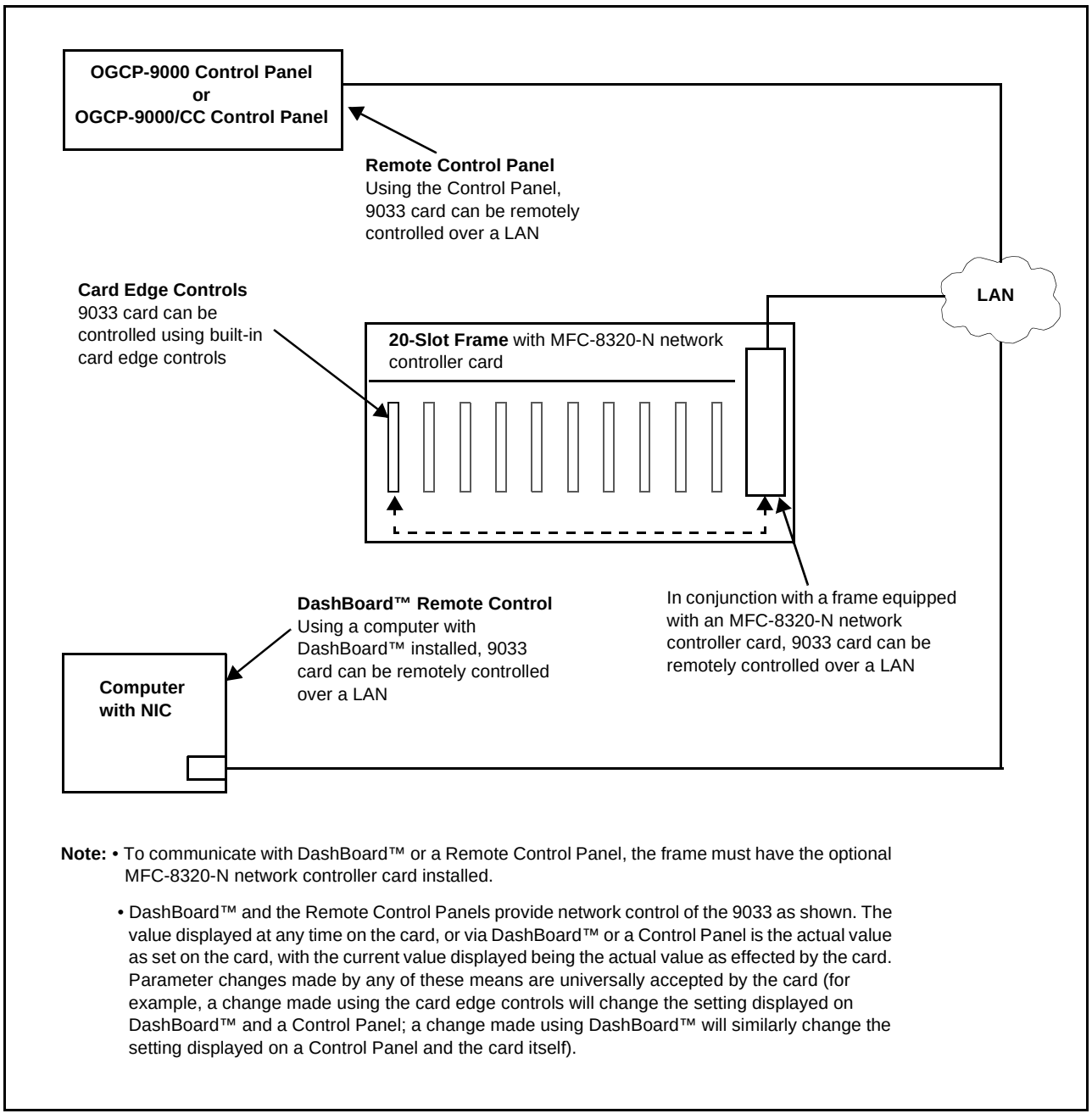

Figure 1-7 9033 User Control Interface

- **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.

Note: Some of the 9033 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 9033 and other cards installed in openGear®[1] frames such as the Cobalt® 8321 or HPF-9000 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. 1-24).

- **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 HPF-9000 or 8321 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.

9033 Rear I/O Modules

The 9033 physically interfaces to system video and audio connections using a Rear I/O Module. Figure 1-8 shows a typical 9033 Rear I/O Module.

All inputs and outputs shown in the 9033 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 9033 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 9033 Rear I/O Modules is shown and described in 9033 Rear I/O Modules (p. 2-6) in Chapter 2, “Installation and Setup”.

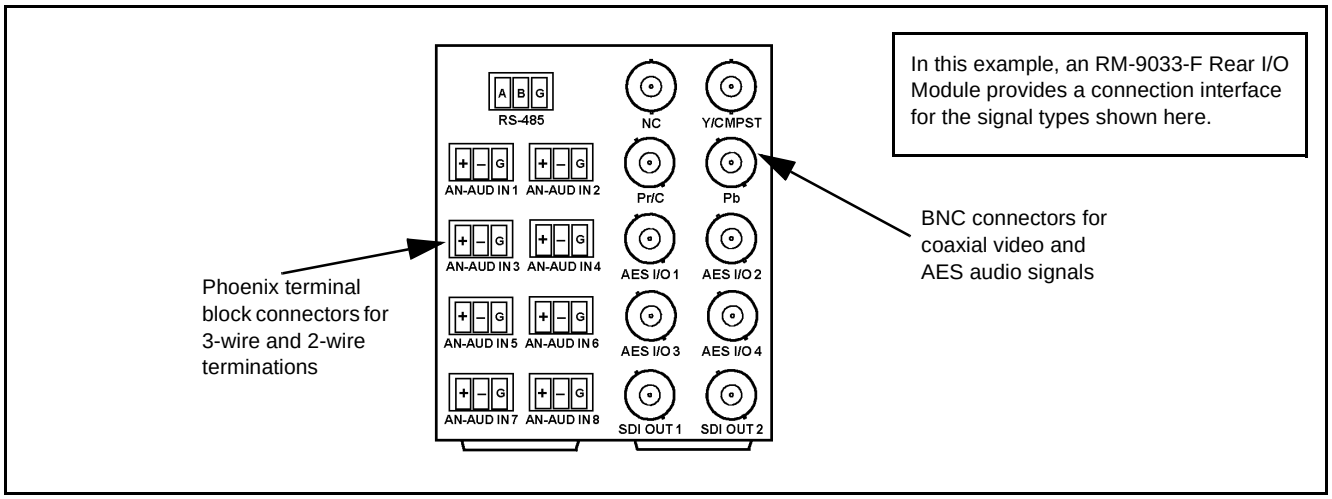

Figure 1-8 Typical 9033 Rear I/O Module

Audio and Video Formats Supported by the 9033

The 9033 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 9033.

Table 1-1 Supported Audio and Video Formats

Item	Description/Specification	
Input / Output Video	Raster Structure:	Frame Rate:
	1080PsF	23.98; 24
	1080p	23.98; 24
	1080i (1)	25; 29.97; 30
	720p	23.98; 24; 25; 29.97; 30; 50; 59.94; 60
	486i (1, 2)	29.97
	575i (1, 2)	25
Embedded Audio	The 9033 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 9033 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 9033 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 9033 does not support AES input at 32 kHz, 44.1 kHz, 96 kHz or 192 kHz rates.	
Discrete AES Audio Output	The 9033 can provide 16 channels (8 pairs) of discrete AES audio on 75Ω BNC connections.	
(9033-DEC only) Dolby® E/ Dolby® Digital™ Audio Input Decode	The 9033-DEC provides up to 10 decoded AES channels when valid Dolby® E or Dolby® Digital™ audio is received on either discrete AES or embedded inputs with corresponding metadata.	

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

(2) 9033-SD support only NTSC and PAL SD rates.

Technical Specifications

Table 1-2 lists the technical specifications for the 9033 Input Processing Analog to Digital Video Converter with Audio Embedding card.

Table 1-2 Technical Specifications

Item	Characteristic
Note: HD specifications apply only to 9033; 9033-SD only accepts and outputs SD signals.	
Part number, nomenclature	• 9033 – Input Processing Analog to Digital Video Converter with Audio Embedding • 9033-DEC – Input Processing Analog to Digital Video Converter with Audio Embedding and Dolby® Decoding Option • 9033-SD is functionally equivalent, but processes only SD analog video with a resulting SMPTE 259M SDI output
Installation/usage environment	Intended for installation and usage in frame meeting openGear® modular system definition.
Power consumption	< 13 Watts (not including Dolby decoder)
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.

Table 1-2 Technical Specifications — continued

Item	Characteristic
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
Resolution	10-bit video data path
Video 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

Table 1-2 Technical Specifications — continued

Item	Characteristic
Post-Processor Serial Digital Video Outputs	Number of Outputs: Two HD/SD-SDI BNC per IEC 60169-8 Amendment 2 (9033-SD is SD only) Impedance: 75 Ω 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): < 0.10 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 at 100 kHz to 6 MHz
	Resolution: 24-bit only Sample Rate: 48 kHz SRC: 32-channel; 142 dB S/N

Table 1-2 Technical Specifications — continued

Item	Characteristic
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
AES Audio Output	Standard: SMPTE 276M Number of Outputs (maximum): 8 unbalanced Output Impedance: 75 Ω Return Loss: > 30 dB 100 kHz to 6 MHz Sample Rate: 48 kHz
RS-485 Metadata I/O	Metadata extracted from input video (per SMPTE 2020-1-2008) or Dolby® decoder (where equipped) on RS-485 interface; 3-wire balanced via Phoenix terminal block connector. With option +LTC, also provides RS-485 LTC input or output.

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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Chapter 2

Installation and Setup

Overview

This chapter contains the following information:

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 9033 are to be used as **outputs** (the switches are set to input mode by factory default). The 9033 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.

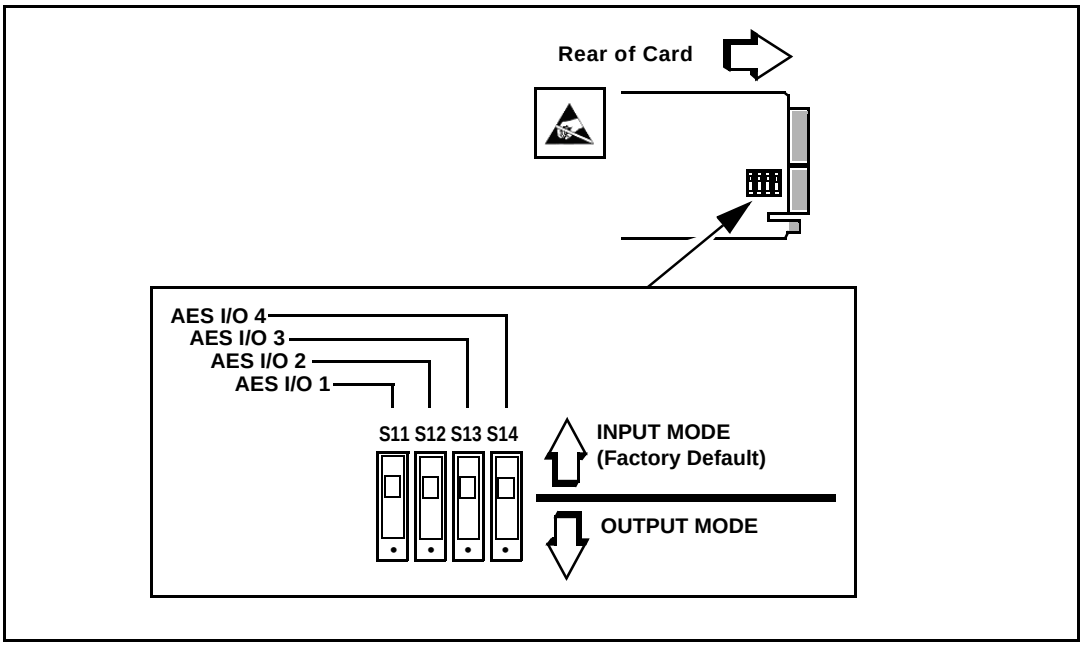


Figure 2-1 9033 AES I/O (1-4) Mode Switches

Installing the 9033 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 9033 has a moderate power dissipation (12 W). 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 9033 in an 8310-C-BNC or 8310-BNC frame** (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, proceed to card installation steps below.
- **If installing the 9033 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. 2-5) for rear I/O module installation procedure.

CAUTION

If required, make certain Rear I/O Module(s) is installed before installing the 9033 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 9033 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 9033 into a frame slot as follows:

1. Determine the slot in which the 9033 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 9033 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 9033 is being installed in a frame using a specific 9033 Rear I/O Module, connect cabling in accordance with the appropriate diagram shown in Table 2-1, "9033 Rear I/O Modules" (p. 2-6).

9. Repeat steps 1 through 8 for other 9033 cards.

Note: The 9033 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 Cobalt® reference guide “COMPASS™ Remote Control User Guide” (PN 9000RCS-RM).

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.

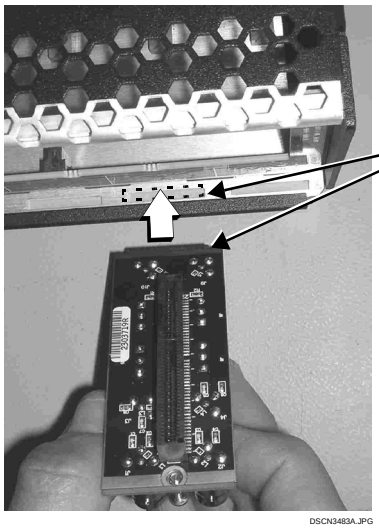
Installing a Rear I/O Module

Note: This procedure is applicable **only if a Rear I/O Module is not currently installed** in the slot where the 9033 is to be installed.

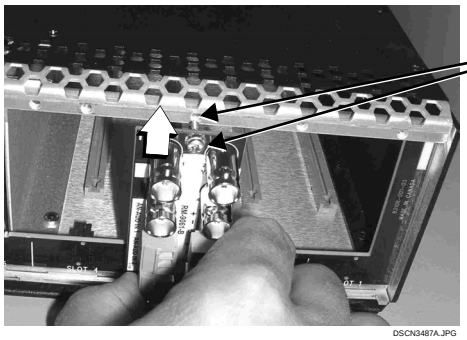
If installing the 9033 in a 8310-C-BNC or 8310-BNC frame (which is pre-equipped with a 100-BNC rear I/O module installed across the entire backplane) or a slot already equipped with a suitable I/O module, omit this procedure.

The full assortment of 9033 Rear I/O Modules is shown and described in 9033 Rear I/O Modules (p. 2-6). Install a Rear I/O Module as follows:

1. On the frame, determine the slot in which the 9033 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 RM-9033-C, -D, -E, and -H occupy two rear module slot mounting locations and use two captive screws.
Rear I/O Module RM-9033-G occupies three rear module slot mounting locations and uses three captive screws.

Figure 2-2 Rear I/O Module Installation

9033 Rear I/O Modules

Table 2-1 shows and describes the full assortment of Rear I/O Modules specifically for use with the 9033.

Notes:
- 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.
- Rear I/O Modules with **DOLBY META** port provide RS-485 port usable for Dolby metadata decoder output (where equipped with option **+DEC**) or serial LTC I/O (where licensed for option **+LTC**).
- RM20-x Rear I/O Modules compatible **only** with 20-slot frames.

Table 2-1 9033 Rear I/O Modules

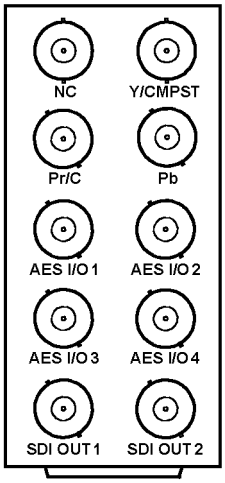
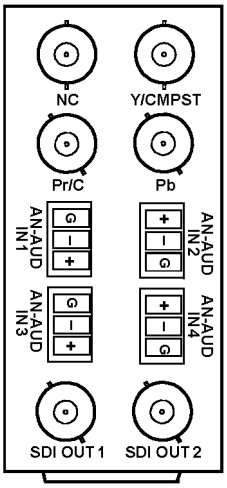
9033 Rear I/O Module	Description
RM20-9033-A 	Provides the following connections: • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable) • Two buffered SDI coaxial outputs (**SDI OUT 1** and **SDI OUT 2**)
RM20-9033-B 	Provides the following connections: • 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 9033 Rear I/O Modules — continued

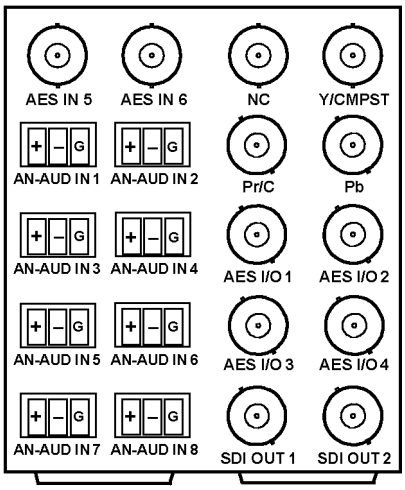
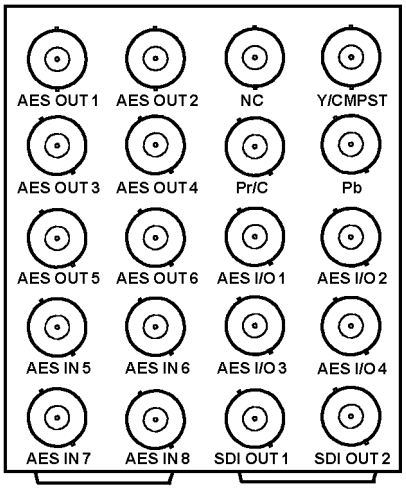
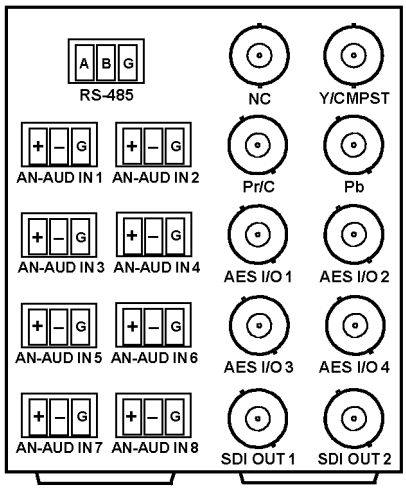
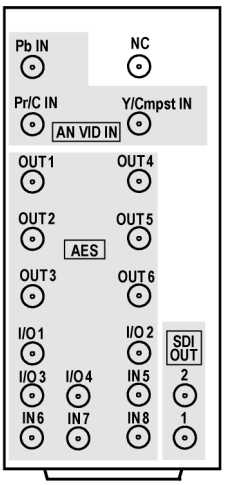
9033 Rear I/O Module	Description
RM20-9033-C 	Provides the following connections: • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Four AES I/O coaxial input/outputs (**AES I/O 1** thru **AES I/O 4**; I/O function of each connection is user-configurable) • 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**)
RM20-9033-D 	Provides the following connections: • 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 RM20-9033-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 9033 Rear I/O Modules — continued

9033 Rear I/O Module	Description
RM20-9033-F 	Provides the following connections: • Analog Y/composite, Pr/C, and Pb coaxial inputs (**Y/Cmpst**, **Pr/C**, and **Pb**, respectively) • Eight analog balanced audio inputs (**AN-AUD IN 1** thru **AN-AUD 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) • Two buffered SDI coaxial outputs (**SDI OUT**) • Dolby® RS-485 metadata output (**RS-485**) **Note:** On card with +LTC option, this connector provides RS-485 LTC I/O as well as Dolby metadata output (selectable using card control).
RM20-9033-E-DIN-HDBNC 	High-density rear modules provides the following connections: • 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: RM20-9033-E-HDBNC or RM20-9033-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 9033 Network Remote Control

Perform remote control setup in accordance with Cobalt® reference guide "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 **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. 1-24).

- 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 9033 Function Submenu List and Descriptions (p. 3-9).

This chapter contains the following information:

Control and Display Descriptions

This section describes the user interface controls, indicators, and displays for using the 9033 card. The 9033 functions can be accessed and controlled using any of the user interfaces described here.

The format in which the 9033 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 9033 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 9033 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 9033 card are organized into function **submenus**, which consist of parameter groups as shown below.

Figure 3-1 shows how the 9033 card and its submenus are organized, and also provides an overview of how navigation is performed between cards, function submenus, and parameters.

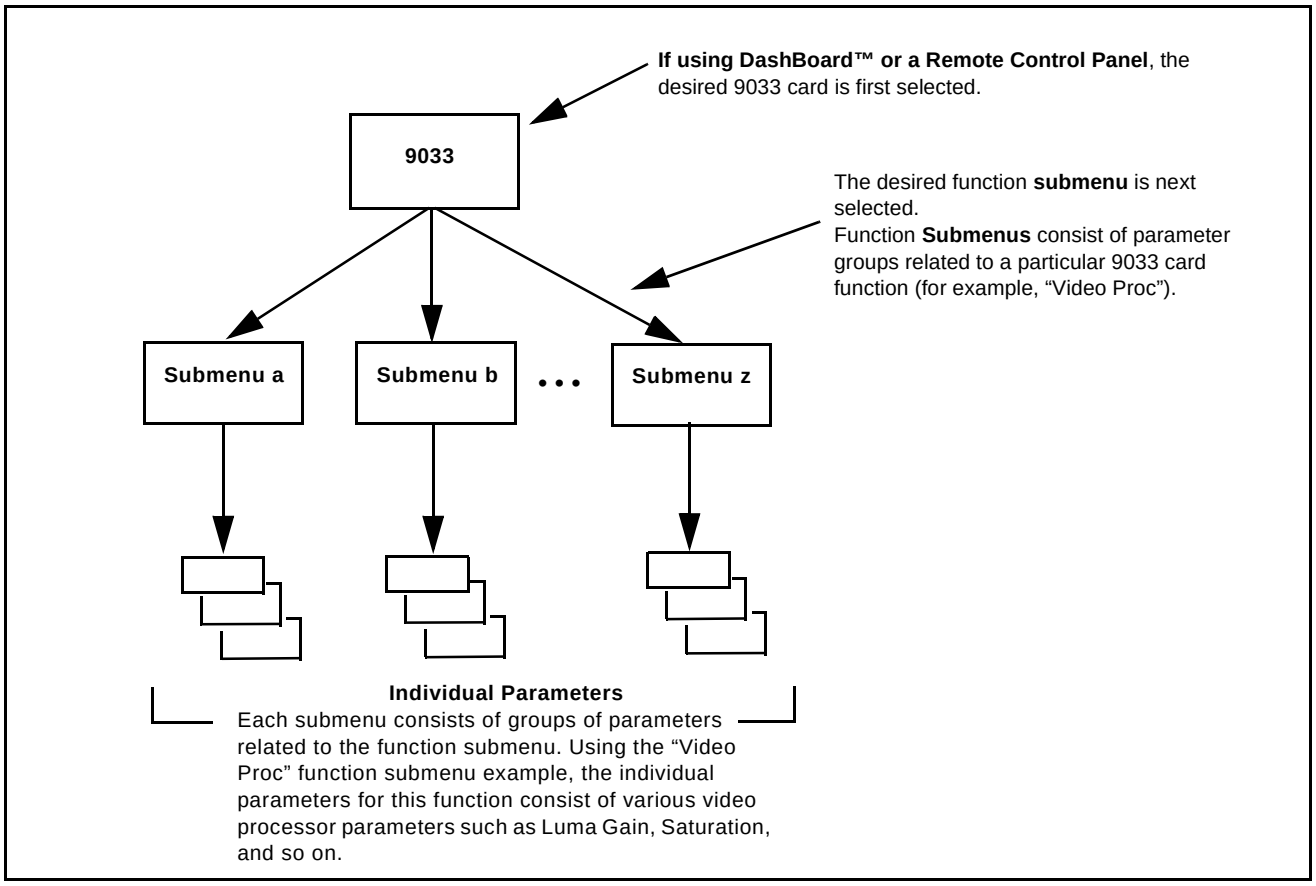


Figure 3-1 Function Submenu/Parameter Submenu Overview

DashBoard™ User Interface

(See Figure 3-2.) The 9033 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 9033 card edge controls.)

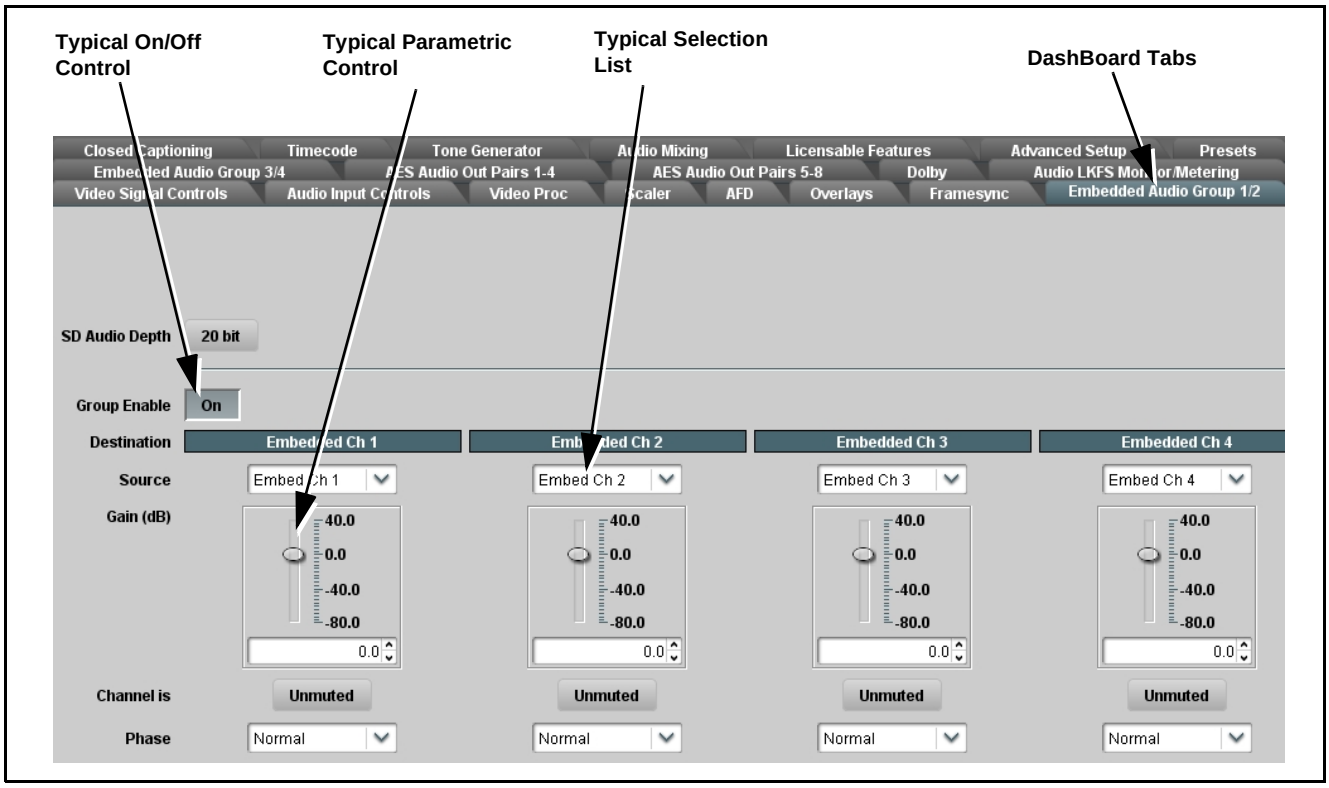


Figure 3-2 Typical DashBoard Tabs and Controls

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 acts like a potentiometer. Items in a list can then be selected using the control knobs which correspondingly acts 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 9033 card edge controls.)

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

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.

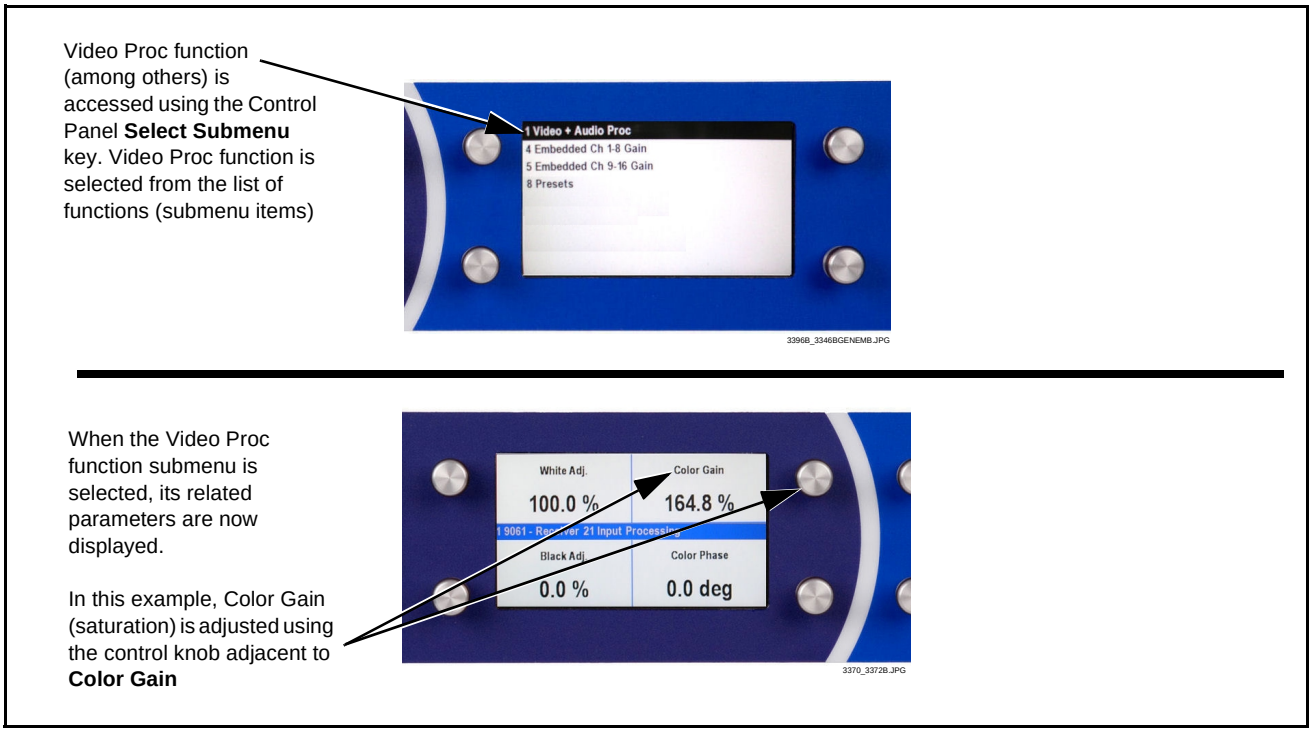


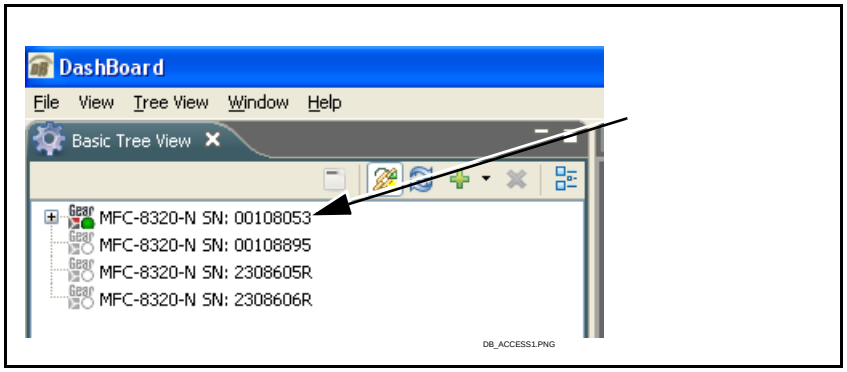
Figure 3-3 Remote Control Panel Setup of Example Video Proc Function Setup

Accessing the 9033 Card via Remote Control

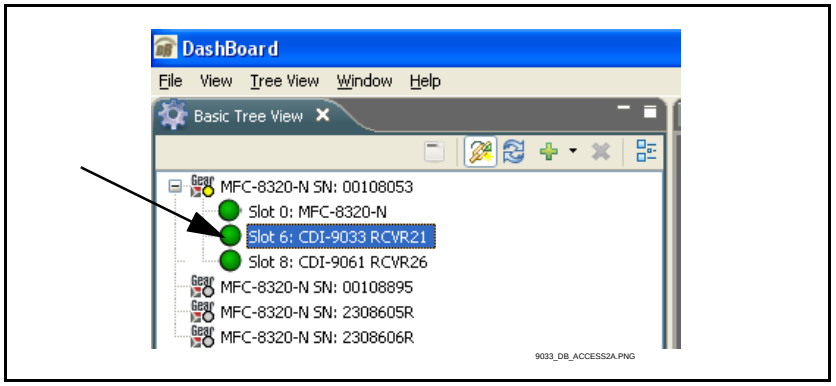
Access the 9033 card using DashBoard™ or Cobalt® Remote Control Panel as described below.

Accessing the 9033 Card Using DashBoard™

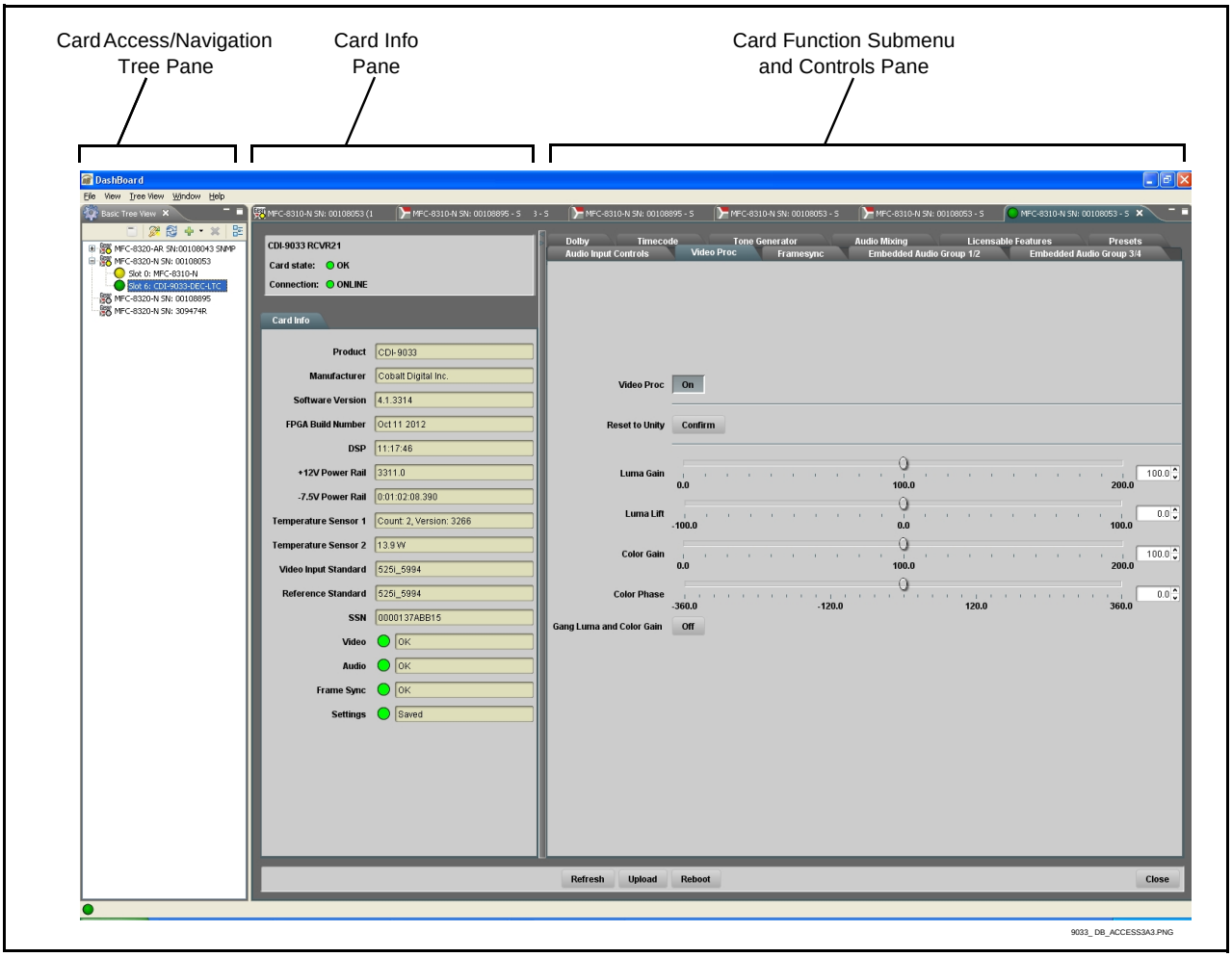
1. On the computer connected to the frame LAN, open DashBoard™.
2. As shown below, in the left side Basic View Tree locate the Network Controller Card associated with the frame containing the 9033 card to be accessed (in this example, “MFC-8320-N SN: 00108053”).



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-9033 RCVR21”).



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 9033 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 9033 - 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 9033 Card Information

The operating status and software version the 9033 card can be checked using DashBoard™ or the card edge control user interface. Figure 3-4 shows and describes the 9033 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. 3-43) for corrective action.

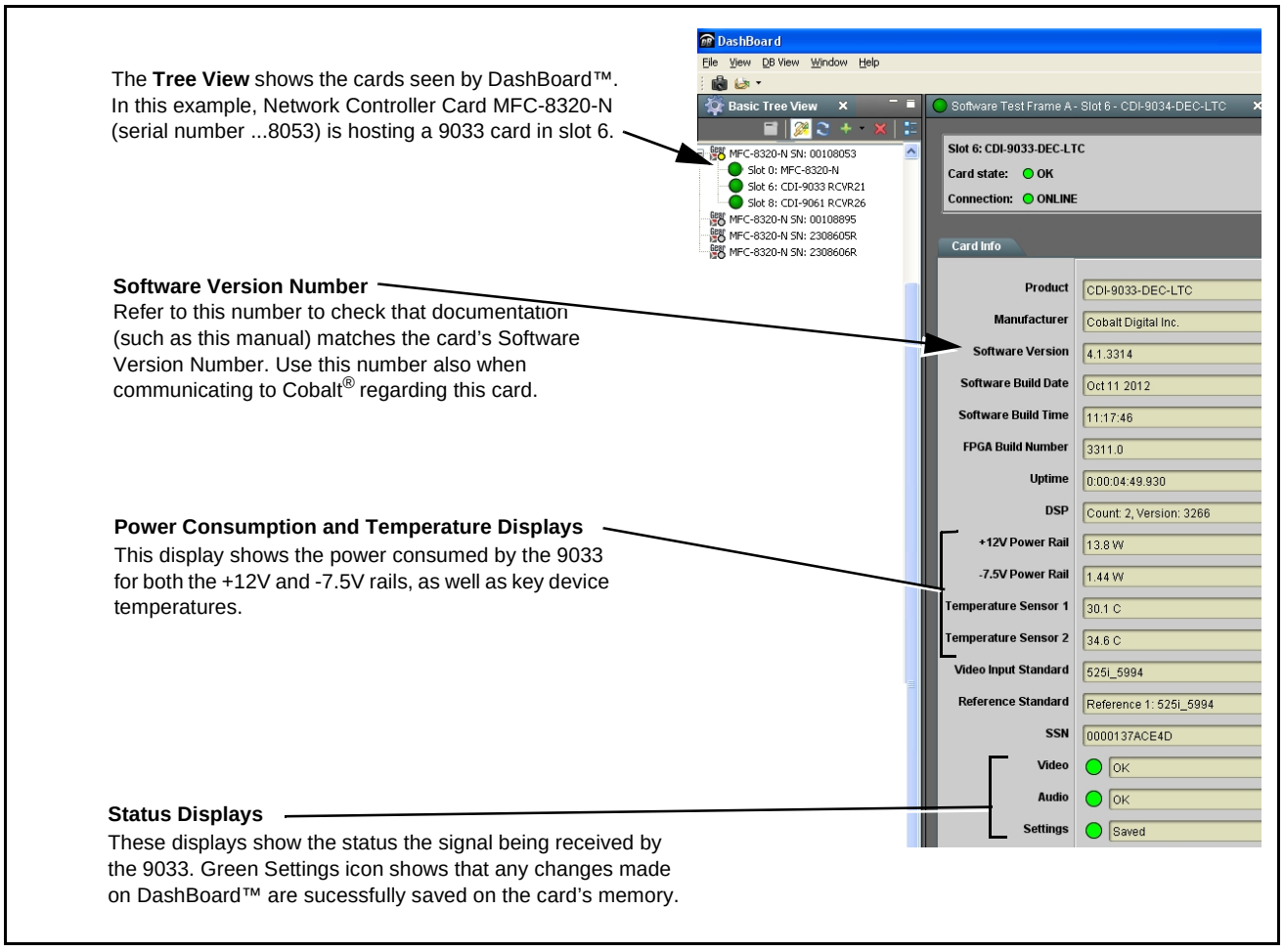


Figure 3-4 9033 Card Info Utility

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	12 (locked)	9/8 (Note 2)
ATC_LTC	—	10 (Note 2)
Dolby® Metadata	13 (Note 2)	13 (Note 2)
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.

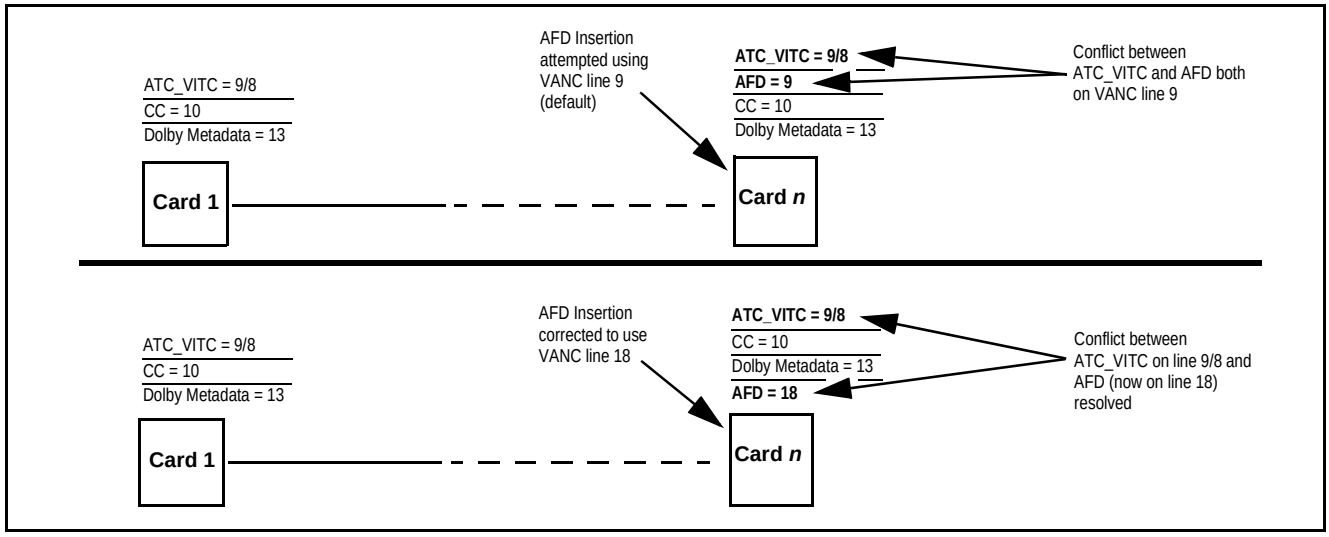


Figure 3-5 Example VANC Line Number Allocation Example

9033 Function Submenu List and Descriptions

Table 3-2 individually lists and describes each 9033 function submenu ('tab") 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.)
- HD controls and setting described in this section are not applicable for 9033-SD card model.

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.

Table 3-2 9033 Function Submenu List

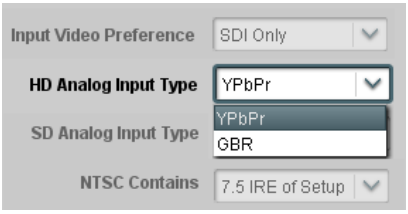
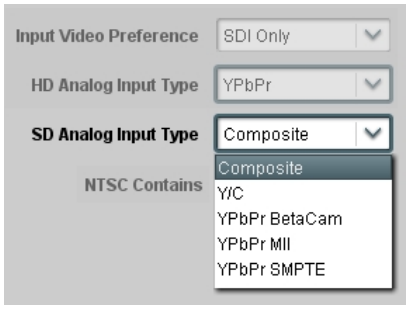
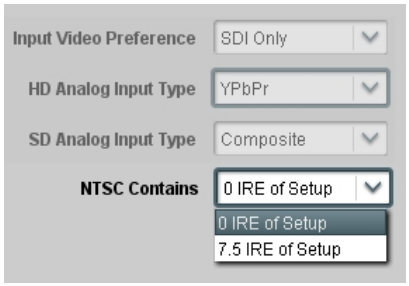
Video Signal Controls	Sets the 9033 video signal input type and preference and priority.
• HD Analog Input Type 	When receiving analog video input, sets the 9033 HD input video type to accept received input signal from choices shown. **Note:** Input type must be appropriately set for the 9033 to correctly process the received input.
• SD Analog Input Type 	When receiving analog video input, sets the 9033 SD input video type to accept received input signal from choices shown. **Note:** Input format must be appropriately set for the 9033 to correctly lock to the input.
• NTSC Contains 	This setting tells the 9033 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 9033 Function Submenu List — continued

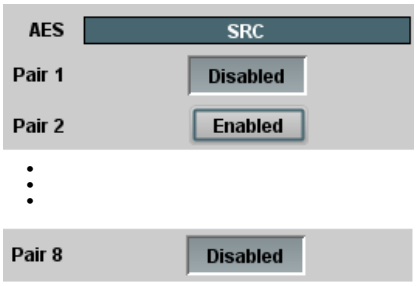
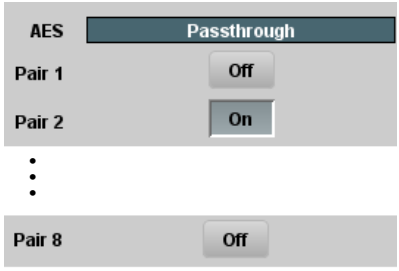
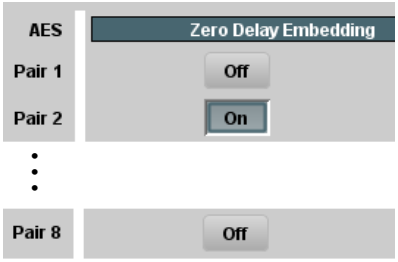
Audio Input Controls	Controls the AES Audio Input features for the eight AES pairs, and displays signal status for received AES pairs. Also provides global unity routing/parameter control resets. **Note:** Also refer to AES Audio Input Advanced Features (p. 1-12) in Chapter 1, "Introduction" for detailed information regarding these functions.
• **AES SRC** 	Individual SRC **Disable** control for each AES pair (1 thru 8) disables or enables Sample Rate Conversion (SRC) bypass as follows: • **Disabled On:** In this mode, AES SRC for the corresponding AES pair is **bypassed** (button pressed in). SRC is set to **Disabled** (bypass turned on) by default. This mode is preferred where the AES rate matches the input video rate. This mode is necessary when embedding non-PCM AES audio such 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. **Note:** AES audio must be nominally 48 kHz. • **Disable Off:** In this mode, AES SRC for the corresponding AES input pair is **enabled** (button in out position). SRC enabled allows the 9033 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 normal audio routing. 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). **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 9033 Function Submenu List — continued

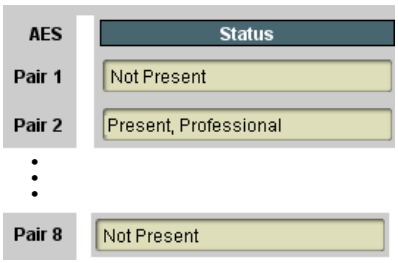
Audio Input Controls	(continued)
• **Status Displays** 	Individual signal status displays for AES pairs 1-8 as follows: • **Not Present:** Indicates AES pair does not contain recognized audio PCM data. **Note:** Channel displaying Not Present may still carry usable audio data with **Not Present** being displayed due to invalid headers. • **Present, Professional:** Indicates AES pair contains recognized AES audio PCM data. • **Present, Consumer:** Indicates AES pair contains audio PCM data other than AES (for example, S/PDIF). • **Present, Dolby E:** Indicates AES pair contains Dolby® E encoded data. • **Present, Dolby Digital:** Indicates AES pair contains Dolby® Digital encoded data. **Note:** Dolby status displays shown to the left only occur for valid Dolby® signals meeting SMPTE 337M standard. **(9033 only)** The 9033 card does not perform Dolby® processing on the signal. Although the 9033 controls will appear to be usable for this signal tag, the signal is passed through with SRC bypassed as well as all gain and polarity controls set to unity. **(9033-DEC only)** When Dolby® E or Dolby® Digital™ is present on a discrete AES pair, the decoder can provide up to 10 decoded channels (according to the Dolby® sub-format and received metadata). All channels are available as inputs to audio routing.
• **Embedded Unity Channel Selection** 	Selects unity reset to Embedded Audio Group 1/2 and 3/4 controls and re-establishes default 1-to-1 routing as follows: • **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. • **Dolby:** (9033-DEC only) Routes Dolby decoder output channels 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: • **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. • **Dolby:** (9033-DEC only) Routes Dolby decoder output channels 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 9033 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 9033 Function Submenu List — continued

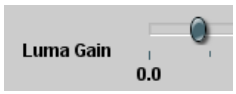
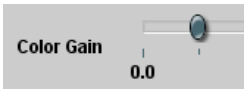
	Provides the following Video Proc parametric controls.
• **Video Proc** 	**Video Proc (On/Off)** provides master on/off control of all Video Proc functions. • When set to **Off**, all processing is bypassed. • When set to **On**, currently displayed parameter settings take effect.
• **Reset to Unity** 	**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.
• **Luma Gain** 	Adjusts gain percentage applied to Luma (Y channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Luma Lift** 	Adjusts lift applied to Luma (Y-channel). (-100% to 100% range in 0.1% steps; null = 0.0%)
• **Color Gain** 	Adjusts gain percentage (saturation) applied to Chroma (C-channel). (0% to 200% range in 0.1% steps; unity = 100%)
• **Color Phase** 	Adjusts 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 **Luma Gain** or **Color Gain** controls increases or decreases both the Luma and Chroma levels by equal amounts.

Table 3-2 9033 Function Submenu List — continued

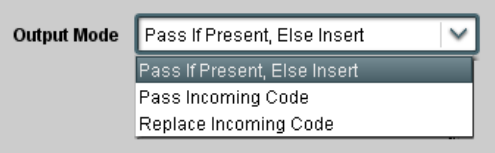
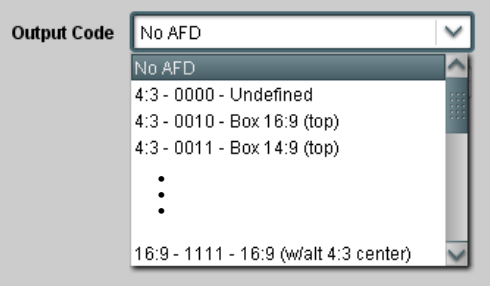
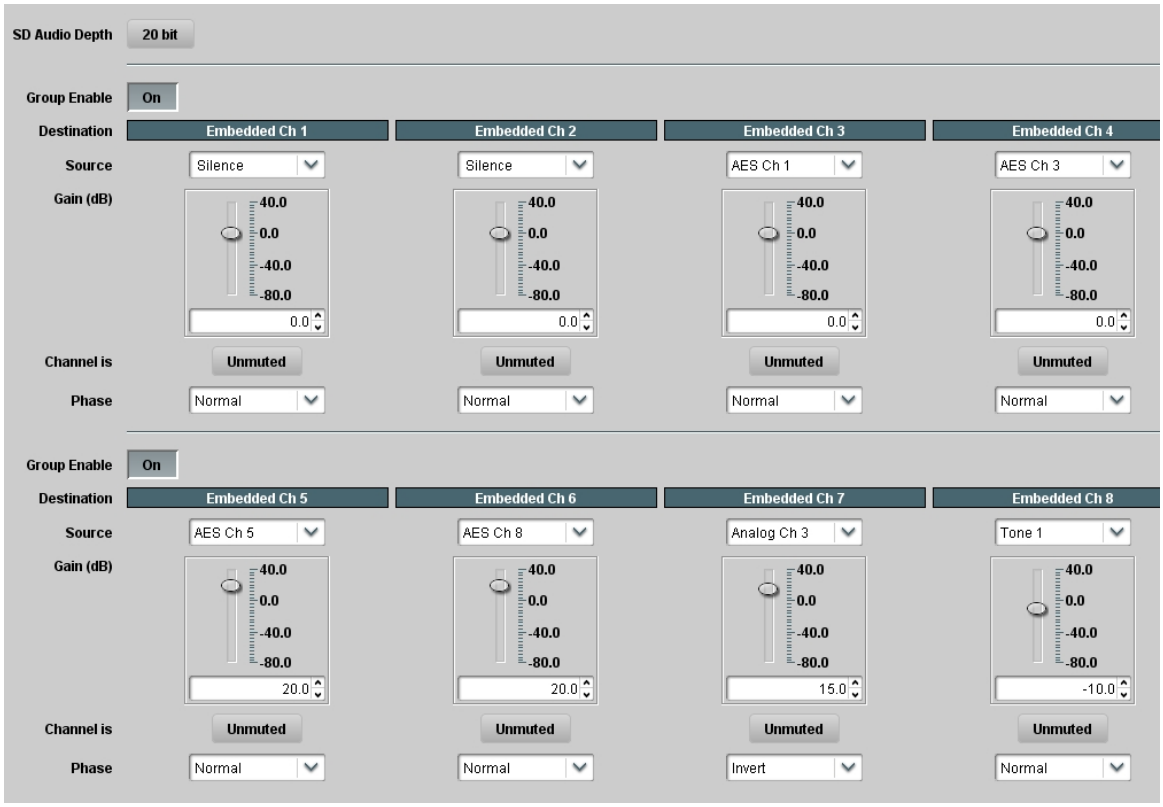
AFD	Allows assignment of AFD (Active Format Description) codes to the SDI output video.
Note: This function only marks the SDI output with an AFD code. Actual AFD processing must be performed by a downstream card or system that recognizes an AFD code assigned here.	
• Output Mode 	Drop-down selection determines action to take in presence or absence of existing AFD code on input video. **Note:** The Incoming AFD and Pass Incoming AFD Code selections, while present on this card, are non-functional since the analog video input does not support AFD code embedding.
• 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 9033 Function Submenu List — continued

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



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.

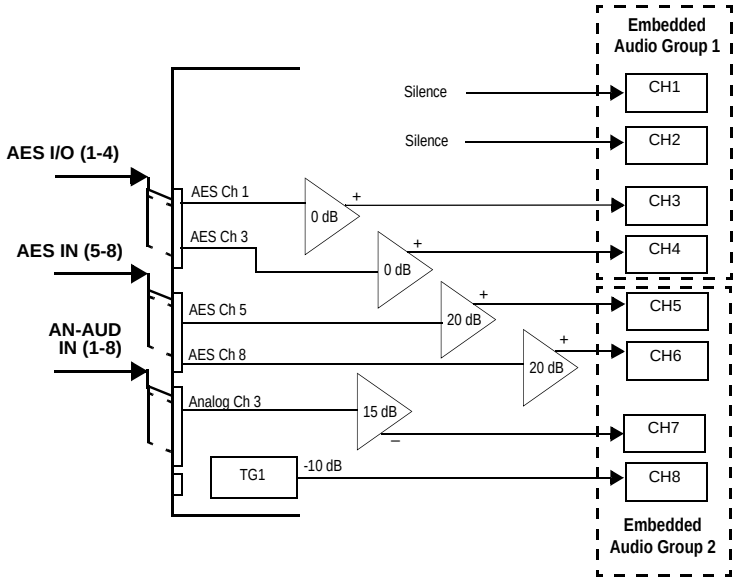


Table 3-2 9033 Function Submenu List — continued

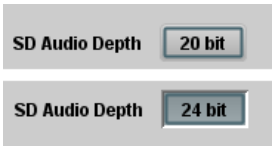
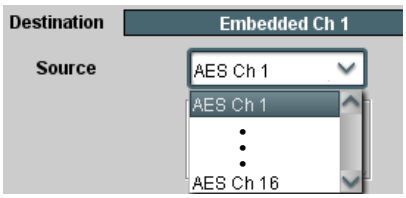
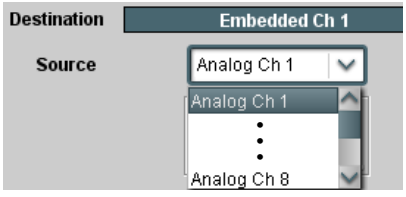
Embedded Audio Group 1/2	**(continued)**
• **SD Audio Depth** 	Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default is 20-bit per SMPTE 272M, §3.5). **Note:** • If 24-bit depth is desired, make certain downstream equipment is compatible with 24-bit SD audio data. • Depth 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.
• **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)
• **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)

Table 3-2 9033 Function Submenu List — continued

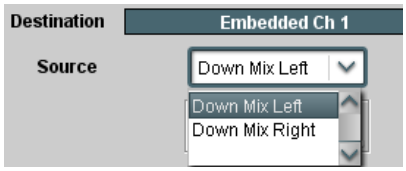
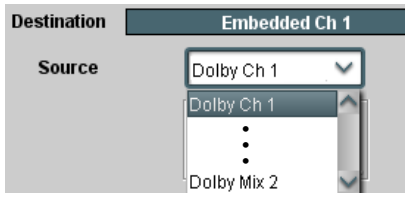
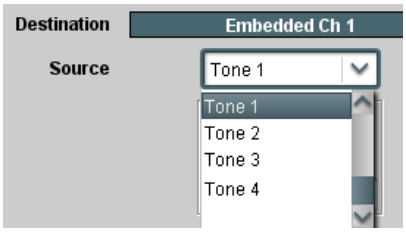
Embedded Audio Group 1/2	(continued)
• **Down Mix Left or Right as Source** 	**Down Mix Left** and **Down Mix Right** selections in Source drop-down list allow either downmixer left or right channel to be the source for the selected destination Embedded Audio Group channel. (In this example, the Down Mix Left channel is the source for destination Embedded Ch 1) **Note:** Down Mix Left and Down Mix Right channels are a stereo pair derived from the L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information. Refer to **Audio Mixing** function description on page 3-35 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 3-35 for more information.
• **Dolby® Decoded Channel as Source**  Option	**(9033-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 Metadata** function description on page 3-25 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 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 3-40 for more information.

Table 3-2 9033 Function Submenu List — continued

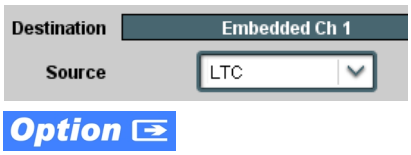
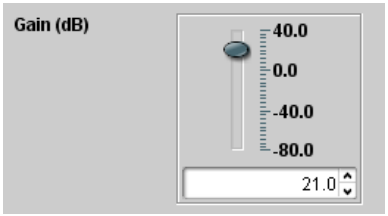
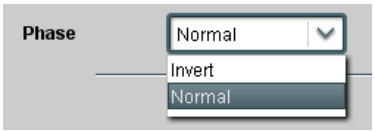
Embedded Audio Group 1/2	**(continued)**
• Audio LTC as Source  Option	**LTC** selection in Source drop-down list allows any timecode format received by the card to be outputted as audio LTC over an embedded audio output (destination) channel. (In this example, audio LTC is the source for destination Embedded Ch 1) **Note:** • When LTC is selected as source, **Gain** and **Mute** controls are disabled. • Refer to **Timecode** function description on page 3-31 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 9033 Function Submenu List — continued

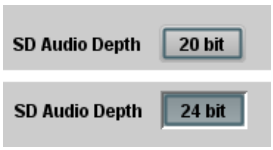
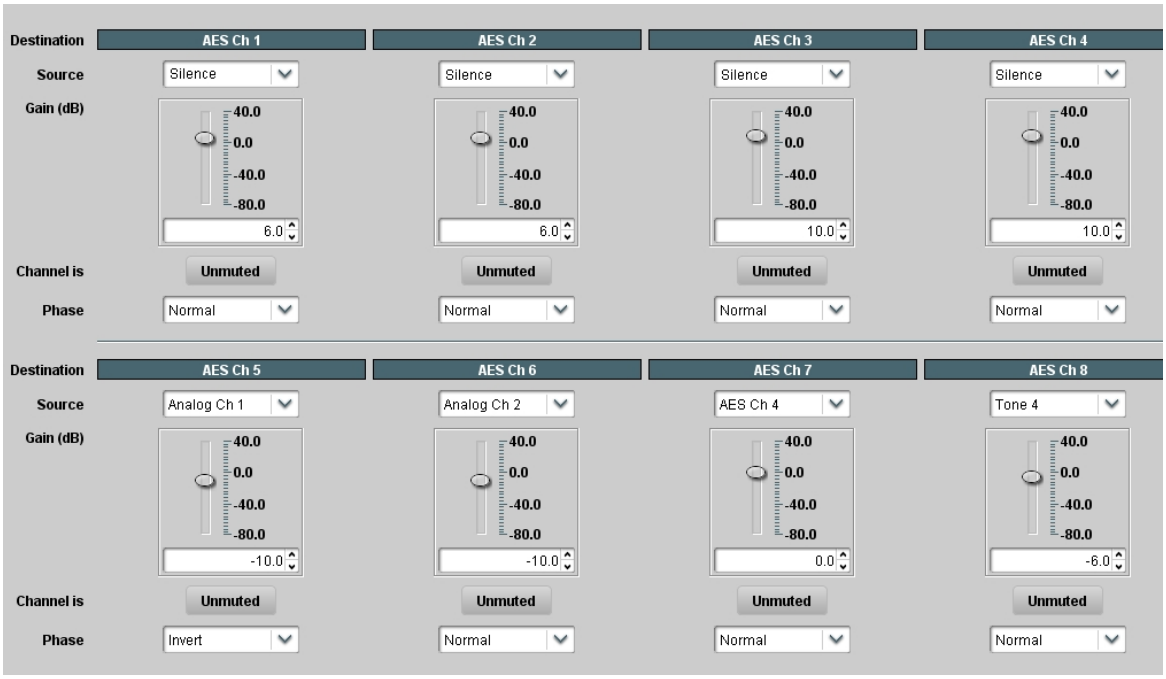
Embedded Audio Group 3/4	Selects the audio source for each embedded audio channel 9 thru 16 (Embedded Audio Groups 3 and 4). Also provides Gain, Phase Invert, and Muting controls for each channel.
• **SD Audio Depth** 	Allows option of using 24-bit audio data structure per SMPTE 272M, §3.10 (default 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 3-16 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 9033 Function Submenu List — continued

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



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.

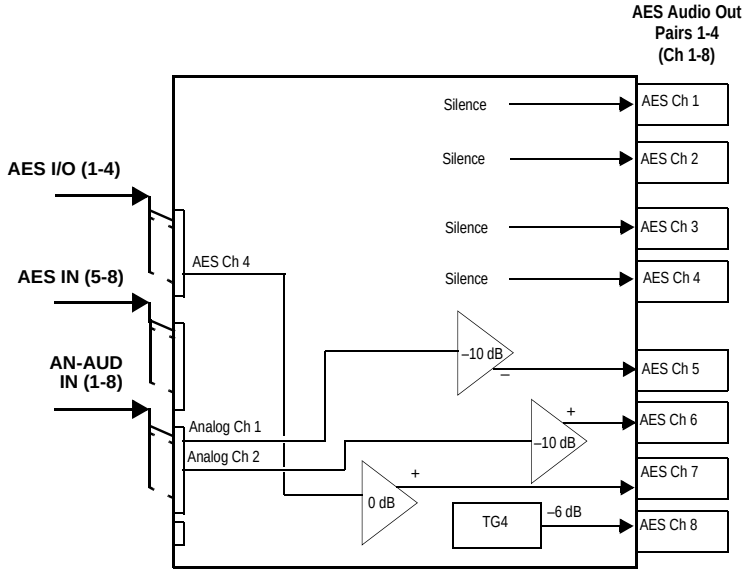


Table 3-2 9033 Function Submenu List — continued

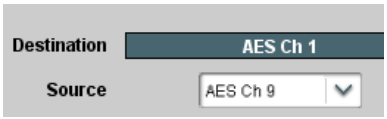
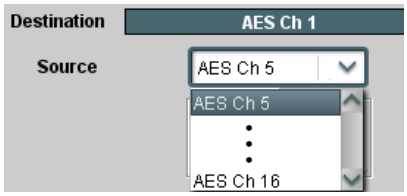
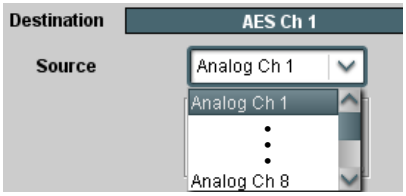
AES Audio Out Pairs 1-4	**(continued)**
Note: • **AES Ch 2** thru **AES Ch 8** have controls that are identical to the **Source**, **Gain**, **Mute**, and **Phase** controls described here for **AES Ch 1**. Therefore, only the **AES Ch 1** controls are shown here. • For each channel, its source and destination 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.
• **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 L, C, R, Ls, and Rs channel inputs selected using the Audio Mixing function. The stereo pair consists of basic L/R PCM signals with no additional encoded information. Refer to **Audio Mixing** function description on page 3-35 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 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 3-35 for more information.

Table 3-2 9033 Function Submenu List — continued

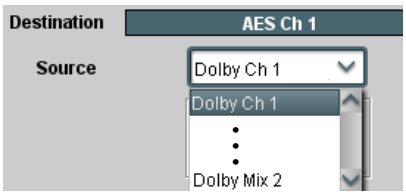
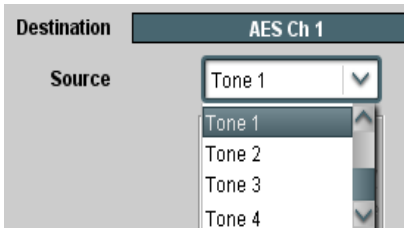
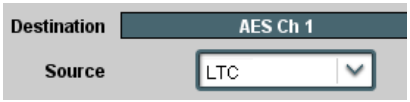
AES Audio Out Pairs 1-4	**(continued)**
• Dolby® Decoded Channel as Source  Option	**(9033-DEC only) Dolby Ch 1** thru **Dolby Ch 8** range in Source drop-down list enables a Dolby® decoded channel to be the source for the selected destination AES channel. (In this example, Dolby® decoded Ch 1 is the 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 Metadata** function description on page 3-25 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 3-40 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 3-31 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 9033 Function Submenu List — continued

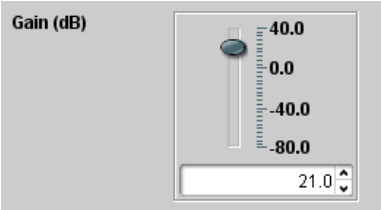
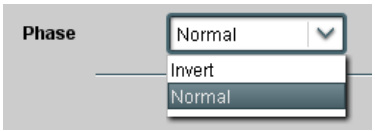
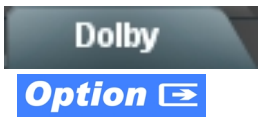
AES Audio Out Pairs 1-4	**(continued)**
• **Gain (dB) Control** 	Adjusts and displays relative gain (in dB) applied to the corresponding destination AES channel. (-80 to +40 dB range in 0.1 dB steps; unity = 0.0 dB)
• **Mute Control** 	Allows pushbutton On/Off channel muting while saving all other settings.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

Table 3-2 9033 Function Submenu List — continued

AES Audio Out Pairs 5-8	Routes audio sources to AES output channels 9 thru 16 (AES Audio Out Pairs 5-8). Also provides Gain, Muting, and Phase Invert controls for each channel.
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 3-21 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.	
Dolby	**(9033 only)** Extracts and preserves Dolby® metadata from the input video, and in turn allows the metadata to be re-inserted in the output SDI.
• **Metadata Embedding** Metadata Embedding On	**Metadata Embedding (On/Off)** controls SMPTE 2020-1 metadata embedding in the SDI video output. • When set to **On**, metadata is extracted from the input video, buffered, and re-directed to the output SDI video. • When set to **Off**, metadata is not embedded in the output SDI video.
• **Metadata Output Line** Metadata Output Line 13	Allows selection of SMPTE 2020-1 metadata line location within the VANC space for re-inserted Dolby® metadata. (Range is 9 thru 41; default is line #13.) **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 unless existing metadata is to be intentionally overwritten.
Note: **(9033 only)** The **Metadata Output Source** button in DashBoard™ is locked to Input Video for this card. With this function enabled, the extracted metadata is always available in the SDI video output and on cards equipped with an appropriate Rear I/O Module having a Dolby® metadata RS-485 connector.	

Table 3-2 9033 Function Submenu List — continued



(9033-DEC only) Routes a Dolby® encoded pair to the Dolby® decoder, and provides Dolby® configuration display and metadata handling controls.

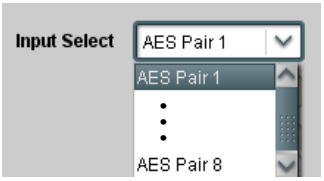
Note: • The Dolby tab controls described here appear only on card equipped with Dolby Decoder option (-DEC).

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

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

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

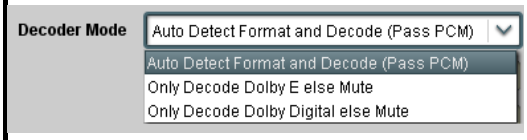
• AES Pair as Input



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

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

• Decoder Mode



Using the drop-down list, selects the action to take in presence or absence of Dolby® E or Digital source from the choices shown on the left.

Table 3-2 9033 Function Submenu List — continued

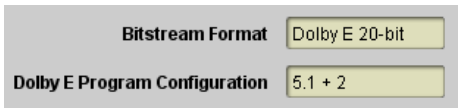
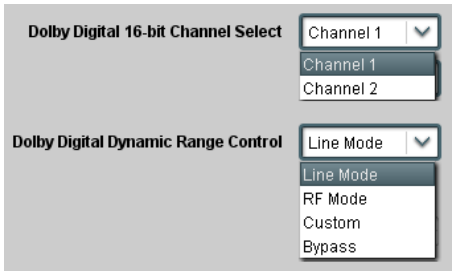
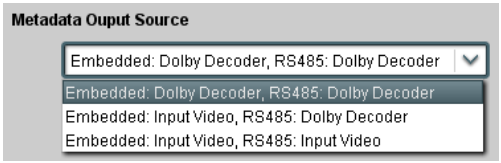
Dolby	**(continued)**
• **Dolby® Mode Display** 	Shows specific bitstream information and Dolby® decoding type (Dolby® E or Dolby® Digital) for input applied to Dolby® decoder. (In this example, Dolby® E 20-bit with 5.1+2 decoded channel configuration is being decoded) If selected input has invalid or 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.)
• **Dolby® Digital Channel and Dynamic Range Controls** 	**Channel Select** drop-down list sets the channel carrying the Dolby® Digital encoded signal for D1/0 formats as shown from choices on the left. **Dynamic Range Control** drop-down list selects from audio level compression scheme choices as shown to the left. (Line Mode is typical setting; RF Mode is used where signal may be fed through low-cost video/ audio RF modulator, in which case RF Mode helps prevent overmodulation. Refer to ATSC A/52B for more information.)
• **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.
• **Metadata Output Source** 	Drop-down list allows embedding and RS485 metadata routing to the choices shown to the left and described below. • **Embedded: Dolby Decoder, RS485: Dolby Decoder** – Routes the metadata from the Dolby® decoder to both embedding on the output SDI and the RS485 port on card so equipped. • **Embedded: Input Video, RS485: Dolby Decoder** – Preserves input metadata and directly re-routes it to the output SDI. Routes the metadata from the Dolby® decoder to only the RS485 port on card so equipped. • **Embedded: Input Video, RS485: Input Video** – Routes the preserved input metadata to both embedding on the output SDI and the RS485 port on card so equipped. **Note:** Typically, Metadata Output Source should be set to **Embedded: Dolby Decoder, RS485: Dolby Decoder**, since this is the new metadata produced by the card decoder and should also be made available in the SDI stream and to any other external systems. If embedding new metadata, make certain to set its line number such that 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).

Table 3-2 9033 Function Submenu List — continued

Dolby	**(continued)**
• **Metadata Output Line** 	Allows selection of SMPTE 2020-1 metadata line location within the VANC space for source embedding selected above. (Range is 9 thru 41; default is line #13.) **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 unless existing metadata is to be intentionally overwritten.

Table 3-2 9033 Function Submenu List — continued

Dolby E Metadata Option	**(9033-DEC only)** Displays the status and programming details for each Dolby® E AC-3 program dictated by the received external metadata.

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

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

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

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

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

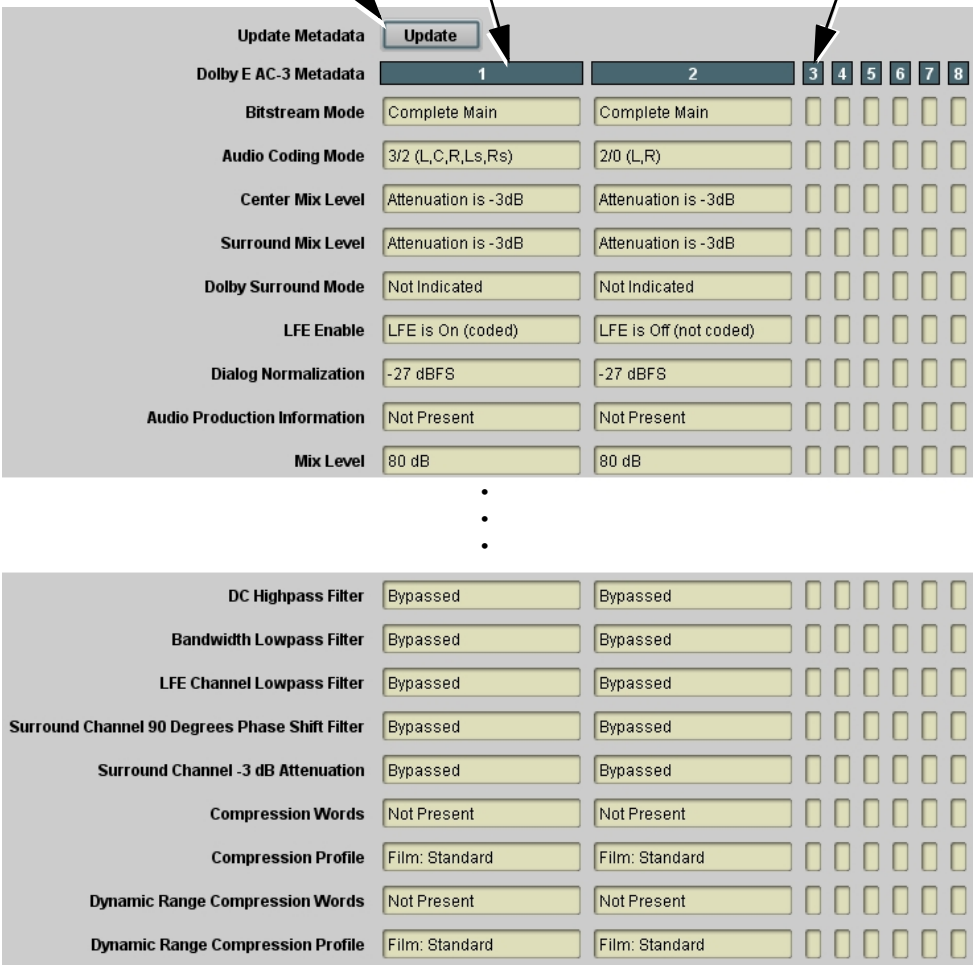


Table 3-2 9033 Function Submenu List — continued

Dolby D Metadata Option	**(9033-DEC only)** Displays the status and programming details for Dolby® Digital program dictated by the received external metadata.

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

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

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

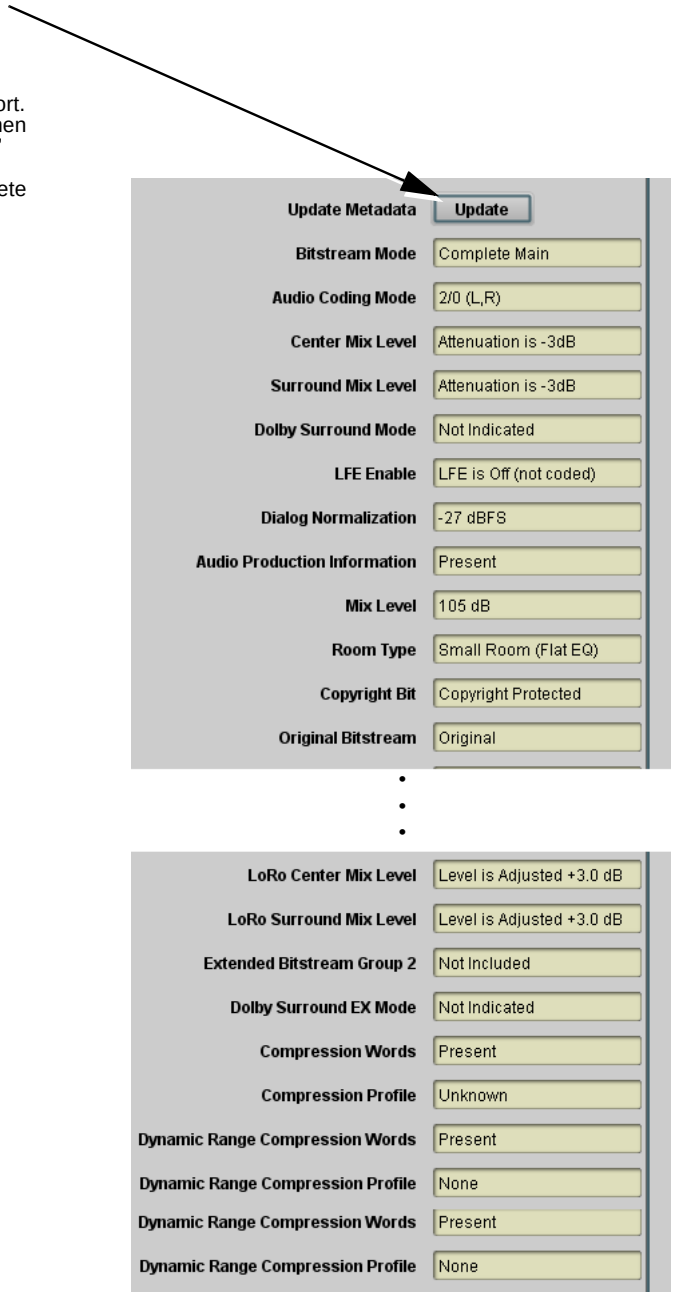
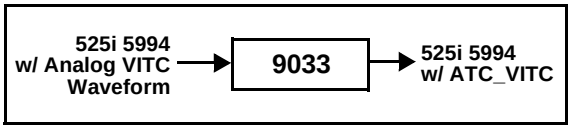


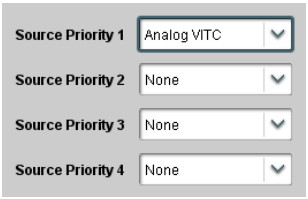
Table 3-2 9033 Function Submenu List — continued

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 video with 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 analog VITC timecode data 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 **SD ATC Insertion Insertion** to **Enabled**.

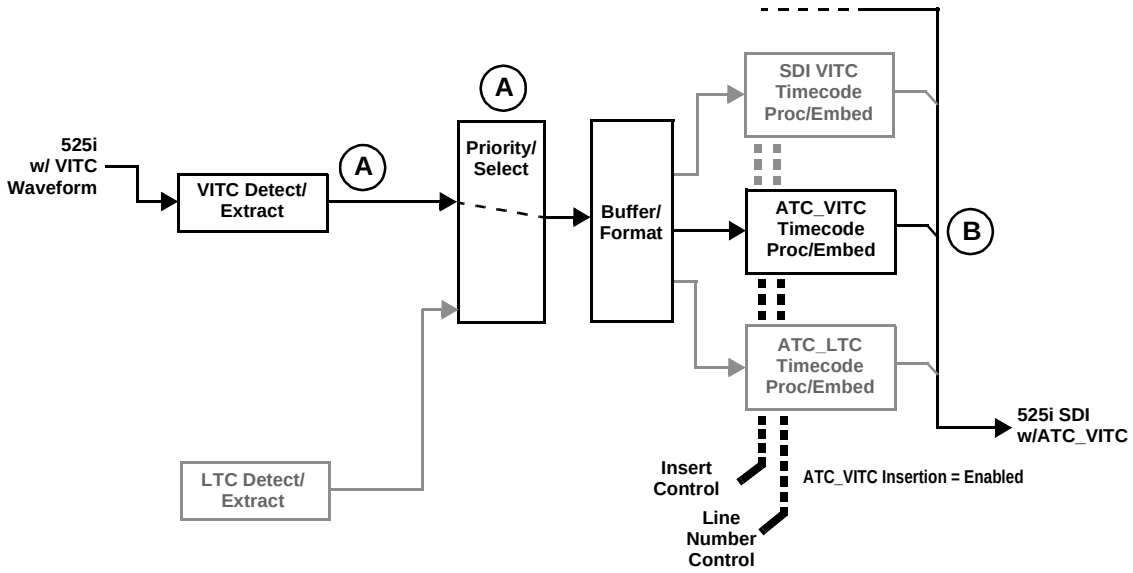
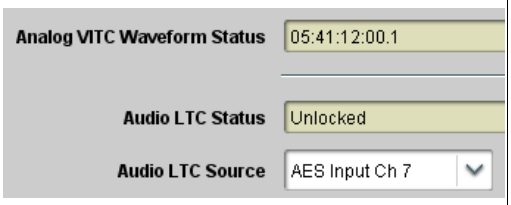


Table 3-2 9033 Function Submenu List — continued

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.
	  • 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.

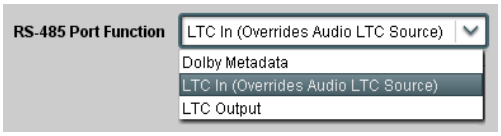
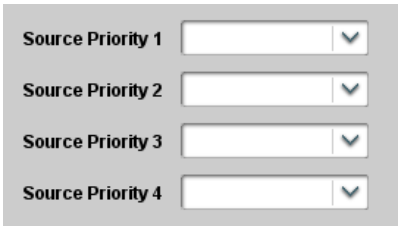
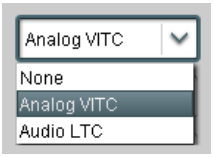
• **RS-485 Port LTC Control** 	Allows RS-485 port to be used to receive LTC, or send LTC over RS-485 port as follows: • If **RS-485 LTC** is to be **received** via the shared RS-485 port, set the **RS-485 Port Function** control to **LTC In**. • If **RS-485 LTC** is to be **outputted** via the shared 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** 	This control is not applicable for this card.
• **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.

Table 3-2 9033 Function Submenu List — continued

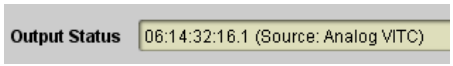
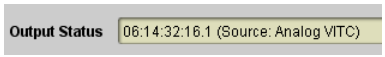
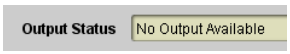
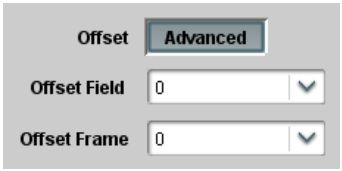
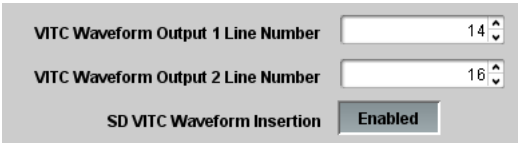
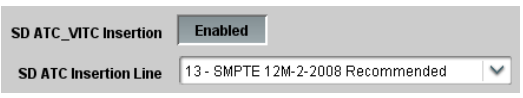
Timecode	**(continued)**
• **Output Status Display** 	Displays the current content and source being used for the timecode data as follows:  • Output status OK (in this example, running analog VITC timecode received and outputted).  • Timecode not available due to lack of appropriate input timecode data 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. • 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.
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.

Table 3-2 9033 Function Submenu List — continued

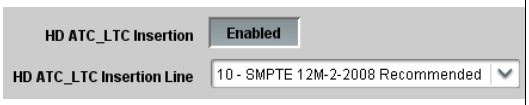
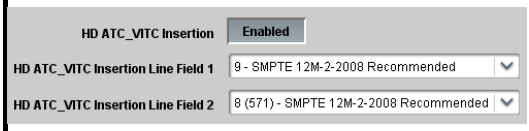
Timecode	(continued)
• **HD ATC_LTC Insertion Control** 	For HD output, enables or disables ATC_LTC timecode insertion into the output video, and selects the line number for ATC_LTC timecode data.
• **HD ATC_VITC Insertion Control** 	For HD output, enables or disables ATC_VITC timecode insertion into 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 9033 Function Submenu List — continued

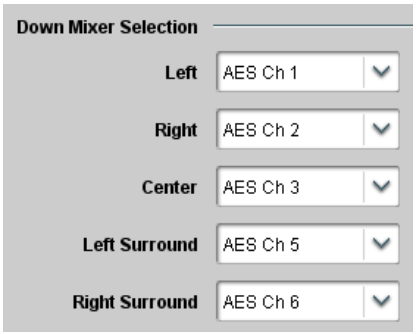
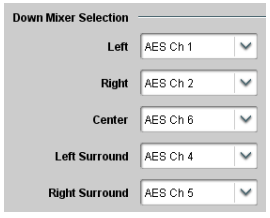
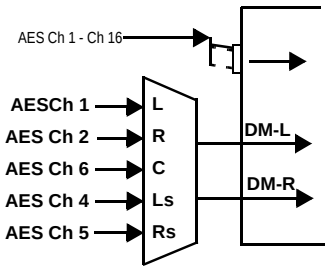
Audio Mixing	Provides down-mix audio routing selections that multiplexes any five AES, analog audio, or Dolby decoder (where equipped) channel sources into a stereo pair (Down Mix Left and Down Mix Right), or selection of any two audio sources to be mono-mixed to serve as a monaural source. With an optional upmixer licensable feature activated, any normal PCM stereo pair can be fed to the upmixer to generate 5.1 surround sound audio which in turn can be applied to six user-selectable channels.
• Down Mixer Selection 	Separate drop-down lists for **Left**, **Right**, **Center**, **Left Surround (Ls)**, and **Right Surround (Rs)** inputs allow AES channel audio source selection for each of the five AES inputs. 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.
• 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.

Table 3-2 9033 Function Submenu List — continued

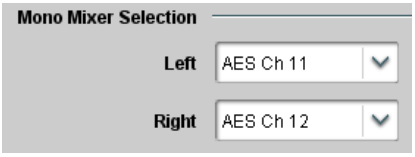
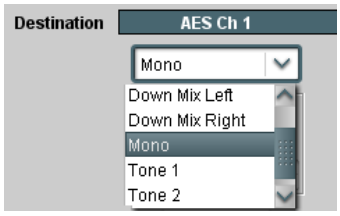
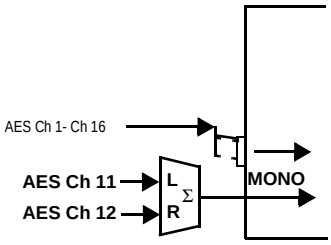
Audio Mixing	(continued)
• **Surround Mix Ratio Control** 	Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix. • Minimum attenuation setting (-0.0 dB) applies no ratiometric reduction. Surround-channel 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 AES 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 16 destination AES output channels as shown below.   **Note:** Selection of any two channels for mono mixing in no way affects the source channels themselves.

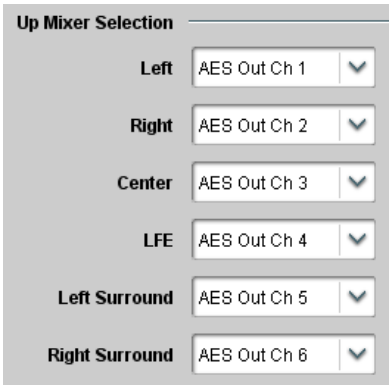
Table 3-2 9033 Function Submenu List — continued

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 3-40 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. 1-10) 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 AES audio source selection, and channel assignments for the six generated 5.1 channels.

The example below shows selection of AES channels 1 and 2 as the received stereo source (AES 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 AES 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 AES Ch 3 – Ch 6, respectively.

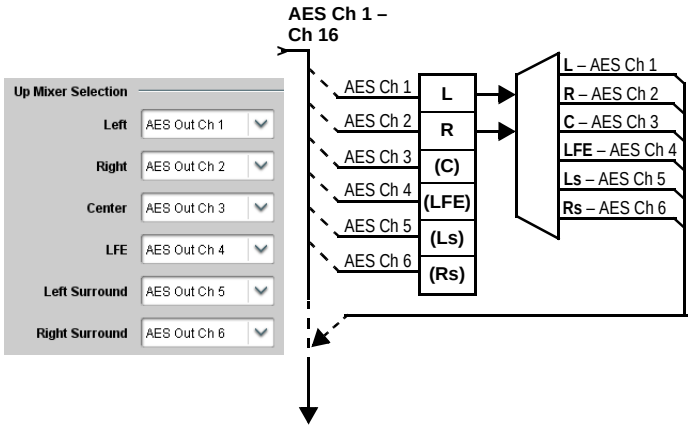
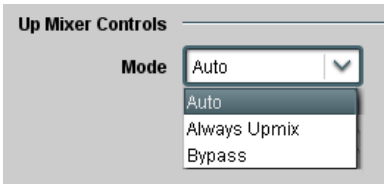


Table 3-2 9033 Function Submenu List — continued

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.

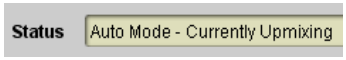
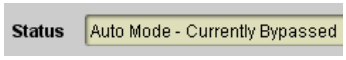
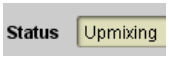
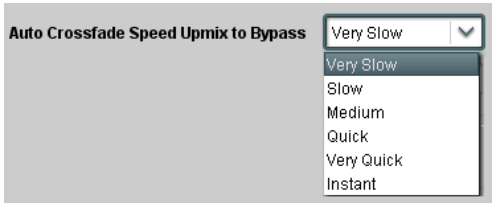
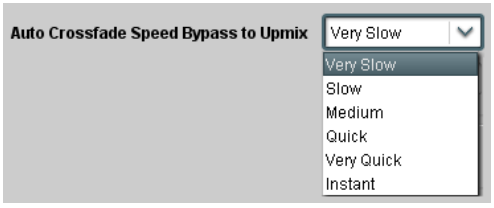
• **Up Mixer Status Display**    	Shows activity status of upmixer processing as follows: • **Auto Mode - Currently Upmixing:** With upmixer enable set to **Auto**, indicates selected channels designated as **Center**, **LFE**, **Left Surround**, and **Right Surround** are clear for use (as described 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 9033 Function Submenu List — continued

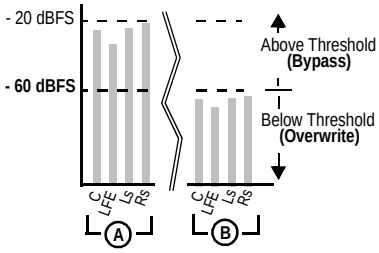
Audio Mixing	**(continued)**
• **5.1 Detection Threshold Control** 	Adjusts the threshold at which selected channels designated as C, LFE, Ls, and Rs are considered to have viable content, or at which signal levels can be considered insignificant when upmixer enable is set to **Auto**. Setting affects 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 9033 Function Submenu List — continued

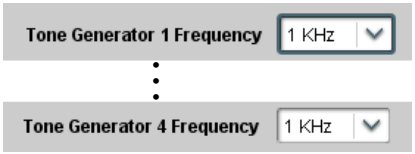
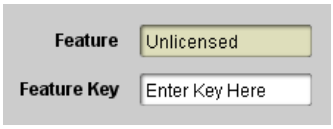
Tone Generator	Sets the test tone frequency for each of four tone generators (Tone Generator 1 thru 4).
• **Frequency Selection Lists** 	Selects the frequency for each of the four tone generators. 18 discrete sine wave frequencies are available, ranging from 50 Hz to 16 kHz (default frequency is 1.0 kHz). **Note:** Unity-gain signal level is equivalent to -20 dBu.
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.

Table 3-2 9033 Function Submenu List — continued

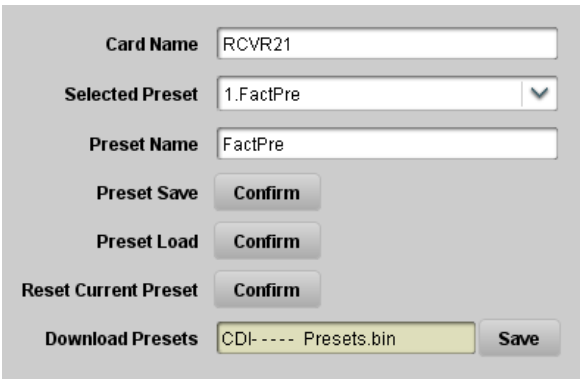
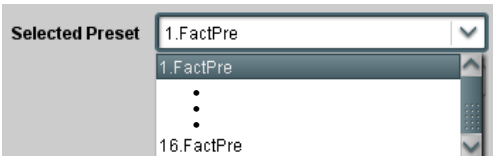
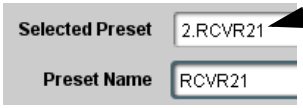
Presets	Allows up to 16 card user settings configuration presets to be saved in a Preset and then recalled (loaded) as desired. All current settings (including list selections and scalar (numeric) control settings such as Gain, etc.) are saved when a Preset Save is invoked.
	The **Preset Name** field 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.
• **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.

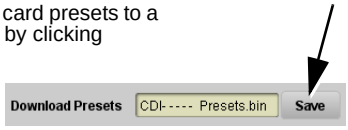
Table 3-2 9033 Function Submenu List — continued

Presets	(continued)
• **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.
• **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 button has a **Confirm?** pop-up that appears, requesting confirmation.
• **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. Refer to Cobalt® reference guide "Remote Control User Guide" (PN 9000RCS-RM) for instructions on using the Download Presets function.

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.

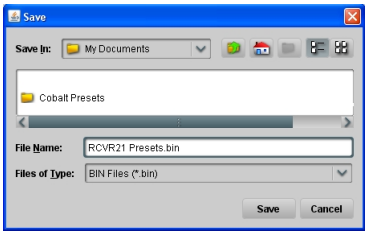
Note also that a presets file can **also be uploaded to other same-model COMPASS® cards**. In this manner, presets built up using a single card can be easily applied to other same-model cards without repeating the setup work on the other cards.

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*).

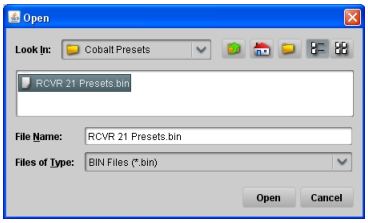
The file can then be renamed if desired (*RCVR21 Presets* in this example) before saving.



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.

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the 9033 card and its remote control interface. The 9033 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 9033 card itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the 9033 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.

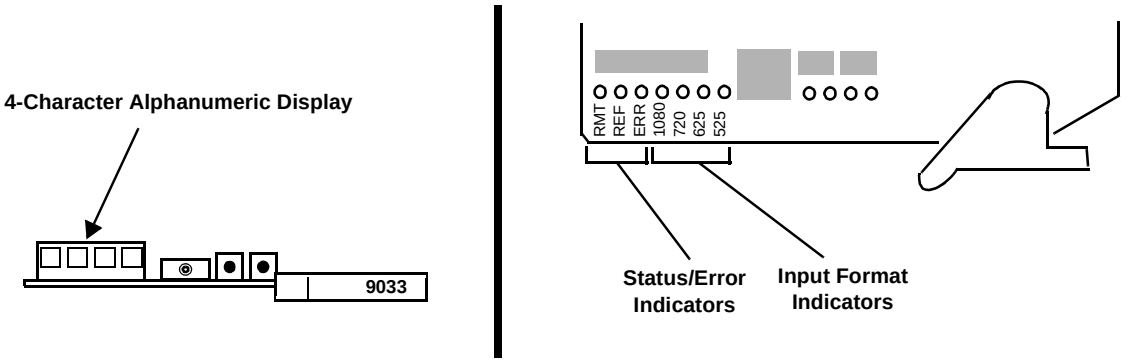
The various 9033 card and remote control error and failure indicators are individually described below.

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. 3-47)
- 9033 Processing Error Troubleshooting (p. 3-48)
- Troubleshooting Network/Remote Control Errors (p. 3-50)

9033 Card Edge Status/Error Indicators and Display

Figure 3-6 shows and describes the 9033 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
RMT LED	Blue LED flashes when 9033 is receiving control message from remote network control (e.g., DashBoard™ or Cobalt® Remote Control Panel)
ERR LED	Red LED illuminates when 9033 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 9033 (1080, 720, 625, 525). Continuous cycling of the LEDs indicates the 9033 has not locked onto a particular format (as in the case of no signal input).

Figure 3-6 9033 Card Edge Status Indicators and Display

DashBoard™ Status/Error Indicators and Displays

Figure 3-7 shows and describes the DashBoard™ status indicators and displays. These indicator icons and displays show status and error conditions relating to the 9033 card itself and remote (network) communications.

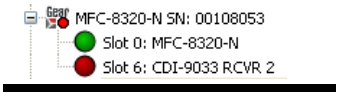
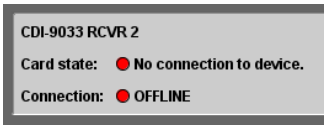
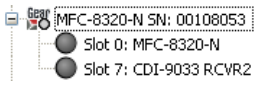
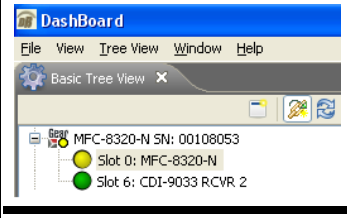
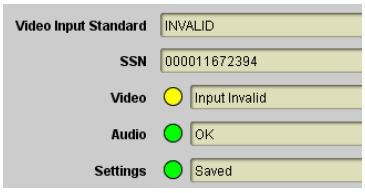
Indicator Icon or Display	Error Description
	Red indicator icon in Card Access/Navigation Tree pane shows card with Error condition (in this example, the Card Access/Navigation Tree pane shows a general error issued by the 9033 card in slot 6).
	Specific errors are displayed in the Card Info pane (in this example “No connection to device” indicating 9033 card is not connecting to frame/LAN).
	If the 9033 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 9033 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 9033 Card Info pane shows error alert, along with cause for alert (in this example, the 9033 is receiving no video input, or a video input that is invalid for the card and/or its current settings).

Figure 3-7 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 3-8).

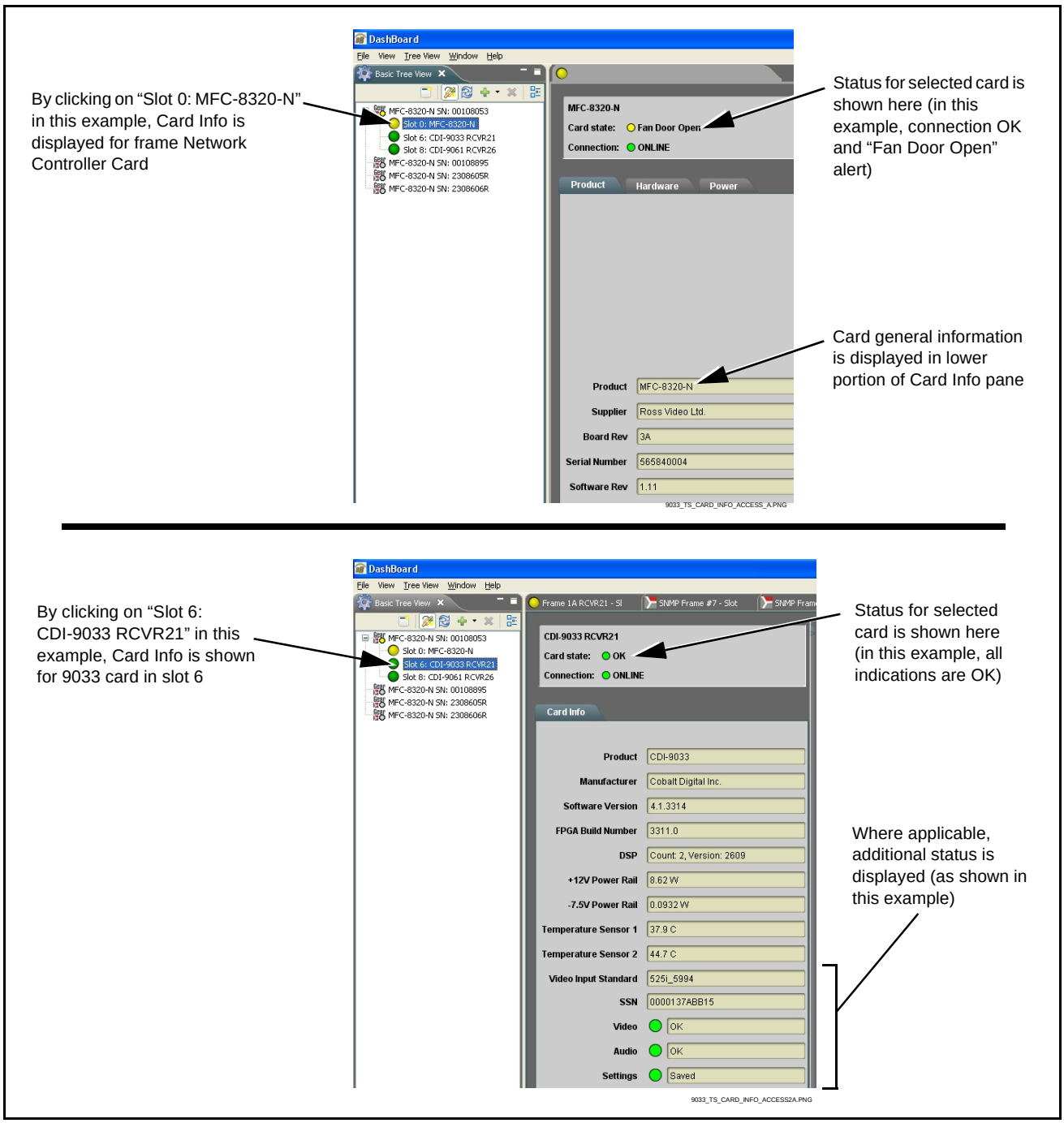


Figure 3-8 Selecting Specific Cards for Card Info Status Display

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 9033, 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 9033 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 9033 card itself is defective.
	  • If either of the rail supplies show **excessive** power being consumed (see Technical Specifications (p. 1-18) in Chapter 1, “Introduction”), the 9033 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 9033 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.

9033 Processing Error Troubleshooting

Table 3-4 provides 9033 processing troubleshooting information. If the 9033 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 9033 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 9033 card edge status indicators.

Note: Where errors are displayed on both the 9033 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 3-4 Troubleshooting Processing Errors by Symptom

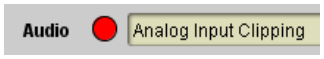
Symptom	Error/Condition	Corrective Action
• **DashBoard™** shows **Video** yellow icon and Input Invalid message in 9033 Card Info pane.  • Card edge **Input Format** LEDs show continuous cycling.	No video input present	Make certain intended video source is connected to appropriate 9033 card video input. Make certain BNC cable connections between frame Rear I/O Module for the card and signal source are OK.
Ancillary data (closed captioning, timecode, Dolby® metadata, AFD) not transferred through 9033.	• Control(s) not enabled	• Make certain respective control is set to **On** or **Enabled** (as appropriate).
	• VANC line number conflict between two or more ancillary data items	• Make certain each ancillary data item to be passed is assigned a unique line number (see Ancillary Data Line Number Locations and Ranges on page 3-8).
• **DashBoard™** shows red **Audio** icon and Analog Input Clipping message in 9033 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:** 9033 audio gain controls cannot be used to correct analog input overload condition. The condition must be corrected at the source.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
(9033-DEC only) Dolby® data indicated as **Present** on Audio Input Controls Status display does not process, or cannot be accessed as an audio source	• **Input Select** in **Dolby Decoder** function selection not set for pair carrying locked Dolby® data	• Make certain intended channels carrying locked Dolby® data are selected as the input for the Dolby® decoder.
	• Upstream metadata not enabled	• Check upstream device or system and enable as required.
Audio signal(s) do not route as expected. Parameter control not available as expected.	• **(9033 only)** 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 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 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.
Audio not processed or passed through card.	• Input audio of type that cannot be locked by 9033 card	• AES discrete audio must be nominal 48 kHz input. **Note:** Although the Status Displays in **Audio Input Controls** function submenu tab will show audio formats other than “Present, Professional” as being locked (such as “Present, Consumer”), in any case the audio must be at nominal 48 kHz rate for lock and processing to occur.
	• Enable control not turned on	• **Group Enable** button for **Embedded Audio Group 1/2** or **Embedded Audio Group 3/4** function submenu must be turned on for sources to be embedded into respective embedded channels.

Table 3-4 Troubleshooting Processing Errors by Symptom — continued

Symptom	Error/Condition	Corrective Action
Audio not processed or passed through card (cont.).	• Upmixer inadvertently enabled (Upmixer Licensed Feature only)	• Make certain upmixer is set to **Bypass** if not intended for use. **Note:** When manually enabled or set for automatic enable with appropriate signal levels, upmixer overwrites selected channels with new data; same-channel output will no longer represent same-channel inputs for selected 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	• **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 “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. 1-24) in Chapter 1, “Introduction“ for contact information.

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