AAP-8644 User Guide

Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
   - offer the best product quality and support
2. Make Cool Practical Technology
   - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

AAP-8644 · User Guide

- Ross Part Number: **8644DR-004-07**
- Release Date: August 23, 2022.

The information contained in this Guide is subject to change without notice or obligation.

Copyright

Trademark Information

Dolby® is a registered trademark of Dolby Laboratories, Inc. Dolby® encoder technology on this card is manufactured under license from Dolby Laboratories.

Other product names or trademarks appearing in this manual are the property of their respective owners.

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

EMC Compliance per Market

Market	Regulatory Standard or Code
United States of America	FCC Code of Federal Regulations" Title 47 Part 15, Subpart B, Class A
Canada	ICES-003
International	CISPR 24:2010
	IEC 61000-4-2:2008
	IEC 61000-4-3:2006 with A1:2007 and A2:2010
	IEC 61000-4-4:2004
	IEC 61000-4-6:2008
	IEC 61000-6-3:2006 with A1:2010
	CISPR 22:2008

Maintenance/User Serviceable Parts

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

Environmental Information

The equipment may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

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

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

Company Address

Ross Video Limited
8 John Street
Iroquois, Ontario
Canada, K0E 1K0

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

General Business Office: (+1) 613 • 652 • 4886
Fax: (+1) 613 • 652 • 4425

Technical Support: (+1) 613 • 652 • 4886
After Hours Emergency: (+1) 613 • 349 • 0006

E-mail (Technical Support): techsupport@rossvideo.com
E-mail (General Information): solutions@rossvideo.com
Website: http://www.rossvideo.com

Contents

Introduction

This guide covers the installation, configuration, and use of the AAP-8644 3G/HD/SD-SDI Embedded and Discreet AES/Analog Audio Processor with Advanced DSP Based Dolby Options. The following chapters are included:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Before You Begin**" provides general information to keep in mind before installing and configuring your AAP-8644.
- "**Video Processor Overview**" outlines the AAP-8644 video subsystem functions.
- "**Audio Processor Overview**" outlines the functions of the AAP-8644 audio processor.
- "**Hardware Overview**" provides a basic introduction to the AAP-8644 hardware features including the cabling and monitoring features of the rear module.
- "**Physical Installation**" provides instructions for the physical installation of the AAP-8644 card and its rear module into an openGear frame.
- "**Getting Started**" outlines how to display the AAP-8644 interfaces in DashBoard.
- "**Ancillary Data Line Numbers**" summarizes the typical default output video VANC line number locations for ancillary data processed by the AAP-8644.
- "**Audio DSP Setup Controls**" summarizes the Audio DSP tab settings.
- "**Dolby® E Encoder Setup**" provides descriptions and operating instructions for the AAP+DSP-ENCE (Dolby® E Encoder) option.
- "**Input Video Setup**" summarizes the Input Video tab settings.
- "**Output Video Setup**" summarizes the Output Video tab settings.
- "**FrameSync**" summarizes the Framesync tab settings.
- "**Video Delay**" summarizes the Video Delay tab settings.
- "**Input Audio**" summarizes the Input Audio Status fields, and the Input Audio Routing/Control tabs.
- "**Output Audio Routing Controls**" summarizes the Output Audio Routing/Control tabs.
- "**Timecode**" summarizes the Timecode tab settings.
- "**Reticules**" summarizes the Reticules tab settings.
- "**Video Quality Events**" summarizes the Video Quality tab settings.
- "**Audio Detect Events**" summarizes the Audio Detect Events tab settings.
- "**Closed Captioning**" summarizes the Closed Captioning settings.
- "**Presets**" summarizes the Presets tab settings.
- "**GPO Setup**" summarizes the GPO Setup tab settings.
- "**Event Setup**" summarizes the Event Setup tab settings.
- "**Admin**" summarizes the Admin tab settings.
- "**User Logs**" summarizes the User Logs tab settings.
- "**Alarms Setup**" summarizes the Alarms tab settings.
- "**Monitoring**" provides basic information for monitoring the AAP-8644 via its card-edge LEDs and DashBoard read-only fields.
- "**Troubleshooting**" provides general troubleshooting information and specific symptom/corrective action for the AAP-8644.
- "**Technical Specifications**" provides the specifications for the AAP-8644.

- "**Service Information**" provides information on the warranty and repair policy for your AAP-8644.
- "**Glossary**"provides a list of terms used throughout this guide.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your AAP-8644:

- ***DashBoard User Manual***, Ross Part Number: 8351DR-004
- ***MFC-OG3-N User Manual***, Ross Part Number: 8322DR-004
- ***OG3-FR Series User Manual***, Ross Part Number: 8322DR-005

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter **`English`**.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Manual***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save As**," you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✶ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your device.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support**: (+1) 613-652-4886
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Before You Begin

If you have questions pertaining to the operation of AAP-8644, please contact us at the numbers listed in the section "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Overview

The AAP-8644 is an audio processor that can process SDI with embedded audio or discreet audio (AES or analog) Analog composite video is also supported. In addition to a basic signal presence input failover function, a Quality Check option allows failover to alternate inputs or other actions based on user-configurable criteria such as black or frozen frame. Frame sync can be added as an option.

The AAP-8644 provides a DSP-based platform that supports multiple audio DSP options. When optioned with various diverse audio processing options, the DSP-based processing core allows flexible tailoring of multiple proc function instances.

Functional Block Diagram

Figure 1 provides a general overview of the AAP-8644 functions.

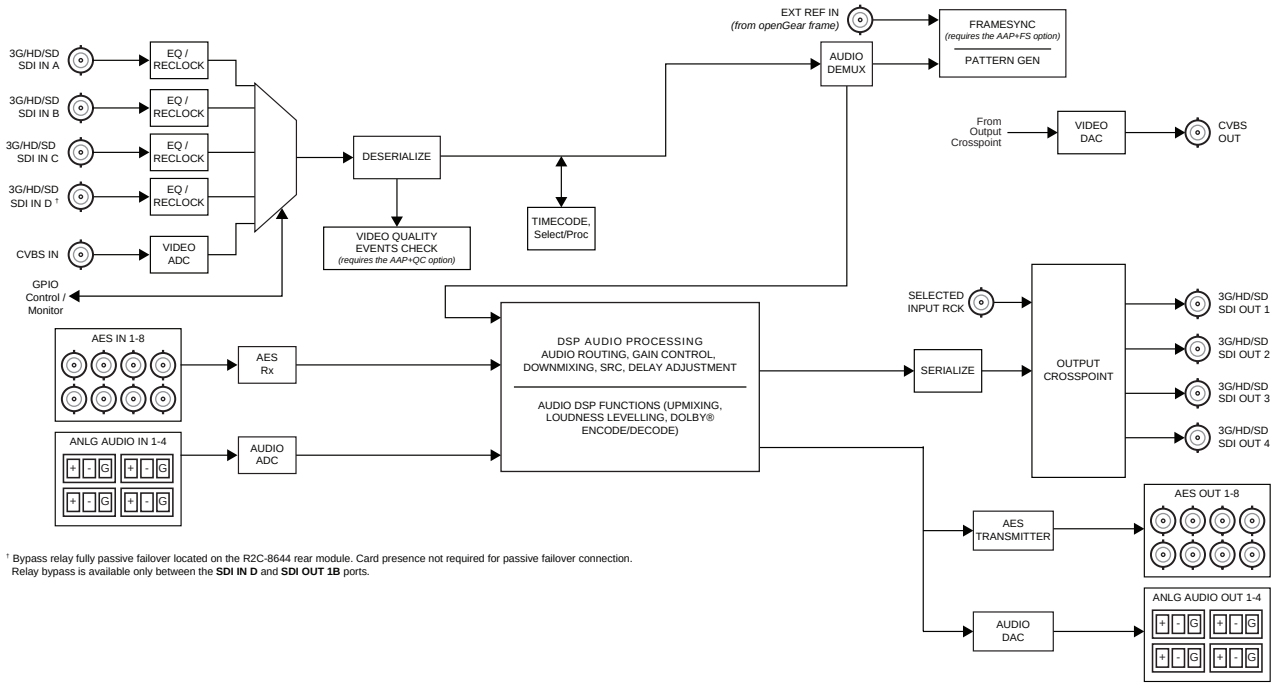


Figure 1 Functional Block Diagram

Available Options

Table 1 summarizes the available options currently available for the AAP-8644.

Table 1 AAP-8644 — List of Optional Licenses

Part Number	Description
AAP+DLY	Extended Frame Sync Delay Option

Table 1 AAP-8644 — List of Optional Licenses

Part Number	Description
AAP+DSP-DEC	Dolby® E / Dolby® Digital / Dolby® Digital Plus Decoder
AAP+DSP-ENCD-2.0	Dolby® Digital/Digital Plus 2.0 Encoder
AAP+DSP-ENCD-5.1	Dolby® Digital/Digital Plus 5.1 Encoder
AAP+DSP-ENCE	Dolby® E Encoder
AAP+DSP-RTLL-2.0	Dolby® RTLL™ Real-Time Loudness Leveling 2.0 Channel Stereo Loudness Processor
AAP+DSP-RTLL-5.1	Dolby® RTLL™ Real-Time Loudness Leveling 5.1 Channel Surround Sound Loudness Processor
AAP+DSP-UPMIX	Linear Acoustic UPMAX™ 2.0 to 5.1 Upmixer
AAP+QC	Provides failover, alert, or user presets action on criteria such as black/frozen frame, audio silence, and CC absence.
AAP+FS	Add Frame Sync Option

To install an option

1. Contact your Ross representative and provide the following:
   - the option(s) you wish to order for your AAP-8644
   - the serial number of the physical card[1]
2. When the order is processed, Ross Video will provide you with a license file that can be uploaded to the card.
3. To install the license file to the card:
   a. Display the AAP-8644 in DashBoard as outlined in "**Accessing the AAP-8644 Interfaces in DashBoard**".
   b. Click **Upload**.

      This button is located at the bottom of the DashBoard window.
   c. Follow the on-screen instructions.

1. The serial number of your unit is reported on the Product Info tab in DashBoard. Refer to the section "Accessing the AAP-8644 Interfaces in DashBoard" for information on displaying the AAP-8644 tabs.

Video Processor Overview

This chapter describes the functions that the AAP-8644 video subsystem provides.

Input Video Select/Quality Check Function

A GUI-based control allows the AAP-8644 to select from up to four 3G/HD/ SD-SDI inputs, and a SD CVBS analog video input. For analog inputs, waveform-based ancillary data is preserved for extraction and usage later in the card processing chain.

The input can be selected using DashBoard manual control, set to failover to an alternate input upon loss of the target input, and can be externally selected via a GPIO interface. An input **Allowed Rasters** and **Allowed Frame Rates** filter allows inputs to be filtered (screened) for only user-allowed raster sizes and frame rates, with unsupported raster/rates being rejected as an input (input unlock). Reclocked copies of any SDI input can be outputted by the card when selected as a choice on the output crosspoint.

Option AAP+QC

Quality Check allows criteria such as black/ frozen frame events to propagate an event alert. This alert can be used by the AAP-8644 Presets function to invoke video routing changes, GPO, and other actions.

Video Output Crosspoint

A four-output video matrix crosspoint allows independently applying the card processed video output or reclocked input to any of the four card discrete coaxial outputs (SDI OUT 1 to SDI OUT 4). For an SD output, a CVBS coaxial output is available as a processed video output.

An additional output (RLY BYP D) provides a relay-protected output that outputs a copy of SDI OUT 1 crosspoint selection in normal operation. In power loss failover, RLY BYP D passive outputs the signal connected to SDI IN D.

Timecode Processor

This function provides for extraction of timecode data from input video source, and in turn allow individual timecode strings to be embedded into the output video. The function can monitor any of the video inputs of the card for supported timecode formats such as ATC_LTC or ATC_VITC for down-conversions to HD, and ATC_VITC or VITC waveform (with selectable odd/even field line number control) for SD SDI or CVBS inputs. Waveform VITC timecode can also be extracted from a reference input and used as the output timecode value. If the preferred format is detected, the preferred format is used by the card; if the preferred format is not detected, the card uses other formats (where available) as desired. An internally-generated free-run timecode can be also be embedded on output video if desired.

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

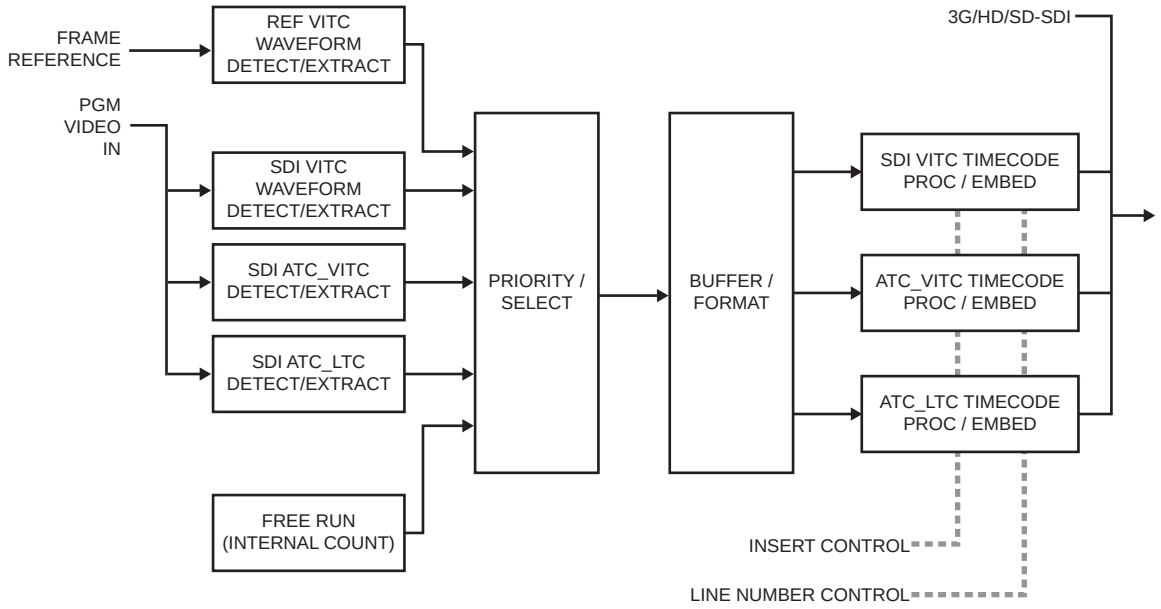


Figure 2 Timecode Processor

Frame Sync (AAP+FS)

The option AAP+FS provides for frame sync control using either one of two external FRAME REF IN (1,2) reference signals distributed with the card frame, or the input video as a frame sync reference.

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

Frame sync can select from either of two card frame reference sources, or free-run input video sync. Selectable failover allows alternate reference selection should the initial reference source become unavailable or invalid. In the event of input video loss of signal, the output can be set to disable video, go to black, go to an internal test signal generator pattern, or freeze to the last intact frame (last frame having valid SAV and EAV codes).

An internal test signal generator provides a selection of various standard patterns such as color bars, sweep patterns, and other technical patterns. The test patterns can be applied to the output video upon loss of input or manually inserted at any time.

✶ On cards not licensed for option AAP+FS, a Video Delay function is provided. This function can restore lip sync when using audio DSP functions such as RTLL and Dolby® encoding.

Video Quality Events Detection (AAP+QC)

The option AAP+QC provides a Video Quality Events user interface and an Event Triggers user interface for setting an area of concern across the program raster which can be monitored for frozen or black video events. Threshold controls allow setting the sensitivity of the function, while engage and disengage threshold timing controls allow setting how fast the event detection engages and releases when triggered. The Event Triggers user interface allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

An Event Triggers user interface can detect Closed Caption Presence and Closed Caption Absence events. The Event Triggers user interface in turn allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Audio Processor Overview

This chapter describes the functions that the AAP-8644 audio subsystem provides.

Overview

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

- 16 channels of embedded audio from the SDI video input (default 1-to-1 routing to SDI output)
- Up to 16 channels (8 pairs) of discrete AES input
- Up to 4 channels of balanced analog audio input

The audio processing subsection is built around a card internal 16-channel audio bus. This 16-channel bus receives inputs from an input routing crosspoint that routes de-embedded, and discrete AES and analog audio inputs, over the 16-channel card bus. Correspondingly, at the output end of the 16-channel bus is an output routing crosspoint that in turn distributes the 16-channel bus signals to embedded, and discrete AES and analog audio outputs.

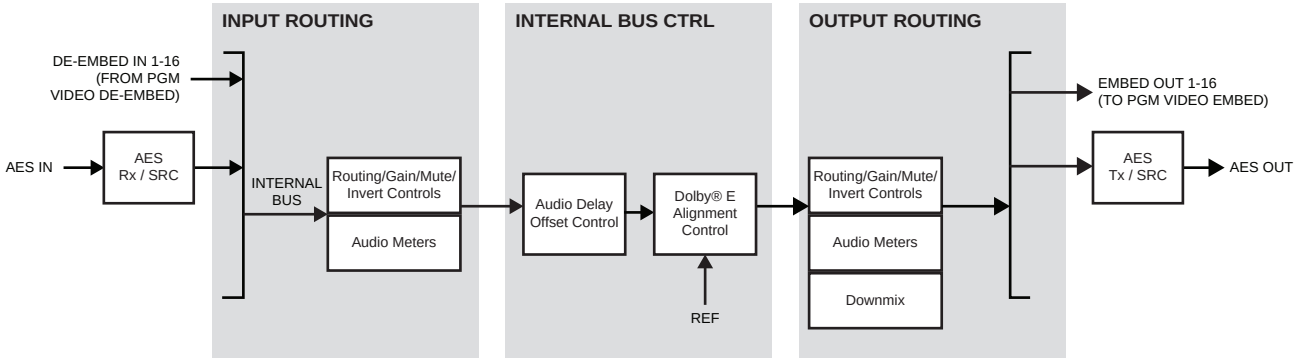


Figure 3 Basic Audio Processing Work Flow

An Input Audio Status display shows the presence and peak level of each input audio channel received by the card. In addition to SDI embedded audio channel sources, analog and coaxial AES inputs are available as input audio choices. For AES audio inputs, payload is identified (PCM or data such as Dolby® Digital or E). Each AES input pair has independent sample rate converters to align each input pair with video timing to accommodate cases where AES audio is not synchronous with input video (SRC automatically bypassed for non-PCM payloads). As such, the audio subsection provides a full crosspoint between all supported audio inputs and output types.

Audio Down Mix Function

The Audio Down Mixer function provides for the selection of any five embedded channels serving as Left (L), Right (R), Center (C), Left Surround (Ls), and Right Surround (Rs) individual signals to be multiplexed into 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 to any embedded audio pair as desired (or de-embedded to an AES or analog audio output).

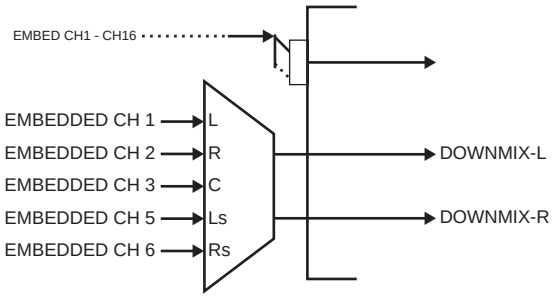


Figure 4 Audio Down Mix Functional Block Diagram with Example Sources

Flex Buses

For both input and output nodes before and after the card internal buses, flex buses provide flexible-structure mixer in which any of 16 summing nodes (Flex Mix Bus A to Flex Mix Bus P) can receive any card audio input, thereby allowing several customizable mixing schemes. Similarly, any of the 16 card internal bus signals can be applied to an output flex bus mixer.

Audio DSP Function

The Audio DSP Function provides a DSP-based platform that supports multiple audio DSP options. When optioned with various diverse audio processing options, the DSP-based processing core (which supports numerous simultaneous processing engines) uses license “credits” which allows flexible tailoring of multiple proc function instances. Audio proc options include Dolby® Real-Time Loudness Leveling automatic loudness processing, Dolby® D/D+ encode/decode, and Linear Acoustic® UPMAX™ automatic upmixing.

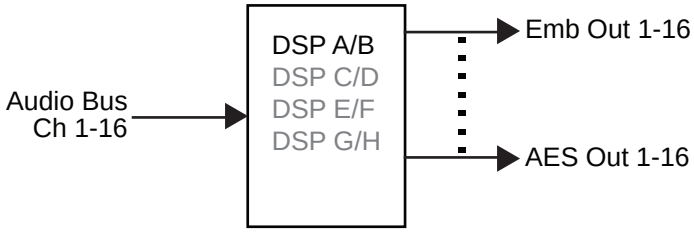


Figure 5 DSP Pipelines and Input/Output Mixer Positioning

The Audio DSP block is positioned between all card audio inputs (input mixer positioning) as well as audio outputs (output mixer positioning). Actual audio DSP proc functions are facilitated using licenses for these options. When any audio option is licensed (activated), the processing can be positioned at the input or output mixer as desired.

- Input Mixer path positioning locates the DSP pipeline to receive basic external inputs coming into the card, and then allows DSP processed output channels to be directed to the card internal Audio Bus channels by selecting Audio DSP channels as sources for destination Audio Bus channels via the Input Audio Routing/Controls.
- Output Mixer path positioning locates the DSP pipeline to receive card Audio Bus channels and then place the DSP processed output channels directly at the card audio outputs as sources for destination Embedded Output or AES Output channels via the Output Audio Routing/Controls.

DSP Options

Option licenses provide the user-exposed DSP functions. Available DSP options are as follows. Multiple licenses for the same or different options can be installed and used simultaneously.

- AAP+DSP-RTLL-5.1 — Dolby® Real-Time Loudness Leveling™ 5.1-Channel Loudness Processor Option
- AAP+DSP-RTLL-2.0 — Dolby® Real-Time Loudness Leveling™ 2.0-Channel Loudness Processor Option
- AAP+DSP-ENCD-5.1 — Dolby® Digital/Digital Plus 5.1 Encoder
- AAP+DSP-ENCD-2.0 — Dolby® Digital/Digital Plus 2.0 Encoder
- AAP+DSP-DEC — Dolby® Decoder
- AAP+DSP-UPMIX — Linear Acoustic® UPMAX™ 2.0-to-5.1 Upmixer

DSP Loading

The AAP-8644 has two DSP cores (Core 0 and Core 1). Each core is divided into four slices:

- Core 0 includes DSP A, DSP B, DSP C, and DSP D.
- Core 1 includes DSP E, DSP F, DSP G, and DSP H.

Each AAP+DSP license feature uses resources, which can be expressed as a percentage of a core. The AAP-8644 Audio DSP tab reports how much of each DSP core is currently used. (**Figure 6**)

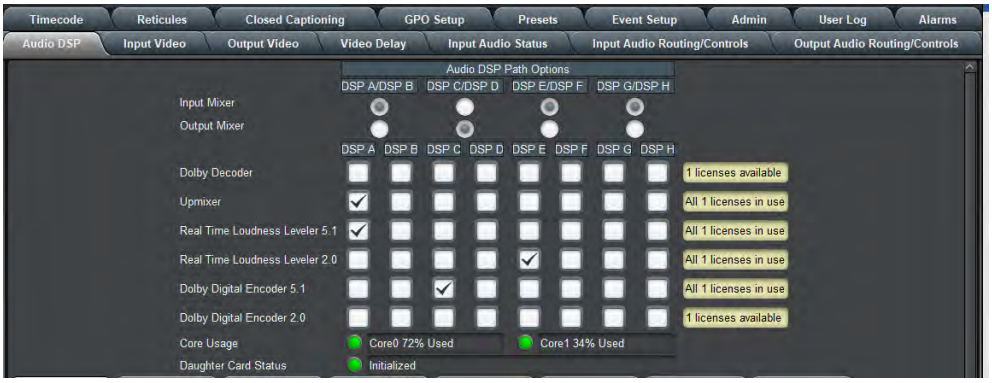


Figure 6 Audio DSP Tab — Example of DSP Core Usage

The AAP-8644 supports multiple licenses for each feature (e.g. an AAP-8644 can have four AAP+DSP-RTLL-5.1 licenses and three AAP+DSP-ENCD-5.1 licenses). The Audio DSP tab will report how many licenses are in use and how many are available for each feature. In the mentioned example, not all licenses would be able to be concurrently active.

Table 2 outlines the percentage of DSP Core that each license requires.

Table 2 AAP-8644 Licenses — Required DSP Core

Part Number	Percentage of DSP (%)
AAP+DSP-RTLL-5.1	40
AAP+DSP-RTLL-2.0	40
AAP+DSP-ENCD-5.1	28
AAP+DSP-ENCD-2.0	21
AAP+DSP-DEC	16
AAP+DSP-UPMIX	20

Audio Events Detect (AAP+QC)

The option AAP+QC provides a Audio Detect Events user interface and an Event Triggers user interface for checking user-selected channels to detect audio silence conditions. The Event Triggers user interface in turn allows instructing the card as to the action to take upon an event (such as go to a changed signal routing, activate a GPO, send an automated email, or go to a user-defined preset).

Hardware Overview

This chapter presents information on the AAP-8644 card-edge controls and features.

Overview

The AAP-8644 is an openGear modular system composed of two sub-systems.

- a main board which connects to a rear module and the openGear chassis midplane
- a rear module that provides physical connectors

✶ Depending on the rear module, up to ten AAP-8644 cards may be installed into an openGear frame.

Main PCB Overview

The main PCB is a typical openGear card. An ejector on one end secures the module to the slot inside the openGear frame, and the other end inserts into a connector on the back of the rear module.

Reset Button

Pressing this button resets the microprocessor and re-initializes the card. This is a hard reset of the card. This action should only be before as advised by Ross Video Technical Support.

AAP-8644 Rear Module Overview

This section provides an overview of the cabling designations for the rear module that the AAP-8644 supports. The R2C-8644 rear module occupies four slots in the openGear frame and accommodates one AAP-8644 card. (**Figure 7**) All coaxial connectors are HD-BNC.

For More Information on...

- installing a rear module, refer to "**Installing the Rear Module into the openGear Frame**".

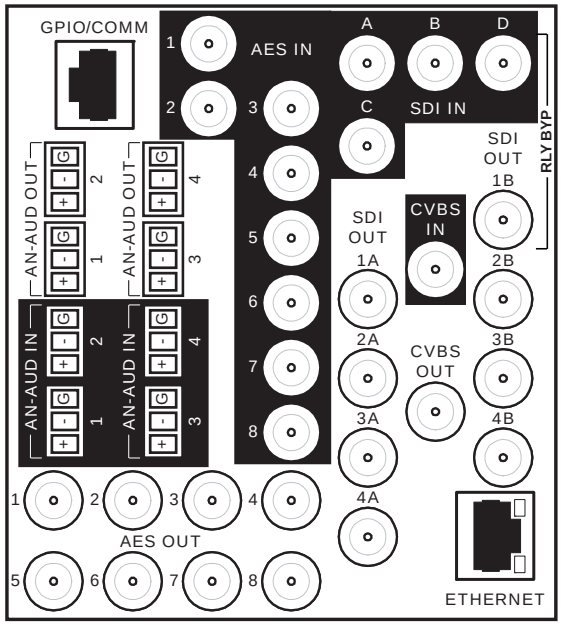


Figure 7 Cabling Designations — R2C-8644

This rear module provides:

- Four 3G/HD/SD-SDI video inputs
- Four 3G/HD/SD-SDI video outputs (OUT 1B with relay bypass protect)
- One CVBS video input
- One CVBS video output
- Four analog balanced audio inputs
- Four analog balanced audio outputs
- Eight AES audio inputs
- Eight AES audio outputs
- One COMM/GPIO RJ-45 connector
- One ETHERNET 100/1000 BaseT Ethernet connector

GPI Interface

Two independent ground-closure sensing GPI inputs (GPI 1 and GPI 2; each sharing common ground connection as chassis potential) are available.

Associated with each GPI user control is a selection of one of 32 user-defined card presets in which GPI activation invokes a card control preset. Because the GPI closure invokes a user-defined preset, the resulting setup is highly flexible and totally user-defined. Invoking a user preset to effect a change involves card setup communication limited only to the items being changed.

GPI triggering can be user selected to consider the activity on discrete GPI ports, or combinations of logic states considering both GPI inputs, as well as be set for level or edge triggering. This flexibility allows multistage, progressive actions to be invoked if desired. Indication is provided showing whenever a GPI input has been invoked.

GPO Interface

Two independent photo-transistor non-referenced (floating) contact pairs (GPO 1/1 and GPO 2/2) are available. A GPO can be invoked by setting a GPO to be enabled when a card preset is in turn applied (i.e., when a preset is invoked (either manually or via event-based loading), the GPO is correspondingly also activated.

Serial (COMM) Port

This port is not implemented.

Physical Installation

Installing an AAP-8644 card into the openGear frame requires you to remove the blank plates in the designation frame slots, install the required rear module into the frame rear panel, and then install the AAP-8644 card into the required frame slot.

If you have questions pertaining to the installation of AAP-8644, please contact us at the numbers listed in the section "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

For More Information on...

- the technical specifications for the AAP-8644, refer to the chapter "**Technical Specifications**".

Before You Begin

These installation guidelines assume the following:

- Ensure the openGear frame is properly installed. Refer to the frame ***User Manual*** for details.
- A valid IP addresses is available for the AAP-8644.
- If the rear module is already installed in the openGear frame, proceed to "**Installing the AAP-8644 Card into an openGear Frame**".
- The AAP-8644 supports the 8322AR-324 rear module. Each rear module occupies two slots in the frame, but accommodates one card.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

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

Removing the Blank Plates from the openGear Frame

When a frame slot is not populated with an openGear card, a blank plate must be installed to ensure proper frame cooling and ventilation.

To remove a blank plate from the openGear frame

1. Locate the slots in the openGear frame you wish to install the AAP-8644 into.

   It is recommended to use the following slot combinations:

   - Slots 1, 2, 3, 4
   - Slots 5, 6, 7, 8
   - Slots 9, 10, 11, 12
   - Slots 13, 14, 15, 16
   - Slots 17, 18, 19, 20

2. Use a Phillips screwdriver to unfasten each blank plate from the frame backplane.
3. Remove each blank plate from the chassis and set aside.

Installing the Rear Module into the openGear Frame

If the rear module is already installed in the openGear frame, proceed to the section "**Installing the AAP-8644 Card into an openGear Frame**".

To install a rear module into the openGear frame

1. For each retaining screw on the rear module, push the o-ring to the end of the screw (but not off the screw). This will help to align the rear module to the frame backplane in step 3.

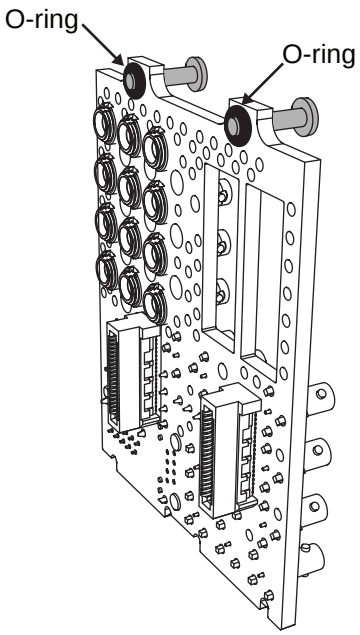


Figure 8 Location of the O-rings on the R2C-8644 Rear Module

2. Seat the bottom of the rear module in the seating slots at the base of the openGear frame's backplane.
3. Align the top holes of the rear module with the screw holes on the top-edge of the frame backplane.
4. Using a Phillips screwdriver and the provided screw, fasten the rear module to the backplane.

✶ Do not fully tighten the screws until after installing the card and you have verified that the AAP-8644 card aligns with the rear module.

Installing the AAP-8644 Card into an openGear Frame

The slot the AAP-8644 installs into depends on the slot combination you installed the rear module in and the rear module you are using. This allows adequate spacing to avoid damaging the card, the cards installed in the neighboring slots, or both. Refer to **Table 3** for valid slot combinations.

Table 3 Card Slot Combinations — R2C-8644 Rear Module

Rear Module is Installed in	Card Installs into Slot
Slots 1, 2, 3, 4	2
Slots 5, 6, 7, 8	6
Slots 9, 10, 11, 12	10
Slots 13, 14, 15, 16	14
Slots 17, 18, 19, 20	18

To install the AAP-8644 into the openGear frame

1. Locate the slot the AAP-8644 card will slide into as follows:
2. Verify that the AAP-8644 card aligns with the rear module.
3. Using a Phillips screwdriver fasten the rear module to the backplane using the provided screws.

✶ Do not over tighten the screws.

4. Hold the card by the edges and carefully align the card edges with the slot rails in the frame.
5. Fully insert the card into the frame until the card is properly seated in the rear module.

Getting Started

This chapter provides instructions for launching DashBoard and accessing the AAP-8644 interfaces in DashBoard.

If you have questions pertaining to the operation of AAP-8644, please contact us at the numbers listed in the section **"Contacting Technical Support"**. Our technical staff is always available for consultation, training, or service.

Before You Begin

Ensure that:

- The openGear frame that houses the AAP-8644 displays in the Basic Tree View of DashBoard.
- The AAP-8644 displays as a sub-node in the openGear frame tree of DashBoard.

Launching DashBoard

DashBoard must run on a computer that has a physical wired ethernet connection. Wireless connections do not allow device discovery.

For More Information on...

- downloading and installing the DashBoard client software, refer to the ***DashBoard User Manual***.

To launch DashBoard

1. Ensure that you are running DashBoard software version 9.3 or higher.
2. Launch DashBoard by double-clicking its icon on your computer desktop.

Accessing the AAP-8644 Interfaces in DashBoard

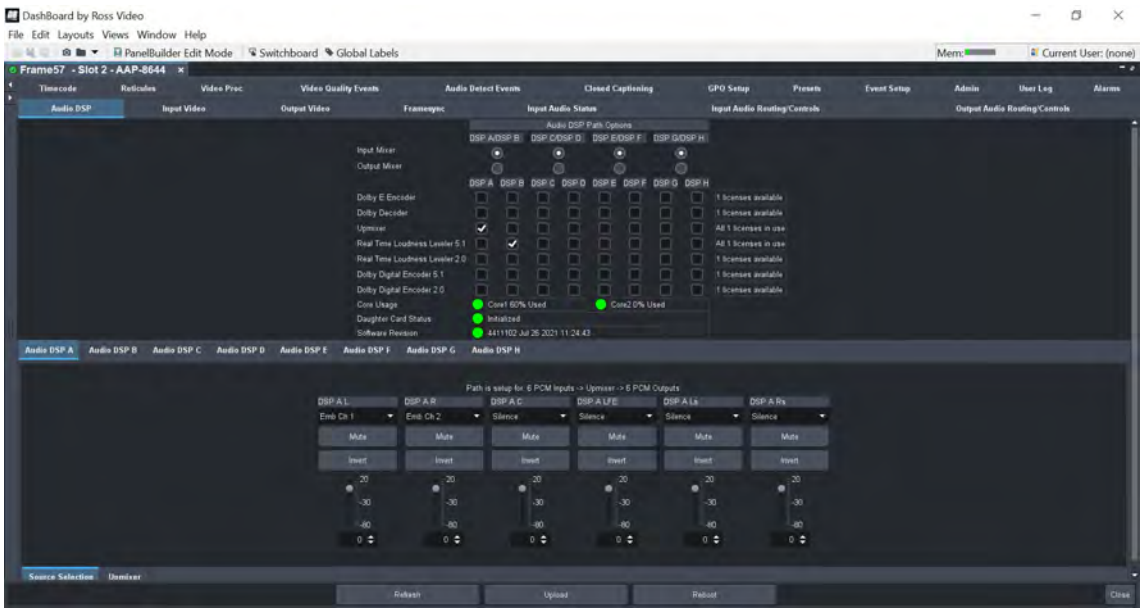
The AAP-8644 settings are organized in DashBoard using tabs. When a tab is selected, each parametric control or selection list item associated with the function is displayed. Scalar (numeric) parametric values can then be adjusted as desired using the GUI slider controls. Items in a list can then be selected using GUI drop-down lists.

Once the openGear frame that houses the AAP-8644 displays in the Tree View of DashBoard, you can access the AAP-8644 interfaces. These interfaces provide options for configuring, monitoring, and operating your AAP-8644 via DashBoard.

To display the Global interface in DashBoard

1. Launch DashBoard.
2. In the Basic Tree View of DashBoard, locate the openGear frame the AAP-8644 is installed in.
3. Expand the openGear frame node to display a list of sub-nodes.
4. Locate the AAP-8644 node in the frame tree.
5. Double-click the AAP-8644 node.

   The AAP-8644 interface opens in the right pane of the DashBoard window.



The following chapters in this user guide are organized based on the tab structures in DashBoard. Each chapter summarizes the menus, parameters, and fields for a specific tab.

Ancillary Data Line Numbers

This chapter outlines the typical output video VANC line number locations for various ancillary data items that may be passed or handled by the AAP-8644.

✶ The AAP-8644 does not check for conflicts on a given line number. Make certain the selected line is available and carrying no other data.

Table 4 Typical Ancillary Data Line Number Locations/Ranges

Item	Default Line Number/Range SD	HD
AFD	12	9
ATC_VITC	13	9/8
ATC-LTC	—	10
Dolby® Metadata	13	13
SDI VITC Waveform	14/16	—
Closed Captioning	21 (locked)	10

While range indicated by the drop-down list on GUI may allow a range of choices, the actual range is automatically limited to certain ranges to prevent inadvertent conflict with active picture area depending on video format. **Table 5** defines the limiting ranges for various output formats.

Table 5 Line Ranges Based on Format

Format	Line Number Range
525i	12-19
625i	9-22
720p	9-25
1080i	9-20
1080p	9-41

Because line number allocation is not standardized for all ancillary items, consideration should be given to all items when performing set-ups. **Figure 9** shows an example of improper and corrected VANC allocation within an HD-SDI stream.

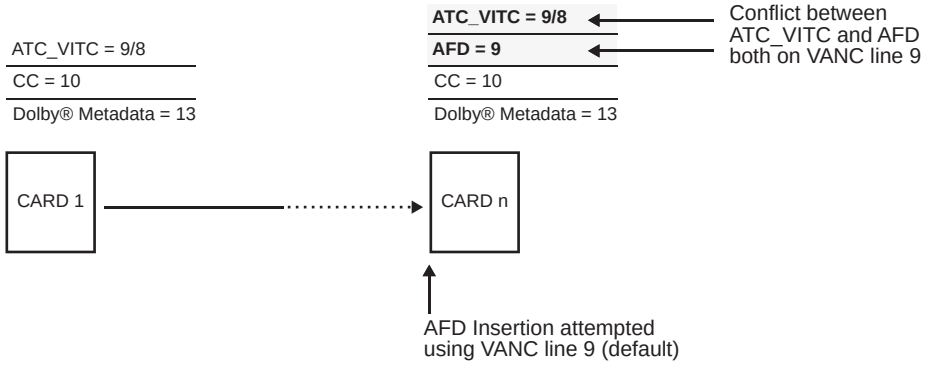


Figure 9 Example VANC Line Number Allocation Examples — Conflicts

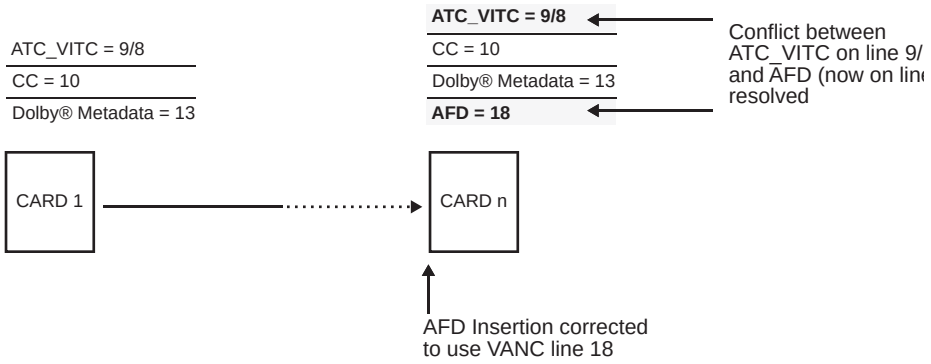


Figure 10 Example VANC Line Number Allocation Examples — Corrected

Audio DSP Setup Controls

✶ Read and understand the overview shown below before proceeding to specific DSP detailed control settings. The overview shows basic setup (with examples) to select and enable various DSP functional blocks, and shows how to route inputs and outputs to and from individual DSP blocks.

Input Mixer and Output Mixer DSP Positioning

Each pair of the eight DSP pipelines (DSP A/B to DSP G/H) can be independently positioned either at the AAP-8644 input mixer (Input Audio Routing/Controls) location or at the card output mixer (Output Audio Routing/Controls) location.

Path positioning is set for each DSP pipeline pair in the upper pane of the Audio DSP page by selecting Input Mixer or Output Mixer button for each DSP pair (DSP A / DSP B to DSP G / DSP H).

Figure 11 Example the Audio DSP Tab in DashBoard

In **Figure 11**, DSP A/B pair is set to work with the input mixer, and DSP E/F pair is set to work with the output mixer. Any DSP process can be set to use the input or output path as desired.

In each DSP function row, the licenses available displays shows whether or not the DSP function is licensed for the card, and if so the number of licenses available. As DSP functions are enabled for use, the available licenses is correspondingly decremented.

Input Mixer

Input Mixer path positioning locates the DSP pipeline to receive basic external inputs coming into the card (in this example, Emb Ch 1 and Ch 2 feeding DSP A L and DSP A R), and then allows DSP processed output channels to be directed to the card internal Audio Bus channels by selecting Audio DSP channels as sources for destination Audio Bus channels via the Input Audio Routing/Controls.

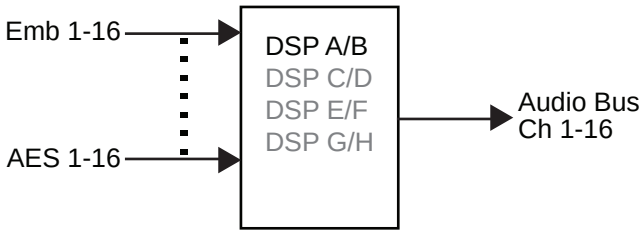


Figure 12 Example of Input Mixer Configuration

The DSP outputs are then routed to card Audio Bus Channels as desired (in **Figure 13**, Audio DSP A L to Audio DSP A Rs serving as sources for Emb Ch 1 to Ch 6).

Figure 13 Example of Input Mixer Configuration

Output Mixer

The Output Mixer path positioning locates the DSP pipeline to receive card Audio Bus channels (in **Figure 14**, DSP E L and DSP E R receiving card Audio Bus Channels 9 and 10) and then place the DSP processed output channels directly at the card audio outputs as sources for destination Embedded Output or AES Output channels via the Output Audio Routing/Controls.

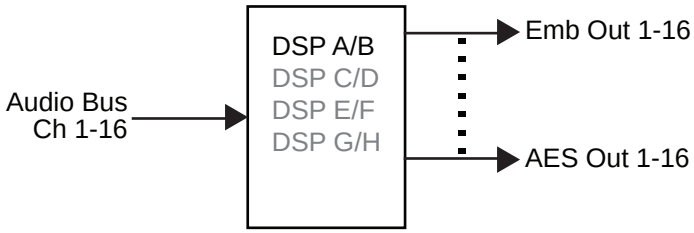


Figure 14 Example of Output Mixer Configuration

The DSP outputs are then routed to card external outputs as desired.

Example of Multiple DSP Process Audio Routing and DSP Setup

In **Figure 15**, single DSP pipeline DSP A is setup to:

- Receive an embedded PCM pair from the basic card input audio (input mixer positioning).
- Upmix the PCM stereo pair to 5.1 audio.
- Perform Real-Time Loudness Leveler (RTLL) loudness processing.
- Output the processed 5.1 complement as PCM and as a separate Dolby® Digital 5.1 Encoded pair.
- Provide a separate additional Dolby® 2.0 Encoder (on DSP E) for a SAP stereo PCM pair.

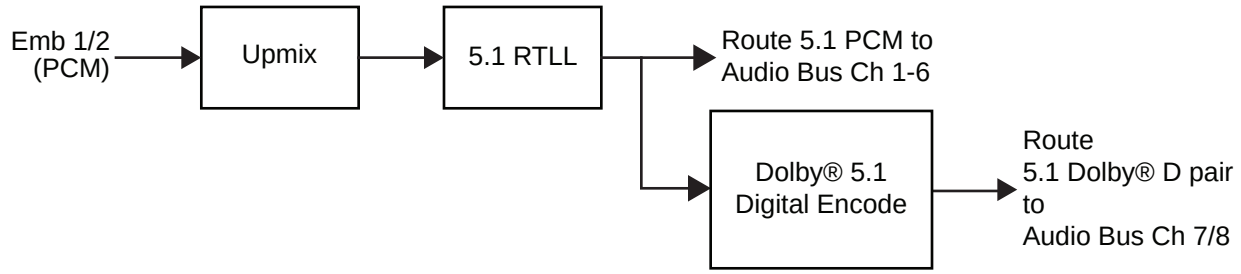


Figure 15 Example of Multiple DSP Routing

The upper pane on the Audio DSP tab allows enabling DSP processes for each of the eight DSP pipelines. In **Figure 16**, DSP A is set to provide Upmixer, RTLL 5.1, and Dolby® Digital 5.1 Encode by checking the corresponding boxes. In this example, all processing is positioned at the Input mixer.

Figure 16 Example of Multiple DSP Setup in DashBoard

When a DSP pipeline is enabled for any function by checking any check box like that shown above, the sub-tabs for the related DSP in the lower pane expose all the setup functions required for the selected processes. In **Figure 17**, we'll start with the Source Selection function since this is the first step in setting up a DSP.

After check boxes enabling the desired processes are checked in the Audio DSP page upper pane, selecting the respective DSP tab (Audio DSP A to Audio DSP H) shows the pertinent setup tabs for the functions that are selected.

In this example, we've selected DSP processes using DSP pipeline Audio DSP A. Clicking the Audio DSP A tab exposes the setup functions sub-tabs for the pipeline. Here, we will start with telling the DSP what inputs it will receive using the Source Selection sub-tab.

With the Source Selection sub-tab opened, we now assign the card basic input channels that the processing chain will use (in this example, sourcing from card basic inputs Emb Ch 1/2). Since all of the processes selected here reside in DSP A, each process will forward its processed signal to the next enabled process in the DSP pipeline.

Figure 17 Example of Multiple DSP Setup in DashBoard

With source selection having been set, now we proceed to setting up the Upmixer. In **Figure 18** we are sourcing from a stereo PCM pair, so Cross-fade does not need to be considered (Mode can be set to Auto or Always Upmix). For cases where 5.1-channel PCM is used as an input, and may already carry 5.1 content, the Threshold and Auto Cross-fade controls can make for smoother transitions between existing and Upmixer-developed 5.1 content. Default settings are recommended in most cases.

Figure 18 Setting up the Upmixer

Now that the Upmixer is set up, the 5.1 Upmix content in our example is fed to the Real Time Loudness Leveler 5.1 function (since we also have that check box checked for the DSP A pipeline).

Figure 19 Setting up the RTLL

The RTLL blocks offer parametric controls for loudness leveling. Basic setup is setting RTLL to Enabled, and choosing a Manual IRL level (typically same as the desired loudness level). Other settings can typically be left at the default settings provided.

Our final processing step in this example is setting DSP A to also provide a Dolby® 5.1 encoded pair. When a Dolby® encoder is checked (enabled), the Dolby® Digital Encoder and Dolby® Digital Encoder Metadata sub-tabs appear, which allow setup of the Dolby® encoded pair.

The first step in setting up an encoder is selecting the Encoder Format (which selects between Dolby® Digital and Dolby® Digital Plus formats). In **Figure 20**, Dolby® Digital is used, with the default data rate being used. The status displays below the setup drop-downs show data rate actually being used, as well as encode success.

Figure 20 Including a Dolby® 5.1 Encoded Pair

✶ Although the Metadata Source drop-down allows choices other than encoder internal metadata, only internal metadata is currently supported.

Figure 21 Setting the Remaining Data

With the encoder format and data rate basics set up above, now the bitstream mode, metadata, and other particulars related to the selected mode can be set. In **Figure 21**, standard 5.1 is selected (3/2L) with a dialnorm of -24 (conforming to ATSC A/85). The encoded stream is now ready to be placed on an audio bus channel pair for eventual output from the card.

Example of Routing the DSP Audio Outputs on the AAP-8644

Again, depending on whether the DSP is positioned at the card input or output mixer, Audio DSP processed outputs are available as follows:

- DSP positioned at the Input Mixer makes its outputs available to the card Audio Bus Channels (as choices on each card Audio Bus Ch 1 to Audio Bus Ch 16 drop-down using the Input Audio Routing tab).
- DSP positioned at the Output Mixer makes its outputs available to the card Embedded, AES, and Analog Audio channels (as choices on each card output drop-downs using the Output Audio Routing tab).

✶ Dolby® encoded audio can only be outputted on digital audio channels such as embedded or AES. However, DSP audio processed to provide PCM outputs can also be outputted on analog audio output channels. These outputs will be processed just like any other PCM handled by the card, and converted to analog by the card on-board audio DAC.

In **Figure 22**, since DSP A was set up to be positioned at the input mixer, its DSP outputs are routed to the card Audio Bus channels as shown below.

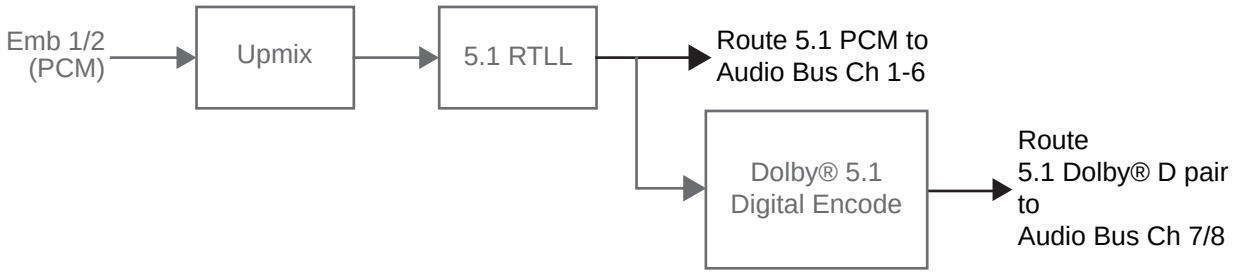


Figure 22 Example of DSP outputs Routed to the Audio Bus Channels

The DSP outputs can be used for other internal card routing or processes, or be available as PCM outputs from the card via the AAP-8644 Audio Bus.

Like any other signals routed to the AAP-8644 Audio Bus, these outputs are available on any of the card embedded audio or AES outputs.

Figure 23 Example of Outputs Routed to Audio Channels

As mentioned earlier, a separate DSP pipeline (DSP E) has been set up in this example to provide a SAP Dolby® 2.0 pair, with this DSP being positioned at the output mixer in this example. **Figure 24** illustrates the routing that provides this.

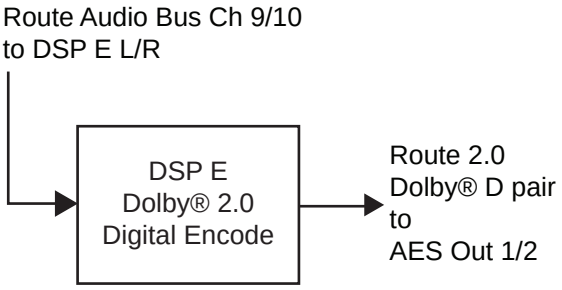


Figure 24 Example of Outputs Routed to Audio Channels

Tips for Using Audio DSP

- Determine what positioning (input or output mixer) is best for the task being set up. Placement at the input mixer provides the most flexibility (especially if the processed output may be needed for other processes).

- When performing significant changes like clearing or checking (enabling) new DSP functions, always press the DashBoard Refresh button to make sure the change is taken in on DashBoard and sub-tabs correspondingly displayed are refreshed with the drop-downs that correlate with the DSP setup. If DashBoard changes (such as channel routing) are done before refresh, the intended routing settings may not actually take place and engage.
- Where possible where a compound setup (like that shown in this example for DSP A) is being set up, it's a good idea to confine the processes to a single DSP pipeline. In this manner, the intermediate processed signals will always be routed to the next function selected, without requiring any manual routing setup in DashBoard.
- Audio lag (delay) will occur when RTLL is used. Using the card Video Delay controls (or Frame Sync controls and Input Audio Routing > Audio Delay controls where equipped), it is recommended to provide a 200 msec video delay (or 200msec audio advance) to restore lip sync. As with all Dolby® Encoders, restoring lip sync for a Dolby® encode/decode chain must also be considered. Refer to applicable manual(s) for more information.

Audio DSP Interface in DashBoard

This section covers the specific controls and settings of the DSP enable setup pane, signal routing to and from DSP blocks, and the specific DSP blocks themselves. Reading and understanding the overview on the preceding pages is strongly recommended before proceeding to the descriptions below.

The Audio DSP interface provides controls for enabling licensed DSP functions, routing inputs and outputs to and from the DSP functions, and setting individual parametric settings for each DSP function.

Audio DSP Basic Setup Pane (Upper Pane)

When the Audio DSP tab is opened, the upper pane allows basic, primary setup of the card DSP functions (blocks) such as selecting (enabling) available DSP functions for each DSP pipeline.

Figure 25 Example of Audio DSP Tab — Upper Pane

These settings must be performed first, as these settings will enable desired DSP functions and position the DSP assets at either the input mixer or output mixer as desired. DSP-specific controls appear only when the corresponding DSP function is enabled here.

1. Clicking the Audio DSP tab opens the upper and lower panes of the Audio DSP page.
2. In the upper pane, select desired pairs A/B to G/H of DSP pipelines as desired to facilitate DSP functions as needed.
3. In each DSP function row (Dolby® Decoder to Dolby® Digital Encoder 2.0), enable DSP function and apply it to a DSP pipeline pair as desired by clicking the corresponding box.
4. When DSP functions are enabled In a DSP pipeline column, now position the DSP pipeline to be at the input or output mixer as desired by checking the Input Mixer or Output Mixer button.

In **Figure 25**, DSP A is set to enable Upmixer, Real Time Loudness Leveler 5.1, and Dolby® Digital Encoder 5.1, with all set to be positioned at the Input Mixer.

Also in **Figure 25** DSP E is set to enable Dolby® Decoder, with this set to be positioned at the Output Mixer.

✶ Unused DSP asset rows/columns can be left as-is with mixer selection being ignored.

The message **`licenses available`** displays shows whether or not the DSP function is licensed for the card, and if so the number of licenses available. As DSP functions are enabled, the available licenses is correspondingly decremented.

Audio DSP Pipeline Select/Setup Pane (Lower Pane)

The lower pane that displays when the Audio DSP tab is opened allows "going into" each enabled DSP pipeline, and setting up attributes for the pipeline such as signal routing and function-specific settings for the DSP functions that are enabled.

Figure 26 Example of Audio DSP Tab — Lower Pane

Sub-tabs for each DSP pipeline allow selecting a specific pipeline to "go into" and access other settings specific to the enabled functions. In **Figure 26** DSP A has Upmixer, RTLL5.1, and Dolby® Digital Encoder 5.1 enabled, when DSP A sub-tab is clicked, a series of applicable lower sub-tabs appear which allow specific setup of the enabled functions. The processing path to be applied is also shown in the Path Setup window.

✶ If a DSP pipeline has no functions enabled, "**`Path is disabled`**" is displayed and no lower sub-tabs appear.

The lower sub-tabs that display correspond to the setup required for the enabled functions.

The tabs that appear are a dynamic function of enabled DSP functions (for example, if Upmixer was not enabled, the Upmixer sub-tab shown here would not display).

Source Selection Sub-tab

Allows selecting audio channels to be inputted to any pipeline DSP function(s). Also provides Gain, Mute, and Invert controls for each input channel.

Figure 27 Example of Source Selection Sub-tab

Drop-down source choices depend upon whether input mixer or output mixer positioning is selected. Input mixer choices are primarily basic card input audio sources; output mixer choices are primarily card audio bus channels.

Upmixer Sub-tab

✶ Requires the AAP+DSP-UPMIX licensed feature. Takes 10% of DSP core.

This tab provides controls for configuring the up-mixing of any normal PCM stereo pair into 5.1 surround sound audio which in turn can be applied to six user-selectable channels or further DSP processing.

Figure 28 Example of Upmixer Sub-tab

The following settings are available:

- Mode selects from Auto (detect content on surround, else force upmix), Bypass, or Always Upmix.
- 5.1 Detection Threshold 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 up-mixer enable is set to Auto. Setting affects automatic enable/bypass of 5.1 upmix function.
- Center Width 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.
- LFE Level allows gain to be added to derived LFE channel.

- Surround Depth 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.
- Dimension adjusts the perceptual spacial image in the surround channels to be accentuated or diminished.

Real-Time Loudness Leveler Sub-tab

✶ Requires the AAP+DSP-RTLL licensed feature. Takes 34% of DSP core.

This sub-tab provides controls for setting up Real Time Loudness Leveler loudness processing.

Figure 29 Example of a Real Time Loudness Sub-tab

The following settings are available:

- Enable sets RTLL to enabled or bypassed.
- Dialogue Intelligence, when enabled, allows loudness processing speech-gating that measures and adjusts loudness only during segments that contain dialog.
- Peak Limit applies a peak compressor/ limiter if the selected threshold is exceeded.
- IRL Source; Manual IRL allows IRL from Auto, Dialnorm, or Manual.
- Aggressiveness adjusts how fast and deep loudness leveling is engaged.

Keep the following in mind when using this sub-tab:

- Default settings are recommended and conform to ATSC A/85.
- The level displays that appear are not user-facing units such as dBFS or percent.
- Parametric controls described here apply to -5.1 and -2.0 RTLL versions.

Dolby® Digital Encoder Mode Setup Sub-Tab

✶ Requires the AAP+DSP-ENCD licensed feature.

This sub-tab provides controls for setting up Dolby® Digital Encoder mode and bit rate.

Figure 30 Example of a Dolby® Digital Encoder Sub-tab

The following settings are available:

- Metadata Source (currently, only Internal is supported).
- Encoder Format selects from Dolby® Digital or Dolby® Digital Plus modes.
- Data Rate selects max bit rate allowed.
- Effective Data Rate display shows bit rate being used.
- Encodes Attempted display shows number of encode frames attempted.
- Encodes Succeeded display shows running number of encode frames successfully generated.

✶ Parametric controls described here apply to -5.1 and -2.0 ENCD versions.

Dolby® Digital Encoder Metadata Setup Sub-Tab

This sub-tab contains conventional suite of Dolby® Digital metadata setup controls and drop-downs.

✶ Parametric controls described here apply to -5.1 and -2.0 ENCD versions.

Figure 31 Example of Dolby® Digital Encoder Metadata Sub-tab

Dolby® Decoder Setup Sub-Tab

✶ Requires the AAP+DSP-DEC licensed feature.

This sub-tab provides controls for setting up Dolby® Decoder. Refer to the section"**Source Selection Sub-tab**" for routing desired Dolby® pair to decoder input.

The following settings are available:

- Mode sets decoder to disabled, decode Dolby® D/D+ else mute, or decode Dolby® E, else mute.

- Dolby® Digital 16-bit Channel Select selects from Ch1 or Ch2 selections.
- Dolby® Digital Dynamic Range Control selects from Dolby® convention choices of Line mode, RF mode, Custom, or Bypass.
- Bitstream Summary display shows currently-received Dolby® bitstream format.

✶ Dolby® D Decoder Metadata and Dolby® E Decoder Metadata sub-tabs show currently-received Dolby® metadata for respective format (as applicable) using Dolby® conventions.

Dolby® E Encoder Setup

This chapter provides descriptions and operating instructions for the AAP+DSP-ENCE (Dolby® E Encoder) option.

For More Information on...

- installing the AAP+DSP-ENCE, refer to "**To install an option**".

Overview

The Dolby® E Encoder receives and encodes up to eight audio channels from the internal bus and/or optional audio DSP (upmixed and/or loudness-processed) channels. Internally generated metadata can be user-defined using the encoder controls. The encoded pair can be sent from the card as embedded audio or over discrete AES-3id connections as a SMPTE 337M-formatted non-PCM signal.

✶ The Dolby® E Encoder can receive PCM audio inputs from any combination of internal bus or Audio DSP outputs. The resulting encoded pair can be sent only to embedded or AES card audio outputs.

Workflow

Any audio input supported by the card can serve as audio inputs for the Dolby® E Encoder. The encoder selects from these sources which can be user mapped to encoder inputs Dolby 1 to 8.

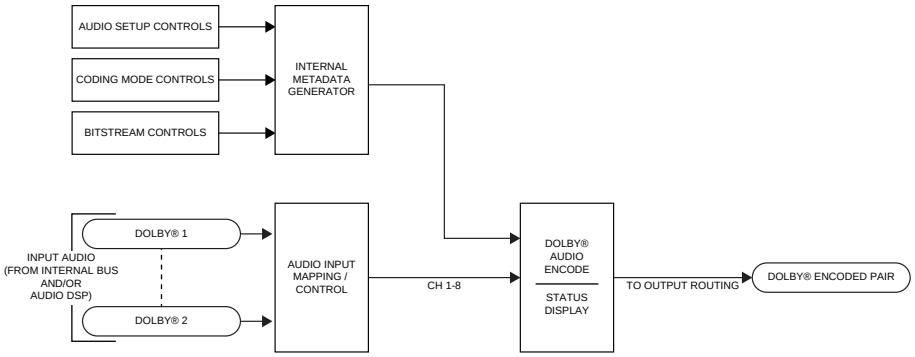


Figure 32 AAP+DSP-ENCE Workflow Diagram

Internal Metadata Generator

The internal metadata generator provides full audio setup, program coding, and bitstream definition controls, allowing user-generated metadata for providing Dolby® encoding without any external metadata being required.

Dolby® E Audio Encoder

In accordance with the selected metadata, the Dolby® audio encode function receives the audio inputs Dolby 1- 8 from the internal bus and/or Audio DSP and provides the Dolby® encoded SMPTE 337M pair. The encoded pair is then available as a source for embedded channel pairs, and as a source for AES output pairs (allowing the encoded pair to be available over a discrete AES-3id port).

Before You Begin

Keep the following in mind:

- An AAP+DSP-ENCE option must be installed on your card. Refer to "**To install an option**".

- Although not essential for setting up Dolby® encoded audio, it is recommended to consider the small audio delay induced in the encoding. After setup is done, refer to "**Compensating for Dolby® Encoding Audio Delays**" to remove this delay.

The following sections summarize the Dolby® E Encoder controls available using DashBoard for cards equipped with the AAP+DSP-ENCE licensed feature.

Dolby E Encoder Interfaces

Once an AAP+DSP-ENCE option is installed, the Dolby® E Encoder can be assigned to an Audio DSP. **Figure 33** shows a card with one AAP+DSP-ENCE license that is assigned to Audio DSP E.

Figure 33 Example of an Audio DSP assigned to the Dolby E Encoder

Assigning the Dolby® E Encoder to an Audio DSP displays the Dolby E Encoder and Dolby E Encoder Metadata sub-tabs at the bottom of the DashBoard window for that DSP. (**Figure 34**)

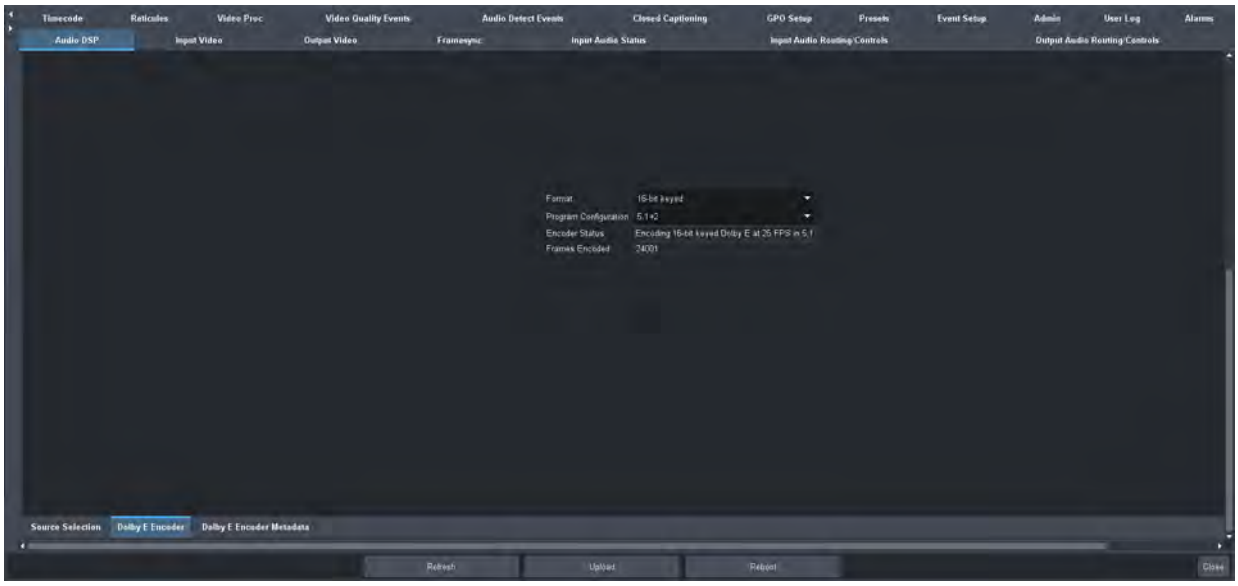


Figure 34 Example of the Dolby E Encoder Sub-tabs for an Audio DSP

Dolby® E Encoder Sub-tab

The Dolby E Encoder sub-tab provides global setup and status monitoring for the Dolby E Encoder.

Encoding Mode

The Dolby DSP Mode menu enables or disables the Dolby E encoder. On cards also licensed for Dolby D encoder(s), these choices will also appear in this drop-down.

Dolby DSP Status/Reset Controls

This area reports the reboot (restart) and encoding status. Note that encoding errors are also displayed on the card's Card Info pane and overall DashBoard card status indicator (errors are indicated in red).

Dolby E Encoder Status

This field displays the encoding status summary for the Dolby E encoder. If an installed encoder is not enabled, it is shown as **`Ready to encode`**.

Bitstream Format Selection

Use the **Format Selection** menu to select between 16-bit and 20-bit keyed/unkeyed formats. Use this menu for downstream equipment requiring keyed bitstream to avoid errors (most systems can use this setting).

Source Selection Sub-tab

The Source Selection sub-tab provides source routing and gain controls for the up to 8 input channels supported in Dolby E encoding. Individual input source routing controls are provided for each of the encoder inputs.

The Encoder input channels Dolby 1 to 8 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. **Table 6** is for general information only; not all modes may be available. The Unnumbered channel designations imply channel 1 where multiple programs exist.

Table 6 AAP+DSP-ENCE — Encoder Input Channels

CH #	5.1 + 2	5.1 + 2 x 1	4 + 4	4 + 2 x 2	4 + 2 + 2 x 1	4 + 4 x 1	4 x 2	3 x 2 + 2 x 1	2 x 2 + 4 x 1	2 + 6 + 1	8 x 1	5.1
1	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	C	LF
2	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF	2C	RF
3	C	C	C	C	C	C	3L	3L	3C	4C	3C	C
4	LFE	LFE	S	S	S	S	3R	3R	4C	5C	4C	LFE
5	LS	LS	2C	3L	3C	4C	4L	4C	5C	6C	5C	LS
6	RS	RS	2S	3R	4C	5C	4R	5C	6C	7C	6C	RS
7	2L	2C	2L	2L	2L	2C	2L	2L	2L	2C	7C	—
8	2R	3C	2R	2R	2R	3C	2R	2R	2R	3C	8C	—

CH #	4 + 2	4 + 2 x 1	3 x 2	2 x 2 + 2 x 1	2 + 4 x 1	6 x 1	4	2 + 2	2 + 2 x 1	4 x 1	7.1	7.1 Screen
1	LF	LF	L	L	L	C	L	L	L	C	LF	LF
2	RF	RF	R	R	R	2C	R	R	R	2C	RF	RF
3	C	C	3L	3C	4C	3C	C	—	—	3C	C	C
4	S	S	3R	4C	5C	4C	S	—	—	4C	LFE	LFE
5	—	—	—	—	—	5C	—	—	—	—	LS	LS
6	—	—	—	—	—	6C	—	—	—	—	RS	RS
7	2L	2C	2L	2L	2C	—	—	2L	2C	—	BSL	LE
8	2R	3C	2R	2R	3C	—	—	2R	3C	—	BSR	RE

C = Center (or mono as applicable)	LE/RE = Left Extra/Right Extra	LFE = Low-Frequency Effects	S = Surround mono
BSL/BSR = Back-Surround Left/Back Surround Right	LF/RF = Left Front/Right Front	LS/RS = Left Surround/Right Surround	— = Not available; do not use

Source Selection

Each Source menu specifies the input channel mapping for an encoder input (1-8). Each input can be independently sourced from the following:

- Bus 1 to 16 — routes card bus channels (which transport input embedded, discrete AES, and/or analog inputs through the card).
- Upmix (L, R, C, LFE, Ls, RS) — routes card DSP-generated upmixed channels to Dolby® encoder input channel. Requires the AAP+DSP-UPMIX option.
- LP5.1, LP2 Sources — routes DSP loudness processed 5.1 or stereo sources to Dolby® encoder input channel. Requires the corresponding AAP+DSP-RTLL option.
- Tone 1 to 8 — routes card internal tone generator sources to Dolby® encoder input channel.
- Silence — routes silence to Dolby® encoder input channel.

Gain and Mute Controls

This area provides relative gain (in dB) control and peak level display for corresponding encoder input. Also provides a channel Mute control. The options are a range between -80 to +20dB (in 0.1 dB steps) where unity is 0.0dB.

Dolby E Encoder Metadata Sub-tab

The Dolby E Encoder Metadata sub-tab provides internal metadata audio production and bitstream controls. This section is intended as an overview of the tab. The displayed parameters are per ATSC A/52B definitions. Refer to ***ATSC A/52B*** for detailed descriptions and background.

✶ The default settings provide typically accepted parametric settings for each Audio Coding mode. If settings are changed, note that settings performed here have a profound effect on program material technical and aesthetic aspects. Setup should only be performed by authorized personnel.

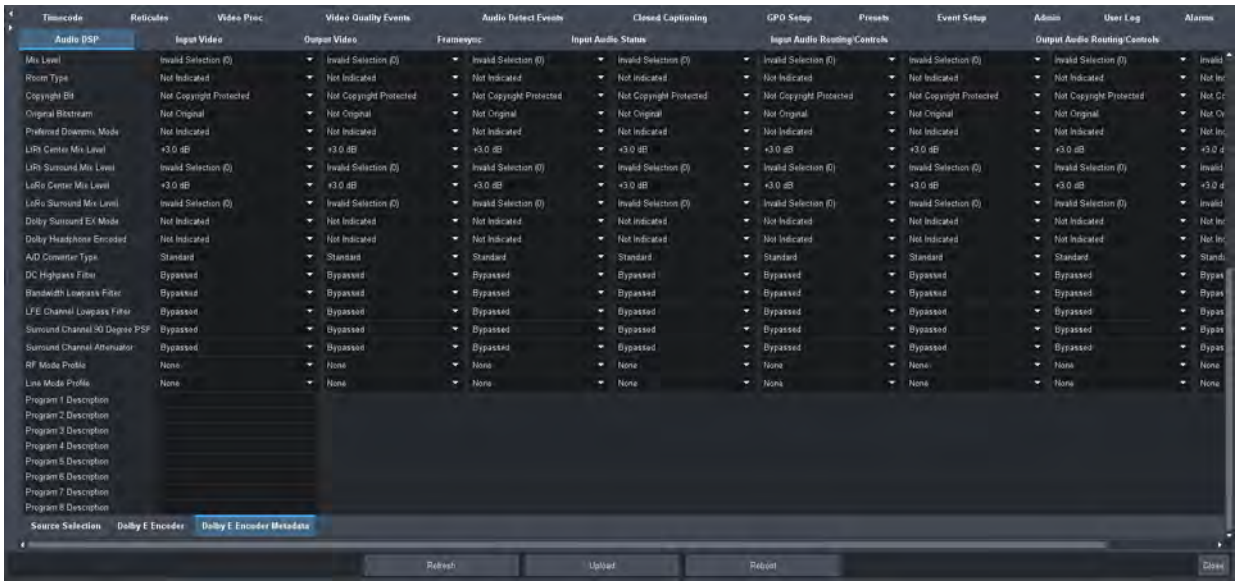


Figure 35 Example of the Dolby E Encoder Metadata Sub-tab

For internally generated metadata, individual audio production parametric settings and bitstream information controls allow individual setup for the encoder.

Drop-down menus provide on/off settings or selection from a range of appropriate choices in general conformance with ***ATSC A/52B*** practices. The following sub-sections outline these menus.

Loudness Override

When set to Enable, individual Loudness Override controls for each Dolby® E program allow internal metadata settings to override the Dialnorm, RF Mode Profile, and Line Mode Profile settings in external metadata.

Compensating for Dolby® Encoding Audio Delays

Because of the significant DSP functions required to develop a Dolby® encoded stream an audio delay results which, if not compensated for, can be noticeable when played out on the decoded receiving end. The AAP+DSP-ENCE encoding audio delay for all Dolby® E modes is 53msec. This delay can be nulled (compensated for) by delaying video and advancing the input audio timing to remove the delay.

For example, a card-generated Dolby® E 5.1+2 encoded pair is being routed onto the output video. Noting that a 53msec delay needs to be compensated for, the input audio to be applied to the encoder is advanced by this amount using the card Audio/Video Delay Offset control on the Audio Bus Input Routing/Controls tab. (Note that either the Bulk control or individual per-channel delay controls can be used.)

To accommodate the 53msec audio advance, a similar amount of video must be buffered in the card memory. Viewing the Framesync tab and noting that the default latent delay in this example is approximately 33msec, more video must be added to the latency. As such, the Minimum Latency control setting is increased to buffer at least 53msec of video. (It is recommended to “round up”.)

Input Video Setup

The Input Video tab in DashBoard allows manual or failover selection of AAP-8644 SDI program video inputs and displays status and raster format of received SDI video.

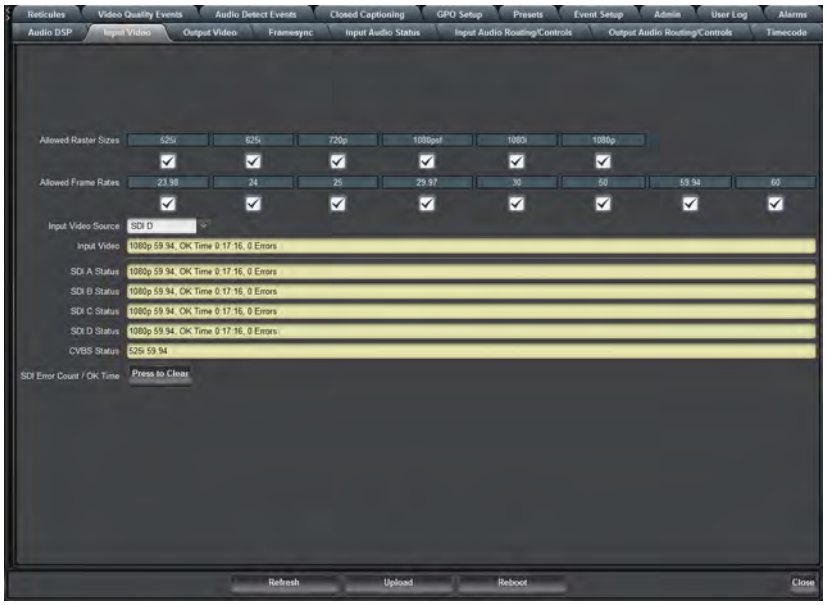


Figure 36 Example of the Input Video Tab

Input Video Source

Use the **Input Video Source** menu to select the input video source to be applied to the AAP-8644's program video input. Choose from the following:

- SDI A and SDI B choices allow forced manual selection of correspondingly SDI IN A or SDI IN B.
- Failover A to B sets main path preference of SDI IN A.
  - › If SDI IN A goes invalid, then SDI IN B is selected.
  - › If SDI IN A goes valid again, failover automatically reverts to SDI IN A.
- Failover B to A sets main path preference of SDI IN B.
  - › If SDI IN B goes invalid, then SDI IN A is selected.
  - › If SDI IN B goes valid again, failover automatically reverts to SDI IN B.
- SDI C and SDI D choices allow forced manual selection of correspondingly SDI IN C or SDI IN D without failover choices.
- CVBS – select CVBS input as the program video input.

✶ Failover criteria via this control is simple signal presence.

Input Video Status

The Input Video status read-only fields display input status of each video input, along with elapsed time of signal acquire.

- SDI A to SDI D and CVBS Status show raster/format for all card inputs. If signal is not present or is invalid, Unlocked is displayed. (These status indications are also propagated to the Card Info pane.)
- Input Format Disabled by User indicates raster size and/or frame rate has been rejected from being passed by card (as described below in Input SDI Raster Size / Frame Rate Filtering).

✶ Status display shows maximum card input complement. Input complement is determined by rear I/O module used.

Input SDI Raster Size/Frame Rate Filtering

The controls shown in **Figure 37** allow user filtering to only include selected raster or rate formats to be used as a card program video input.

Default settings have all raster sizes and frame rates selected, thereby providing no filtering (exclusion).

✶ Rates shown in selector are frame rates and not field rates.

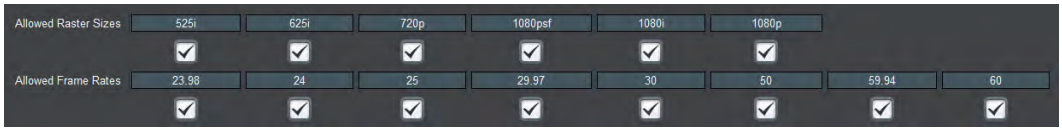


Figure 37 Filtering for Allowed Raster Sized and Frame Rates

Figure 38 shows the instance where only 720p and 29.97 are selected, filtering allowed input to only be 720p 29.97 (720p half-rate).

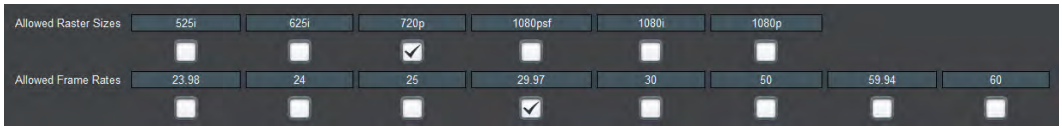


Figure 38 Example of Filtering

Output Video Setup

The Output Video tab includes two sub-tabs: Output Routing and Analog Video.

Figure 39 Example of the Output Video Tab

Output Routing Tab

This sub-tab allows the selection of each of the four video output coaxial connectors as processed SDI out or reclocked SDI out. Also provides CVBS parameter controls and test pattern output controls for card CVBS output.

Output Video Crosspoint Menus

For each SDI output port supported by the card, provides a crosspoint for routing program processed video or selected-input reclocked to an SDI output.

For example, SDI OUT 1. SDI OUT 3, and SDI OUT 3 can output Program (processed) video out, with SDI OUT 2 providing SDI IN A reclocked input video.

✶ Outputs set to Input Reclocked will pass input SDI regardless of Input SDI Raster Size / Frame Rate Filtering. Input filtering applies only to the card program video path.

Analog Video Tab

This sub-tab provides CVBS output parameter controls and test pattern output controls.

CVBS Oversampling and Color Controls

The Oversampling menu enables or disables video DAC oversampling. Oversampling can improve rendering of motion for down-conversions to the CVBS SD analog output.

The Color menu enables or disables chroma content in the CVBS output.

CVBS Test Pattern Generator Control

This menu enables manual insertion (replacement) of CVBS output video to instead output 75% color bars.

FrameSync

The AAP+FS licensed feature provides video frame sync/delay offset control and output control/loss of program video failover selection controls.

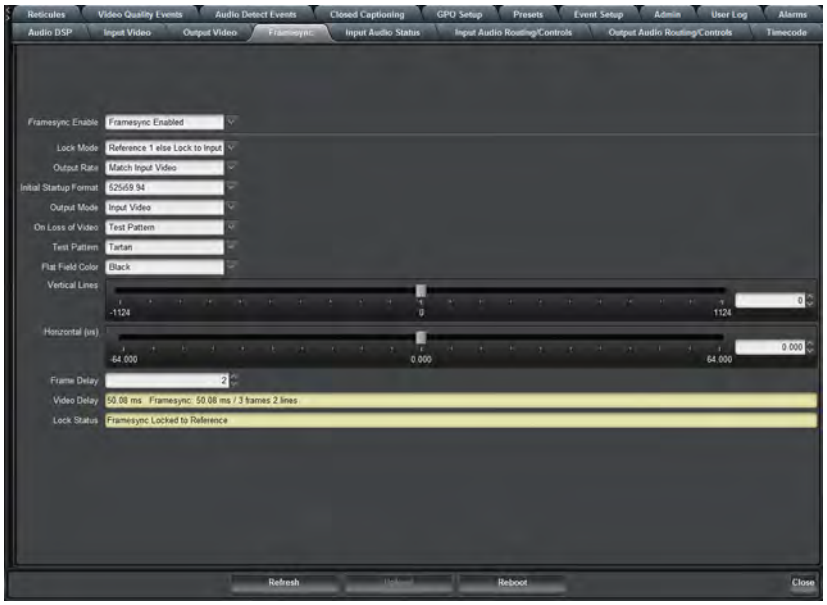


Figure 40 Example of Framesync Tab

Framesync Enable/Disable Control

This setting provides master enable/disable of all card frame sync functions/controls.

Lock Mode Select

Selects Frame Sync functions from the following:

Lock to Reference

Output video is locked to selected external reference received on the frame reference bus. (External reference signal Ref 1 / Ref 2 are distributed to the card and other cards via the Ref 1 / Ref 2 buses on the frame.)

✶ If valid reference is not received, the indication appears in the Card Info status portion of DashBoard™, indicating invalid frame sync reference error.

Lock to Input

Uses the program video input video signal as the reference standard.

✶ If Lock to Input is used for FrameSync, any timing instability on the input video will result in corresponding instability on the output video.

Free Run

Output video is locked to the card's internal clock. Output video is not locked to external reference.

Output Rate Select

Allows frame rate to be outputted same as input video, or converted to. Choose from the following:

- Match Input Video
- 23.98/29.97/59.94 – forces standard North American frame rates. Can be used to convert 24/30/60 Hz camera frame rates to corresponding 23.98/29.97/59.94 standard North American frame rates.
- 24/30/60 – forces 24/30/60 frame rates. Can be used to convert 23.98/29.97/59.94 Hz frame rates to corresponding 24/30/60 Hz frame rates.

Initial Startup Format Select

Selects a synthesized frame sync format/rate to be invoked in the time preceding stable lock to external reference.

Set this control to that of the intended external reference to help ensure smoothest frame sync locking. This control also sets the card test pattern format where the card's initial output at power-up is the internal pattern instead of program video.

Program Video Output Mode Select

Provides a convenient location to select between card program video output and other technical outputs from the choices shown to the left and described below.

- Input Video – card outputs input program video (or loss of signal choices described below).
- Flat Field – card outputs flat field.
- Freeze – card outputs last frame having valid SAV and EAV codes.
- Test Pattern – card outputs standard technical test pattern (the pattern is selected using the Pattern menu described below).
- Snow – card outputs synthesized snow multi-color pattern.

Loss of Input Signal Selection

In the event of program input video Loss of Signal (LOS), determines action to be taken as follows:

- Disable Outputs: Disable program video SDI outputs.
- Flat Field – go to flat field on program video output.
- Freeze – go to last frame having valid SAV and EAV codes on program video output.
- Test Pattern – go to standard technical test pattern on program video output (pattern is selected using the Pattern drop-down described below).
- Snow – output synthesized snow multi-color pattern.

Test Pattern Select

Provides a choice of standard technical patterns when Test Pattern is invoked (either by LOS failover or directly by selecting Test Pattern on the Program Video Output Mode Select control).

Flat Field Color Select

Provides a choice of flat field colors when Flat Field is invoked (either by LOS failover or directly by selecting Flat Field on the Program Video Output Mode Select control).

Output Video Reference Offset Controls

With FrameSync enabled, provides the following controls for offsetting the output video from the reference:

- Vertical (Lines) – sets vertical delay (in number of lines of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance). The range is -1124 to 1124 lines; null = 0 lines.
- Horizontal (µs) – sets horizontal delay (in µs of output video) between the output video and the frame sync reference. (Positive values provide delay; negative values provide advance). The range is -64µsec to 64µsec; null = 0.000µsec.)

✶ Offset advance is accomplished by hold-off of the reference-directed release of the frame, thereby effectively advancing the program video relative to the reference.

Frame Delay Control

When Framesync is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the frame sync. The frame sync will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).

✶ Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected.

When using this control, be sure to check the Report Delay display to make certain desired amount of frames are delayed.

Video Delay Display

Displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines). Status display shows total input-to-output video delay, along with any FrameSync delay.

Framesync Lock Status Display

Displays the current FrameSync status and reference source.

✶ Audio timing offset from video is performed using the delay controls on the Input Audio Routing/Controls tab. Refer to "**Input Audio Routing Controls**" for these controls.

Video Delay

The Video Delay licensed feature provides video delay controls. These controls are used to restore lip sync when using audio DSP functions such as RTLL and Dolby® encoding.

✶ On AAP-8644 licensed with Add Framesync (AAP+FS), this tab does not appear. On AAP-8644 with +FS, use the frame sync output video reference offset and frame delay controls to delay the video to match audio delay as described in the chapter "**FrameSync**".

Enabling the Video Delay

The Video Delay menu provides master enable/disable of video delay functions and controls.

Output Video Offset

With Video Delay enabled, provides the following controls for offsetting the output video from input video:

- **Vertical** (Lines) – sets vertical delay (in number of lines of output video) between the output video and input video. (Positive values provide delay; negative values provide advance). The range is -1124 to 1124 lines; null = 0 lines.
- **Horizontal** (µs) – sets horizontal delay (in µs of output video) between the output video and input video. (Positive values provide delay; negative values provide advance). The range is -64 to 64µsec; null = 0.000µsec.

✶ Offset advance is accomplished by hold-off of the reference-directed release of the frame, thereby effectively advancing the program video relative to the reference.

Frame Delay

When Video Delay is enabled, specifies the smallest amount of latency delay (frames held in buffer) allowed by the delay. The Video Delay will not output a frame unless the specified number of frames are captured in the buffer. The operational latency of the frame sync is always between the specified minimum latency and minimum latency plus one frame (not one field).

✶ Due to card memory limits, the maximum available Minimum Latency Frames is related to the output video format selected. When using this control, be sure to check the Report Delay display to make certain desired amount of frames are delayed.

Video Delay Status

This read-only field displays the current input-to-output video delay (in msec units) as well as in terms of Frames/fractional frame (in number of lines). It also shows total input-to-output video delay, along with any FrameSync delay.

✶ Audio timing offset from video is performed using the delay controls on the Input Audio Routing/Controls tab. Refer to the section "**Input Audio Routing Controls**" for these controls.

Input Audio

The Input Audio tab displays signal status and payload for embedded and discrete audio received by the AAP-8644.

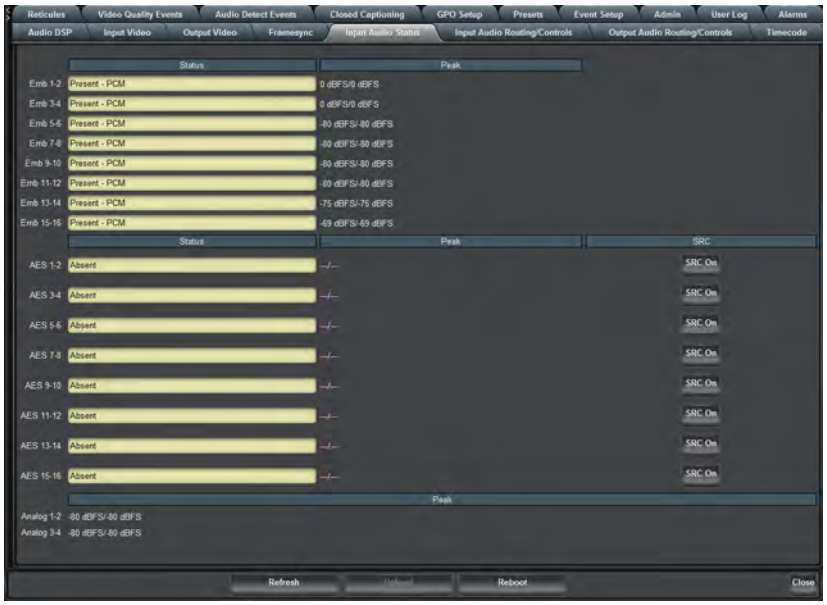


Figure 41 Example of the Input Audio Status Tab

Input Audio Status Tab

The individual signal status and peak level displays for embedded audio input pairs, and AES/analog input pairs as described below.

- **Absent** — Indicates embedded channel or AES pair does not contain recognized audio PCM data.
- **Present - PCM** — Indicates AES pair or embedded channel contains recognized audio PCM data.
- **Dolby E** — Indicates embedded channel or AES pair contains Dolby® E encoded data.
- **Dolby Digital** — Indicates embedded channel or AES pair contains Dolby® Digital encoded data.

✶ Dolby status displays occur only for valid Dolby® signals meeting SMPTE 337M standard.

The AES Dolby-encoded inputs that are routed directly to AAP-8644 are directed via a special path that automatically bypasses SRC. However, AES inputs to other destinations (e.g., AES embedding) are first applied through SRC. These paths disable SRC if Dolby-encoded data is detected. To avoid a possible “Dolby noise burst” if an input on these paths changes from PCM to Dolby, it is recommended to set the AES SRC control for the pair to SCR Off for an AES input that is expected to carry a Dolby signal.

Input Audio Routing Controls

The options in the Input Audio Routing/Controls tab are organized into sub-tabs. Each sub-tab is discussed in this section.

Input Bus Tab

This tab provides audio routing, gain, per-channel/bulk audio delay controls, and audio meters. These controls route selected audio sources onto the card 16-channel internal bus (which is used for all audio processing).

Figure 42 Example of the Input Audio Routing > Input Bus Tab

Figure 43 illustrations a workflow where all audio inputs are transferred through the AAP-8644 via the 16-channel Internal Bus (Bus Ch 1 to Bus Ch 16) where each bus channel provides Gain, Mute, and Invert controls.

The source-to-destination correlation shown in **Figure 43** is only an example; any of the sources described on the following pages can route to any of the internal bus channels.

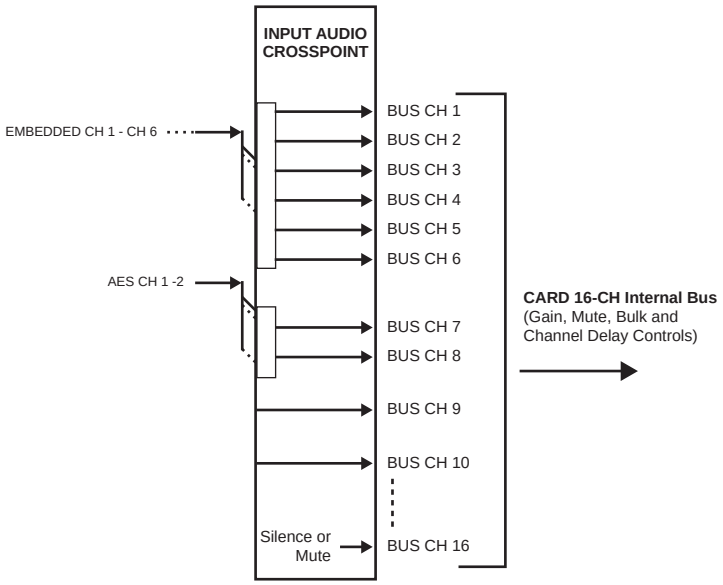


Figure 43 Example of the Input Audio Routing Workflow

✶ The default factory preset routing routes embedded Ch 1 - Ch 16 to bus channels Audio Bus Ch 1 to Ch 16. Bus Ch 2 to Bus Ch 16 have controls identical to the controls described here for Bus Ch 1. Therefore, only the Bus Ch 1 controls are shown here.

Bus Channel Source

Using the Source drop-down list, selects the audio input source to be routed to the card bus channel from the following choices:

- Embedded input channel 1 to 16 (Emb Ch 1 to Emb Ch 16)
- AES input channel 1 to 16 (AES Ch 1 to AES Ch 16)
- Analog input channel 1 to 16 (Analog Ch 1 to Analog Ch 4)
- Input flex mix summed mix output nodes Flex Bus A to P
- Audio DSP sources (route DSP output to card audio bus)

Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at input mixer (see "**Audio DSP Setup Controls**" for more information).

✶ AES pair and analog channel count are dependent on rear I/O module used. Current rear modules may not support full input complement.

Channel Mute/Phase Invert/Gain Controls and Peak Level Display

Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

✶ Although the AAP-8644 can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.

Audio Delay Tab

This sub-tab provides bulk (all four groups/master) and individual card audio bus channel delay offset controls and delay parametric displays.

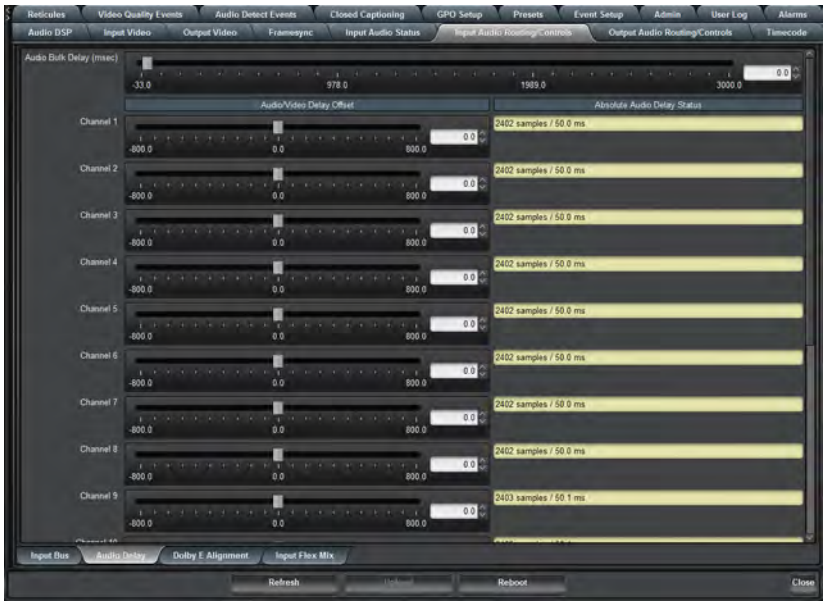


Figure 44 Example of the Input Audio Routing > Audio Delay Tab

Bulk (Master) Audio/Video Delay Control

Bulk Delay control adds bulk (all four groups) audio delay from any video delay (net audio delay offset setting adds delay in addition to any delay included by other actions). This control is useful for

correcting lip sync problems when video and audio paths in the chain experience differing overall delays. (-33 to +3000msec range in 0.01msec steps; null = 0msec).

Per-Channel Audio/Video Delay Offset Controls

The Offset control adds or reduces (offsets) channel audio delay from the matching video delay (audio delay offset setting adds or removes delay in addition to any delay included by other actions). This control is useful for correcting lip sync problems when video and audio paths in the chain experience differing overall delays.

✶ Maximum advance/delay offset is dependent on video format. (-800.0 to +800.0msec range in 0.02msec steps; null = 0.0msec)

The Delay Status read-only field shows current delay from video for the corresponding audio channel.

✶ Where a Dolby pair is present, adjustment of either channel control results in a matching delay setting for the other channel in the pair.

Dolby E Alignment Tab

This tab provides selectable Dolby E alignment for embedded Dolby E to position the bitstream utilizing the Dolby E “guard band”. This helps prevent frame errors that may occur in a bitstream upon switching or editing.

Figure 45 Example of the Input Audio Routing > Dolby E Alignment Tab

For incoming Dolby E data routed to the audio bus (either over embedded channels or via AES embedding to the bus), aligns the embedded Dolby data corresponding to selection. Alignment line as a result of selection is shown in E Alignment status display.

✶ Where a frame reference is available, it is recommended to use the Align to Reference selection. This helps ensure that the correct alignment is achieved even if the video is user delayed or output format is changed.

For More Information on...

- Dolby E alignment, refer to the Dolby website.

Flex Mix Tab

This tab provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. Each input channel has independent gain and mute controls.

Figure 46 Example of the Input Audio Routing > Input Flex Mix Tab

Figure 47 shows four, 4-input mono mixers are provided by selecting Flex Mixer Bus A for the Flex Mix 1 to Flex Mix 4 inputs, and Flex Mixer Bus B for the next four inputs, and so on as shown.

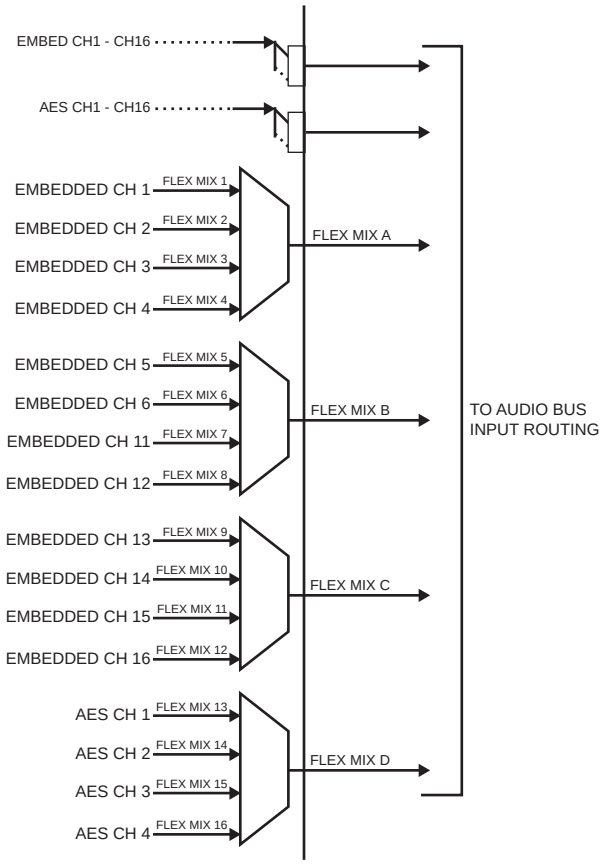


Figure 47 Example of Four 4-input Mono Mixers

Figure 48 shows three, 2-input mono mixers are provided by selecting Flex Mixer Bus A for the Flex Mix 1 and Flex Mix 2 inputs, and Flex Mixer Bus B for the next two inputs, and so on as shown.

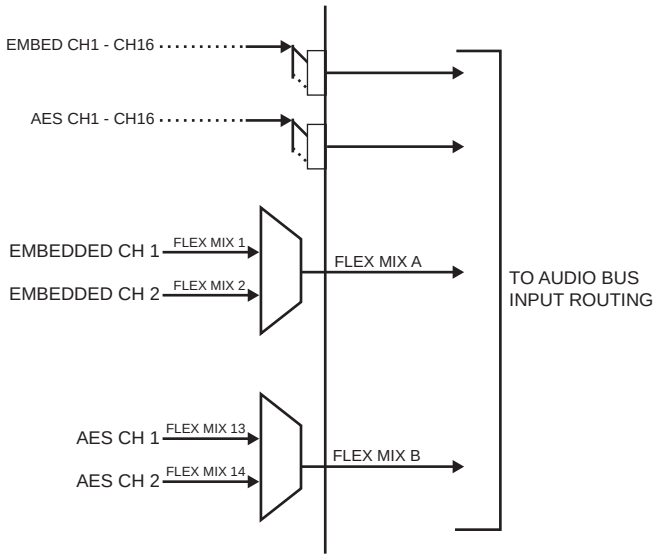


Figure 48 Example of Three 2-input Mono Mixers

- Flex Mix input channels Flex Mix 2 to Flex Mix 16 have controls identical to that described here for Flex Mix 1. Therefore, only the Flex Mix 1 controls are shown in this section.
- For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection.

Flex Mix Input Channel Source/Bus Assignment

Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.

- Silence
- Embed Ch 1 to Embed Ch 16
- AES Ch 1 to AES Ch 16
- Analog Ch 1 to Analog Ch 4

The Flex Bus drop-down selects the bus (A to P) to which the input is assigned to.

See the examples on the previous page showing various types of mixers using multiple flex buses.

Gain / Mute Control

Provides relative gain (in dB) control and a channel Mute check-box. (-80dB to +20dB range in 0.1dB steps; unity = 0.0dB).

Output Audio Routing Controls

The AAP-8644 provides an audio crosspoint allowing the audio source selection for each embedded audio output channel. The options in the Output Audio Routing/Controls tab are organized into sub-tabs. This chapter outlines each sub-tab.

Embedded Output Tab

Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.

✶ Embedded Ch 2 to Embedded Ch 16 have controls identical to the Source, Gain, Mute, and Invert 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.

Figure 49 Example of Output Audio Routing/Controls > Embedded Output Tab

Group Enable/Disable Controls

Allows enable/disable of embedded audio groups 1 to 4 on card program video output to accommodate some legacy downstream systems that may not support all four embedded audio groups.

✶ Changing the setting of this control will result in a noise burst in all groups. This control should not be manipulated when carrying on-air content.

Embedded Output Channel Source

Using the drop-down list, selects the audio input source to be embedded in the corresponding embedded output channel from the following choices:

- Card Audio Bus Ch 1 to Ch 16
- Built-in Tone generators Tone **n** (where -20 dBFS level tone generators with n being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)

- Downmixer L
- Downmixer R
- Audio DSP n sources (route DSP output to card embedded output)

✶ Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see "**Audio DSP Setup Controls**") for more information).

Channel Mute/Phase Invert/Gain Controls and Peak Level Display

Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for the corresponding destination Embedded Audio Group channel. (-80 to +20 dB range in 1.0 dB steps; unity = 0 dB)

✶ Although the AAP-8644 can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.

Downmixer Tab

This tab provides audio down-mix audio routing selections that multiplexes any five audio channel sources into a stereo pair.

Figure 50 Example of the Output Audio Routing/Controls > Downmixer Tab

Downmixer Source Controls

Left Channel Input to Right Surround Channel Input select the five audio bus source channels to be used for the downmix.

Downmix channels Downmixer L and Downmixer R are available as sources for embedded, AES, or analog audio outputs using the Channel Source controls described above.

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.

- 0dB setting 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 (-80dB) applies a -80dB ratiometric reduction of center-channel content. Center-channel content is restored as in-phase center-channel content at a -80dB ratio relative to overall level, making center-channel content less predominate in the overall mix.
- The range is 20dB to -80dB in 0dB steps. The default is 0dB.

✶ The default setting is recommended to maintain center-channel predominance in downmix representative to that of the original source 5-channel mix.

Surround Mix Ratio Control

Adjusts the attenuation ratio of surround-channel content from 5-channel source that is re-applied as Lo and Ro content to the DM-L and DM-R stereo mix.

- 0dB setting 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 (-80dB) applies a -80dB ratiometric reduction of surround-channel content. Surround-channel content is restored at a -80dB ratio relative to overall level, making surround-channel content less predominate in the overall mix.
- The range is 20dB to -80dB in 0dB steps. The default is 0dB.

✶ The default setting is recommended to maintain surround-channel predominance in downmix representative to that of the original source 5-channel mix.

Output Flex Mix Tab

This tab provides a 16-channel mixer in which each of the inputs can be mixed onto up to 16 independent output summing nodes. The input sources are the card processed audio bus channels. Each input channel has independent gain and mute controls.

✶ For each Flex Mix input channel, its source should be considered and appropriately set. Unused input channels should be set to the Silence selection.

Figure 51 Example of the Output Audio Routing/Controls > Output Flex Mix Tab

Flex Bus Input Channel Source/Bus Assignment

Using the Source drop-down list, selects the audio input source to be directed to the corresponding bus channel from the choices listed below.

- Silence
- Audio Bus Ch 1 to Ch 16
- Tones (100 Hz to 16 kHz)
- Downmix L or Downmix R

The Flex Bus drop-down selects the bus (A to P) to which the input is assigned to.

Gain / Mute Control

Provides relative gain (in dB) control and a channel Mute check box. The range is -80 to +20dB in 0.1dB steps. Unity is 0.0dB.

AES Output Tab

The AES Out Ch 2 has controls identical to the Source, Gain, Mute, and Invert controls described here for AES Out Ch 1. Therefore, only the AES Out 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.

Figure 52 Example of Output Audio Routing/Controls > AES Output Tab

AES Output Channel Source

Using the Source drop-down list, selects the audio input source to be routed to the corresponding AES output channel from the following choices:

- Card Audio Bus Ch 1 to Ch 16
- Built-in Tone generators Tone **n** (where -20dBFS level tone generators with **n** being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
- Flex Bus A to P mixer sum node outputs
- Downmixer L
- Downmixer R
- Audio DSP n sources (route DSP output to card AES output)

✶ Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see "**Audio DSP Setup Controls**") for more information).

✶ AES pair channel count are dependent on rear I/O module used. Current rear modules may not support full output complement.

Channel Mute/Phase Invert/Gain Controls and Peak Level Display

Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for the corresponding destination AES output channel. (-80 to +20dB range in 1.0dB steps; unity = 0dB)

✶ Although the AAP-8644 can pass non-PCM data such as Dolby® E or AC-3, setting the gain control to any setting other than default 0 will corrupt Dolby data.

Analog Output Tab

This tab provides an audio crosspoint allowing the audio source selection for each analog audio output channel. Also provides Gain, Phase Invert, and Muting controls and peak level meters for each output channel.

Figure 53 Example of the Output Audio Routing/Controls > Analog Output Tab

Analog Output Channel Source

Using the Source drop-down list, selects the audio input source to be routed to the corresponding analog audio output channel from the following choices:

- Card Audio Bus Ch 1 to Ch 16
- Built-in Tone generators Tone **n** (where -20dBFS level tone generators with **n** being frequencies of 100, 200, 300, 400, 500, 600, 700, 800, 900, 1k, 2k, 4k, 6k, 8k, 12k, and 16k)
- Flex Bus A to P mixer sum node outputs
- Downmixer L
- Downmixer R
- Audio DSP n sources (route DSP output to card analog output)

✶ Audio DSP source choices depend on Audio DSP asset(s) being enabled and position at output mixer (see "**Audio DSP Setup Controls**" for more information).

✶ Audio DSP choices that provide a PCM output are suitable for use as an analog output source. Use care to avoid routing non-PCM signals (such as Dolby pairs) to an analog output.

Channel Mute/Phase Invert/Gain Controls and Peak Level Display

Provides Mute and phase Invert channel controls, as well as peak level meter for each output channel. (Meter shows level as affected by Level control.)

Gain controls allow relative gain (in dB) control for each corresponding destination analog audio out channel. (-80 to +20dB range in 1.0dB steps; unity = 0dB)

Timecode

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

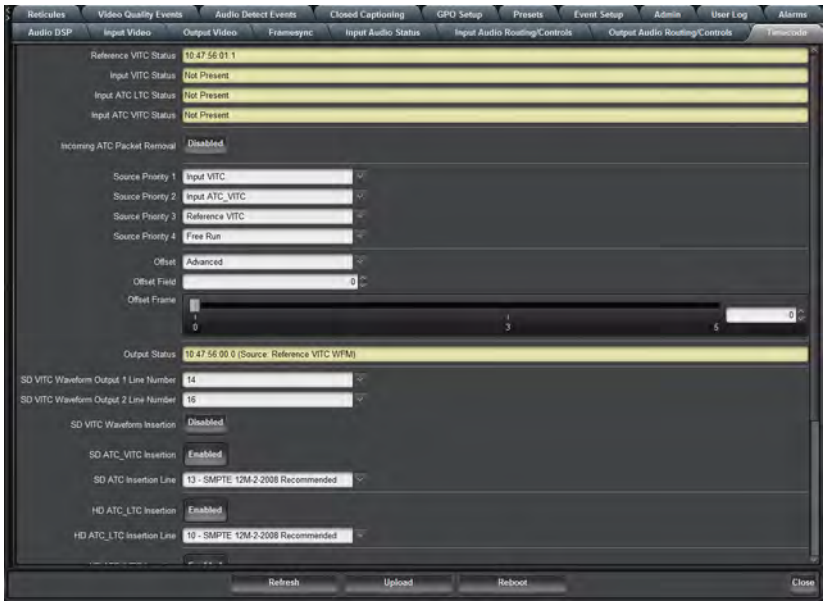


Figure 54 Example of the Timecode Tab

Workflow Examples

Figure 55 shows an example in which received 525i 5994 SDI video with VITC waveform timecode is being processed to output ATC_VITC timecode. To re-format and insert the timecode data, the following can be performed using the Timecode function. Each Timecode control is fully described on the pages that follow.

Figure 55 Example of the Timecode Functions

In **Figure 56** the incoming video contains VITC waveform timecode data (as shown in the status display), set the Source Priority drop-down lists to include VITC Waveform timecode data (SDI VITC) as a choice. This extracts VITC Waveform timecode data from the incoming video.

Figure 56 Example of the Timecode Functions

In **Figure 57**, it is desired to provide SDI ATC_VITC timecode data in the processed output video. As such, set SD ATC VITC Insertion to Enabled.

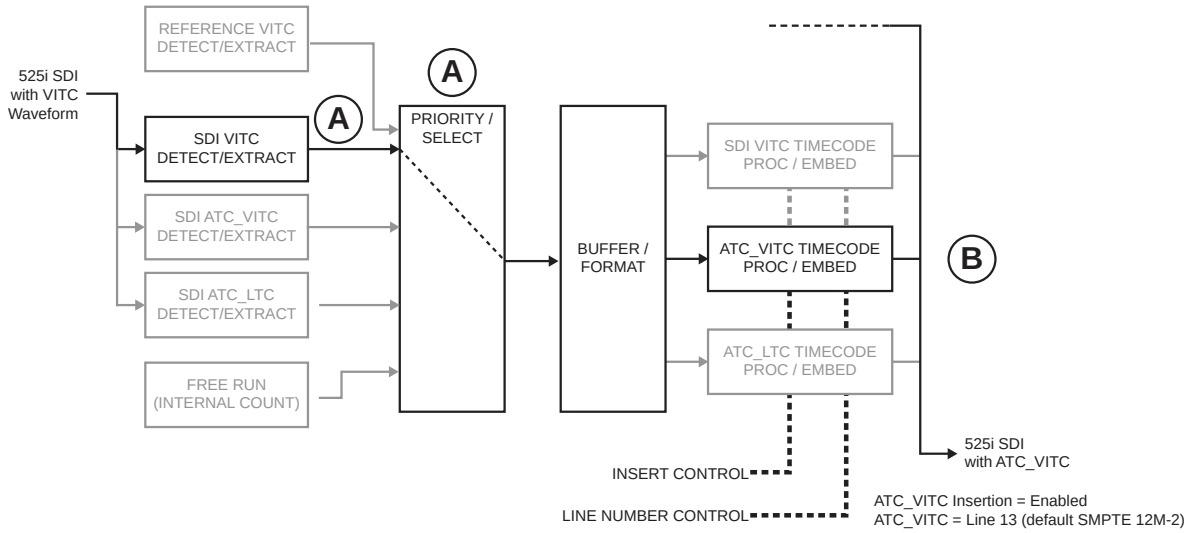


Figure 57 Example of the Timecode Functions

In **Figure 58**, the line numbers are set to the default SMPTE 12M-2-2008 recommended values.

Figure 58 Example of Line Numbers set to SMPTE 12M-2-2008

Timecode Source Status Displays

Displays the current status and contents of the four supported external 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, **`Not Present`** is displayed.

Source Priority

Selects the priority assigned to each of the four supported external formats, and internal Free Run in the event the preferred source is unavailable.

Source Priority 1 to 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. See **Figure 59**.)

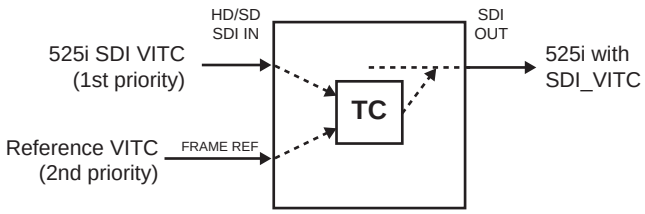


Figure 59 Example of Source Priority Setting

In **Figure 59**, Input VITC 1st priority selection selects SDI VITC (received on SDI input) over reference VITC (received on frame reference) regardless of video input material source to be processed by the card.

The selected timecode source is embedded on the SDI video output (in this example, 720p) using the selected line number. In this example, if the SDI VITC on the SDI input becomes unavailable, the card then uses the reference VITC data received on the frame reference.

✶ Set Incoming ATC Packet Removal Control to Enabled if Free-Run timecode is to be used. If incoming packets are not removed, output embedded SMPTE timecode may alternate between free-run and embedded SMPTE timecode values.

✶ Disable Output setting should be used with care. If Disable Output is selected with alternate intended format(s) set as a lower priority, the card will indeed disable all timecode output should the ordinate preferred format(s) become unavailable. Typically, choices other than Disable should be used if a timecode output is always desired, with Disable only being used to remove all timecode data.

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.

✶ Default settings are null, with both controls set at zero.

Output Status Display

Displays the current content and source being used for the timecode data as follows:

- Output status OK (in this example, SDI VITC timecode received and outputted).
- Timecode Insertion button set to Disabled; output insertion disabled.

✶ If timecode is not available from Source Priority selections performed, timecode on output reverts to Free Run (internal count) mode.

Because the 1's digit of the display Frames counter goes from 0 to 29, the fractional digit (along with the 1's digit) indicates frame count as follows:

- 0.0 — Frame 0
- 0.1 — Frame 1
- 1.0 — Frame 2
- 1.1 — Frame 3
- …
- 29.1— Frame 59

✶ 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 Numbers**" for more information.

✶ The AAP-8644 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 to 22) where the VITC waveform is inserted.

✶ 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. An existing VITC waveform on an unscaled SD SDI stream is not affected by this control and is passed on an SDI output.

SD ATC Insertion Control

For SD output, enables or disables SD ATC_VITC timecode insertion into the output video, and selects the line number for ATC_VITC.

HD ATC_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.

ATC_VITC Legacy Support Control

When enabled, accommodates equipment requiring ATC_VITC packet in both fields as a “field 1” packet (non-toggling).

✶ 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.

Free Run Timecode Controls

Allows an initial (starting) count to be applied to output video timecode when Free Run insertion is enabled.

✶ Initialization can only be applied when card is outputting Free Run timecode (as shown by Output Status displaying “Free Run”).

If failover to Free Run occurs due to loss of external timecode(s), the Free Run count assumes its initial count from the last valid externally supplied count.

Reticules

The Reticules tab allows Safe Action and/or Safe Title overlays and other static markers to be added to the output video image.

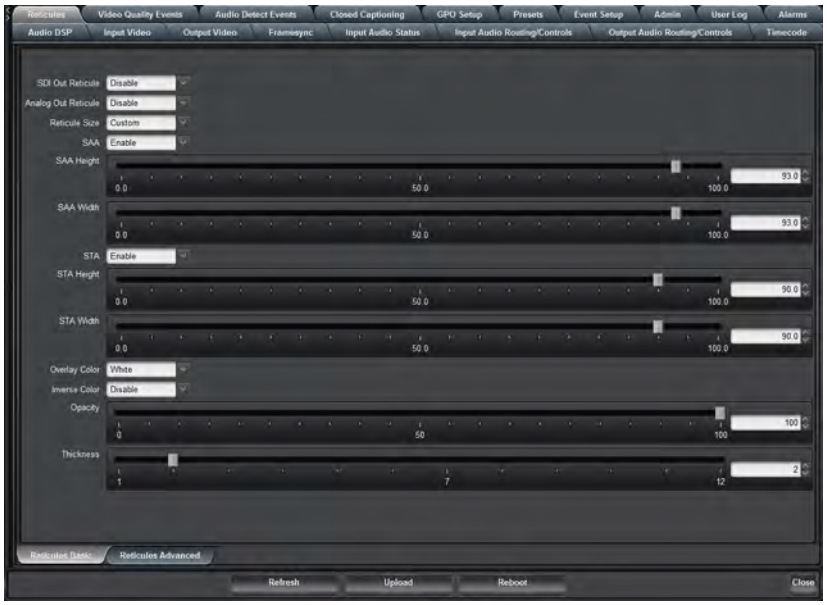


Figure 60 Example of the Reticules Tab

Typical Reticule/Overlay Marker Insertions

The AAP-8644 allows any combination of the reticule/overlay markers to be applied to the output video. Sizing and other characteristics for each type of marker can be set as described below.

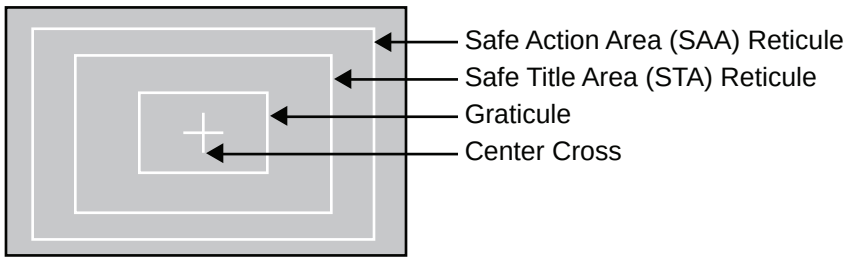


Figure 61 Example of Reticule/Overlays

Overlay markers using this function are for setup only. When enabled, these markers are embedded in the output video and will appear in the image. Use this function only on preview video and not on-air video. Make certain any overlay tools are turned off when no longer needed.

Basic Tab

Multiple overlay markers described below can be simultaneously enabled as desired.

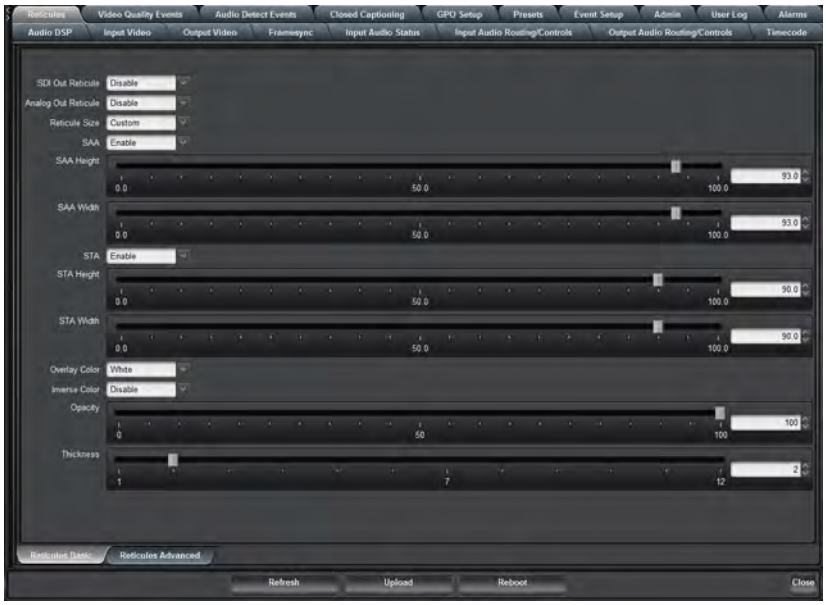


Figure 62 Example of Reticule/Overlays > Basic Tab

Insertion Master Enable/Disable

Provides independent master enable/disable for card SDI and CVBS outputs.

- When enabled, any combination of reticules or other markers described below can be inserted.
- When disabled, insertion of all reticules or other markers is disabled.

Safe Action Area (SAA) Controls

SAA provides enable/disable of safe action area graticule insertion.

SAA Height and SAA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

✶ Reticule Size control is locked to Custom for this card, with safe action area size control as described above.

Safe Title Area (STA) Controls

STA provides enable/disable of safe title area graticule insertion.

STA Height and STA Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Overlay Color Controls

Overlay Color selects from white or black colors.

Opacity sets the opacity of the overlay for both white/black and inverse color modes.

Advanced Tab

Provides insertion and sizing controls for custom graticule and other markers. Also provides NTSC legacy 4:3 master reticule sizing.

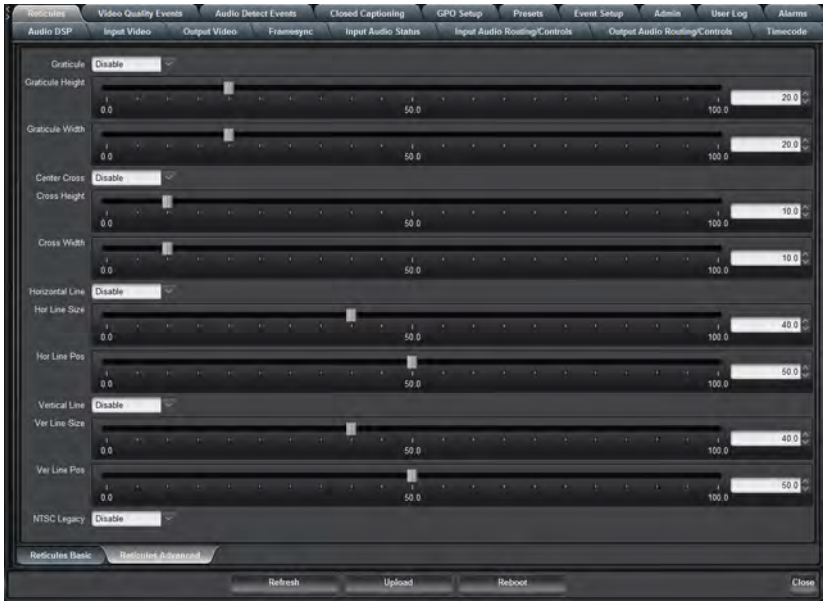


Figure 63 Example of Reticule/Overlays > Advanced Tab

✶ Color attributes of markers described below are set using the master Overlay Color Controls described above.

Graticule Controls

Graticule provides enable/disable of user graticule insertion.

Graticule Height and Width control height and width of insertion (from 0% to 100% of 4:3 outputted image area).

Center Cross Controls

Center Cross provides enable/disable of center cross insertion.

Cross Height and Width control height of vertical line and width of horizontal line (from 0% to 100% of 4:3 outputted image area).

Horizontal Line Controls

Horizontal Line provides enable/disable of horizontal line insertion.

Horizontal Line Size controls the width of the horizontal line (from 0% to 100% of 4:3 outputted image area).

Horizontal Line Pos controls the vertical positioning of the horizontal line (from 0% to 100% of 4:3 outputted image area).

Vertical Line Controls

Vertical Line provides enable/disable of vertical line insertion.

Vertical Line Size controls the height of the vertical line (from 0% to 100% of 4:3 outputted image area).

Vertical Line Pos controls the horizontal positioning of the line (from 0% to 100% of 4:3 outputted image area).

NTSC Legacy Reticule Fixed Control

When set to Enable, provides fixed-size safe action area 4:3 reticule suited for CRT-based displays.

Video Quality Events

The AAP+QC licensed feature enables you to set quality check screening and thresholds for video quality event alerts. When a quality events occur, the event(s) can be used by the Presets function to invoke input routing or other changes.

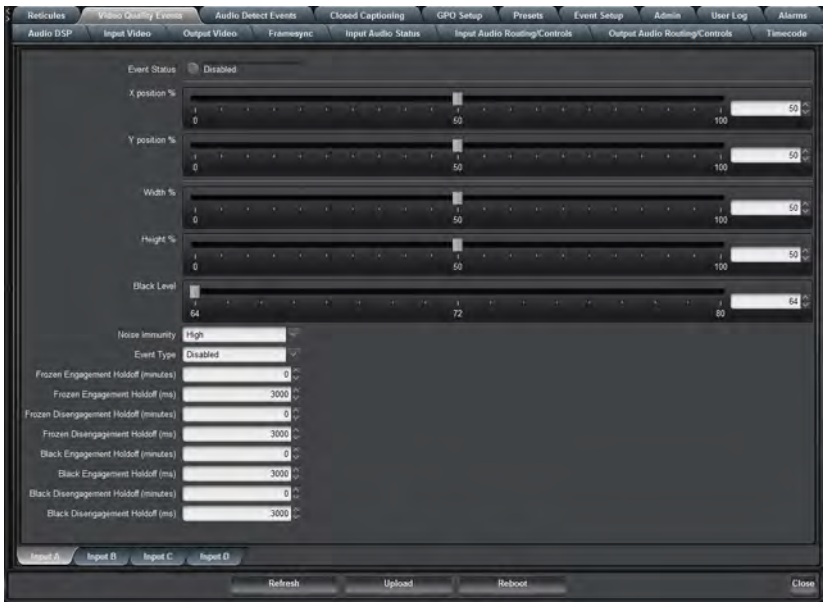


Figure 64 Example of Video Quality Events > Input A Tab

✶ Inputs B to Input D have controls identical to the controls described here for Input A sub-tab. Therefore, only the Input A controls are shown here. Set controls for other inputs using the respective sub-tab.

Event Status Indicator

Each Input tab displays event status (based on criteria set below) for signal condition to be considered OK (green), or signal condition considered to be a quality alert event (red) due the condition exceeding the criteria threshold(s) set below.

Position and Width Controls

These controls set the area of concern to be screened by the Quality Event function.

X and Y Position controls set the origin point for the area of concern.

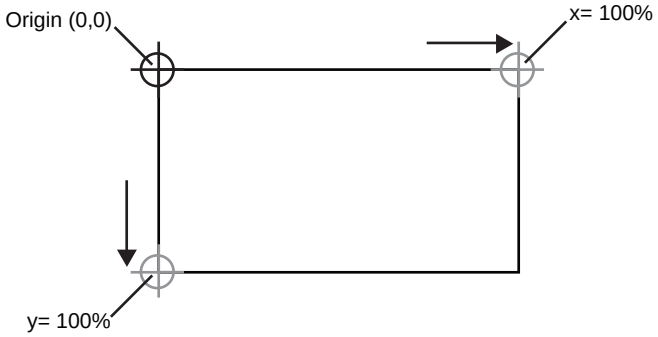


Figure 65 Example of X and Y Position Controls

X and Y Width controls set the size for the area of concern.

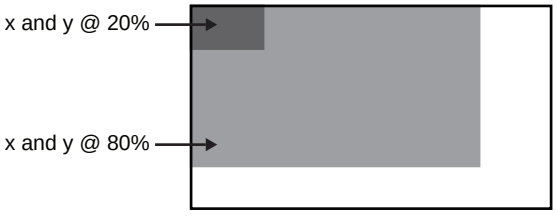


Figure 66 Example of X and Y Width Controls

Threshold and Event Type Controls

Sets the thresholds for black frame and event type to be considered. Also provides hold-off controls for event trigger engagement and disengagement. The following settings are available:

- Noise Immunity sets the relative noise levels that are rejected in the course of black event assessment (Low, Medium, or High).
- Engagement Hold-off sets the time (in msec) where, when time is exceeded, an event is to be considered a valid alert event.
- Disengagement Hold-off sets the time (in msec) where, when event time is has ceased, an alert event is cleared.
- Event Type sets the type of event(s) to be considered by the event screening (Disabled, Frozen frame, Black frame, or either Black or Frozen frame).

Audio Detect Events

The Audio Detect Events tab enables you to set the audio level screening and thresholds for audio silence/presence event alerts on embedded and/or AES discrete audio in. When an audio events occur, the event(s) can be used by the Presets function to invoke input routing or other changes.

✶ Requires the AAP+QC licensed feature.

Figure 67 Example of the Audio Detect Events Tab

Overview

Any combination of embedded and AES input channels can be selected to be screened for silence or presence. In the example here, Audio Detect Event 1 is set to trigger if audio on any of channels Emb Ch 1 to Ch 6 fall below the selected threshold for an interval exceeding the selected threshold. Status indicators for each channel show silence (S) / presence (P) status based on the configured thresholds.

Up to eight independent audio silence/presence events can be set to be screened (with descending priority of consideration from Event 1 down to Event 8). This status here can be propagated to the Presets > Event Triggers sub-tab controls to issue a GPO, preset engage, or other command when audio silence events are detected.

Audio Failover Threshold

This setting specifies the dBFS level at which channel content is considered to be silent, and correspondingly also a transition back to an untriggered condition with resumption of audio for the selected embedded channels. If the selected channels maintain levels above the selected Audio Failover Threshold, no triggering is invoked.

Trigger Holdoff

Sets the period of time in which selected channel silence must occur before an Audio Silence Event trigger goes true.

Release Holdoff

Sets the time in which the trigger is revoked upon an event false condition.

✶ Default threshold and hold-off settings shown here are recommended for typical use.

The “Don’t Care” setting may be labeled as Don’t Care, DC, or DSBL (disabled). All notations mean ignoring the channel from event triggering.

Selections other than Don’t Care work as an AND function. Where multiple selections are set, a true (trigger) condition is not propagated unless all selected channels experience the configured criteria.

Closed Captioning

The Closed Captioning tab provides support for closed captioning setup. Also provides controls for setting closed captioning absence and presence detection thresholds.

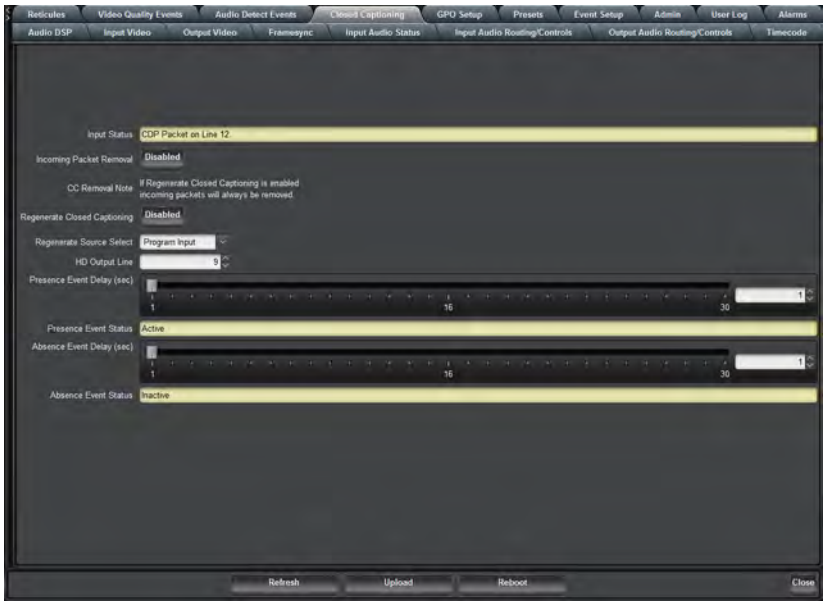


Figure 68 Example of the Closed Captioning Tab

Displays incoming Closed Captioning status as follows:

- If closed captioning is present, a message similar to the example shown is displayed.
- If no closed captioning is present in the video signal, Not Present or Disabled is displayed.

Packet closed captioning status **`Captioning Rejected Due To`** message can appear due to the items described in **Table 7**. The closed captioning function assesses cdp_identifier, cdp_frame_rate, ccdata_present, and caption_service_active items contained in the packet header to make the determinations listed below. Refer to ***CEA-708-B*** for more information.

Table 7 Closed Captioning Status Messages

Message	Description
Unsupported Frame Rate	Film rate closed-captioning (either as pass-through or up/down conversion) is not supported by the AAP-8644
Data Not Present	Packet is marked from closed captioning source external to the AAP-8644 that no data is present
No Data ID	Packet from closed captioning source external to the AAP-8644 is not properly identified with 0x9669 as the first word of the header (unidentified packet)
Caption service is marked as inactive	display indicates bit in packet from upstream source may inadvertently be set as inactive. In this case, closed captioning data (if present) is still processed and passed by the card as normal

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

Closed Captioning Remove/Regenerate and HD Insertion Line Controls

Allows removal of closed captioning packets and regeneration of packets. This is useful where closed captioning must be moved to a different line than that received on.

- Although the output line drop-down will allow any choice within the 9 to 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 Numbers**" for more information.

The AAP-8644 does not check for conflicts on a given line number. Make certain selected line is available and carrying no other data.

Presence/Absence Check Controls

Displays CC presence and/or absence event status. This status can be propagated to the Presets > Event Triggers tab controls to issue a card GPO or other command when CC presence/absence events are detected.

Controls for both presence and absence provide for a hold-off time (in seconds) where, when time is exceeded, an event is to be considered a valid alert event.

Presets

The Presets tab allows user control settings to be saved in a Preset and then loaded (recalled) as desired, and provides a one-button restore of factory default settings.

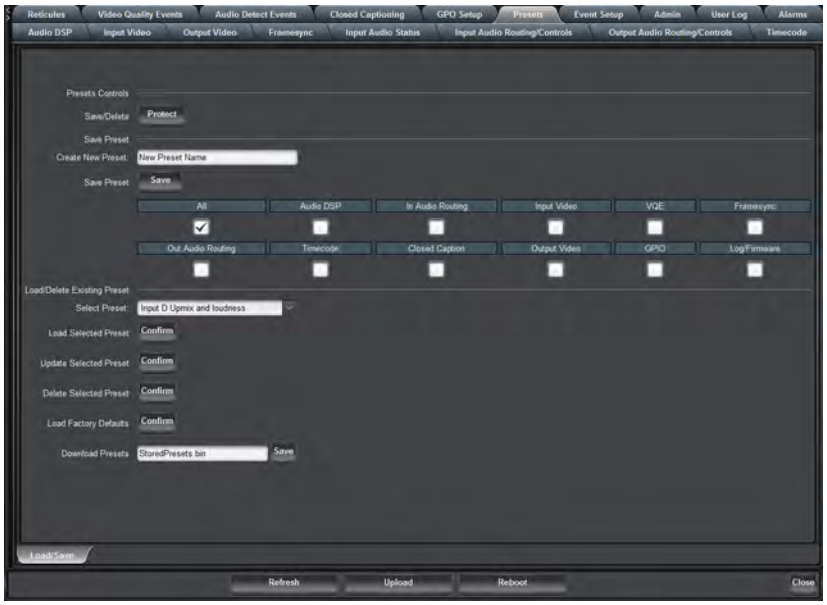


Figure 69 Example of a Presets Tab

Preset Layer Select

Allows selecting a functional layer (or “area of concern”) that the preset is concerned with. Limiting presets to a layer or area of concern allows for highly specific presets, and masks changing card settings in areas outside of the layer or area of concern.

Default All setting will “look” at all card settings and save all settings to the defined preset with no masking.

Selecting a layer (in the example, “In Audio Routing”) will set the preset to only “look at” and “touch” audio routing settings and save these settings under the preset. When the preset is loaded (recalled), the card will only “touch” the audio routing layer.

Example

Since EAS audio routing can be considered independent of GPIO settings, if normal audio routing was set up with a particular GPIO setting in effect, and at a later time EAS audio routing is desired to be saved and invoked as a preset, selecting In Audio Routing here tells the preset save and load to not concern itself with GPIO settings. In this manner, any GPIO settings in effect when the EAS preset is invoked will not affect any GPIO settings that might be currently in effect.

Preset Enter/Save/Delete

Locks and unlocks editing of presets to prevent accidental overwrite as follows:

- Protect (ready): This state awaits Protected and allows preset Save/ Delete button to save or delete current card settings to the selected preset. Use this setting when writing or editing a preset.
- Protected: Toggle to this setting to lock down all presets from being inadvertently re-saved or deleted. Use this setting when all presets are as intended.

- Create New Preset: Field for entering user-defined name for the preset being saved (in this example, “IRD Rcv122”).
- Save: Saves the current card settings under the preset name defined above.

Preset Save/Load Controls

- Select Preset: drop-down allows a preset saved above to be selected to be loaded or deleted (in this example, custom preset “IRD Rcv122”).
- Load Selected Preset button allows loading (recalling) the selected preset. When this button is pressed, the changes called out in the preset are immediately applied.
- Delete Selected Preset button deletes the currently selected •preset.
- Load Factory Defaults button allows loading (recalling) the factory default preset. When this button is pressed, the changes called out in the preset are immediately applied.

✶ Load Factory Defaults functions with no masking. The Preset Layer Select controls have no effect on this control and will reset all layers to factory default.

- Download Presets saving the preset files to a folder on the connected computer.

Load/Save Sub-tab

Keep the following in mind when using the Load/Save tab:

- 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 selecting and loading a desired preset as described on the previous page.

GPO Setup

The GPO Setup tab provides controls for setting up the two GPOs power-up states as well as forced manual or event action triggered.

✶ This tab has identical independent controls for GPO 1 and 2. Therefore, only the GPO 1 controls are described here.

Figure 70 Example of the GPO Setup Tab

Current State

This read-only field indicates GPO status regardless of any pre-setup.

Power-on State

This menu allows the power-up GPO state to be set (initialized) upon power-up.

Control Mode

This menu allows GPO manual asserted open or closed states, or hands over control to Event Action triggering.

Event Setup

The Event Setup tab provides event-based loading allowing a defined action to be automatically engaged upon various received signal status. Actions can be “canned” control commands or user-defined by going to a user preset.

Figure 71 Example of the Event Setup Tab

Before You Begin

- Event based preset loading is not passive and can result in very significant and unexpected card control and signal processing changes if not properly used. If event based presets are not to be used, make certain the Event Based Loading button is set to Disabled.
- Because event based preset loading can apply card control changes by invoking presets, loading conditions cannot be nested within a called preset (event-based loading settings performed here cannot be saved to presets, although the settings are persistent across power cycles).

Event Triggers Tab

Event triggers allow a variety of event screening criteria, and in turn provide an Event Action “go to” in response to the detected event(s). For each screened criteria, categories can be set as “Don’t Care” or set to specific criteria to broaden or concentrate on various areas of concern.

- The Event based loading button serves as a master enable/disable for the function.
- Go-to Event Actions can be user-defined presets, “canned” (hard-coded) selections (such as GPO triggers or routing changes).
- Each Event (1 to 32) can be set to screen for any or several Definer criteria as shown in the example below. Up to 32 separate events can be defined.
- Event 1 to Event 32 are arranged with Event 1 having the highest priority, descending down to Event 32. Where multiple event screening is enabled, lower-priority events are serviced first, with the highest-priority event being the final event serviced and last action taken as well as last item

logged in the Event History (see below). This helps ensure that a lower-priority event does not mask detection of higher-priority event(s).

- The Status indicator and message shows the activation status of each Event. Green indicator means event is currently engaged.
- Some columns in the DashBoard Event Setup table are present only when certain options are installed (for example, Video Quality column appears only with option AAP+QC).

Event Definers

Each event can be uniquely set up for any of the condition types in these columns. Unless set to Don't Care, all defined conditions will need to be true in order for the Event to be considered active

✶ Event criteria settings in any row comprise an AND function. Where multiple criteria are selected, a true (trigger) condition is not propagated unless all specified criteria are true. To independently screen for multiple criteria, rows should be set up where each criteria is screened in its own Event row. Examples of this are shown on the following pages.

The Event History log shows any triggered events in groups of five most recent events (newest at the top).

Pressing the Force Event **Refresh** button updates the list.

Examples

In **Figure 73** for Event 1, the Video Quality Events tab is set to screen for frozen video on Input A. When detected, this status can be used here (Video Quality set to "Input A Event Engaged" indicating black or frozen video detected). Using the Event Action selector, go-to action of "go to B" can be invoked (which in this example is a user preset that changes card routing to use an alternate input source).

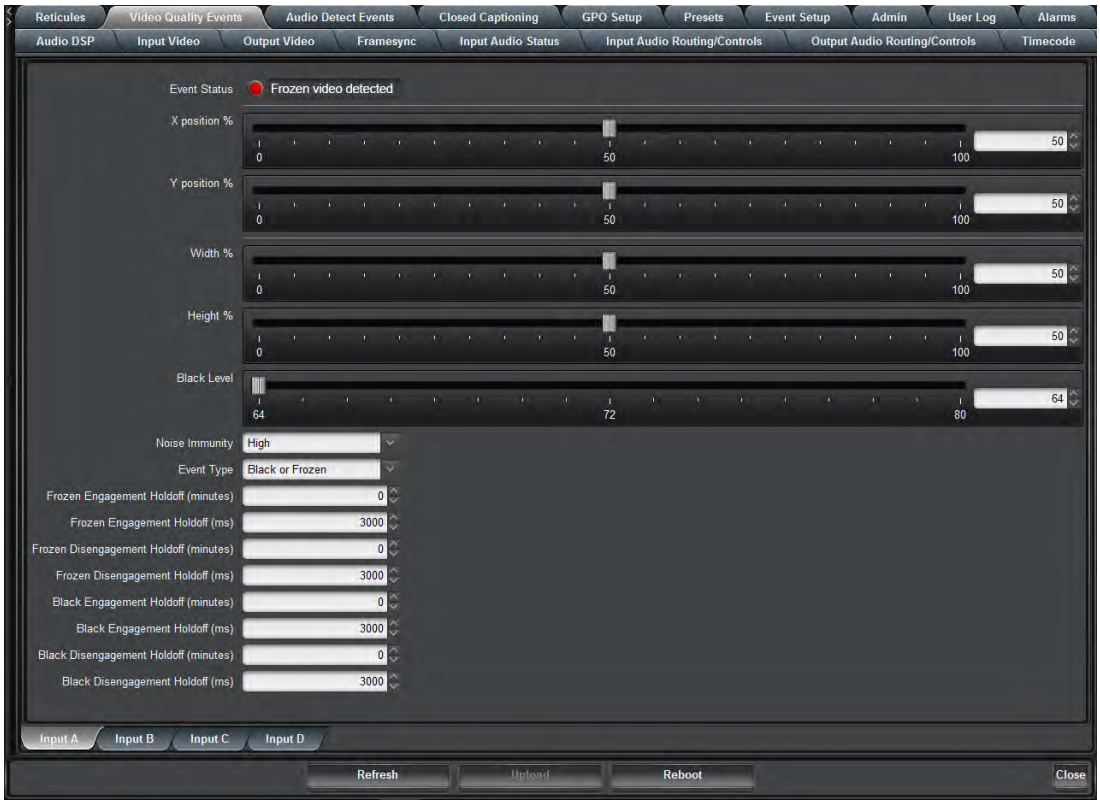


Figure 72 Example of Event 1 — Video Quality Events > Event Status Field

Conversely, to go back to the original source, an event could be set up with Video Quality here looking for “Input A Event Disengaged” and in turn invoke an event action returning routing to the original video source (in this example, user preset “normal path A”).

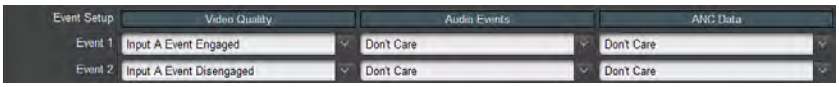


Figure 73 Example of Event 1 Setup

Notes

- Screened conditions are triggered upon start of event. Any event-based setup must be done in advance of the triggering event in order for event to be detected.
- If a desired user preset does not appear in the Event Action drop-down, press the DashBoard Refresh button at the bottom of the page to update the list in the drop-down.
- Loss of true conditions does not disengage an event-based triggering. A new set of true conditions must be defined and then occur to transition from one event-based trigger to another.
- Time required to engage an event-based trigger depends upon complexity of the called preset. (For example, a preset that invokes a video change will take longer to engage than a preset involving only an audio routing change.)
- Make certain all definable event conditions that the card might be expected to “see” are defined in any of the Event 1 to 32 rows. This makes certain that the card will always have a defined “go-to” action if a particular event occurs. For example, if the card is expected to “see” a 720p5994 stream or as an alternate, a 525i5994 stream, make certain both of these conditions are defined (with your desired go-to presets) in any two of the Event 1 to 32 condition definition rows.
- Event Actions defined using user presets must be used with care to prevent conditions that could cause looping or the removal or “override” of desired expected settings. When using presets, the Preset Layer selection should be used such that only required aspects are touched (for the example above, the preset “no-cc-msg” should be set to only send a GPO).
- Where multiple event screening is set up, the event you consider to be the highest priority should be set as higher priority than lesser events (as shown in the example above where Video Quality screening trumps CC absence). Also, this hierarchy helps ensure that all desired events are screened for before a significant change (such as input video source change) is effected.

User States

The User States is a special column which allows a logic state to be set (similar to a register or latch) whenever a defined condition is first triggered. A user state (which is latched until cleared by some other definable action) can be successively used with other user states, thereby allowing a final action to be invoked only when subordinate user states have been sequentially satisfied as true.

In **Figure 74**, two independent units are used for an EAS alert input (one box supplies alert key video, and the other supplies automated alert audio). Both communicate their ready signal each using edge-trigger GPOs which are fed to the respective GPI 1 and GPI 2 on the card.

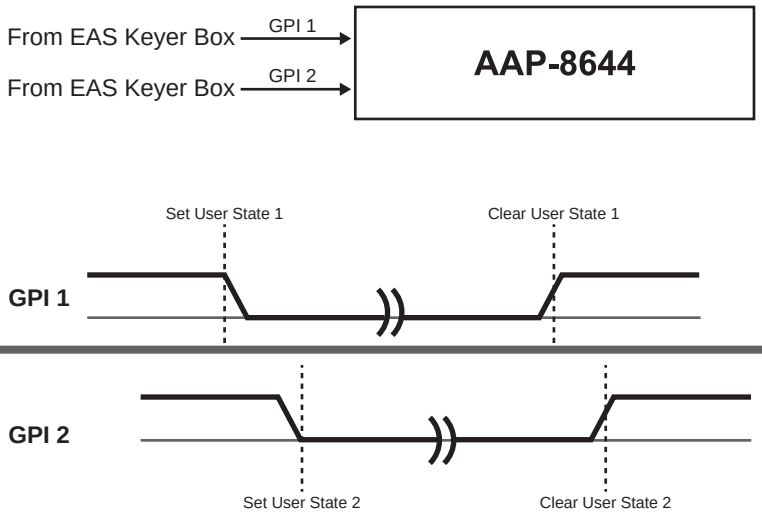


Figure 74 Example of a Configured User State

Because these two boxes are independent and cannot be relied upon to provide coinciding triggers, a chain of user state definers are used here to engage a preset routing key video and EAS audio routing when both states from both boxes are true in the order of GPI 1 first and then GPI 2 second for this example.

Figure 75 Example of GPI 1 and GPI 2 User States

Event Timer Setup Tab

This sub-tab provides three general-purpose timers that can be triggered to start, pause, reset, or stop upon event actions. The state of each timer, in turn, can also be used to invoke other actions.

Figure 76 Example of an Event Timer Setup Sub-tab

Event Timers 1 to 3 can be set with count-down values. The Pause/ Reset/Start control here are manual controls. The timers are typically used with automated cues to start and stop the timer(s), as shown in **Figure 77**.

Figure 77 Example of an Event Timer 1 Configuration

In **Figure 78**, Event Timer 1 is used to set a logo insertion disable after a specific amount of elapsed time. Upon the timer timeout, a separate action sends an email.

Table 24.1

Figure 78 Example of an Event Timer Configuration

Email Alerts Tab

This sub-tab provides setup for automated Email alerts when an event has occurred.

As an Event Action choice on the Events Triggers sub-tab, an Email alert can be sent as a response. Set up email fields as shown in the example below.

✶ The openGear frame hosting the AAP-8644 must be accessible to email recipient's network. It is recommended to set up and generate a test event to test the email send.

When fields are filled-in to specify recipient and sender, and email alert is selected for Event Action on Event Triggers sub-tab page, recipient receives an email alert upon event, with the triggering event shown.

Admin

The Admin tab provides a global card operating status and allows a log download for factory engineering support. Also provides controls for selecting and loading card firmware upgrade files, and for setting the card comm IP address.

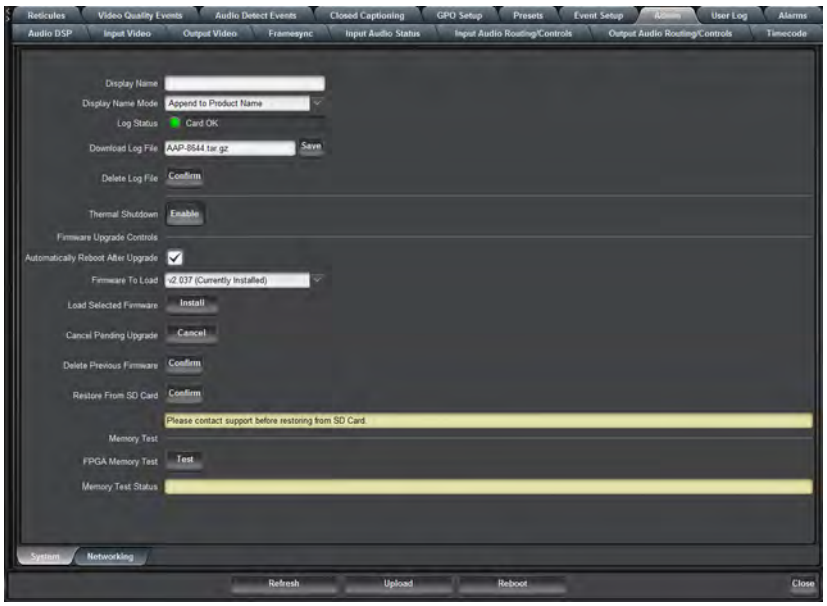


Figure 79 Example of an Admin Tab

Card DashBoard Name Control

Allows card name In DashBoard to be changed as desired. Click return to engage change.

- **Append to Product Name** appends (or adds to) existing card name (for example, “AAP-8644 Processing 1A”).
- **Replace Product Name** completely replaces the card name (for example, “Processing 1A”).

✶ DashBoard instance(s) may have to be refreshed before name change appears.

Log Status and Download Controls

The following settings are available:

- Log Status indicates overall card internal operating status.
- Download Log File allows a card operational log file to be saved to a host computer. This log file can be useful in case of a card error or in the case of an operational error or condition. The file can be submitted to Ross Technical Support for further analysis.
- Delete Log File deletes the currently displayed log file. A second confirmation dialog is displayed to back out of the delete if desired.
- Thermal Shutdown enable/disable allows the built-in thermal failover to be defeated. (Thermal shutdown is enabled by default).

Caution — *The AAP-8644 FPGA is designed for a normal-range operating temperature around 85°C core temperature. Operation in severe conditions exceeding this limit for non-sustained usage are within device operating safe parameters, and can be allowed by setting this control to Disable. However, the disable (override) setting should be avoided under normal conditions to ensure maximum card protection.*

Firmware Upgrade Controls

Firmware upgrade controls allow a selected firmware version (where multiple versions can be uploaded to the card's internal memory) to invoke an upgrade to a selected version either instantly, or set to install on the next card reboot (thereby allowing card upgrade downtime to be controlled at a scheduled point in time).

✶ The page/tab here allows managing multiple firmware versions saved on the card. New upgrade firmware from our website can always be directly uploaded to the card without using this page. Instructions for firmware downloading to your computer and uploading to the card can be found on our website.

To upgrade the firmware

1. Access a firmware upgrade file from a network computer by clicking **Upload** at the bottom of DashBoard.
2. Browse to the location of the firmware upgrade file on your network computer. For example, My Documents\v1.0.0019.bin.
3. Select the desired file.
4. Click **Open** to upload the file to the card.

Immediate Firmware Uploads

The card default setting of Automatically Reboot After Upgrade checked allow a selected firmware version to be immediately uploaded as follows:

1. Click **Firmware To Load**.
2. Select the desired upgrade file to be loaded. For example, "v1.0.0019".
3. Click **Load Selected Firmware**.

   The card now reboots and the selected firmware is loaded.

Deferred Firmware Uploads

With Automatically Reboot After Upgrade unchecked, firmware upgrade loading is held off until the card is manually rebooted. This allows scheduling a firmware upgrade downtime event until when it is convenient to experience to downtime (uploads typically take about 60 seconds).

1. Click **Firmware To Load**.
2. Select the desired upgrade file to be loaded (in this example, "v1.0.0019").

   Note now how the display shows "Installs on Next Reboot".
3. Click **Load Selected Firmware**.

   The card holds directions to proceed with the upload, and performs the upload only when the card is manually rebooted (by pressing the **Reboot** button).
4. To cancel a deferred upload, click **Cancel Pending Upgrade**.

   The card reverts to the default settings that allow an immediate upload/upgrade.

Card IP Physical Port Select Control

Allows card dedicated IP interface (as set below) to use frame communications or dedicated rear I/O module Ethernet RJ-45 port.

✶ Frame net connection allows cards with per-card Ethernet connection to connect with network via a shared frame Ethernet port instead of per-card dedicated Ethernet connectors on the card's rear module. Frame net connection is available only on certain frame models.

Card Check and Restore Utilities

Memory Test allows all cells of the card FPGA memory to be tested.

✶ The Memory Test should only be activated under direction of product support. Exercising the memory test is not part of normal card maintenance.

Restore from SD Card allows card rendered inoperable to be restored using an SD memory card fitted to the card internal SD slot.

✶ Ross Technical Support must be contacted prior to performing this operation. Use of any SD card not supplied by support can corrupt the card.

NTP Clock Setup

Allows device NTP clock IP source and localization. This is the clock/time device will use for logs and other recorded actions.

- NTP IP sets the IP address where NTP is to be obtained.
- Local Timezone sets the recorded time to the localized time.
- NTP Status shows if time is synced with NTP or if an error exists.

User Logs

This tab automatically maintains a log of user actions and input lock status.

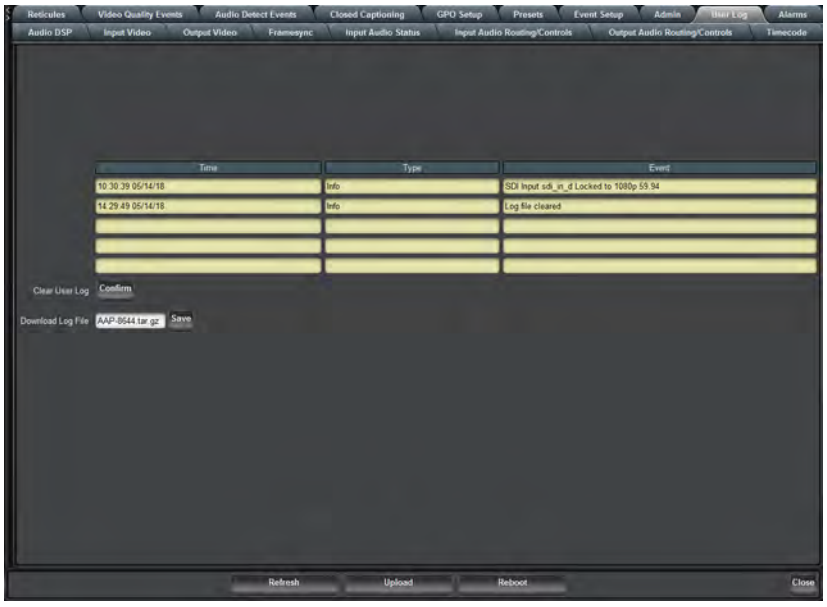


Figure 80 Example of Entries in the User Log Tab

User Log shows input lock and other user conditions (with most recent event at top of list).

Clear User Log clears all entries.

Download Log File opens a browser allowing the log file to be saved on the host machine.

Alarms Setup

The Alarms Setup tab provides controls for setting up controls which screen for and propagate input program video alarms for video, audio, and ancillary data defect conditions.

Conditions and alarm status can be propagated as DashBoard tree-view frame alarms, down-loadable *.txt files and/or Syslog IP-based alarms.

The Alarms tab has several sub-tabs which allow setting up detection and alarm severity/propagation for input program video alarms for video, audio, and ancillary data defect conditions (as described and shown below)

Video Alarm Setup Tab

The Video Alarm Setup sub-tab allows setting up screening engagement and disengagement hold-off for frozen and/or black video detection on the card's four SDI inputs (independent for each SDI input). **Figure 81** shows the default settings for engagement and disengagement of alarm generation occurs 3000 msec after event detect.

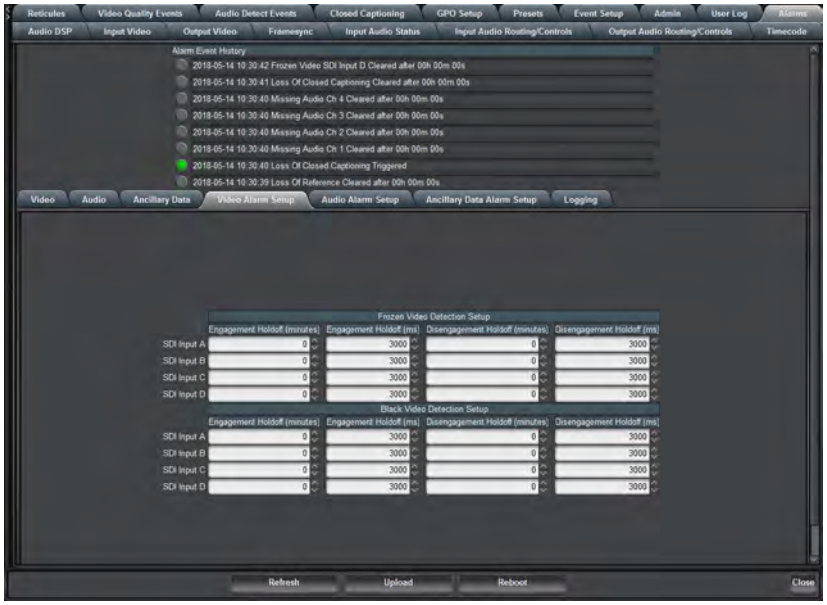


Figure 81 Example of the Alarms > Video Alarm Setup Tab

✶ Factory default hold-off settings shown here are recommended for at least initial settings. If hold-off periods are too brief, nuisance alarms may be generated during transitions to and from programs and interstitials.

Audio Alarm Setup

Audio Alarm Setup sub-tab allows setting up screening trigger threshold, engagement and disengagement hold-off for low or missing audio levels on the card's embedded audio input channels.

- Levels above the Failover Threshold are considered normal.
- Levels below the Failover Threshold (and exceeding the hold-off) are considered below normal.

Audio channels screened are from the card SDI that is selected for the program video/audio path (for example, if SDI A is selected as the input source on the Input Video tab, the 16 embedded channels comprising this video/audio input are screened).

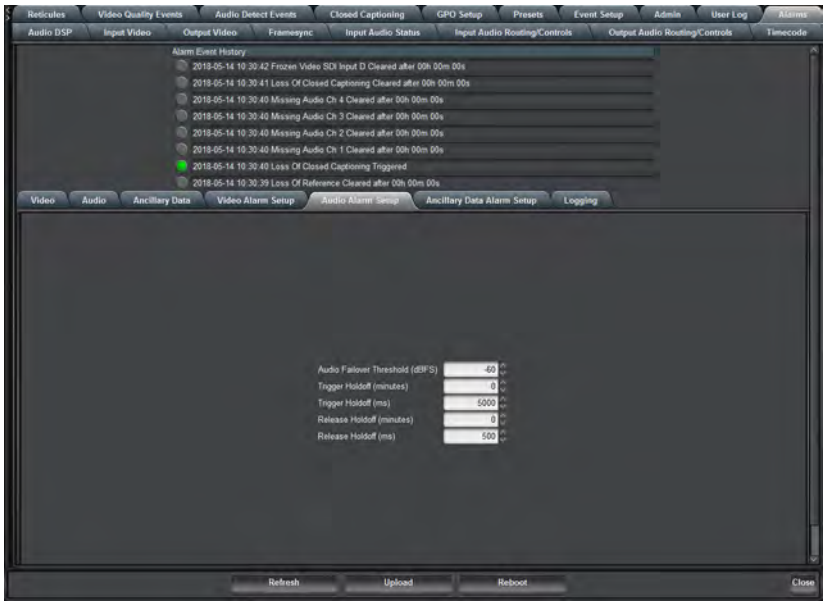


Figure 82 Example of the Alarms > Audio Alarm Setup Tab

✶ Factory default hold-off and threshold settings shown in **Figure 82** are recommended for at least initial settings. If hold-off periods are too brief (or threshold set too high), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.

Ancillary Data Alarm Setup

The Ancillary Data Alarm Setup sub-tab allows setting up screening engagement and disengagement hold-off for absence of closed captioning packets. Note that video screened is the card SDI that is selected for the program video/audio path.

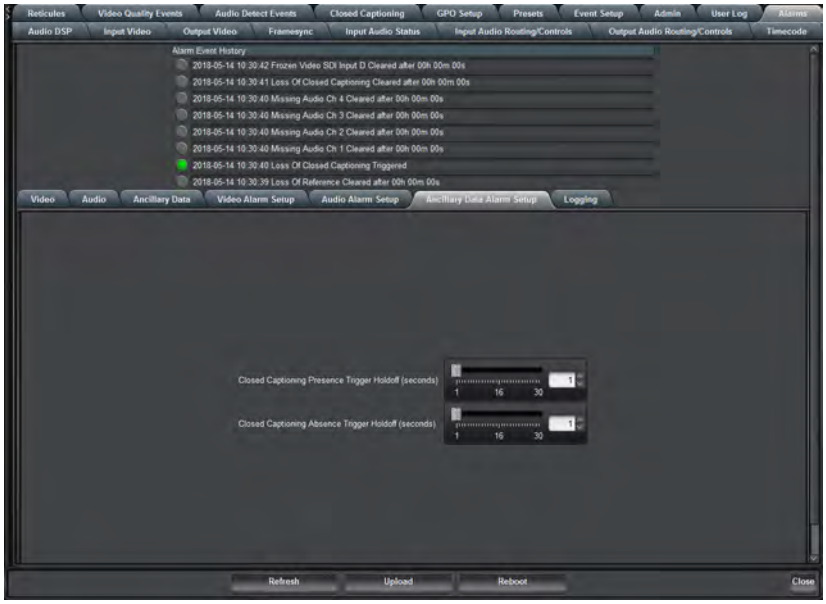


Figure 83 Example of the Alarms > Ancillary Data Alarm Setup Tab

✶ Ancillary data condition detection is functional only for CEA608/708 packet-based closed captioning. This feature does not function for SD line 21 “waveform-based” closed captioning.

Alarm Status Tabs

Video, Audio, and Ancillary Data sub-tabs set alarm propagation attributes, including:

- Logging of alarms and conditions
- Propagation of alarms to the card general Card State/DashBoard frame-based tree-view pane
- Ignore alarm, or set severity as Warning (yellow “LED”) or Error (red “LED”) Each of these sub-tabs is described below.

Video Status Tab

The Video sub-tab independently shows for all four SDI inputs any LOS (loss of signal), frozen, or black conditions triggered for any of the SDI IN A to SDI IN D inputs.

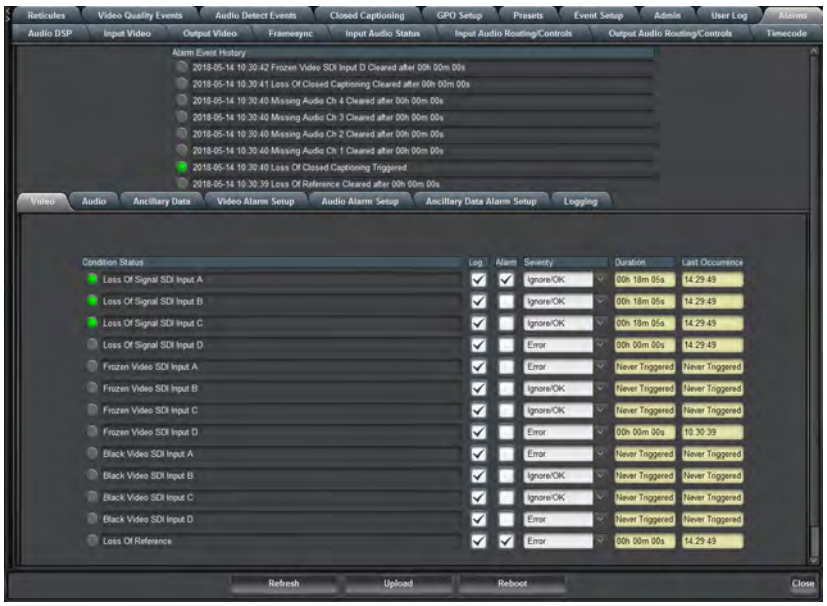


Figure 84 Example of the Alarms > Video Status Tab

- Condition/Status — includes Loss of Signal, Frozen, and Black status fields for four SDI inputs. Illuminated ‘LED’ indicates that condition is presently occurring. Color of LED is determined by user-set Severity level.
- Log — (when enabled) propagates the alarm to a log file.
- Alarm — (when enabled) propagates the alarm to the Card State and frame-level DashBoard tree-view.
- Severity — selects from Ignore/OK (green), Warning (yellow) and Error (red) alarm escalation statues.
- Duration and Last Occurrence — reports details for each triggered alarm event.

✶ The Log, Alarm, Severity, and Duration/Last Occurrence columns appear on the other alarm sub-tabs and function identically as described here.

Audio Status Tab

The Audio sub-tabs independently show for all 16 embedded channels any missing audio (whether absent due to low level, mute or unlocked status). Audio screened is the audio associated with the selected card SDI program inputs.

✶ Unused audio channels should, at the minimum, have Severity set to Ignore/OK. If this is not done, nuisance alarms may occur.

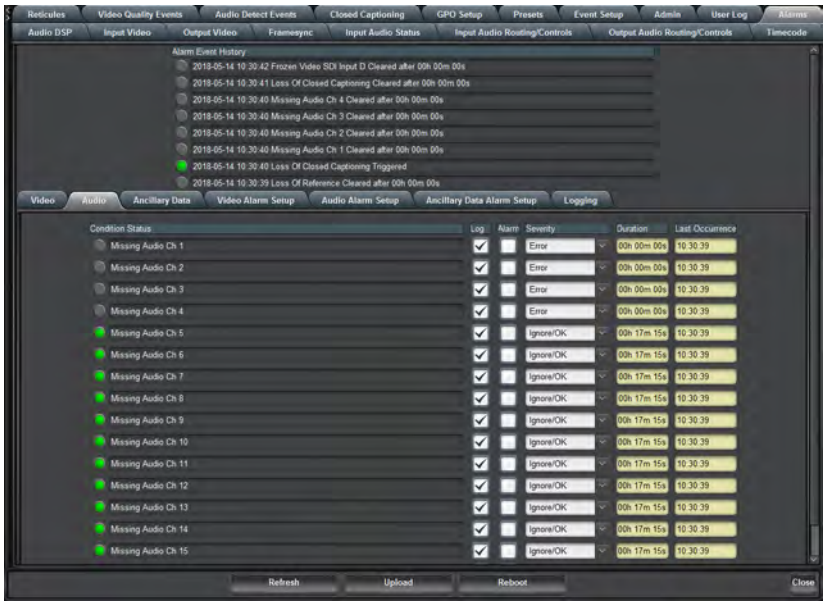


Figure 85 Example of Alarms > Audio Status Tab

Independent rows are present for each of the program path 16 embedded audio channels. Log, Alarm, Severity and Duration/ Last Occurrence controls and status function as described in "**Video Status Tab**".

Ancillary Data Status Tab

The Ancillary Data sub-tab shows loss of closed captioning packet presence for program video path.

✶ Closed captioning screened are the CC packet presence associated with the selected card SDI program inputs.

Ancillary data condition detection is functional only for CEA608/708 packet-based closed captioning. This feature does not function for SD line 21 "waveform-based" closed captioning.

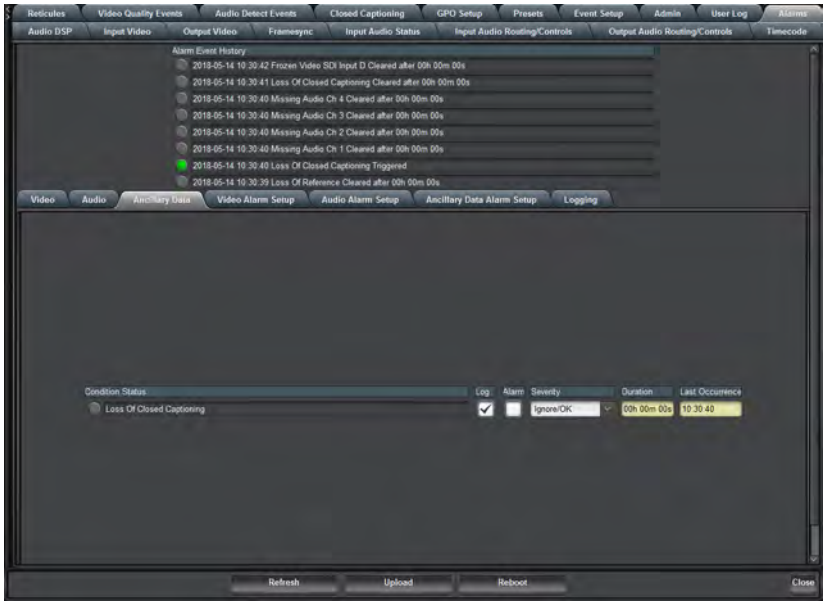


Figure 86 Example of Alarms > Ancillary Data Status Tab

The row showing program path ANC status. Log, Alarm, Severity and Duration/Last Occurrence controls and status function as described in "**Video Status Tab**".

Alarm Event History

Alarm Event History shows the eight most-recent alarm events that have been detected (with most-recent at top of list). The alarm severity (as set using the **Severity** menu for each alarm type) sets the "LED" color shown here.

In addition to alarms directly affecting performance, status such as cleared alarms are also displayed, as well as any actions related to enabling alarm propagation (such as "**`Logging Enabled`**" and "**`Logging Disabled`**").

All display rows are retained in the overall log and can be downloaded as a *.txt file (see "**Logging Sub-tab**").

Cleared alarms appear as an gray indicator.

Alarms configured as Error or Warning correspondingly appear here as a red indicator or yellow indicator.

Detected alarms event configured as Ignore/OK appear here as a green indicator.

Logging Sub-tab

The Logging sub-tab allows downloading of an overall running AlarmLog.txt file via DashBoard to a host computer. This sub-tab also has setup controls for using Syslog IP connection of alarm log data (Linux and Unix).

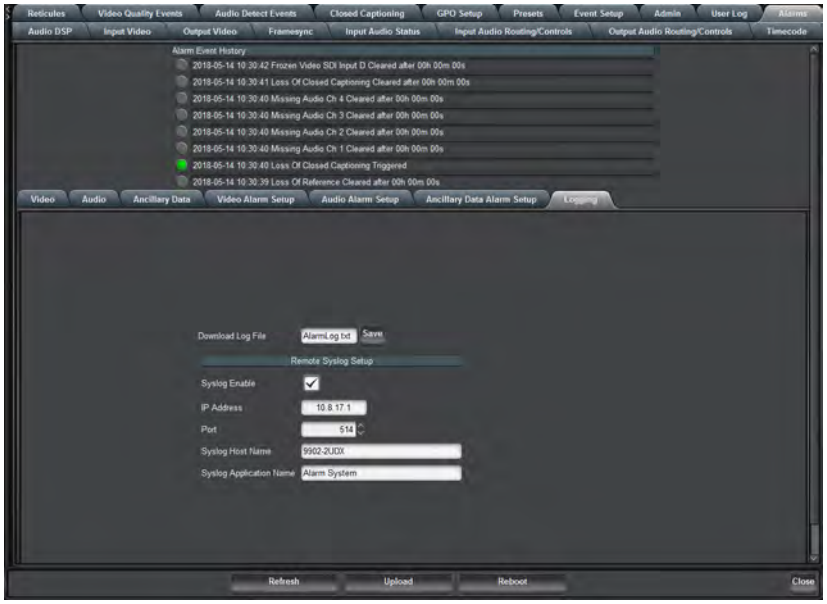


Figure 87 Example of the Logging Sub-tab

Clicking **Save** opens a dialog to save the AlarmLog.txt file to a host computer.

✶ A Download Log File is performed via DashBoard connection; no external connection is required.

The Remote Syslog Setup area provides controls and fields for Syslog:

- For Syslog usage, default 514 port assignment is recommended.
- Syslog usage is available only on certain openGear frame models offering per-card dedicated Ethernet connection. The AAP-8644 includes the R2C-8644 rear module which is equipped with an Ethernet connector in order to use Syslog.

Monitoring

The AAP-8644 itself and its remote control systems all (to varying degrees) provide error and failure indications. Depending on how the AAP-8644 is being used (i.e, standalone or network controlled through DashBoard), check all available indications in the event of an error or failure condition.

✶ The descriptions below provide general information for the various status and error indicators.

Card-edge Status/Error Indicators and Display

Figure 88 shows the AAP-8644 card-edge status indicators. Because these indicators are part of the card itself and require no external interface, the indicators are particularly useful in the event of communications problems with external devices such as network remote control devices.

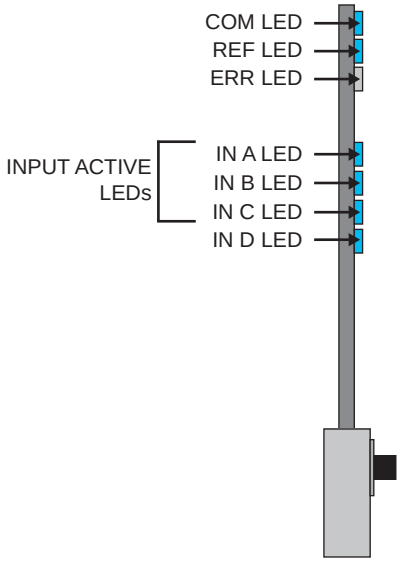


Figure 88 AAP-8644 Card-Edge Components

These indicators report status and error conditions relating to the card itself and remote (network) communications (where applicable) as summarized in **Table 25**.

Table 25 LEDs on the AAP-8644

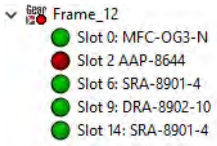
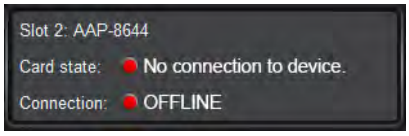
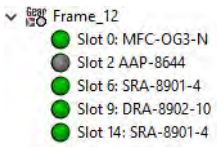
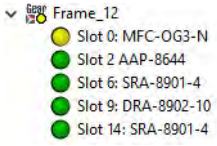
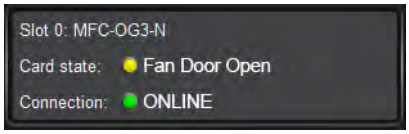
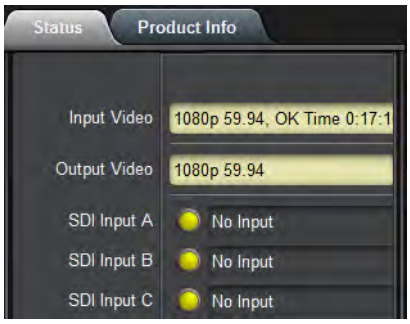
LED	Color	Display and Description
COM	Blue	When flashing, this LED indicates when the card is receiving control messages from DashBoard.
REF	Blue	When lit, this LED indicates when the card is receiving a valid reference signal when set up for reference frame sync.
ERR	This LED is not implemented.	
INPUT ACTIVE	Blue	An LED for each SDI input (A to D) indicates signal presence for each corresponding card SDI input.
	Off	When unlit, the LEDs indicates the AAP-8644 has not locked onto a valid signal on any input.

DashBoard Status/Error Indicators and Displays

Table 26 shows the DashBoard™ status indicators and displays. These indicator icons and displays report status and error conditions relating to the AAP-8644 card itself and remote (network) communications.

✶ You can access Card Info panes for specific cards by clicking the card slot position in the Card Access/Navigation Tree pane.

Table 26 DashBoard Status Indicators Icons and Displays

Indicator Icon or Display	Error Description
	A red indicator icon in the Basic Tree View of an openGear frame indicates a card with an error condition. In this example, the AAP-8644 in Slot 2 is reporting an error.
	Specific errors are displayed in the Card Info pane. In this example the AAP-8644 is not connecting to the frame/LAN. If the AAP-8644 is not connecting to the frame or LAN, all controls are grayed-out.
	A gray indicator icon in the Basic Tree View indicates the AAP-8644 is not being seen by DashBoard due to lack of connection to frame LAN. In this example, the AAP-8644 in Slot 2 is not seen.
	Yellow indicator icon in the Basic Tree View indicates a card with Alert condition. In this example, the MFC-OG3-N Network Controller Card is reporting an alert.
	Clicking the card slot position in the Card Access/Navigation Tree (in this example Network Controller Card “Slot 0: MFC-OG3-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 AAP-8644 Card Info pane reports an alert, along with cause for alert. In this example, the AAP-8644 is receiving no video input, or a video input that is invalid, on the SDI Input A, B, and C connections.

Troubleshooting

This section provides general troubleshooting information and specific symptom/corrective action for the AAP-8644. The AAP-8644 requires no periodic maintenance in its normal operation; if any error indication (as described in this chapter) occurs, use this chapter to correct the condition.

Basic Troubleshooting Checklist

Failures of a general nature (affecting many cards and/or functions simultaneously), or gross errors are best addressed first by performing basic checks before proceeding further. **Table 27** 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 27 Basic Troubleshooting Checklist

Item	Checks
Verify power presence and characteristics	On both the frame Network Controller Card and the AAP-8644, 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 indication for the AAP-8644 card. This can be observed using the DashBoard Card Info pane.
	If DashBoard shows no power being consumed, either the frame power supply, connections, or the AAP-8644 card itself is defective.
	If DashBoard shows excessive power being consumed (see "**Technical Specifications**"), the AAP-8644 card may be defective.
Check Cable connection secureness and connecting points	Cabling mistakes are especially easy to make when working with large I/O modules. • Make certain all cable connections are fully secure (including coaxial cable attachment to cable ferrules on BNC connectors). • Make certain all connecting points are as intended. • Make certain the selected connecting points correlate to the intended card inputs and/or outputs.
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 re-seating it again.)
Check status indicators and displays	On both DashBoard and the AAP-8644 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-valid card

AAP-8644 Processing Error Troubleshooting

Table 28 provides AAP-8644 processing troubleshooting information. If the AAP-8644 card exhibits any of the symptoms listed in **Table 28**, follow the troubleshooting instructions provided. In the

majority of cases, most errors are caused by simple errors where the AAP-8644 is not appropriately set for the type of signal being received by the card.

The error indications shown below are typical for the corresponding error conditions listed. Other error indications not specified here may also be dis- played on DashBoard and/or the AAP-8644 card-edge status indicators.

Where errors are displayed on both the AAP-8644 card and network remote controls, the respective indicators and displays are individually described in this section.

Table 28 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
DashBoard shows **`Unlocked`** message in Card Info pane	No video input present	Ensure certain intended video source is connected to the appropriate AAP-8644 card video input.
Card-edge Input LED corresponding to input is unlit		Ensure the BNC cable connections between the rear module and the signal source are correct.
Ancillary data (closed captioning, timecode) not transferred through	Control (not enabled)	Ensure certain respective control is set to On or Enabled (as appropriate)
	VANC line number conflict between two or more ancillary data items	Ensure each ancillary data item to be passed is assigned a unique line number
Audio not processed or passed through card	Enable control not turned on	On Output Audio Routing/Controls tab, Audio Group Enable control for group 1 to 4 must be turned on for sources to be embedded into respective embedded channel groups.
Audio DSP routing or other settings show in DashBoard but are not carried out	Card DashBoard UI is stale and not dynamically taking in and engaging changed settings.	When performing significant changes like de-selecting or selecting (enabling) new DSP functions, always press the DashBoard Refresh button to make sure the change is taken in on DashBoard and sub-tabs correspondingly displayed are refreshed with the drop-downs that correlate with the DSP setup. If DashBoard changes (such as channel routing) are done before refresh, the intended routing settings may not actually take place and engage.
Excessive or nuisance input signal quality events in log or Card State status display	Hold-off periods are too brief (or threshold set too high)	If hold-off periods are too brief (or threshold set too sensitive), nuisance alarms may be generated during transitions to and from programs and interstitials, as well as during certain content.
Audio silence event not detected or triggered on (AAP+QC only)	Hold-off set too long to detect condition	The Trigger Hold-off controls on the Audio Detect Events tab allow ignoring silence events unless the event duration exceeds the hold-off setting. Make certain hold-off is set sufficiently low to detect events as desired.

Table 28 Troubleshooting Processing Errors by Symptom

Symptom	Error/Condition	Corrective Action
Selected upgrade firmware will not upload	Automatic reboot after upgrade turned off	Card Presets > Automatically Reboot After Upgrade box unchecked. Either reboot the card manually, or leave this box checked to allow automatic reboot to engage an upgrade upon selecting the upgrade.
Card does not pass video or audio as expected. Control settings spontaneously changed from expected settings	Event-based preset inadvertently invoked	Event-based preset loading (Presets tab > Event Triggers sub-tab) should be set to Disabled if this function is not to be used. Read and understand this control description before using these controls to make sure engagement for all expected conditions is considered. See "**Presets**" for more information.
Card will not retain user settings, or setting changes or presets spontaneously invoke.	Event Based Loading sub-tab inadvertently set to trigger on event	If event based loading is not to be used, make certain Event Based Presets is disabled (either using master Enable/Disable control or through events settings. See "**Presets**" for more information.

Recovering the AAP-8644 via the SD Memory Card

Each AAP-8644 comes equipped with an SD card installed in a slot receptacle on the underside of the PCB. The data on this SD card can be used to restore the AAP-8644 should the AAP-8644 become unresponsive (can not communicate with DashBoard or other remote control). Recovering a AAP-8644 using the procedure here will restore the AAP-8644 to any installed option licenses and the most recent firmware installed.

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

To install the SD Card on the AAP-8644

1. Make certain the card has the proper SD card installed in the under-card slot.

✶ If SD card is not installed, contact Ross Technical Support to obtain an SD card.

2. From the underside of the PCB, locate the SD card receptacle.
3. With SD Card labeling facing up, gently push the SD card into the receptacle until it clicks and locks into place.

To recover the AAP-8644 using the SD card

1. Remove the AAP-8644 from its slot in the openGear frame.
2. Locate the **MMC BOOT** button on the PCB.
3. Press and hold the **MMC BOOT** button.
4. Insert the AAP-8644 back into its frame slot while continuing to hold the **MMC BOOT** button for 3 seconds.
5. With the **MMC BOOT** button now released, the AAP-8644 will begin reprogramming.

   The COM LED illuminates and remains illuminated.

6. When reprogram is complete, the COM LED turns off, on, and then off again (entire process takes about 1-1/2 minute).
7. Remove the AAP-8644 from its slot in the openGear frame.
8. Insert the AAP-8644 back into its frame slot.

   The AAP-8644 will display as "**UNLICENSED**" in DashBoard.
9. In DashBoard:
   a. Select the **Admin** tab.
   b. Click **Restore from SD Card**.

      After about 30 seconds, the AAP-8644 license(s) will be restored and AAP-8644 runs the most recently installed firmware.

   The AAP-8644 can now be used as normal.

Technical Specifications

This chapter provides technical information for AAP-8644.

✶ Specifications are subject to change without notice.

SDI Inputs Specifications

Table 29 Technical Specifications — SDI Inputs

Item	Specifications
Number of Inputs	4
Standards Accommodated	SMPTE 424M
	SMPTE 292M
	SMPTE 259M-C
Impedance	75ohm terminating
Return Loss	>15dB up to 1.485GHz
	>10dB up to 2.970GHz

Analog Video Input Specifications

Table 30 Technical Specifications — Analog Video Inputs

Item	Specifications
Number of Inputs	1 SD analog CVBS
Impedance	75ohm

AES Audio Input Specifications

Table 31 Technical Specifications — AES Audio Inputs

Item	Specifications
Number of Inputs	up to 16 unbalanced; AES-3id
Standards Accommodated	SMPTE 276M
Impedance	75ohm

Analog Audio Input Specifications

Table 32 Technical Specifications — Analog Audio Inputs

Item	Specifications
Number of Inputs	up to 4 balanced
	0 dBFS => +24dBu
Connector Type	6-wire removable Phoenix connectors

SDI Outputs Specifications

Table 33 Technical Specifications — SDI Outputs (Post Processor)

Item	Specifications
Number of Outputs	up to 4 3G/HD/SD-SDI
Impedance	75ohm
Return Loss	>15dB at 5MHz-270MHz
Signal Level	800mV ±10%
DC Offset	0V ±50mV
Jitter	<0.3 @ 3G
	<0.2 @ HD
	<0.2 @ SD
Minimum Latency (Framesync disabled)	SD: 127 pixels; 9.4us
	720p: 330 pixels; 4.45us
	1080i: 271 pixels; 3.65us
	1080p: 361 pixels; 2.43 us
Maximum Delay	20 frames
Maximum Delay (with AAP+DLY option)	SD: 9 seconds
	HD: 1.5 seconds
	3G: 0.8 seconds

Analog Video Output Specifications

Table 34 Technical Specifications — Analog Video Output

Item	Specifications
Number of Inputs	1 SD analog CVBS
Impedance	75ohm

Embedded Audio Output Specifications

Table 35 Technical Specifications — Embedded Audio Output

Item	Specifications
Number of Outputs	16 channel embedded
Features	User crosspoint allows routing of any embedded channel to any embedded channel output. Multi-frequency tone generator for each audio output
Master Delay Control Range	-33msec to +3000msec

AES Audio Outputs Specifications

Table 36 Technical Specifications — AES Audio Outputs

Item	Specifications
Number of Outputs	Up to 16 unbalanced; AES-3id
Standards Accommodated	SMPTE 276M
Impedance	75ohm

Analog Audio Outputs Specifications

Table 37 Technical Specifications — Analog Audio Outputs

Item	Specifications
Number of Outputs	Up to 4 balanced
	0dBFS => +24dBu
Connector Type	3-wire removable connectors

GPIO Specifications

Table 38 Technical Specifications — GPIO

Item	Specifications
Number of GPI	2
Number of GPO	2
GPI Specifications	
GPO LO	@ Vin <1.5V
GPO HI	@ Vin >2.3V
Max Vin	9V
GPO Specifications	
Max I	120mA
Max V	30V
Max P	120mW

Environment

Table 39 Technical Specifications — Environment

Item	Specifications
Max, Ambient Temperature	0°C to 40°C (32°F to 104°F)

Power

Table 40 Technical Specifications — Power

Item	Specifications
Max. Power Consumption	24W

Service Information

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

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check —** Inspect the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
5. **Unit Exchange** — Exchanging a suspect unit with a unit that is known to be working correctly is an efficient method for localizing problems to individual units.

Warranty and Repair Policy

The AAP-8644 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your card proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

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

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

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

In Case of Problems

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

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your card. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the

responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

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

Glossary

The following terms are used throughout this guide:

Active image — the portion of the video picture area (production aperture) that is being utilized for output content. Active image excludes letterbox bars and pillar-box bars.

Card — openGear terminal devices within openGear frames, including all components and switches.

CBR — constant bit rate.

CDN — content distribution network.

DashBoard — the DashBoard Control System.

DTVCC captions — CEA-708 captions.

Frame — the openGear frame that houses the AAP-8644.

MIB — management information base.

Network Controller Card — the MFC-OG3-N and any available options unless otherwise noted.

NTSC captions — the CEA-608-D: Line 21 Data Services captions.

PAL — PAL-B and PAL-G unless otherwise stated.

Production aperture — the image lattice that represents the maximum possible image extent in a given standard (e.g. the full size of all active pixels and active lines). For example, the 1080i production aperture would be 1920x1080.

System— the mix of interconnected production and terminal equipment in your environment.

TCP — Transmission Control Protocol.

UDP — User Datagram Protocol.

User — the person who uses the AAP-8644.