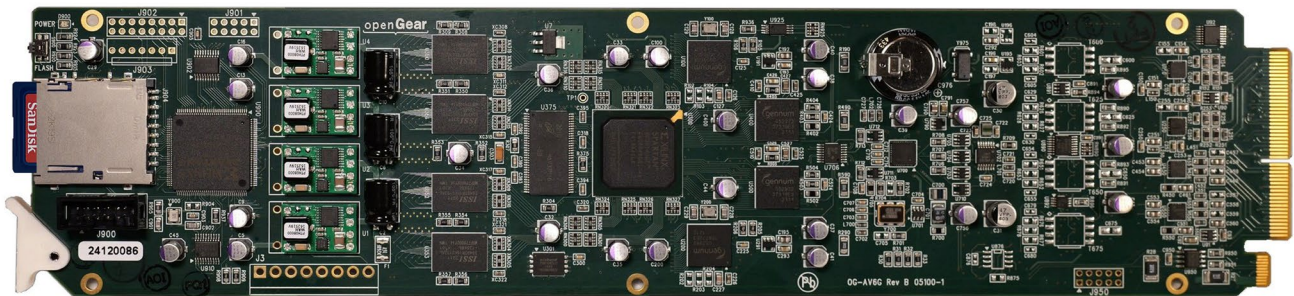


5100-AVD 4K/HD/SD Profanity Delay

Dual Channel Audio-Video Broadcast Delay
and Profanity Elimination System

Operations Manual



5100-AVD • Audio-Video Delay Operations Manual

- Cal Media Engineering Part Number: **5100-AVD-OM**
- Document Version: 0.8.0
- Printed in U.S.A.

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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the “Important Safety Instructions” listed below so as to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these Specific requirements.

Symbol Meanings



This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.



Warning

The symbol with the word “**Warning**” within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.



Caution

The symbol with the word “**Caution**” within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



Notice

The symbol with the word “**Notice**” within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.



**ESD
Susceptibility**

This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.

Important Safety Instructions



Caution

This product is intended to be a component product of the openGear™ series frame. Refer to the openGear™ series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as it's component products.



Warning

Certain parts of this equipment namely the power supply area still present a safety hazard with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing this area.



Warning

Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.

This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair. To reduce the risk of fire, replacement fuses must be the same type and rating. Only use attachments/accessories specified by the manufacturer.

Maintenance/User Serviceable Parts

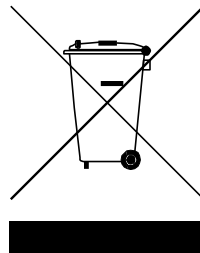
Routine maintenance to this openGear™ product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the contact information on the last page of this manual. All Cal Media Engineering openGear™ products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

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It 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, Cal Media Engineering 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 Cal Media Engineering for more information on the environmental performances of our products.

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Introduction

In This Chapter

This chapter contains the following sections:

- A Word of Thanks
- Overview
- Functional Block Diagram
- Detailed Description

A Word of Thanks

Congratulations on choosing Cal Media Engineering's **5100-AVD Dual Channel Audio-Video Broadcast Delay and Profanity Elimination System** for openGear™ series frames. The 5100-AVD is part of a product line of media gear for broadcast and production facilities.

Should you have a question pertaining to the installation or operation of your 5100-AVD, please contact us at the numbers listed on the back cover of this manual, or through our web site at www.calmedia.com.

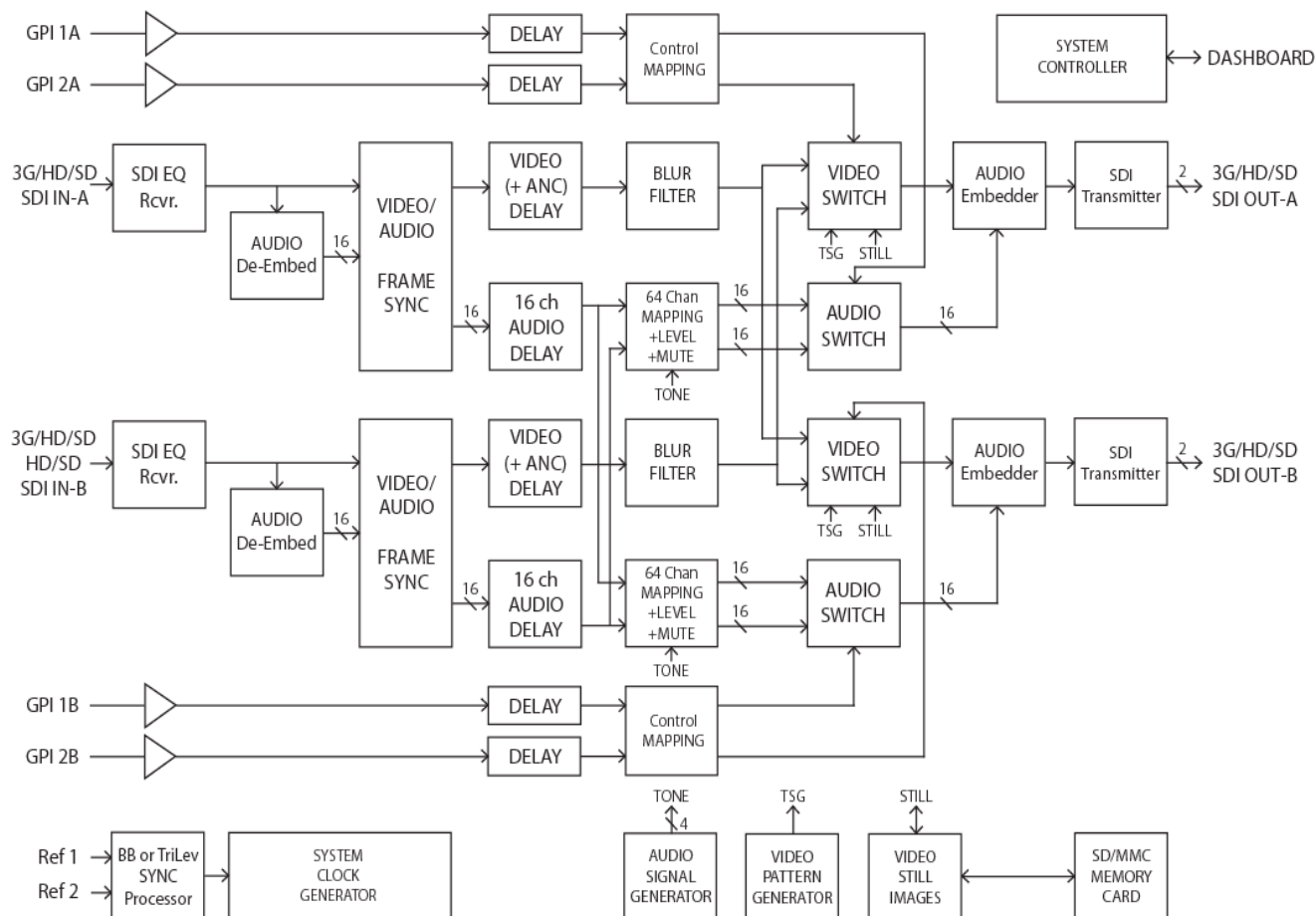
Overview

The 5100-AVD is a Dual Channel Audio-Video Profanity/Broadcast Delay providing everything needed to manage objectionable material during live events. The 5100-AVD is user configurable as two independent delays, a two operator delay, a single delay with "safe" input, or slaved with one or more cards to support 4K/UHD-60. The 5100-AVD provides over 12 seconds of adjustable delay for two 1080p signals.

Each delay channel has 2 GPI ports to activate built-in switching with customizable reaction times. Objectionable material may be eliminated by individually switching the video and each audio channel to alternate signals. Aux A/V input (safe), video blur, freeze frame, user defined images, test patterns, black, other audio channels (shuffle), audio tones, and mute, are all possible switch sources.

The 5100-AVD is designed for use in the openGear™ series frames, and is controlled through the Dashboard™ control software (Windows, Linux and Mac platforms). Optional remote control units are available from Cal Media Engineering.

DUAL CHANNEL A/V DELAY - BLOCK DIAGRAM



Detailed Description

Configuration

The 5100-AVD can be configured to operate in 3 basic modes:

Single Channel Delay

The A channel is the primary delay. The B channel is used as the “safe” input with adjustable delay.

Dual Channel Delay

The A channel and B channel operate as independent delays, and can also be different formats.

Two Operator Delay

The A channel is the primary delay. The B channel’s SDI output provides a “Tap” from the primary delay for a second operator to monitor and censor the signal. The B channel’s SDI input is used as the “safe” input (with no delay).

Audio-Video Processing

The 5100-AVD has two channels each composed of a SDI input, audio-video synchronizer, variable delay, audio and video GPI controlled switches, and a SDI output. Each channel can operate independently at two different formats (same frame-rate), or combined for switching between channels. For each input synchronizer, the audio is de-embedded and processed separately from the video and VANC data. The 5100-AVD contains a powerful audio processor providing individual mapping, level adjustments, and clean switching of all 32 audio channels.

Delay Memory

The 5100-AVD uses solid-state digital memory to delay the audio-video signals. The memory is shared between both A and B channels. A user control allocates a portion of the memory to each channel to allow for maximum delay in one channel or equal delays in both. Each channel's delay is adjustable in frame increments from 0 to a maximum value dependent on the format. Sixteen audio channels are delayed the same amount as each video signal, but with an adjustable offset. The audio delay may be offset from video +/- 500ms.

	60/59.94 Fps	50 Fps	24/23.98 Fps
3G-1080p	25 seconds 36 frames	30 seconds 36 frames	N/A
HD-1080i	51 seconds 6 frames	61 seconds 11 frames	64 seconds 00 frames
HD-720p	57 seconds 4 frames	68 seconds 24 frames	N/A
SD	255 seconds 29 frames	255 seconds 24 frames	N/A

Table 1a: Maximum Delay for single channel (Allocation = 100/0).

	60/59.94 Fps	50 Fps	24/23.98 Fps
3G-1080p	12 seconds 48 frames	15 seconds 18 frames	N/A
HD-1080i	25 seconds 18 frames	30 seconds 18 frames	32 seconds 00 frames
HD-720p	28 seconds 32 frames	34 seconds 12 frames	N/A
SD	131 seconds 22 frames	132 seconds 12 frames	N/A

Table 1b: Maximum Delay for two channels (Allocation = 50/50).

Aux “safe” Input

The B channel's SDI input may be used as alternate sources when configured as “Single Channel Delay” or “Two Operator Delay”.

The video signal will appear as “Aux” source.

The Embedded audio signals will appear as “Aux-Emb” channels.

Video Output Source

The video output source select determines the primary path from which the video output originates.

Delay: the output comes from the Delayed input synchronizer.
Aux:* the output comes from the Aux input synchronizer.
Black: the output goes to black.
Test Signal: the output comes from the internal test signal generator.
Still: the output comes from one of four still image buffers.

*Aux is only available in “Single Channel Delay” and “Two Operator Delay” modes.

Video Output Switch

Regardless of the Video Output Source settings, the active picture portion can be switched to any other source via the Video “Switched Source” control. This switch is engaged by the GPI input(s) and/or the control panel.

Note: The active picture is defined to be the actual picture information within the total signal. The horizontal and vertical ancillary data space is not part of the active picture area, and is not affected by the switch.

Ancillary Data (VANC, Timecode, and Captions)

The video output will always pass the ancillary data from the primary path selected by the Output Source Select.

When the Video-Switch is selecting an alternate video source during the active picture time, the output continues to pass the primary path’s ancillary data, and does not pass any of the alternate source’s ancillary data. This method preserves timecode, closed captions, and other data when switching the video to another source.

Still Image Buffer

The 5100-AVD has four FLASH based still image buffers which may be used as alternate sources for output video. Each buffer may contain captured images from video, or images loaded from the SD/MMC card. Images in each buffer may be saved to the SD/MMC card for future use.

Memory Card

The 5100-AVD has a socket located at the front edge of the card to support SD or MMC memory cards. The memory card is used for updating the firmware, and for storage of still images.

Compatible cards include MMC (multi-media card), SD (secure digital), and SDHC (high capacity). To support still images, the SD/MMC cards must be formatted with a FAT16 or FAT32 file structure (most cards greater than 64MB come pre-formatted as either FAT16 or FAT32). The 5100-AVD conforms to the FAT32 specification so firmware and still image files may be exchanged easily with most computers.

Audio Output Mute.

Each output channel may be individually muted. The “Mute” control overrides channel mapping, levels, and switching.

Audio Output Mapping

Full Audio Mapping is possible with the Audio Output “Source” control. Any source may be selected for any output channel, including one source feeding multiple output channels. Three internal tone generators and silence are also available as sources.

Audio Output Levels.

The mapping function also provides individual level adjustment for all output channels. The level of each channel may be adjusted –40 to +20 dB with the “Gain” control.

Audio Output Switch

Regardless of the Audio Output Source settings, each output channel can be switched to any other source via the Audio “Switched Source” control. This switch is engaged by the GPI input(s) and/or the control panel. The switched outputs also have different level settings than those used for the primary outputs via the Audio “Switched Gain” control.

Installation and Setup

In This Chapter

This chapter contains the following sections:

- Static Discharge
- Unpacking
- Rear Module Installation (Optional)
- Board Installation
- Cable Connections
- SD/MMC Memory Card Installation (Optional)

Static Discharge

Whenever handling the 5100-AVD and other related equipment, please observe all static discharge precautions as described in the following 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 wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.

Unpacking

Unpack each 5100-AVD you received from the shipping container, and check the contents against the packing list to ensure that all items are included. If any items are missing or damaged, contact your openGear™ sales representative or Cal Media Engineering directly.

Rear Module Installation

The 5100-AVD is compatible with DFR series and OG series frames. The procedure for installing the Rear Module in your openGear™ frame is the same regardless of the frame or module used. However, a different module may be required depending on the openGear™ frame you are using.

Rear Modules for the 5100-AVD

The Rear Module for the 5100-AVD depends on the openGear™ frame you are installing the card into.

- **DFR-8310** series frames — When installing the 5100-AVD in the DFR-8310 series frames, the **RM1-5000A** Rear Module is required. The 5100-AVD is also compatible with the DFR-8310-BNC frame.
- **DFR-8320** and **OG** series frames — When installing the 5100-AVD in the DFR-8320 or OG series frames, the **RM2-5000A** is required.

Installing the Rear Module

If you received a Rear Module with your 5100-AVD, you will need to install the module in your DFR or OG series frame before you can install the 5100-AVD in the frame, or connect cables to the slot you have chosen for the 5100-AVD. Skip this section if you are installing the 5100-AVD in a DFR-8310-BNC frame, or the Rear Module is already installed.

Use the following procedure to install the Rear Module in a DFR or OG series frame:

1. Refer to the DFR or OG series frame User Manual, to ensure that the frame is properly installed according to instructions.
2. On the rear of the frame, locate the card frame slot.
3. Remove the Blank Plate from the rear of the slot you have chosen for the 5100-AVD installation. If there is no Blank Plate installed, proceed to the next step.
4. As shown in **Figure 2-1**, seat the bottom of the rear module in the seating slot at the base of the frame's back plane.

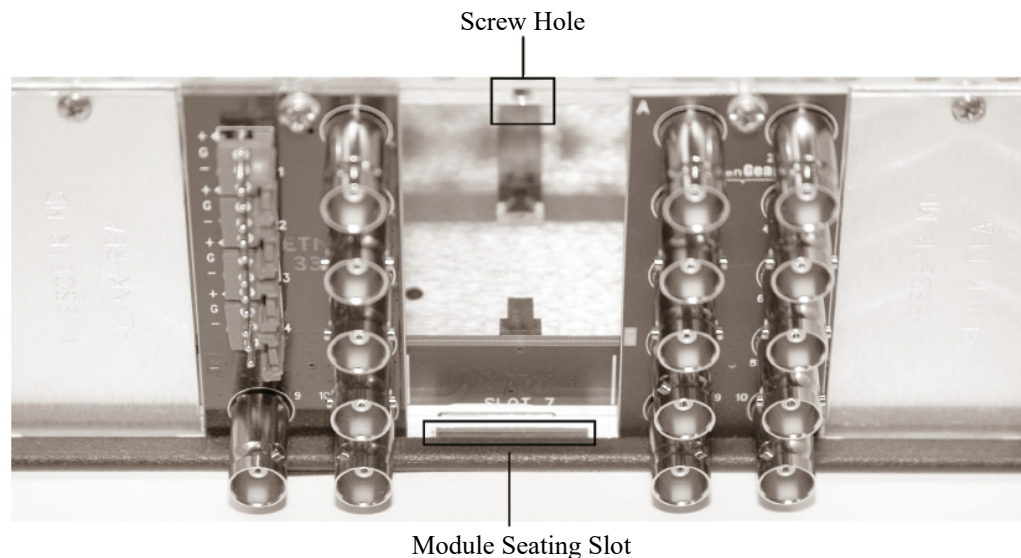


Figure 2-1. Rear Module Installation in a DFR Series Frame (5100-AVD not shown)

5. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
6. Using a Phillips driver and the supplied screw, fasten the rear module to the back plane. Do not over tighten.
7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with Rear Module or blank metal plates. If you need blanks, refer to the chapter, “**Ordering Information**” in your DFR or OG series frame User Manual, and contact your openGear™ sales representative.

This completes the procedure for installing the Rear Module in a DFR or OG series frame.

Board Installation

Use the following procedure to install the 5100-AVD in a DFR or OG series frame:

1. Refer to the User Manual of your DFR or OG series frame to ensure that the frame is properly installed.
2. After selecting the desired frame installation slot, hold the 5100-AVD card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

This completes the procedure for installing the 5100-AVD in a DFR or OG series frame.

Cable Connections

This section provides information for connecting cables to the installed Rear Module.

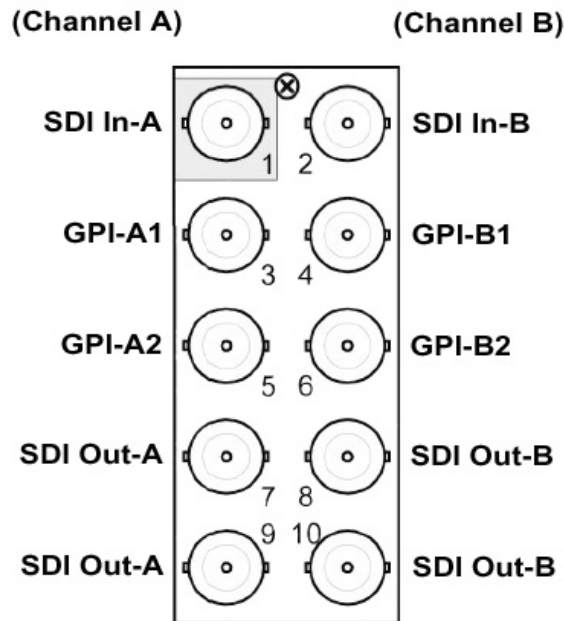


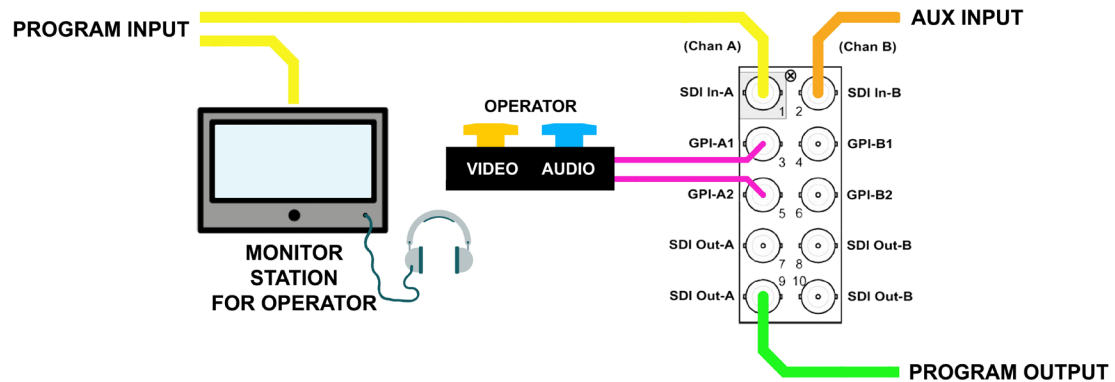
Figure 2-2. Cable Connections for the Rear Module

Fixed Delay Compensation Applications

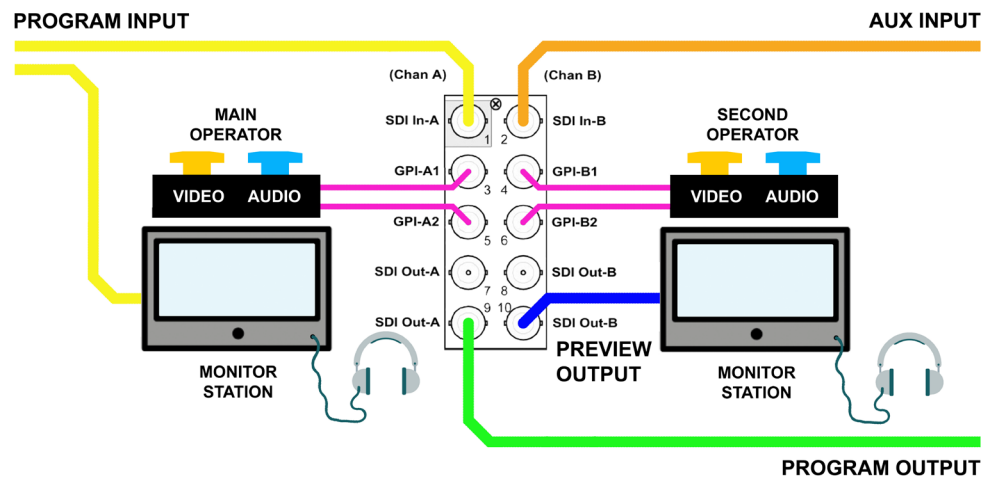
For fixed delay applications to compensate for other processing delays, only SDI input and output connections are necessary. Censorship switching is not needed, so the GPI BNCs can remain unconnected. Refer to the profanity delay system diagrams for more details, ignoring the GPI switch connections.

Single Card Connections for Profanity Delay Systems

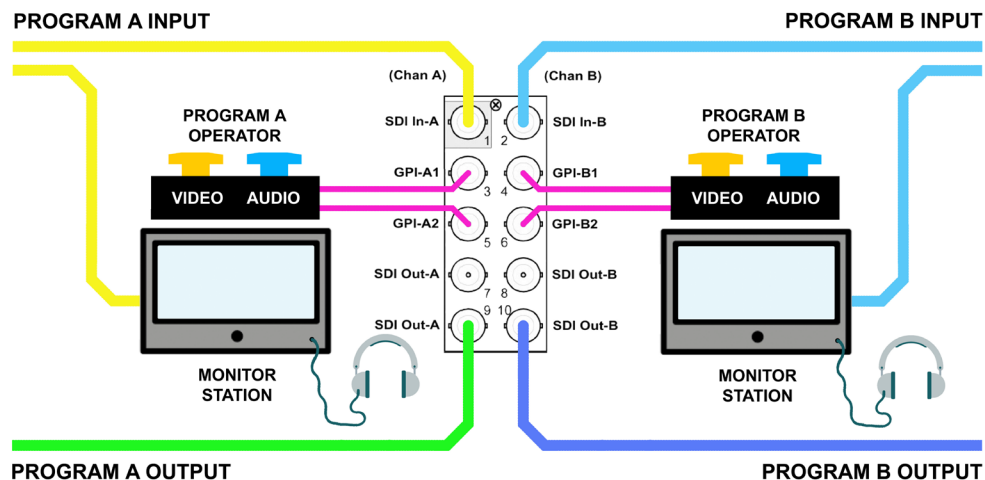
Note: While these diagrams depict using Cal Media's remote switchbox (PDS-REM), users have the option to supply their own switches to create a closure to ground at the GPI BNCs.



Connections for a *Single Card Profanity Delay* system, in *Single Channel Delay+AUX* mode.



Connections for a *Single Card Profanity Delay* system, in *Two Operator Tapped+AUX* mode.

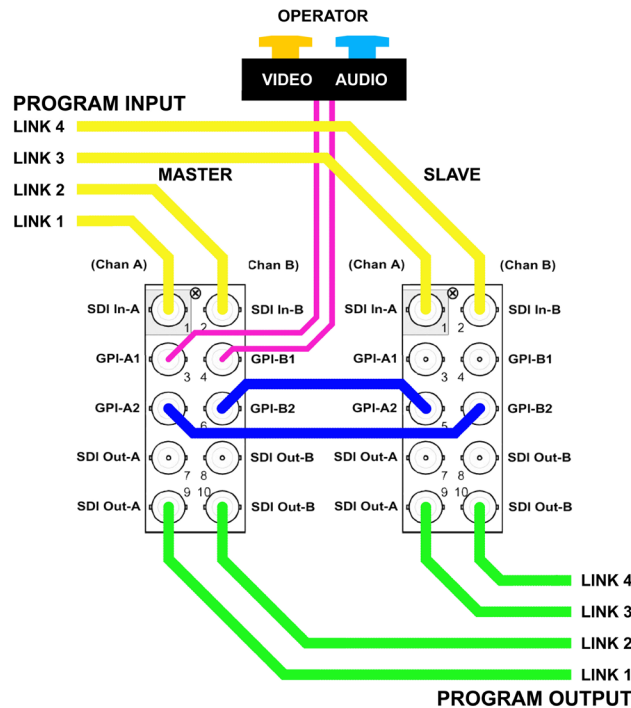


Connections for a *Single Card Profanity Delay* system, in *Dual Channel* mode.

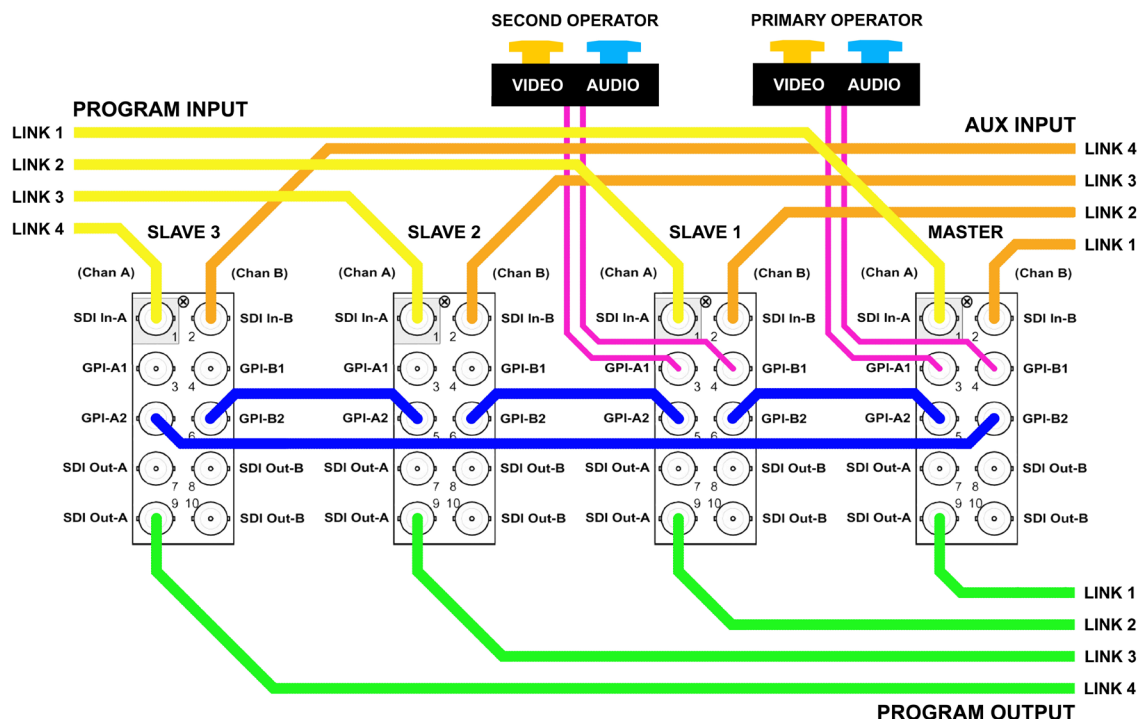
Multiple Card Connections for Profanity Delay Systems

Multiple card systems require assigning one card as the **Master**, and the remaining cards as **Slaves**. See section [Multiple Cards for 4K/UHD](#) under [Guidelines for using the 5100-AVD](#) for more information.

Note: While these diagrams depict using Cal Media's remote switchbox (PDS-REM), users have the option to supply their own switches to create a closure to ground at the GPI BNCs.



Quad Link Connections for a Two Card Profanity Delay System



Quad Link Connections for a Four Card Profanity Delay System

SD/MMC Memory Card Installation (Optional)

The memory card is used for updating the firmware, and for storage of still images. This section provides information for installing a memory card on the 5100-AVD.

Hot Swappable

The memory cards are “hot-swappable”, which means they can be installed and removed while the 5100-AVD card is powered and running, without causing interruption.

Compatible Cards

MMC (multi-media card)

SD (secure digital)

SDHC (secure digital high capacity)

Requirements

To support storage of still images, the SD/MMC cards must be formatted with a FAT16 or FAT32 file structure (most cards greater than 64MB come pre-formatted as either FAT16 or FAT32). The 5100-AVD conforms to the FAT32 specification so firmware and still image files may be exchanged easily with most computers.

Installation

Locate the SD/MMC socket on the front edge of the 5100-AVD card.

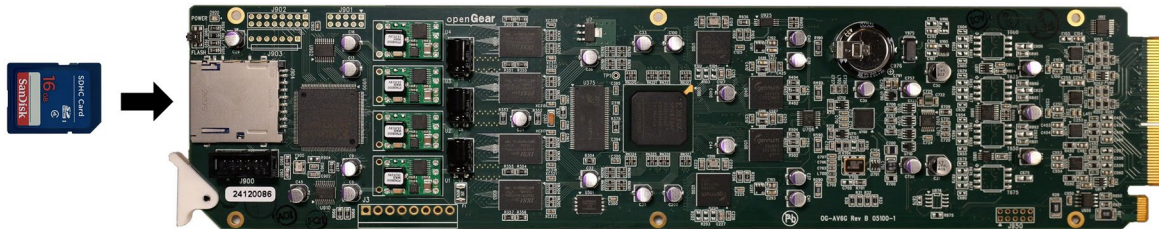


Figure 2-3. SD/MMC Socket location.

The SD or MMC card should be positioned as shown in figure 2-3 with the corner notch nearest the 5100-AVD’s card ejector. Using gentle pressure, carefully slide the memory card all the way into the socket until it clicks. The memory card should now be locked into place.

If the socket will not accept the memory card then check if the card is backwards, upside-down, or damaged. **Do not force the memory card into the socket.**

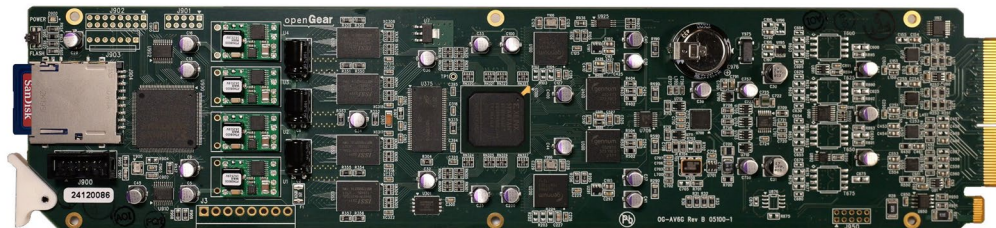


Figure 2-4. SD/MMC Memory Card Installed.

Removal

To remove the SD or MMC card, press the memory card further into the socket until it clicks. Release the card and it should spring part way out. The memory card is now unlocked and should slide easily out of the socket.

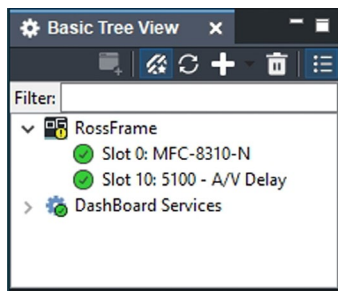
To prevent damage to the socket, do not pull on the SD/MMC card when it is locked into the socket.

Operation

DashBoard™ Control System

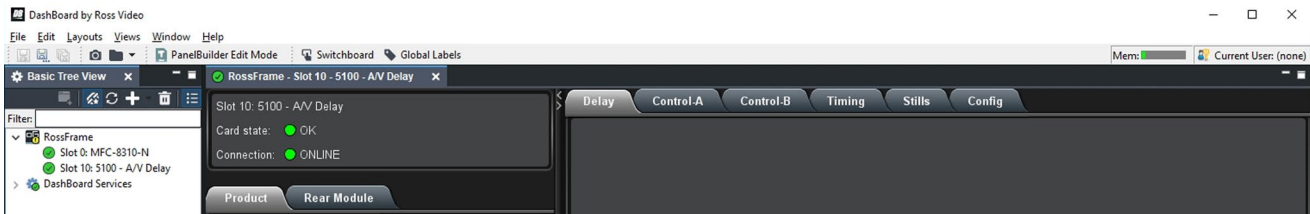
The 5100-AVD is controlled using the DashBoard™ Control System.

When the card is installed in an openGear™ frame, DashBoard™ will identify it as “**5100 - A/V Delay**”.



Open the selected card's control panel by right-clicking the mouse and selecting “Open”.

Menu Tabs



Controls for the 5100-AVD are divided among five or six menu tabs (depending on mode):

- Delay
- Control (for Single Channel and Two Operator modes)
- Control-A (for Dual Channel mode)
- Control-B (for Dual Channel mode)
- Timing
- Stills
- Config

Card status for the 5100-AVD:

- Product
- Rear Module

Config Menu

The Config tab contains the menu of controls used to configure the 5100-AVD.

The screenshot shows the 'Config' tab selected in a menu bar with other tabs: Delay, Control-A, Control-B, Timing, Stills, and Config. Below the menu bar, there is a 'Rename Card as:' label followed by a text input field. A horizontal separator line follows. Below the line, the 'CONFIGURATION' section contains two dropdown menus: 'System' set to 'Single Card' and 'Mode' set to 'Dual Channel Delay'. Another horizontal separator line follows. Below the line, the 'TIME & DATE' section contains several controls: 'Set Hours' (spinner set to 1), 'Set Minutes' (spinner set to 0), 'Set AM/PM' (dropdown set to PM), 'Set Month' (dropdown set to January), 'Set Day' (spinner set to 1), and 'Set Year' (spinner set to 2024).

Rename Card as:

This control allows for the 5100-AVD to be identified by a custom name (up to sixteen characters).

Configuration

These controls configure the operating mode of the 5100-AVD.

System

The 5100-AVD can operate as a single stand-alone delay card at resolutions up to 1080p, or it can be combined with additional cards to achieve 4K UHD resolution with Quad-link SDI.

4K Quad-link can be achieved with either two or four cards.

Two cards will provide a 4K *Single Channel Delay*, but without an Aux “safe” input.

Four cards will provide a 4K *Single Channel Delay + Aux*, or a *Two Operator Tapped Delay + Aux*.

For resolutions up to 1080p, select “Single Card”.

When using multiple cards, one card must be designated “Master” and all others “Slave”.

See [Guidelines for using the 5100-AVD](#) for additional information.

***Warning – Do not change this setting while on air. Changing this setting may cause a disruption to the output video and/or audio.**

Mode

The 5100-AVD can be configured to operate in 3 basic modes:

Dual Channel Delay

The A channel and B channel operate as independent delays, and can also be different formats.

Single Channel Delay + Aux Input

The A channel is the primary delay. The B channel's SDI input is used as the Aux "safe" input with adjustable delay. Primary delay outputs are also provided by the B channel's SDI outputs.

Two Operator Tapped Delay + Aux

The A channel is the primary delay. The B channel's SDI output provides a preview "Tap" from the primary delay for a second operator to monitor and censor the signal. The B channel's SDI input is used as the Aux "safe" input (with no delay).

See [Guidelines for using the 5100-AVD](#) for additional information.

***Warning – Do not change this setting while on air. Changing this setting may cause a disruption to the output video and/or audio.**

Time & Date

This menu is used to adjust the system time and date. The 5100-AVD has a real time clock that is used when writing files (such as still images) to the SD/MMC memory card. The real time clock continues running even when the 5100-AVD is unpowered (typically over six weeks without power). Changing any of the time and date parameters automatically updates the real time clock.

Set Hours

This control sets the Hours setting. Range: 1 – 12.

Set Minutes

This control sets the Minutes setting. Range: 0 – 59.

Set AM/PM

This control sets the time of day setting. Range: AM or PM.

Set Month

This control sets the Month setting. Range: January through December.

Set Day

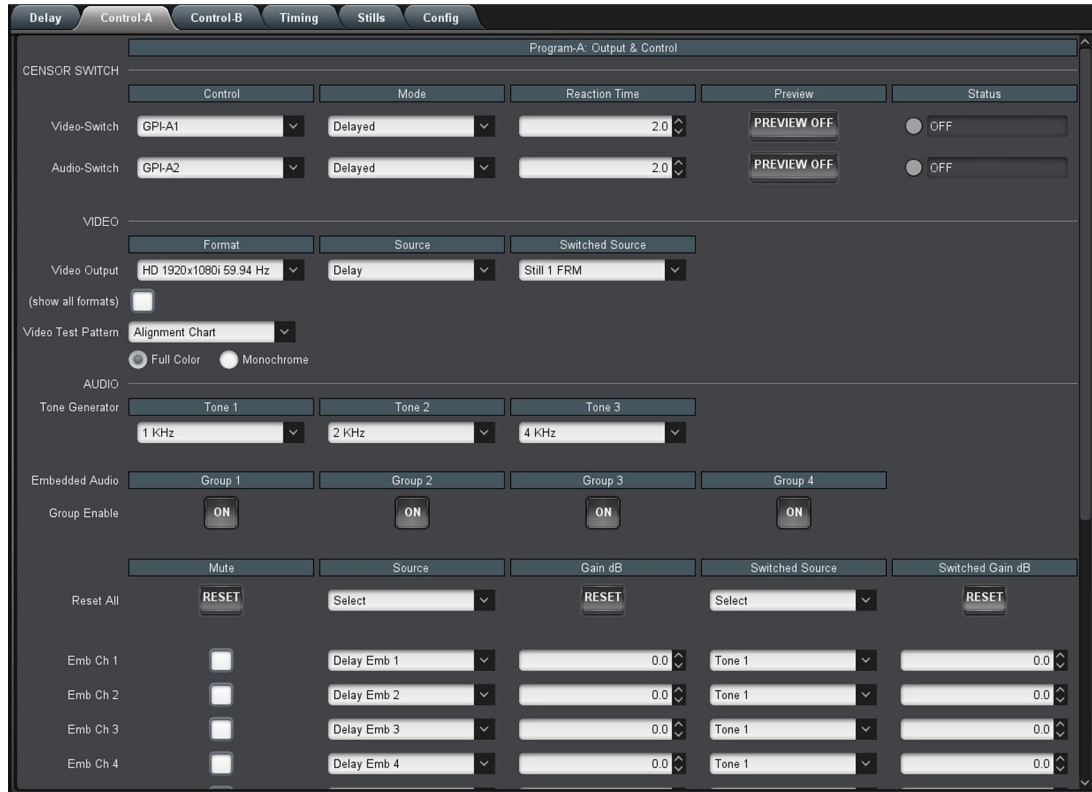
This control sets the Day of the Month setting. Range: 1 – 31.

Set Year

This control sets the Year setting. Range: 2000 – 2099.

Control Menu

The Control tab(s) contains the menu of all controls that affect the outputs of the 5100-AVD.



Single Channel Delay – Control Menu:

For *Single Channel Delay*, there is one tab labeled **Control**.

All outputs, SDI Out-A and SDI Out-B, are the same signal and controlled from this menu.

Dual Channel Delay – Control-A and Control-B Menus:

For *Dual Channel Delay*, there are two tabs labeled **Control-A** and **Control-B**.

The SDI Out-A output signal is controlled from the **Control-A** menu.

The SDI Out-B output signal is controlled from the **Control-B** menu.

Each channel is an independent delay, and may have different formats, such as 720p and 1080i (both channels must have the same base frame rate).

Two Operator Delay – Main Control and 2nd Op Control Menus:

For *Two Operator Delay*, there are two tabs labeled **Main Control** and **2nd Op Control**.

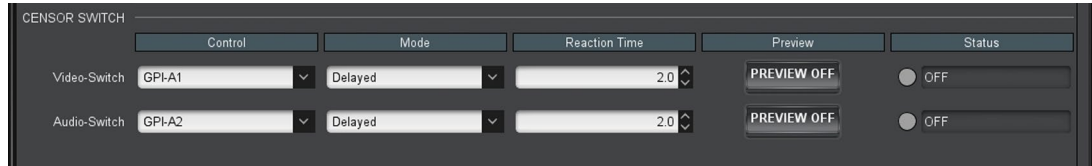
The **Main Control** menu has the primary signal controls for the SDI Out-A output.

The **2nd Op Control** menu has additional sensor controls for the tap output at SDI Out-B.

Censor Switch

Each channel incorporates a video and audio switch, positioned after the delay, to enable censoring of unwanted content by switching to alternate “safe” sources.

The top section of the menu contains controls for configuring the Video and Audio Switches.



Switch Control

The **Control** drop-down box assigns a GPI port to externally control the Video and Audio Switches.

For example, when **GPI-A1** is selected for **Video Switch**, then a closure to ground on the GPI-A1 BNC will activate the video switch.

Switch Mode & Reaction Time

The **Mode** drop-down control configures how each switch behaves.

In **Instant** mode, the switch activates immediately upon GPI closure, instantly switching the 5100-AVD's output to the alternate “safe” source, regardless of **Delay** or **Reaction Time** settings. This mode is useful as a failsafe switch.

In **Delayed** mode (with **Reaction Time**), the switch activation is delayed to match the delayed A/V program. To account for human response times to objectionable incidents, a **Reaction Time** setting (0 to 6 seconds in 0.1-second increments) shifts the start time of this delayed activation earlier without affecting the stop time. In practice, the operator monitors the live, non-delayed input source and engages the GPI-switch when an objectionable incident occurs, holding it until the incident passes. If **Reaction Time** is set correctly (or slightly overcompensated), the system will seamlessly switch the delayed A/V output to an alternate “safe” source before the offensive content and switch back to the main program when it ends.

See [Guidelines for using the 5100-AVD](#) for additional information.

Switch Preview

The **Preview** buttons can be used to test each Switch’s configuration instead of using the GPI.

PREVIEW ON engages the Switch as if the GPI port has a closure to ground.

PREVIEW OFF releases the Switch as if the GPI port is open.

Switch Status

The **Status** indicator shows the real time status of the Video or Audio switch.

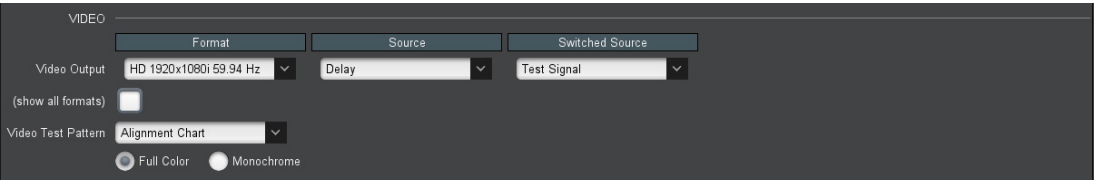
Note: This indicator will be delayed by the **Delay Time** - **Reaction Time**.

ON indicates that the switch is engaged, either by a GPI port, or the Preview button. When on, the Video and/or Audio outputs come from the **Switched Source** control setting.

OFF indicates that the switch is not engaged. The Video and/or Audio outputs come from the **Source** control setting.

Video Output

This section of the menu contains controls for configuring the Video Output.



Video Output Format

The Video Output **Format** control selects the video format and frame rate for the video output.

Note: input video signals must be the same format and frame rate as the output.

The default list of formats only includes broadcast standards:



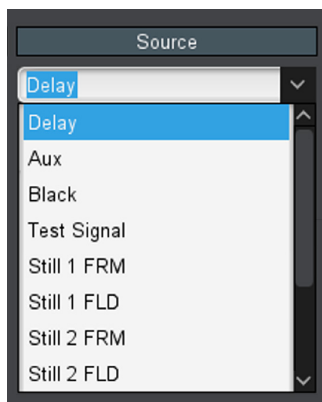
When the “(Show all formats)” box is checked, then all possible formats are available:



Note: In *Dual Channel Delay* mode, the Control-B **Format** selection only includes formats with the same base frame rate as what has been selected for the Control-A **Format**.

Video Output Source

The Video Output **Source** control selects the primary source for the video output (when the Video Switch is OFF).

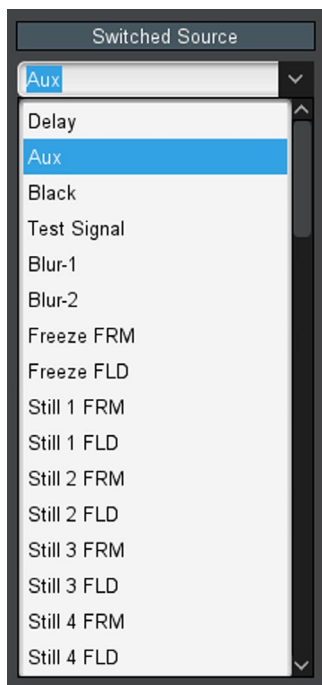


- Delay = Delayed Video input (default).
- Aux = Aux Video input. (not available in *Dual Channel Delay* mode)
- Black = Black Video (0 IRE).
- Test Signal = **Video Test Signal** generator (see *Test Pattern* control below).
- Still # FRM = Display Full Frame Still image (see *Stills* menu).
- Still # FLD = Display Field mode Still image (see *Stills* menu).

Note: This is also the source of the ancillary data that will pass to the output even when the Video Switch is engaged.

Video Switched Source

The Video Output **Switched Source** control selects the “safe” source for the video output when the Video Switch is engaged (ON).

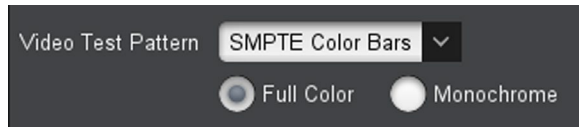


- Delay = Delayed Video input.
- Aux = Aux Video input. (not available in *Dual Channel Delay* mode)
- Black = Black Video (0 IRE).
- Test Signal = **Video Test Signal** generator (see *Test Pattern* control below).
- Blur-1 = Blur Filter (normal).
- Blur-2 = Blur Filter (high).
- Freeze FRM = Full Frame Freeze of Delay video while the switch is active.
- Freeze FLD = Field mode Freeze of Delay video while the switch is active.
- Still # FRM = Display Full Frame Still image (see *Stills* menu).
- Still # FLD = Display Field mode Still image (see *Stills* menu).

Note: Only the active portion of video is switched. All ancillary data from the primary source (Closed Captions, Time Code, etc) will pass undisturbed.

Video Test Patterns

Use the **Video Test Pattern** drop-down control to choose which test pattern will be displayed when “*Test Signal*” is selected as the video output or is selected as a safe source for the censor switch.



Use the radio buttons to choose if the test pattern is to be displayed as **Full Color**, or **Monochrome**.

List of Video Patterns:

- 75% Color Bars
- 100% Color Bars
- Bars Reversed
- Tartan Bars
- SMPTE Color Bars
- RP219 (HD formats)
- Composite (SD formats)
- Alignment Chart
- Multipulse
- Multiburst
- Horz Sweep
- 10 Step
- 100% Ramp
- 5% Shallow Ramp
- Digital Ramp
- 75% Red Field
- 75% Green Field
- 75% Blue Field
- 50% Gray Field
- F1-White/F2-Black
- F1-Blue/F2-Yellow
- SMPTE Checkfield
- Digital Test

Audio Outputs

This section of the menu contains controls for configuring the Audio Outputs.

AUDIO

Tone Generator

Tone 1

Tone 2

Tone 3

1 KHz

2 KHz

4 KHz

Embedded Audio

Group 1

Group 2

Group 3

Group 4

Group Enable

ON

ON

ON

ON

Mute

Source

Gain dB

Switched Source

Switched Gain dB

Reset All

RESET

Select

RESET

Select

RESET

Emb Ch 1

☐

Delay Emb 1

0.0

Tone 1

0.0

Emb Ch 2

☐

Delay Emb 2

0.0

Tone 1

0.0

Embedded Audio Group Enable

This section contains controls for each embedded audio group on the video output.

Embedded Audio

Group 1

Group 2

Group 3

Group 4

Group Enable

ON

ON

ON

ON

Use the **Group Enable** buttons to enable (**ON**) or disable (**OFF**) each of the four audio groups.
Group 1 = Emb Ch1-4, Group 2 = Emb Ch 5-8, Group 3 = Emb Ch 9-12 Group 4 = Emb Ch 13-16
Note: the 5100-AVD strips all ancillary embedded audio from the video input(s) and processes this audio separately from video. In order to pass incoming embedded audio through the system, the stripped audio must be re-embedded and the appropriate audio group(s) must be enabled.

Audio Control Array

This menu provides an array of five controls and sixteen audio channels to allow easy control of any channel parameter. At the top of the array, there are global reset controls which apply to all channels.
Note: Some channels may not be visible without scrolling the DashBoard™ Control screen down.

Mute

Source

Gain dB

Switched Source

Switched Gain dB

Reset All

RESET

Select

RESET

Select

RESET

Emb Ch 1

☐

Delay Emb 1

0.0

Aux Emb 1

0.0

Emb Ch 2

☐

Delay Emb 2

0.0

Aux Emb 2

0.0

Emb Ch 3

☐

Delay Emb 3

0.0

Aux Emb 3

0.0

Emb Ch 4

☐

Delay Emb 4

0.0

Aux Emb 4

0.0

Emb Ch 5

☐

Delay Emb 5

0.0

Aux Emb 5

0.0

Emb Ch 6

☐

Delay Emb 6

0.0

Aux Emb 6

0.0

Emb Ch 7

☐

Delay Emb 7

0.0

Aux Emb 7

0.0

Emb Ch 8

☐

Delay Emb 8

0.0

Aux Emb 8

0.0

Emb Ch 9

☐

Delay Emb 9

0.0

Aux Emb 9

0.0

Emb Ch 10

☐

Delay Emb 10

0.0

Aux Emb 10

0.0

Emb Ch 11

☐

Delay Emb 11

0.0

Aux Emb 11

0.0

Emb Ch 12

☐

Delay Emb 12

0.0

Aux Emb 12

0.0

Emb Ch 13

☐

Delay Emb 13

0.0

Aux Emb 13

0.0

Emb Ch 14

☐

Delay Emb 14

0.0

Aux Emb 14

0.0

Emb Ch 15

☐

Delay Emb 15

0.0

Aux Emb 15

0.0

Emb Ch 16

☐

Delay Emb 16

0.0

Aux Emb 16

0.0

Audio Output Mute

Each output channel may be individually muted. When checked, the **Mute** checkbox silences the corresponding audio channel and overrides all other settings including during switching.

The **Reset All - Mute** button will uncheck (unmute) all audio channels.

Audio Output Source (Mapping)*

For each audio channel, the **Source** drop-down control is used to select a signal that will be present on that embedded output channel (when the Audio Switch is OFF).

Full Audio Mapping is possible with the **Source** control. Any source may be selected for any output channel, including one source feeding multiple output channels. Silence (mute) and three internal tone generators are also available as sources.

Example: Delay Emb 1 signal can be output on Emb Ch 4, and Emb Ch5.

The **Reset All - Source** drop-down control will quickly assign all 16 channels to the selected source.

Source 1:1 – This will assign all Source channel#s to their corresponding output channel#s.
Source Ch1 to Output Emb Ch1,, Source Ch16 to Output Emb Ch16.

Audio Output Level (Gain dB)*

The level of each channel (when the Audio Switch is OFF) may be adjusted –40 to +20 dB.

The **Reset All - Gain** button will adjust all audio channel levels to 0dB (default).

*Note: If the **Audio Switch** is activated, then the output audio channels will change to the sources and levels selected by the **Audio Switch Source** and **Audio Switch Level** controls.

Audio Output Switch

When the Audio Switch is engaged (ON), the embedded audio outputs will switch to the sources selected by the Audio **Switched Source** control. The Audio Switch is engaged by the GPI input(s) and/or the control panel. The switched outputs may also have different level settings than those used for the primary outputs via the Audio **Switched Gain** control.

Audio Switched Source (Mapping)

The Audio **Switched Source** control selects the “safe” source for the audio output when the Audio Switch is engaged (ON).

Full Audio Mapping is possible with the **Switched Source** control. Any source may be selected for any output channel, including one source feeding multiple output channels. Silence (mute) and three internal tone generators are also available as sources.

Example: Aux Emb 5 signal can be output on Emb Ch 1, and Emb Ch2.

The **Reset All – Switched Source** control will quickly assign all 16 channels to the selected source.

Source 1:1 – This will assign all Source channel#s to their corresponding output channel#s.
Source Ch1 to Output Emb Ch1,, Source Ch16 to Output Emb Ch16.

Audio Switched Level (Gain dB)

The level of each channel when the Audio Switch is engaged may be adjusted –40 to +20 dB.

The **Reset All – Switched Gain** button will adjust all switched audio channels to 0dB (default).

Tone Generator

Use the **Tone Generator** drop-down controls to choose a frequency for each of the audio tones. The available range for each tone is 16 Hz to 20 kHz.

Tone Generator	Tone 1	Tone 2	Tone 3
	1 KHz	2 KHz	4 KHz

Delay Menu

This menu provides all controls for setting the Audio/Video Delay. The controls will vary depending on the 5100-AVD's operating mode.

The screenshot shows the 'Delay' menu interface. At the top, there are tabs: 'Delay', 'Control-A', 'Control-B', 'Timing', 'Stills', and 'Config'. The 'Delay' tab is selected. Below the tabs, there are two main columns for 'Program Input-A' and 'Program Input-B'. Each column has a 'Memory Allocation' dropdown set to '50%'. Below that, there are 'Program-A Delay Time (Max: 25:18)' and 'Program-B Delay Time (Max: 25:18)' sections. Each section has 'Seconds' and 'Frames' input fields. For Program-A, Seconds is 7 and Frames is 0. For Program-B, Seconds is 5 and Frames is 0. Below these, there are 'Delay Control' dropdowns set to 'Delay Enabled'. At the bottom, there are 'Audio Delay Offset (mS)' input fields set to 0.0.

Memory Allocation

The 5100-AVD uses solid-state digital memory to delay the audio/video signals. The memory is shared between both A and B channels. The **Memory Allocation** control allocates a portion of the memory to each channel. The control allows adjustments of 1/8 (12.5%) increments. When adjusting one channel, the opposite channel will automatically adjust to always produce 100%.

The **Memory Allocation** control is not available in **Two Operator** mode.

Maximum Delay

The Delay menu indicates the maximum audio/video delay available for each channel. The maximum value is calculated based on the memory allocation and the format selected for each channel.

Delay Time

Each channel's audio/video delay is adjustable from 0 to the maximum delay value.

Note: these settings apply equally to both the Audio and Video signals.

Seconds of Delay

This control adjusts the audio/video delay in one second increments.

Frames of Delay

This control adjusts the audio/video delay in one video frame increments.

Delay Control

Each channel's audio/video delay can be enabled or disabled remotely by a GPI port. To make use of this feature, select a GPI port with this control. The audio/video delay selected by the **Seconds & Frames** setting will be enabled only if the selected GPI port is ON (closure to ground). The delay will be disabled (0) when the selected GPI port is OFF (open).

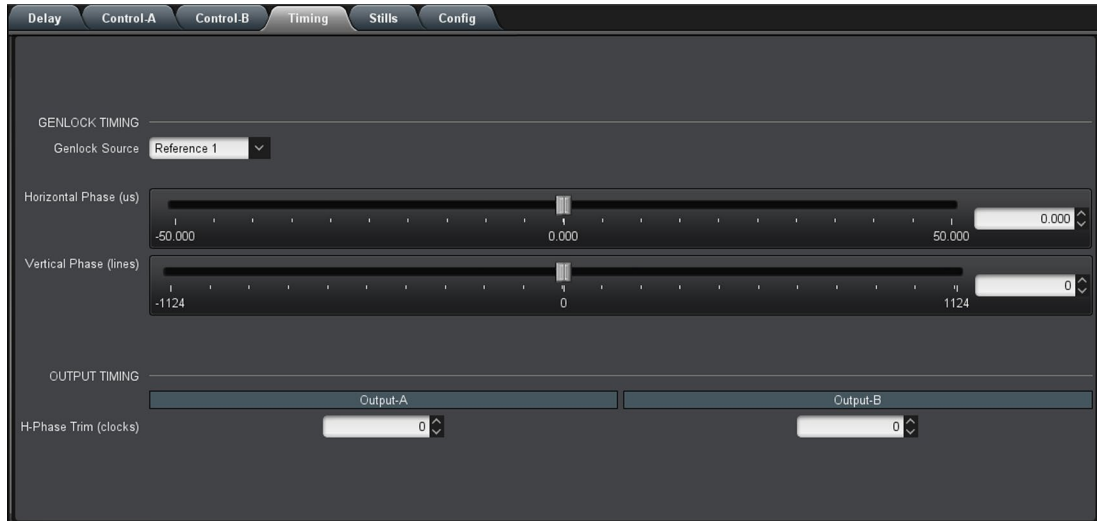
Select "Delay Enabled" when not using this feature.

Audio Delay Offset

To correct for lip-sync errors in source materials or downstream equipment, a fixed offset can be added to the audio path. The offset range is +/- 500ms (milliseconds) in 0.25ms steps.

Timing Menu

This menu contains all controls for timing the 5100-AVD outputs to a genlock reference.



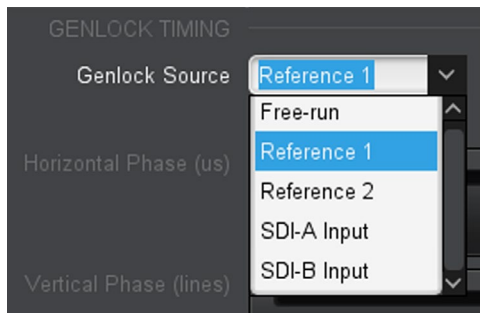
Genlock Timing

The following controls adjust the timing of the video frame synchronizers. Because of internal processing delays (approx. 3+ lines), a phase setting of zero micro-seconds / zero lines will guarantee one frame of delay in the synchronizer.

Genlock Source

Use the **Genlock Source** drop-down control to choose which signal will be used as the genlock reference. The 5100-AVD can lock to composite sync, black-burst, tri-level sync, or the embedded timing signals from one of the SDI inputs.

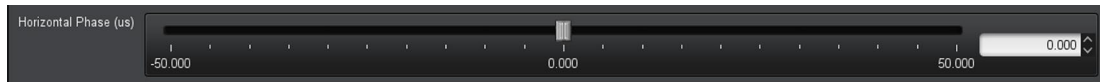
Note: the outputs may become unstable if there is no signal applied to a SDI Input and it is chosen to be the Genlock Reference.



“Reference 1” and “Reference 2” refer to the “REF1” and “REF2” BNC loops on the back of the openGear™ chassis. **There is no genlock reference BNC on the 5100-AVD rear module.**

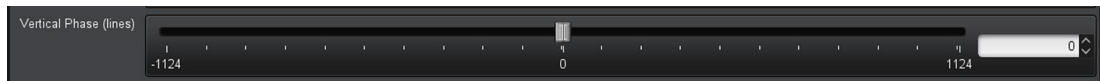
The genlock “Lock” status for the selected source is shown on the Product menu (Card Status).

Horizontal Phase (us)



This control adjusts the horizontal phase of all the SDI outputs with respect to the selected genlock reference. The horizontal phase resolution is 0.00673 micro-seconds per increment, regardless of the output video format.

Vertical Phase (lines)



This control adjusts the vertical phase of all the SDI outputs with respect to the selected genlock reference. The control adjusts the output in video line increments, and may be advanced or delayed up to 1124 lines. This control may be used to advance the output one or more lines to compensate for equipment delays down-stream.

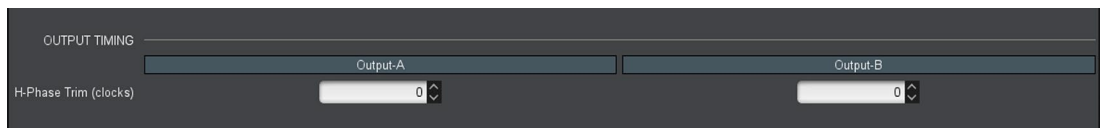
The number of lines per frame is determined by the Channel-A output format.

Note: The maximum number of lines is dependent on the video format selected. Values greater than the actual number of lines in one frame will roll-over to produce a minimum value. For example a value of 530 for a NTSC channel-A output will actually produce 5 (530 – 525).

Output Timing

The 5100-AVD provides a *Horizontal Phase Trim* on each channel to use in compensating for varying cable lengths, or to align Quad-link signals.

H-Phase Trim (clocks)

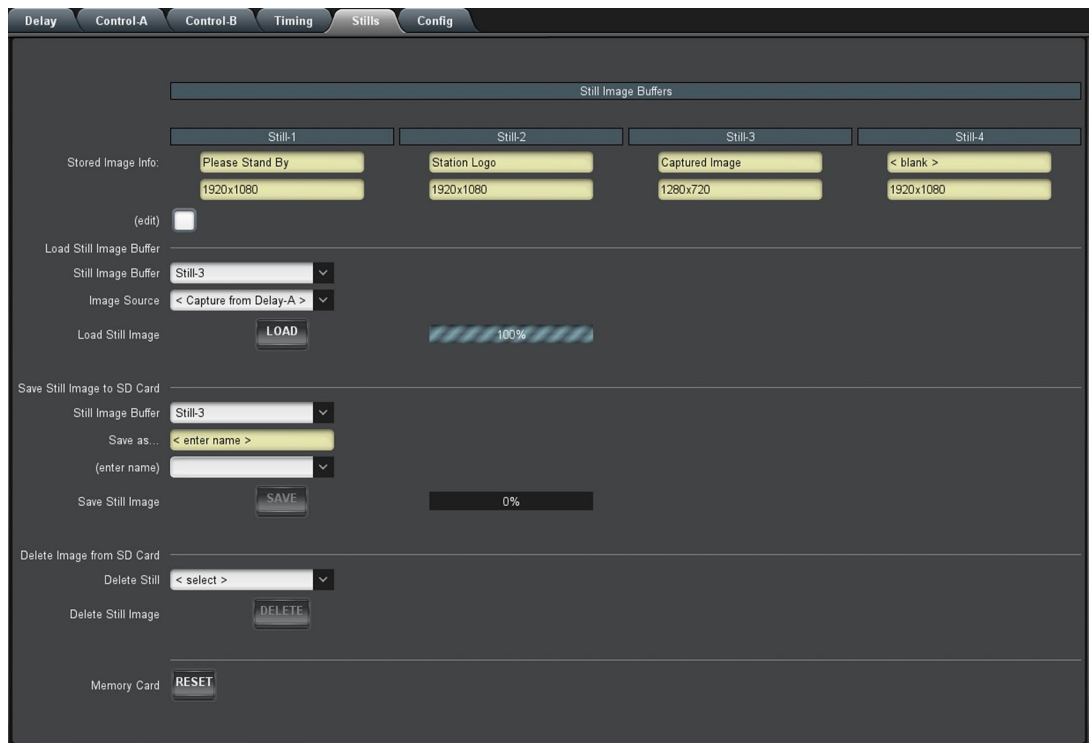


This control is used to adjust each channel's SDI output phase. Each channel can be adjusted +/-254 clock cycles. Note: the frequency or period of the clock cycle will depend on the output format selected for each channel.

It is recommended that the user set this control to 0 before aligning the output's genlock timing with the *Horizontal Phase* control. Then use this control for critical timing alignment when referencing the end receiver.

Stills Menu

The *Stills* menu provides all controls for managing the Still Image Buffers.



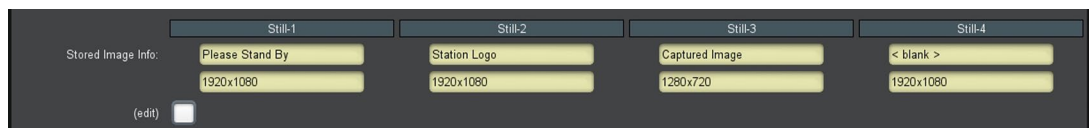
Still Images

The 5100-AVD has four still image buffers which may be used to store trouble slides or test patterns. Each still image is automatically stored in non-volatile FLASH memory that retains the images when the card is unpowered. Each buffer may be selected for viewing with the Control menu's *Video Output Source* control (under the *Control* tab). Using the *Video Switched Source* control, the still image buffers may be used as a “safe” source when switching away from objectionable material. Images may be captured from video, or loaded from the SD/MMC card. Images in each buffer may be saved to the SD/MMC card for future use, or to transfer to another 5100-AVD card.

Note: still images are saved using a proprietary format that is not compatible with most image editing software.

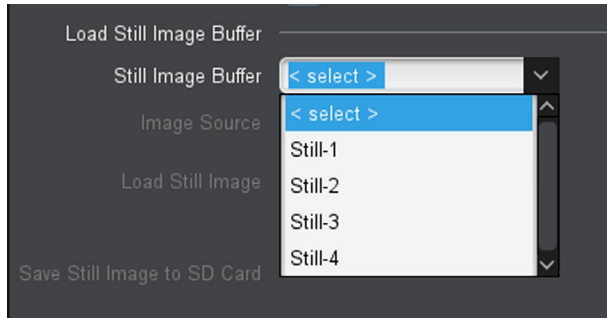
Stored Image Info:

The name and resolution of each still image is displayed at the top of the menu. This information is assigned when the still buffer is loaded from either a video source or the SD/MMC card. When the image is captured from a video source, the assigned name is always “Captured Image” and the assigned resolution is based on the video source. When the image is loaded from the SD/MMC card, the filename is used as the still image name and the resolution is taken from the file data. Checking the “(edit)” box allows the operator to edit the name and resolution assigned to each still buffer.



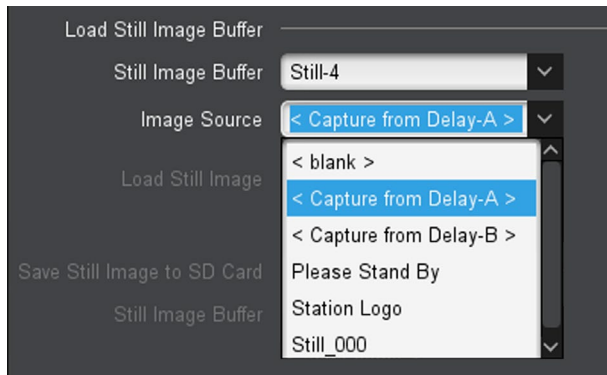
Loading Still Images

Use the **Still Image Buffer** drop-down control to select the buffer to load.



Use the **Source** drop-down control to select the image that will be loaded into the buffer. The first selections are always *< blank >* and *< Capture from Delay >*, followed by a list of any still image files stored on the SD/MMC card.

Note: Dual Channel mode allows for capturing from both Delay-A and Delay-B, and Single Channel Delay + Aux mode allows for capturing from both Delay and Aux.

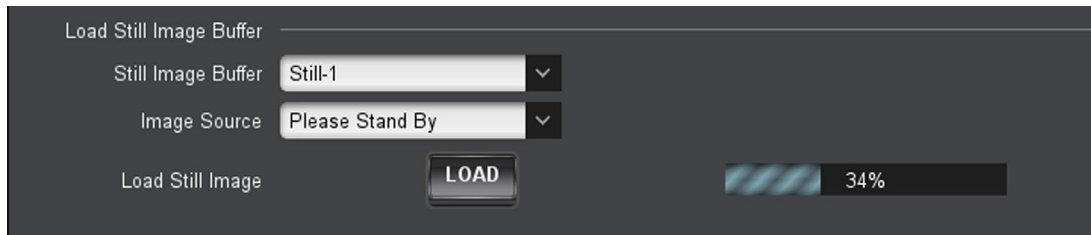


Selecting *< blank >* allows a blank image to be loaded into the buffer.

Selecting *< Capture from... >* allows an image to be captured from the video input.

Selecting a filename allows a still image to be loaded from the SD/MMC card.

Use the **Load** button to transfer the selected image into the buffer.

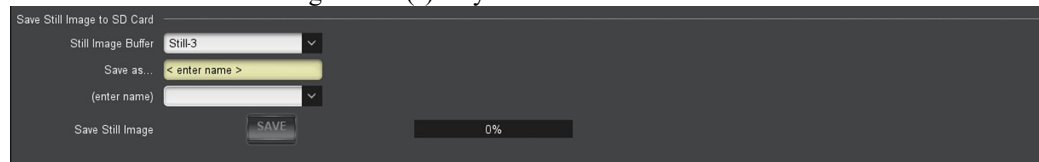


Click on the **Load** button to begin capturing or loading the selected still image. The Status bar shows the progress of the still image being loaded, and will display 100% when the image is complete.

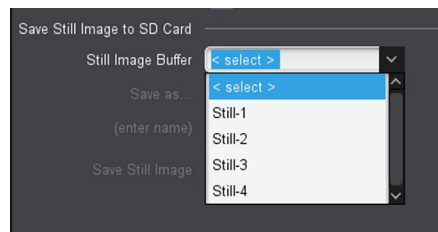
Note: Loading times from files are typically 5-20 seconds depending on the format and the SD/MMC card that is used.

Saving Still Images to the SD/MMC card

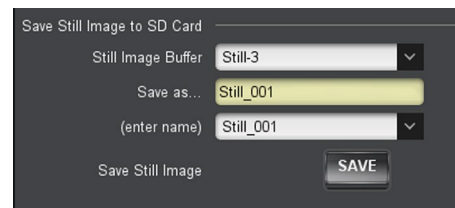
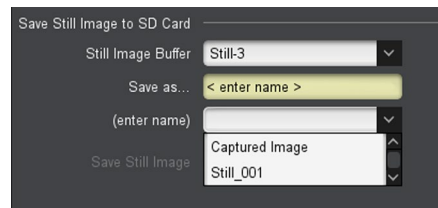
The contents of the still image buffer(s) may be saved to the SD/MMC card for future use.



Use the **Still Image Buffer** drop-down control to select the buffer to save.



To enable the **Save** button, a valid filename must be entered.



A filename must be entered in the **(enter name)** box. The name can be typed into the box, or the drop-down control can provide a default name. A valid filename must be a unique name between 1 and 16 characters long, and may contain upper and lower case letters, spaces, and some special characters: **\$ % ' + - = _ , ; @ ~ ` ! () { } [] ^ # & .**

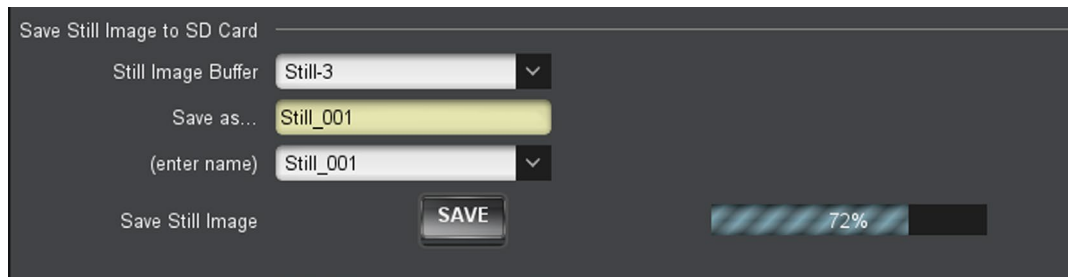
The **Save as...** status box provides confirmation that a valid filename has been entered, or indicates possible problems that prevent the still image from being saved.

< select name >	A name must be selected or typed into the (enter name) box <u>followed by the Enter key</u> .
< already exists >	The filename entered already exists. Change to unique name.
< illegal name >	An illegal character has been used in the name.
< no memory card >	The SD/MMC card is not detected. Install a SD/MMC card.
< mem card full >	The SD/MMC card is out of available memory space. Delete stills to free up memory, or replace the SD/MMC card.
< WR protected >	The SD/MMC card is write protected. Slide the “LOCK” tab on the SD/MMC card toward the top to enable writing.
< card too small >	The SD/MMC card has a FAT12 file structure, and is too small for still image files. Use only FAT16 and FAT32 formatted SD/MMC cards (typically > 64MB).
< mem card error >	An error has occurred with the SD/MMC card. Try resetting the SD/MMC card (see below) or replace the SD/MMC card.

The 5100-AVD's clock and date are used for the creation date and time of the saved image file.

See **Time & Date** section of the **Config** menu for details on setting the real time clock.

Click on the **Save** button to begin saving the selected still image to the SD/MMC card.

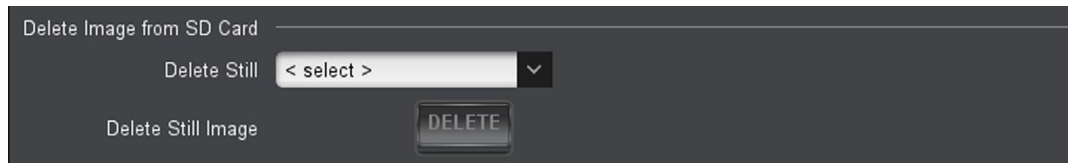


The Status bar shows the progress of the still image file being saved, and will display 100% when the image file is completely saved.

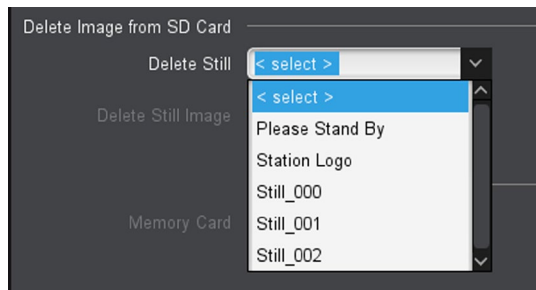
Note: Saving times are typically 7-30 seconds depending on the format and the SD/MMC card that is used.

Deleting Still Images from the SD/MMC card

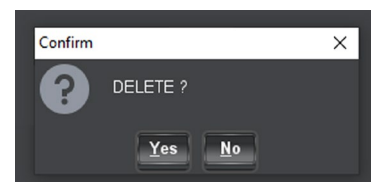
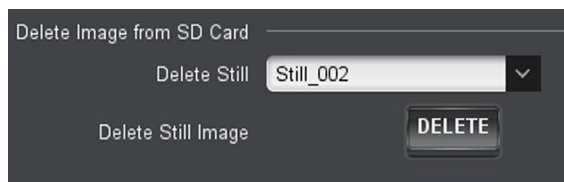
Unwanted Still Image files may be deleted from the SD/MMC card to free up memory for new stills.



To enable the **Delete** button, use the drop-down control to select a filename to be deleted.



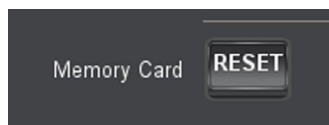
Once a filename has been selected, click on the **Delete** button.



A dialog box will appear confirming if the file is to be deleted. Click on **Yes** to delete the file.

Resetting the SD/MMC Card

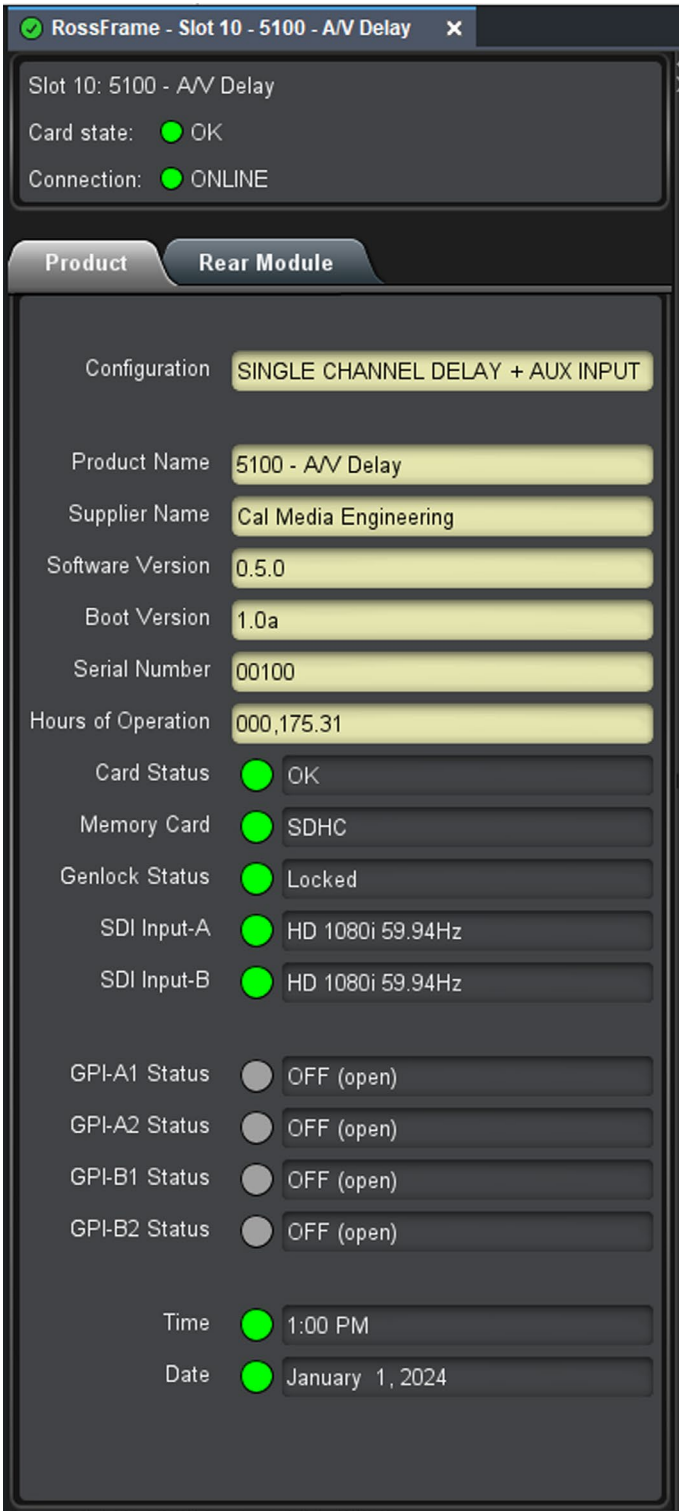
In the unlikely event that the SD/MMC card becomes unresponsive, clicking on the **Memory Card Reset** button should re-initialize the memory card.



If the SD/MMC card still fails to be detected or function correctly, the memory card may have to be ejected and re-installed on the 5100-AVD card to regain proper operation.

Product Menu (Card Status)

The *Product* menu displays various information about the 5100-AVD.



Configuration indicates the card’s operating mode.

Name, Version Numbers and Serial Number.

Hours of Operation indicates how long this card has been powered. This is only an approximate time. The value is updated every 3.75 minutes when powered. *Note: Brand new cards will have a typical value between 72 and 80 hours due to standard 72 hour “burn-in” and final testing time.*

Card Status indicates the card’s operating condition.

Green indicates the card is operating correctly.
Yellow indicates an unusual condition such as “Loading Firmware”.
Red indicates that a failure has been detected.

Memory Card indicates the type of memory card.

Green indicates the memory card is working.
Gray indicates no memory card detected.

The *Genlock Status* indicator shows the current genlock condition.

Green indicates the 5100-AVD is successfully locked to the selected Genlock Reference.
Red indicates an unlocked condition.
The wrong reference may be selected, or may be incorrect frame rate, or no signal is preset.
Yellow indicates Free-run mode.

The *SDI Input* indicators shows the current signals detected at the SDI inputs.

The *GPI Status* indicators show the current state of each GPI port.

Gray indicates the port is OFF (open).
Green indicates the port is ON (closed to ground).

Time & Date. This is the 5100-AVD’s real time clock status.

Rear Module Menu

This menu displays the signal connections for the 5100-AVD at the Rear panel module.



Updating the Firmware

Cal Media Engineering cards can be quickly and easily updated through Dashboard™, or using a MMC or SD memory card.

Note: The 5100-AVD should not be used on-air during the firmware installation process. The card will stop communicating with Dashboard™ and will re-boot upon completion.

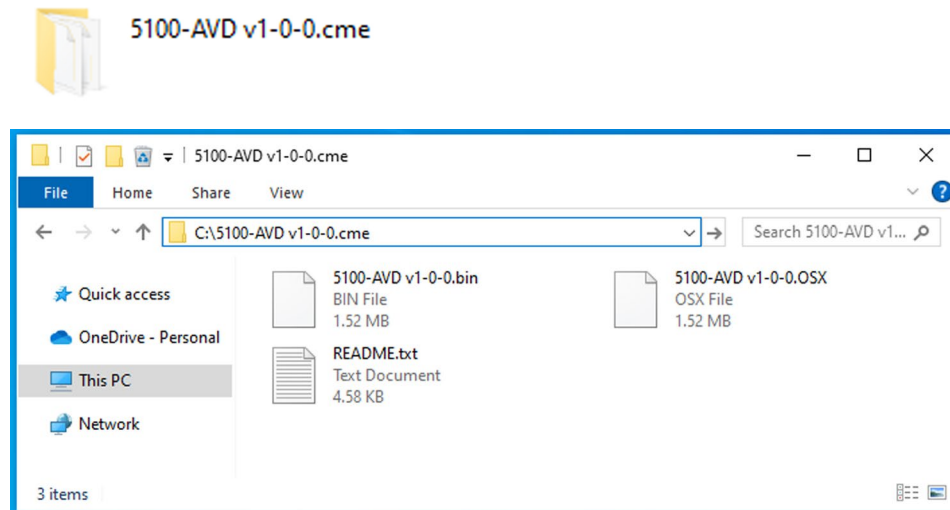
Obtaining New Firmware

The current version of firmware can be obtained from California Media Engineering (www.calmedia.com).

Preparing Firmware Files

The firmware will be provided as a .zip file. Before it can be used, the file must be unzipped. **Be certain that no errors occur during the unzip process.**

Once unzipped, the firmware update should be a folder which contains several files.



Be sure and open the **Read Me.txt** file for any additional instructions.

To update the 5100-AVD using Dashboard™, copy or move the folder to a location accessible from Dashboard™.

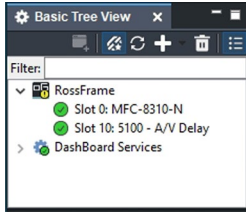
To update the 5100-AVD using a MMC or SD memory card, copy the entire folder to a MMC or SD memory card's root directory.

Note: The 5100-AVD can only recognize one folder with a “.cme” extension. If the memory card already has a “.cme” folder from an earlier version or another product, then that folder must be moved from the root directory or renamed or deleted. Do not combine files from other versions into the same “.cme” folder, as the 5100-AVD will only read the first “.osx” file it finds.

Installing Firmware using Dashboard™

Note: This process typically takes about 90 seconds.

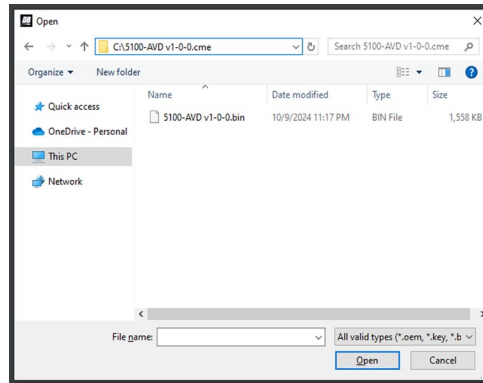
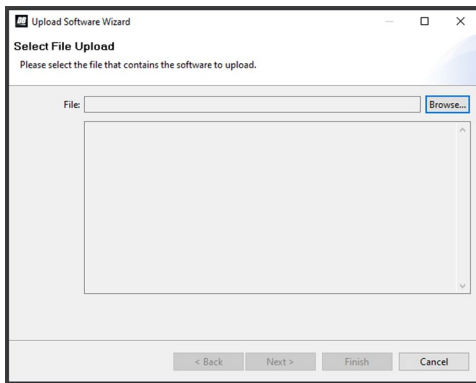
1. Launch the Dashboard™ application and open the **5100-A/V Delay** card listed in the Basic Tree View.



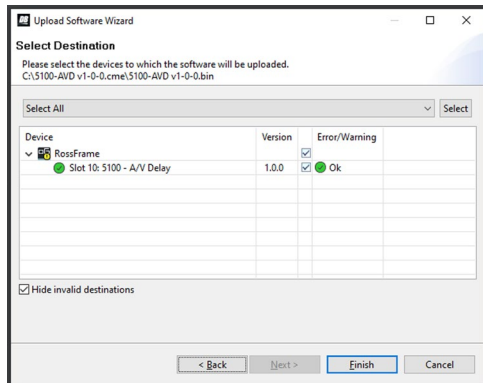
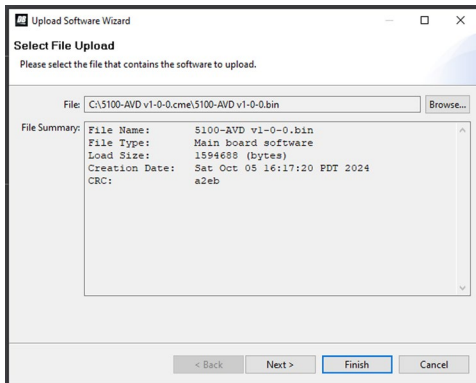
2. Click on the **Upload** button at the bottom of the Dashboard™ control screen.



3. The *Upload Software Wizard* will open. Click **Browse** and navigate to the location of the firmware file folder. Select the “.bin” file and click **Open**.



4. The *Upload Software Wizard* will now display the selected firmware file and its description. Click **Next**. The 5100-AVD card should be selected to receive this file. If other 5100-AVD cards are listed, check these cards too if they are to receive this firmware update.



5. Click **Finish** to begin installing the new firmware. When the installation is complete Click **OK**. The Upload Wizard will close and the 5100-AVD will automatically reboot with the new firmware. Verify that the new version numbers are displayed on the Dashboard™ control **Product** menu.

Note: Some updates may require additional time for the initial reboot cycle (approx. 15 seconds).

WARNING! Do not cancel the upload or cycle power once the firmware begins copying until the firmware is completely loaded and the card has rebooted.

If the firmware installation process is interrupted then the 5100-AVD card may not be able to reboot. If Dashboard™ then fails to open the card, the firmware must be reinstalled using a memory card.

Installing Firmware using a SD or MMC Memory Card

Note: This process typically takes about 45 seconds.

1. Install the memory card containing the firmware update folder on the 5100-AVD (see section *Installation and Setup* for details).

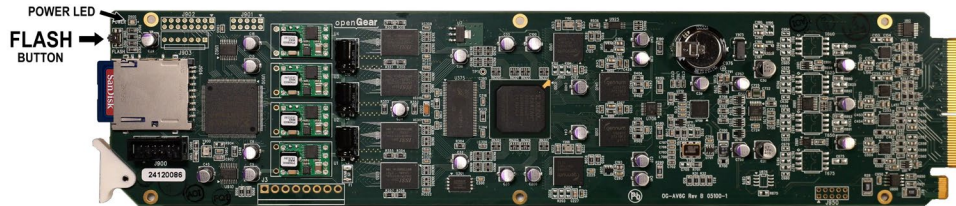


Figure 4-1. FLASH button and POWER LED location.

2. Press and hold in the “FLASH” button for approximately 2 seconds until the POWER LED begins flashing. The LED will rapidly **flash red** as the new firmware file is being copied (approximately 30 seconds). The LED will then rapidly **flash green** as the new file is verified (approximately 15 seconds). Once it has finished, the card will automatically re-boot.

Note: Some updates may require additional time to process the new firmware file. During this time the LED will again rapidly flash red (approximately 15 seconds), and then rapidly flash green (approximately 5 seconds). Once it has finished, the card will automatically re-boot.

3. Verify that the new version numbers are displayed on the Dashboard™ control **Product** menu.

WARNING! Do not remove the memory card or cycle power once the firmware begins copying until the firmware is completely loaded and the card has rebooted.

If the firmware installation process is interrupted, then the update must be performed again.

Retrying Firmware Installation

If the first attempt has failed or was interrupted, the 5100-AVD may not function correctly or even boot. To install the firmware under these conditions, a power-cycle firmware installation may be required.

1. Unseat the 5100-AVD card from the frame slot and wait a few seconds.
2. Install the memory card on the 5100-AVD.
3. Press and hold in the “FLASH” button while fully inserting the 5100-AVD card into the slot.
4. Keep holding in the “FLASH” button until the POWER LED begins flashing.
(The firmware update should now continue as a normal installation described above).

Firmware Installation if Boot File has failed

In the unlikely event that the 5100-AVD card will not boot, and will not accept a firmware installation, a jumper may be installed which will force the card to use the factory default boot file.

1. Unseat the 5100-AVD card from the frame slot.
2. Install a jumper on J900 (pins 1-2) as shown (*right*).
3. Perform the power-cycle firmware installation as described above under *Retrying Firmware Installation*.
4. Once the 5100-AVD has booted, again unseat the card from the frame slot and remove the jumper and memory card.
5. Re-install the 5100-AVD into the frame slot.
6. Once installed, the 5100-AVD should automatically generate a new boot file. This should take approximately 15 seconds as the POWER LED will rapidly flash red, then green.
7. Upon completion, the 5100-AVD should successfully reboot.



Figure 4-2 Boot-Loader jumper location

Troubleshooting Firmware Installation

Troubleshooting Dashboard™ Firmware Installation

Use the following information if the firmware upload process has failed:

- If the “**Selected file does not exist**” or “**Selected file is not a valid upload file**” error conditions are displayed in the **Upload Failed** dialog box, select **OK** from the dialog box and re-start the upload process and select the correct file.
- If a “**No response from device**” condition is encountered, the upload failed while in progress due to loss of power or communications. Verify that the card is powered up and there is communication with the openGear™ frame. Restart the upload process.

In the unlikely event the 5100-AVD card becomes unresponsive, try the following:

1. Unseat the 5100-AVD card from the frame slot and wait a few seconds.
2. Reinstall the 5100-AVD card into the frame slot.
3. If Dashboard™ is able to open the control panel for the 5100-AVD, repeat the installation process using Dashboard™.
4. If Dashboard™ is not able to open the control panel for the 5100-AVD, perform the installation using a SD or MMC memory card (*see previous section*).
5. If the 5100-AVD still does not properly operate after trying all suggestions, contact customer support at support@calmedia.com.

Troubleshooting Memory Card Firmware Installation

If the LED does not begin to rapidly flash red when the FLASH button is pressed, check the following:

1. The FLASH button is not being pressed continuously for 2 seconds.
2. Possible bad memory card. Check if the memory card is indentified on the Dashboard™ control **Product** menu. Try a different memory card.
3. Incorrect Firmware. Check that the Firmware files are meant for the 5100-AVD.
4. Incorrect Firmware files or folder. See **Preparing Firmware Files** section above.
A single “.cme” folder must be located in the root directory of the memory card.
A single file with a “.osx” extension must be located within the “.cme” folder.

If the POWER LED immediately changes from a rapidly flashing red (10 flashes a second) to a slower flashing red (2 flashes a second) and continues flashing for more than a minute, then the firmware file (“.osx”) is incorrect or damaged. Check the files. Try again with a different memory card.

If the card has not re-booted after several minutes, then the firmware update has probably failed. Try again with a different memory card.

Note: It is safe to remove the memory card and/or power cycle the 5100-AVD as long as the POWER LED is not rapidly flashing red (10 flashes a second).

If the 5100-AVD still does not properly operate after trying all suggestions, contact customer support at support@calmedia.com.

Guidelines for using the 5100-AVD

Configuration

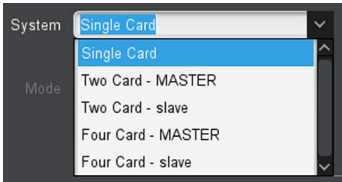
The flexible design of the 5100-AVD allows the user to configure the operating mode to suit their specific needs. This section covers the configuration and use of each mode of the 5100-AVD.

These Dashboard controls configure the operating mode (see section [Config Menu](#) for additional information).



System

The 5100-AVD can operate as a single card stand-alone delay at resolutions up to 1080p, or it can be combined with additional cards to achieve 4K UHD resolution with Quad-link SDI.



Single Card

Select “Single Card” unless combining with other cards for 4K/UHD.

Multiple Cards for 4K/UHD

4K Quad-link can be achieved with either two or four cards.

Two cards will provide a 4K *Single Channel Delay*, but without an Aux “safe” input.

Four cards will provide a 4K *Single Channel Delay* + Aux, or a *Two Operator Tapped Delay* + Aux.

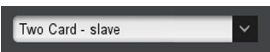
When using multiple cards, one card must be designated “Master” and all others “Slave”.

For a *Two card* system:



Master Channel A = Quad Link 1

Master Channel B = Quad Link 2



Slave Channel A = Quad Link 3

Slave Channel B = Quad Link 4

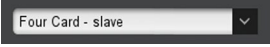
For a *Four card* system:



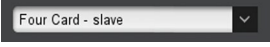
Master Channel A/B = Quad Link 1 (Program/Aux)



Slave 1 Channel A/B = Quad Link 2 (Program/Aux)



Slave 2 Channel A/B = Quad Link 3 (Program/Aux)



Slave 3 Channel A/B = Quad Link 4 (Program/Aux)

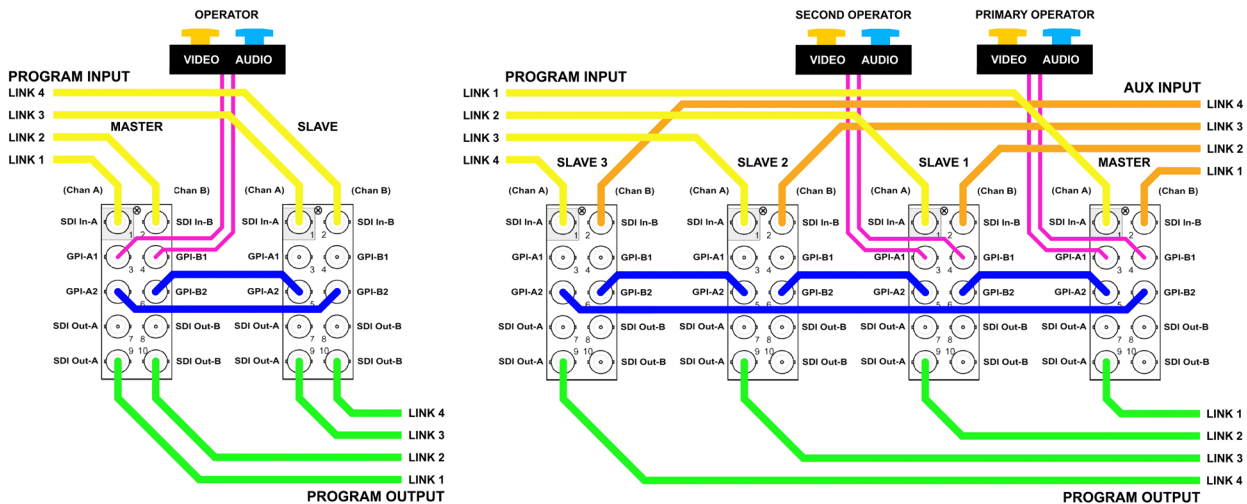
Multi-Card System

Rules for creating a multi-card system:

- All 5100-AVD cards must be in the same openGear frame.
- **The cards must be interconnected for the delay system to operate correctly.**
- Interconnect BNC cables should be of high quality and no longer than one meter.
- Interconnect cables must be direct. They must not pass through any routing device.
- It is recommended that the cards be installed in adjacent slots, in the order shown in the figures below.

Multi-Card Interconnections

In a multi-card system, the GPI-A2 and GPI-B2 ports are used for communications between cards. In both Master and Slave modes, the GPI-A2 port(s) becomes an output for transmitting control and timing information. The GPI-B2 port(s) become a receiver for the control data. Cards are interconnected in a “daisy-chain” loop using BNC cables (blue) as shown below.



Two Card System

Four Card System

Rear modules viewed from back of openGear frame.

See [Multiple Card Connections \(Master/Slave\)](#) under [Installation and Setup](#).

Multi-Card Operation

In a multi-card system, the card assigned as “Master” will control all the boards assigned as “Slave”. This allows the multi-card system to be controlled by one Dashboard device.

In Dashboard, open the 5100-AVD card assigned as “Master” to control the multi-card system.

The operation of the multi-card system will be the same as any “Single Card” mode. Most tabs and menus will be the same, with the following differences:

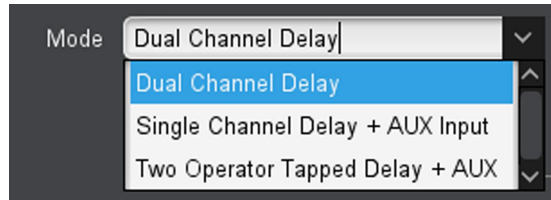
4K/UHD formats added to the Format control.

H-phase Trim adjustments for the slaved outputs added to the Timing menu.

GPI-A1 and GPI-B1 of the first slaved card are usable as GPI inputs for switches.

Mode

The 5100-AVD can be configured to operate in 3 basic modes (see [Config Menu](#) for details):



Dual Channel Delay

The A channel and B channel operate as independent delays (Single card only).

- Pros:
- * Two independent A/V programs can be processed (with same or different formats).
 - * Ideal for stations needing multiple fixed delays to compensate for ad-insertion or transmission delays.
- Cons:
- * No Aux input.

Dual Channel mode is not available when configured as a multi-card system for 4K/UHD.

Single Channel Delay + Aux

The A channel is the primary delay. The B channel is used as the AUX “safe” input with delay.

- Pros:
- * Maximum delay available.
 - * Aux input with adjustable delay is available for a “safe” source.
- Cons:
- * Only one A/V program can be processed.

Aux input is not available when configured as a two card system for 4K/UHD.

Two Operator Tapped Delay + Aux

The A channel is the primary delay. The B channel’s SDI output provides a preview “Tap” from the primary delay for a second operator to monitor and censor the signal. The B channel’s SDI input is used as the Aux “safe” input (with no delay).

- Pros:
- * Two operators for added protection.
 - * Each operator has individual reaction time settings.
 - * Aux input is available for a “safe” source.
- Cons:
- * No delay for Aux input.
 - * Only one A/V program can be processed.

Two operator mode is not available when configured as a two card system for 4K/UHD.

In all modes, each delay channel has 2 GPI ports to activate built-in switching with customizable reaction times. Objectionable material may be eliminated by individually switching the video and each audio channel to alternate signals. Aux input (not available in all modes), video blur, freeze frame, user defined images, test patterns, black, other audio channels (shuffle), audio tones, and mute, are all possible switch sources.

Profanity Delay

A profanity delay is a system used in live broadcasting to delay the audio and video signal, providing a short window of time for operators to react and prevent the transmission of unwanted or offensive material. The 5100-AVD provides both an adjustable A/V delay and the switching capabilities to manage objectionable material during live events.

Basic System Overview

A basic profanity delay system employs a delay mechanism, a switching system, and alternative content sources to replace unwanted material. An operator must monitor the audio-video program at the input to the delay and activate a switch if unwanted content is observed. Both the switch state and the audio-video program enter the delay, and the delayed output is where the switching takes place. To compensate for the operator's response time to an incident, a reaction time feature is employed to advance the start of the delayed switch activation. The delayed audio-video program will appear at the output unless the system is switched to the selected alternate source, which masks the unwanted content.

Note: The program delay time must be greater than the *Reaction Time* setting.

Single Operator System

This system enables a single operator to monitor the audio-video program and engage video and audio switches to eliminate unwanted content.

Configuration

The 5100-AVD should be configured for either *Single Channel* or *Dual Channel* mode (see [Mode](#) section above). This section describes a single channel. In *Dual Channel* mode, the same description applies to each individual channel.

Control Settings

See the [Control Menu](#) section for further information.

VIDEO: **Format** - Select the video format being used (input and output formats must be the same).
Source - Select "Delay".
Switched Source - Select a "safe" source to be used to mask unwanted content.

AUDIO: **Group Enable** - Ensure audio groups are turned ON for the embedded channels being used.
Reset All - Use the *Reset All* controls to quickly setup the audio channels.
 Use *Reset All - Mute* to unmute all audio channels.
 Use *Reset All - Source* to select "Delay 1:1".
 Use *Reset All - Gain* to set all channel levels to 0dB.
 Use *Reset All - Switched Source* to select a source to be used to mask unwanted content.
 Use *Reset All - Switched Gain* to set all channel levels to 0dB when switch is activated.

Each channel may be individually changed to achieve channel swapping or selective muting of specific channels (see section [Managing Discrete Audio Channels](#) for more information).

CENSOR SWITCH:

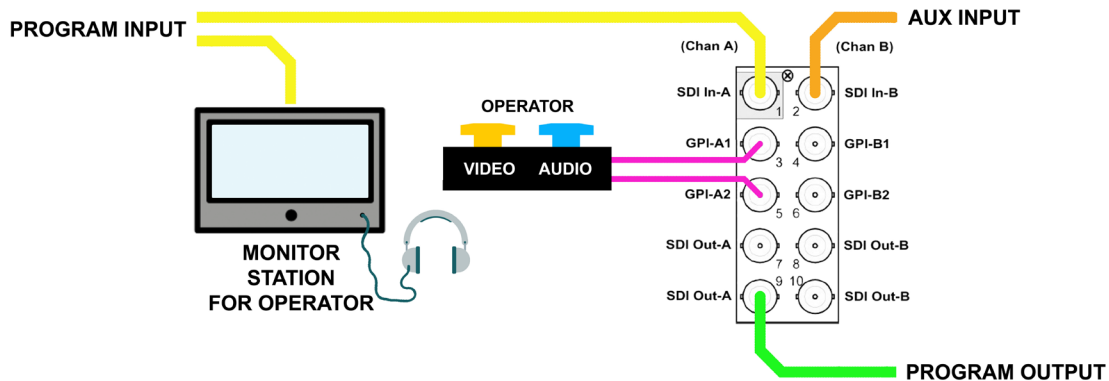
Control - Select the GPI ports that will control the video and audio switches.
Mode - Select "Delayed" for both video and audio.
Reaction Time - Choose a time value (in seconds) that allows ample time for the operator to react and activate the censor switches. Too large a value will unnecessarily mask acceptable content. Too small of a value might allow some undesired content to pass.

Delay Settings

See the [Delay Menu](#) section for further information.

DELAY: **Seconds & Frames** - Select a delay time for the audio-video program. This value must be larger than the *Reaction Time* setting.
Delay Control - Set to "Delay Enabled".

Connections

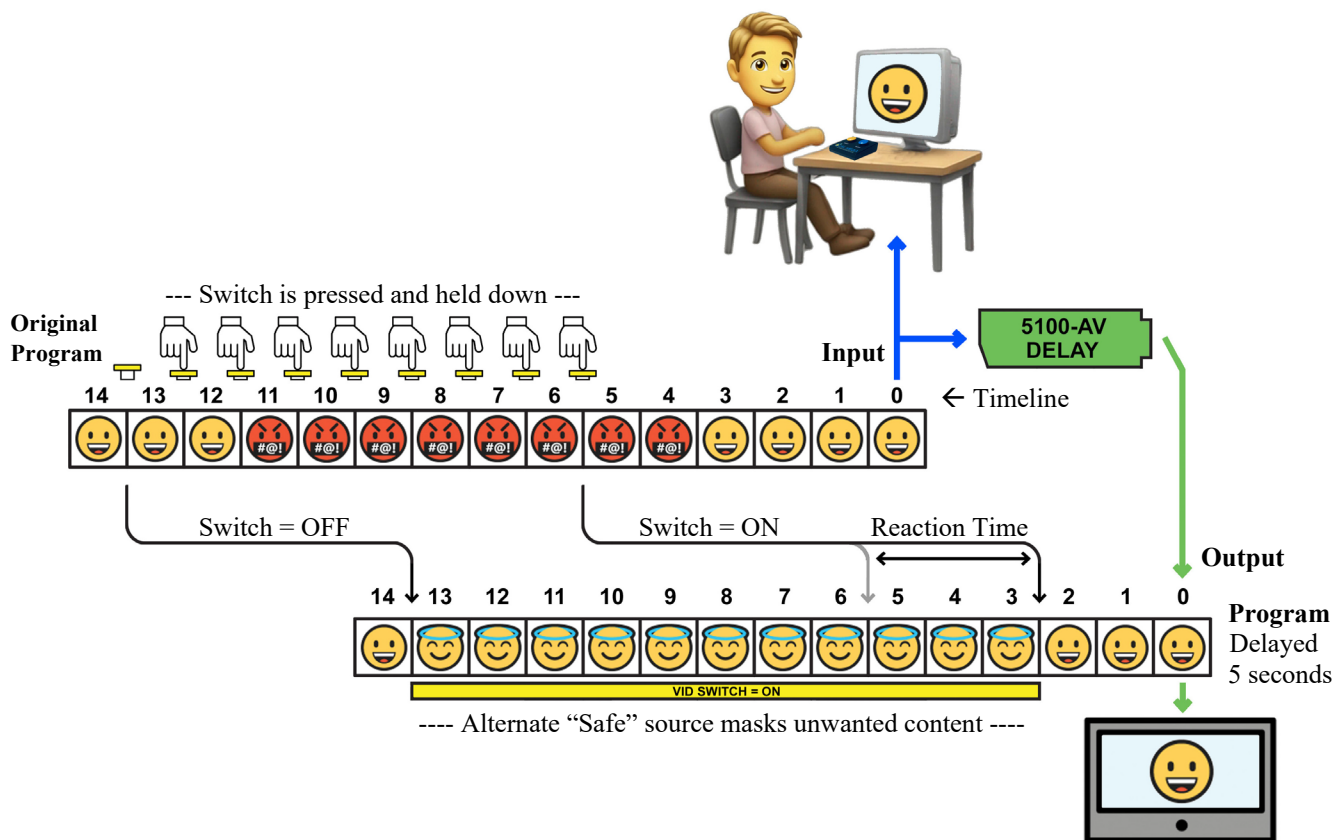


Connections for a *Single Card* system, in *Single Channel Delay* mode.
(AUX input not available in *Dual Channel* mode).

For multi-card systems, see section [Multi-card Interconnections](#) above.

Method of Operation

The basic operation is described using the figure below. For simplicity, the timeline is shown in one second increments beginning at 0, and only video is demonstrated. The operator monitors the program as it enters the 5100-AVD input. For this example, the **Delay Time is 5 seconds**, and the **Reaction Time is 3 seconds**.



Input Time Segment = 0

The operator views the program as it enters the delay input. Since the content is acceptable, the operator takes no action. The content remains acceptable through the end of input-time-segment 3.

Input Time Segment = 4

The start of unacceptable content appears on the operator's monitor as it enters the delay. The operator has not yet responded, due to human reaction time.

Input Time Segment = 6

The operator presses and holds down the censor push-button switch after taking 2 seconds to notice the event. At input-time-segment 6, the switch activation enters the delay along with the program. Due to the 3-second **Reaction Time** setting, the output switch activation is effectively advanced to output-time-segment 3 (see figure). Consequently, the delayed program output transitions to an alternate source one second prior to the initiation of the unacceptable content.

Input Time Segment = 12

The content remains unacceptable through the end of input-time-segment 11, and the operator continues to hold down the push-button switch. Acceptable content resumes at input-time-segment 12, but the operator hasn't responded yet due to human reaction time.

Input Time Segment = 14

Once the operator realizes that the incident is over, he releases the push-button switch at input-time-segment 14. The switch deactivation enters the delay along with the program. As **Reaction Time** only influences the start time, the output switch will also deactivate at output-time-segment 14. As a result, the delayed program output returns to the original program two seconds after the unacceptable content concludes.

The previous illustration and explanation provide a foundational understanding of how a video profanity delay works. A similar process can also be used to mask unacceptable audio content. The 5100-AVD incorporates two switches, one for video and one for audio. These switches allow the operator(s) to selectively mask or censor video and audio content. The alternate video source for masking content can be configured as an Aux input (not available in all modes), video blur, freeze frame, a user-defined still image, a test pattern, or black. Each audio channel may be switched to an alternate source that includes an Aux input audio channel (not available in all modes), a different input audio channel (shuffle), an audio tone, or mute (see section [Managing Discrete Audio Channels](#) for more information).

Two Operator System

This system employs two operators who monitor the audio-video program and engage video and audio switches to eliminate unwanted content. The system can be implemented in two ways: sequential or parallel.

In a **sequential two operator system**, a preview tap from the main delay allows the second operator to monitor the first operator's output before it is finalized. The second operator eliminates any remaining unwanted content before the signal goes to the program output. In this implementation, the channel B output will provide the preview tap.

In a **parallel two operator system**, both operators monitor the same program input, and either one can engage the switches to eliminate unwanted content. This is typically done when two individuals need control, such as a director and producer. In this implementation, the channel B preview tap is not used, and **the Tap Delay must be set to zero**.

Configuration

The 5100-AVD must be configured for **Two Operator Tapped Delay + Aux** mode (see [Mode](#) section above).

Main Control Settings

See the [Control Menu](#) section for further information.

VIDEO: **Format** - Select the video format being used (input and output formats must be the same).
Source - Select "Delay".
Switched Source - Select a "safe" source to be used to mask unwanted content.

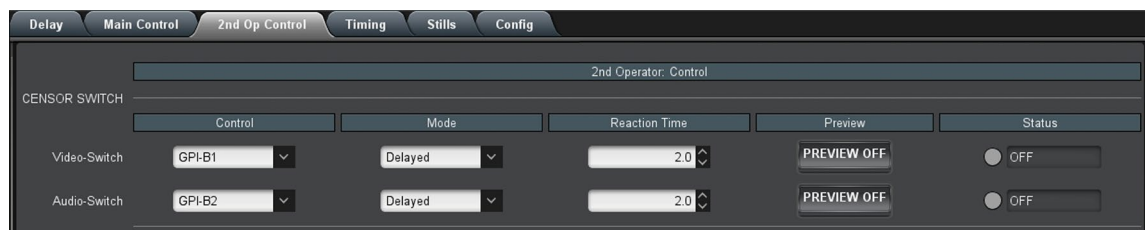
AUDIO: **Group Enable** - Ensure audio groups are turned ON for the embedded channels being used.
Reset All - Use the *Reset All* controls to quickly setup the audio channels.
 Use *Reset All - Mute* to unmute all audio channels.
 Use *Reset All - Source* to select “Delay 1:1”.
 Use *Reset All - Gain* to set all channel levels to 0dB.
 Use *Reset All - Switched Source* to select a source to be used to mask unwanted content.
 Use *Reset All - Switched Gain* to set all channel levels to 0dB when switch is activated.
 Each channel may be individually changed to achieve channel swapping or selective muting of specific channels (see section [Managing Discrete Audio Channels](#) for more information).

CENSOR SWITCH:

Control – Select the GPI ports that will control the main video and audio switches.
Mode - Select “Delayed” for both video and audio.
Reaction Time - Choose a time value (in seconds) that allows ample time for the operator to react and activate the censor switches. Too large a value will unnecessarily mask acceptable content. Too small of a value might allow some undesired content to pass.

2nd Op Control Settings

The "2nd Op Control" tab contains settings for a second set of censor switches, allowing customization for the second operator.

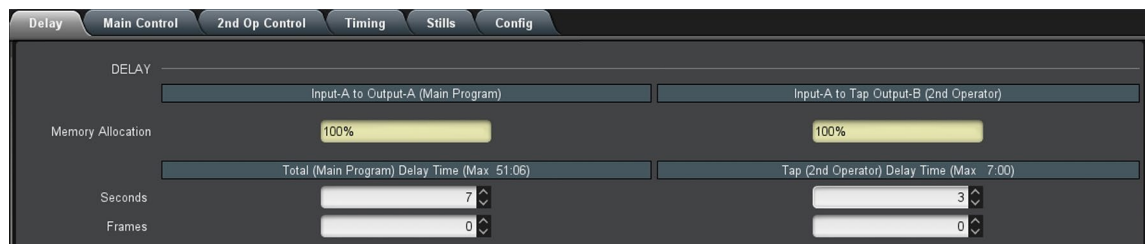


CENSOR SWITCH:

Control - Select the GPI ports that will control the second operator’s video and audio switches.
Mode - Select “Delayed” for both video and audio.
Reaction Time - Choose a time value (in seconds) that allows ample time for the second operator to react and activate the censor switches. Too large a value will unnecessarily mask acceptable content. Too small of a value might allow some undesired content to pass.

Delay Settings

In **Two Operator** mode, the B channel output becomes a preview tap from the main program delay.



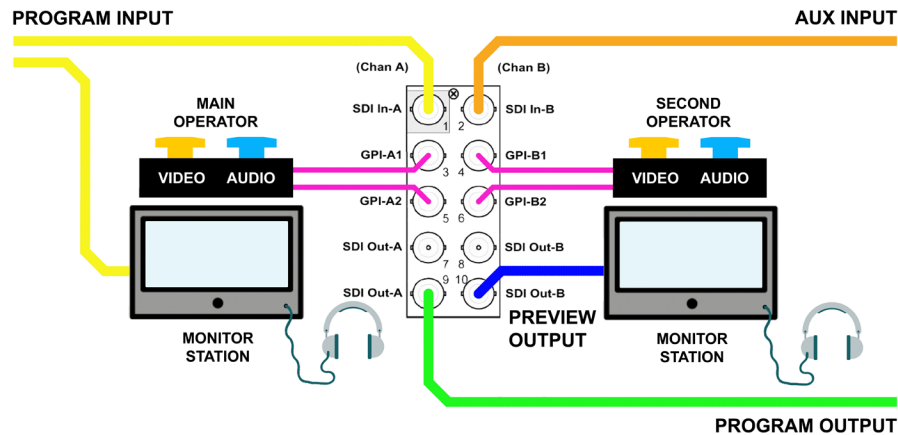
TOTAL (MAIN PROGRAM) DELAY:

Seconds & Frames - Select a delay time for the main audio-video program. This value must be larger than the combined **Reaction Times** of the Main and 2nd Op settings.
Delay Control - Set to “Delay Enabled”.

TAP (2ND OPERATOR) DELAY:

Seconds & Frames - (Sequential use) Select a delay time for the preview tap from the main delay. This value must be larger than the Main Control **Reaction Time** settings.
 - (Parallel use) Select 0 seconds and 0 Frames.

Connections

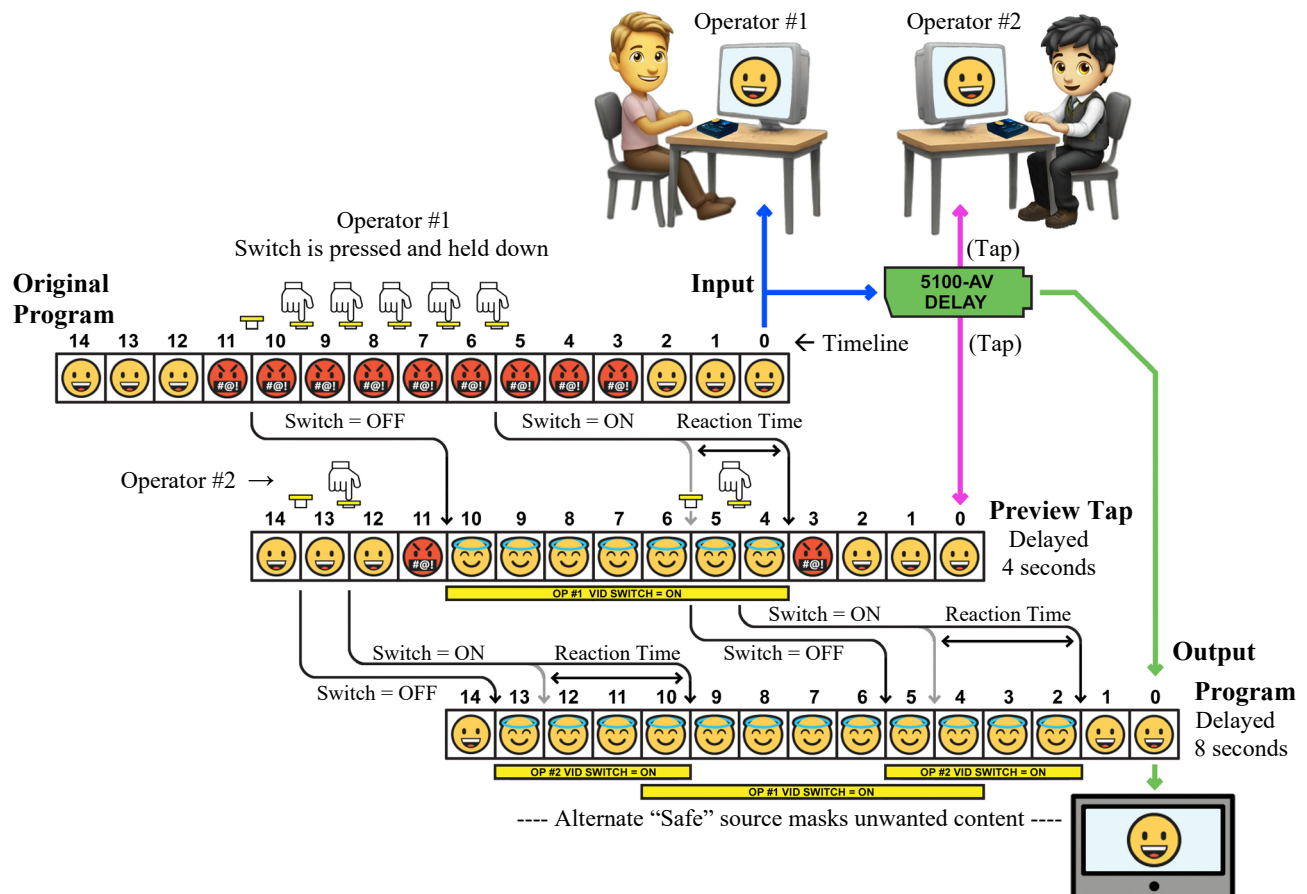


Connections for a *Single Card* system, in *Two Operator* mode.

For multi-card systems, see section [Multi-card Interconnections](#) above.

Method of Operation (sequential)

The basic operation is described using the figure below. For simplicity, the timeline is shown in one second increments beginning at 0, and only video is demonstrated. The main operator (#1) monitors the program as it enters the 5100-AVD input. The second operator (#2) monitors the preview tap output from Channel B. For this example, the **Total Delay Time is 8 seconds**, **Tap Delay Time is 4 seconds**, **Main Reaction Time is 2 seconds** and the **Second Operator Reaction Time is 3 seconds**.



Operator #1:

The following describes the preview (Tap) output, or the final delayed Program output if the second operator does nothing.

Input Time Segment = 0

The main operator (#1) views the program as it enters the delay input. Since the content is acceptable, the operator takes no action. The content remains acceptable through the end of input-time-segment 2.

Input Time Segment = 3

The start of unacceptable content appears on the main operator's monitor as it enters the delay. The operator has not yet responded, due to human reaction time.

Input Time Segment = 6

The main operator presses and holds down the censor push-button switch after taking 3 seconds to notice the event. At input-time-segment 6, the switch activation enters the delay along with the program. Due to the 2-second **Reaction Time** setting, the delayed switch activation is effectively advanced to delayed-time-segment 4 (see figure). Because the operator took longer than the programmed **Reaction Time** setting, the delayed output transitions to an alternate source one second after the initiation of the unacceptable content. Consequently, one second of unacceptable content will pass out of the delay.

Input Time Segment = 11

The content remains unacceptable through the end of input-time-segment 11, and the main operator continues to hold down the push-button switch until the start of input-time segment 11. Acceptable content resumes at input-time-segment 12, but the operator has released the push-button switch one second early. As the **Reaction Time** setting only influences the start time, the delayed switch will also deactivate at delay-time-segment 11. As a result, the delayed output returns to the original program one second before the unacceptable content concludes. Consequently, one second of unacceptable content will pass out of the delay.

Operator #2:

The following describes the second operator reacting to the signal from the preview (Tap) output.

Preview (Tap) Time Segment = 0

The second operator (#2) views the program as it exits the preview (Tap) output. Since the content is acceptable, the operator takes no action. The content remains acceptable through the end of preview-time-segment 2.

Preview (Tap) Time Segment = 3

The start of unacceptable content (that was missed by the first operator) appears on the second operator's monitor as it exits the preview output. The second operator has not yet responded, due to human reaction time.

Preview (Tap) Time Segment = 5

The second operator presses and holds down the censor push-button switch after taking 2 seconds to notice the event. At preview-time-segment 5, the switch activation enters the remaining delay, in sync with the program. Due to the 3-second **2nd Op Reaction Time** setting, the delayed switch activation is effectively advanced to output-time-segment 2 (see figure). Consequently, the final delayed program output transitions to an alternate source one second prior to the initiation of the unacceptable content. The second operator continues to hold down the push-button switch until acceptable program content resumes.

Preview (Tap) Time Segment = 4

Acceptable program content resumes at time-segment 4, but the second operator hasn't responded yet due to human reaction time.

Preview (Tap) Time Segment = 6

Once the second operator realizes that the incident is over, he releases the push-button switch at preview-time-segment 6. The switch deactivation enters the remaining delay, in sync with the program. As *2nd Op Reaction Time* only influences the start time, the output switch will also deactivate at output-time-segment 6.

Preview (Tap) Time Segment = 11

The start of unacceptable content (that was missed by the first operator) appears on the second operator's monitor as it exits the preview output. The second operator has not yet responded, due to human reaction time.

Preview (Tap) Time Segment = 13

The second operator presses and holds down the censor push-button switch after taking 2 seconds to notice the event. At preview-time-segment 13, the switch activation enters the remaining delay, in sync with the program. Due to the 3-second *2nd Op Reaction Time* setting, the delayed switch activation is effectively advanced to output-time-segment 10 (see figure). Consequently, the final delayed program output transitions to an alternate source one second prior to the initiation of the unacceptable content. The second operator continues to hold down the push-button switch until acceptable program content resumes.

Preview (Tap) Time Segment = 12

Acceptable program content resumes at time-segment 12, but the second operator hasn't responded yet due to human reaction time.

Preview (Tap) Time Segment = 14

Once the second operator realizes that the incident is over, he releases the push-button switch at preview-time-segment 14. The switch deactivation enters the remaining delay, in sync with the program. As *2nd Op Reaction Time* only influences the start time, the output switch will also deactivate at output-time-segment 14.

Final Output

When the delayed switch from either operator #1 or #2 is activated, the system routes the alternate "safe" source to the final output. Otherwise, the final output carries the delayed original program.

The previous illustration and explanation provide a foundational understanding of how a sequential two-operator video profanity delay works. A similar process can also be used to mask unacceptable audio content. The 5100-AVD incorporates two switches, one for video and one for audio. These switches allow the operator(s) to selectively mask or censor video and audio content. The alternate video source for masking content can be configured as an Aux input (not available in all modes), video blur, freeze frame, a user-defined still image, a test pattern, or black. Each audio channel may be switched to an alternate source that includes an Aux input audio channel (not available in all modes), a different input audio channel (shuffle), an audio tone, or mute (see section [Managing Discrete Audio Channels](#) for more information).

Managing Discrete Audio Channels

The 5100-AVD allows individual configuration of each audio channel for both normal and switched output.

	Mute	Source	Gain dB	Switched Source	Switched Gain dB
Reset All	RESET	Select	RESET	Select	RESET
Emb Ch 1	☐	Delay Emb 1	0.0	Tone 1	-10.0
Emb Ch 2	☐	Delay Emb 2	0.0	Tone 1	-10.0
Emb Ch 3	☐	Delay Emb 3	0.0	Delay Emb 3	0.0
Emb Ch 4	☐	Delay Emb 4	0.0	Delay Emb 4	0.0
Emb Ch 5	☐	Delay Emb 5	0.0	Aux Emb 1	0.0
Emb Ch 6	☐	Delay Emb 6	0.0	Aux Emb 2	0.0
Emb Ch 7	☐	Delay Emb 15	0.0	silence	0.0
Emb Ch 8	☐	Delay Emb 16	0.0	silence	0.0

Normal:

During normal operation (censor switch inactive), each channel's source and level are independently configurable. This provides the flexibility to reassign (shuffle) channels or duplicate them in other locations. The figure above illustrates the replacement of Emb Ch 7 and Emb Ch 8 with Emb Ch 15 and Emb Ch 16.

Switched:

- Activating the censor switch enables alternate controls for each channel’s source and level configuration. The figure above illustrates the various possibilities when the switch is engaged.
- Emb Ch 1 and Emb Ch 2 are replaced by a Tone at -10dB level.
 - Emb Ch 3 and Emb Ch 4 are passed normally, and not affected by the switch.
 - Emb Ch 5 and Emb Ch 6 are replaced by the Aux input’s Emb Ch 1 and Emb Ch 2.
 - Emb Ch 7 and Emb Ch 8 are muted (silenced).

Notice that when the same source is chosen for both normal and switched modes, the switch is effectively deactivated for those channels (as shown above with Emb Ch 3 and Emb Ch 4). This feature allows specific channels to be switched, while others remain unaffected.

Specifications

Maximum Delay (for single channel mode)

4K*x2160p-60/59.94	12 seconds 0 frames (two cards required)
UHDx2160p-60/59.94	12 seconds 48 frames (two cards required)
4K*x2160p-50	14 seconds 20 frames (two cards required)
UHDx2160p-50	15 seconds 18 frames (two cards required)
2K*x1080p-60/59.94	24 seconds 0 frames
1080p-60/59.94	25 seconds 36 frames
2K*x1080p-50	28 seconds 40 frames
1080p-50	30 seconds 36 frames
1080i-60/59.94	51 seconds 6 frames
1080i-50	61 seconds 11 frames
1080PsF-24/23.98	64 seconds 0 frames
720p-60/59.94	57 seconds 4 frames
720p-50	68 seconds 24 frames
SD 483i (NTSC)	255 seconds 29 frames
SD 576i (PAL)	255 seconds 24 frames

* 2K and 4K formats are 10bit 4:2:2

Delay Adjust

Video	1 frame increments
Audio offset	0.25ms increments

Video Processing

Signal:	3G - 2.97Gb/s (SMPTE 424M) HD - 1.485Gb/s (SMPTE 292M) SD - 270Mb/s (SMPTE 259M)
Inputs:	2 BNCs, 75ohm, 800 mVpp 3G - Auto EQ to 120 meters (Belden 1694A) HD - Auto EQ to 200 meters (Belden 1694A) SD - Auto EQ to 400 meters (Belden 1694A)
Output:	BNC, 75ohm, 800 mVpp 3G Timing Jitter < 0.3UI HD Timing Jitter < 0.25UI SD Timing Jitter < 0.2UI
Formats:	1080p-60/59.94/50/30/29.97/25/24/23.98 1080i-60/59.94/50 1080PsF-24/23.98 720p-60/59.94/50/30/29.97/25/24/23.98 483i-59.94 576i-50
Resolution:	10 bit, 4:2:2

Specifications subject to change without notice.

Audio Processing

Signal:	Embedded SD (SMPTE 272C) HD (SMPTE 299M)
Sample Rate:	48KHz-synchronous
Resolution:	24 bit HD, 20bit SD

Genlock Reference

Signals:	Bi-Lev (Black Burst) , Tri-Level
Inputs:	2 BNC loops, Hi-Z (REF-1 and REF-2 on openGear™ frame)

Control

GPI Inputs:	4 BNCs, internal pullup Activates on closure to ground
Remote Input:	RJ-45 Ethernet connector (on openGear™ frame)

Memory Card

Type:	MMC, SD, SDHC
Format:	FAT16 or FAT32 required for STILL storage (cards > 64MB are typically FAT16 or FAT32)

Still Files

File Folder Name:	STILLS
Capacity:	253 stills maximum for each file format
File Format:	.HD2 = 1920 x 1080, 10bit, 4:2:2 <i>Proprietary file format</i>

Power

12 Watts

Specifications subject to change without notice.

5 YEAR LIMITED WARRANTY

California Media Engineering Inc. warrants that this product (5100-AVD openGear™ card) is free from defects in material or workmanship for a period of five (5) years from the date of original purchase. In the event this product becomes defective through normal usage, California Media Engineering Inc. agrees to repair or at its option replace the defective product without charge.

This warranty does not cover the openGear™ Frame, Network cards or Power supply(s).

This warranty is limited to the original end-purchaser and is not assignable or transferable. This warranty does not apply to damage caused by negligence, accidents, or an act of God. Only a California Media Engineering Inc. factory representative is authorized to repair this product. Any unauthorized attempt to repair this product will immediately void the warranty. Any unauthorized alterations or modifications to this product will immediately void the warranty. This product is designed specifically for standard openGear™ chassis' and any attempt to operate this product outside of an openGear™ chassis will immediately void the warranty.

California Media Engineering Inc. shall not be responsible for incidental or consequential damages, nor damage due to misuse or the use of any unauthorized attachment or modification, nor damage by the use of an unspecified electrical circuit. In no event shall California Media Engineering Inc. be responsible or liable for any damages arising from the use of this product, whether such damages be direct, indirect, special, incidental, consequential, or otherwise. California Media Engineering Inc. shall not be liable for any loss of use, revenue or profit.

Any software provided for use with this product is provided "AS IS." California Media Engineering Inc. shall not be responsible or liable for any damages arising from the use of said software, whether such damages be direct, indirect, special, incidental, consequential, or otherwise.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Any implied warranty is limited in duration to five years provided in this, the only, expressed warranty.

Repair Policy

Should any problem arise with your 5100-AVD openGear™ card, please contact Cal Media Engineering's Technical Support Department at support@calmedia.com or use the contact information on the back cover of this manual.

If required, a Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions. Do not return any product before obtaining a RMA number. Any shipping costs incurred are the customer's responsibility. If available, a temporary replacement card may be provided at a nominal charge.

Cal Media Engineering's Technical Support Department will continue to provide advice on any product manufactured by Cal Media Engineering, beyond the warranty period without charge, for the life of the product.

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