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KAM-HD-MULTI

KAMELEON HD/SD MODULE SERIES

Instruction Manual

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Preface

About This Manual

This manual describes the features of a specific module of the 2000 Series Modular Products family including the Kameleon HD/SD product lines. As part of this module family, it is subject to Safety and Regulatory Compliance described in the Kameleon 2000 Series frame and power supply documentation (see the *Kameleon 2000 Frames Instruction Manual*).

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Kameleon HD/SD Multi-Function Modules

Introduction

The Kameleon HD modules are part of the Grass Valley Kameleon Media Processing System family of products. They offer an ideal solution for high definition and serial digital video processing, frame synchronization, color correction, video processing, audio processing, and timing. This manual covers installation, configuration, and operation of the KAM-HD/SD-MULTI-Function module.

Features offered in these modules include:

- SD video rates of:
  - 480i/59.94 or 576i/50
- HD video rates of:
  - HD 59.94: 1080i or 720p,
  - HD 50: 1080i or 720p, and
  - HD 24: 1080sf or 1080p
- HD/SD video processing for brightness, contrast, saturation and hue,
- Frame synchronization with horizontal and vertical timing delay adjustments,
- Split Screen (horizontal or vertical) output mode,
- Auto and Manual Freeze controls,
- HD/SD color correction and gamma adjustments,
- Color bars test signal generator,
- Two different rear module types:
  - KAM-HD-MULTI-BR with balanced AES/EBU audio connectors, or
  - KAM-HD-MULTI-UR with unbalanced AES/EBU connectors (including audio breakout cables),

- Audio inputs and outputs on the rear modules are configurable as one of the following:
  - 8 inputs/0 outputs
  - 4 inputs/4 outputs
  - 0 inputs/8 outputs
- Four Audio Preset Configurations for quick setup of audio configuration,
- Up to eight streams of input audio selectable for synchronization, then multiplexed into the output video stream and/or sent to available AES audio outputs on the rear module,
- Four streams of the selected audio may be paired and processed for multiplexing into the output audio stream and/or sent to available AES audio outputs,
- Dolby E bypass,
- Newton Modular Control Panel interface,
- NetConfig support, and
- SNMP support – remote monitoring.

System Requirements

Operation of the Kameleon HD modules in 2000 Series frames has the following hardware and software requirements:

- Modules must be installed in a 2000T1DNG or 2000T3DNG Kameleon 2000 Series frame containing a 2000GEN module.

  Existing Kameleon frames can be upgraded with the necessary modules and software for proper operation. Contact your sales representative for more information.
- The frame must have a 2000NET module with assembly number 671-5231-01 or later running software version 4.0.0 or later.
- KAM-HD-MULTI Function operation requires a Kameleon HD module with assembly number 671-6514-20.

Installation

Installation of the Kameleon HD module is a process of:

- Placing the dual-height KAM-HD-MULTI-UR or KAM-HD-MULTI-BR rear module in a rear frame slot,
- Placing the media module in the corresponding front slot, and
- Cabling and terminating signal ports.

The Kameleon HD module can be plugged in and removed from a 2000 Series frame with power on. When power is applied to the module, LED indicators reflect the initialization process (see *Power Up* on page 14).

Note The Kameleon HD must be installed in a 2000T1DNG or 2000T3NG frame (2000NET and 2000GEN module installed) for access to a frame reference.

Module Placement in the 2000 Frame

There are twelve slot locations in both the front and rear of a Kameleon 3 RU frame to accommodate Kameleon HD modules. The KAM-HD-MULTI module requires a dual height rear module, either the KAM-HD-MULTI-UR or the KAM-HD-MULTI-BR, that uses two rear module slots allowing up to 4 modules per 3 RU frame, 2 in a 1 RU frame. Dual-height modules can be placed in any rear slot as long as there is room in the frame.

To install a Kameleon HD module set in a 2000 Series frame:

1. Locate a vacant slot in the rear of the 3 RU frame (Figure 1) or the 2000T1DNG frame (Figure 2 on page 10).

Figure 1. 2000T3NG Frame, Rear View

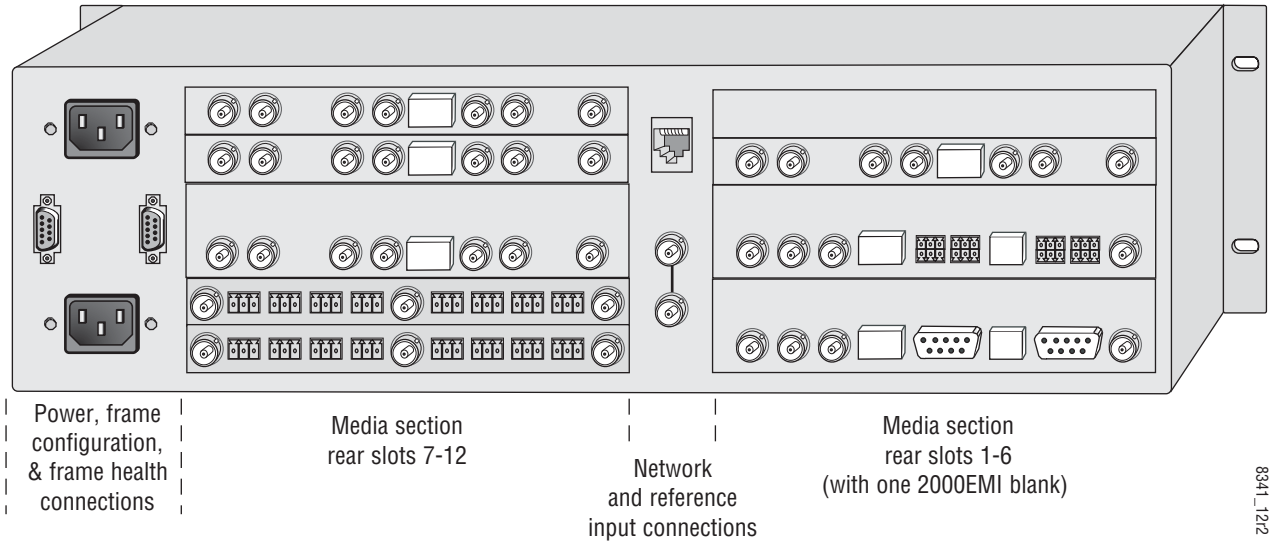
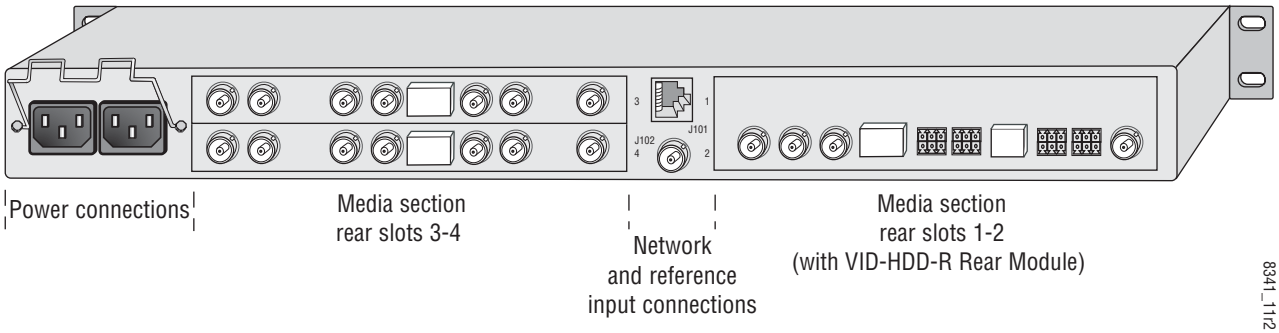


Figure 2. 2000T1DNG Frame, Rear View



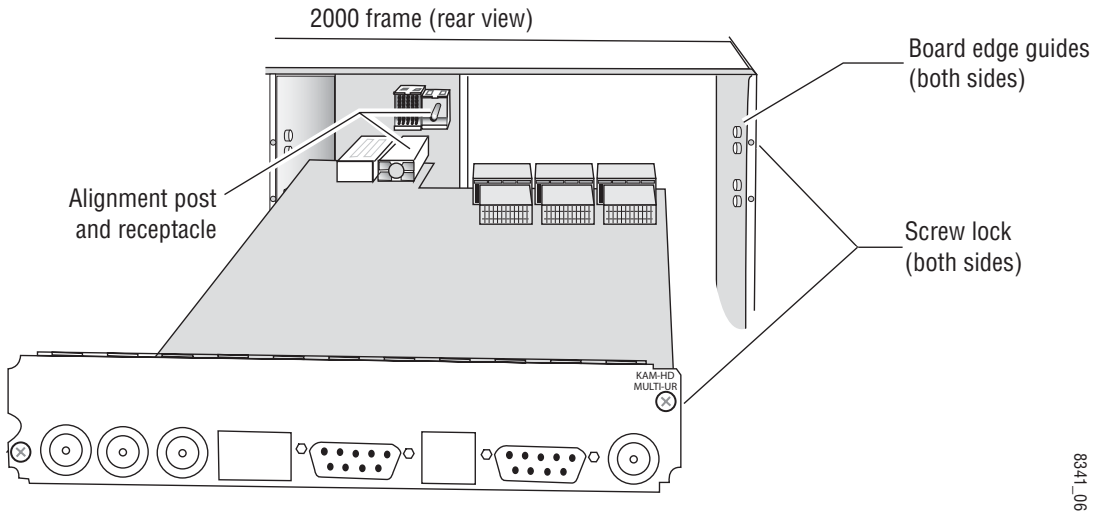
2. Insert the rear module into the vacant rear slot of the frame as illustrated in Figure 3.

3. Verify that the module connector seats properly against the midplane.

4. Using a crossblade screwdriver, tighten the two screw locks to secure the module in the frame.

CAUTION Using the incorrect rear module can cause overheating of the Kameleon 2000 frame.

Figure 3. Installing Passive Rear Module



5. Locate the corresponding front media slot (1 -12) in the 3 RU frame frame (Figure 4) or front media (slot 1-4) the 1 RU frame (Figure 5). Place the KAM-HDD/-FS module in the lower slot when using a dual-height rear module.

Figure 4. 2000T3NG Kameleon Frame, Front Slots

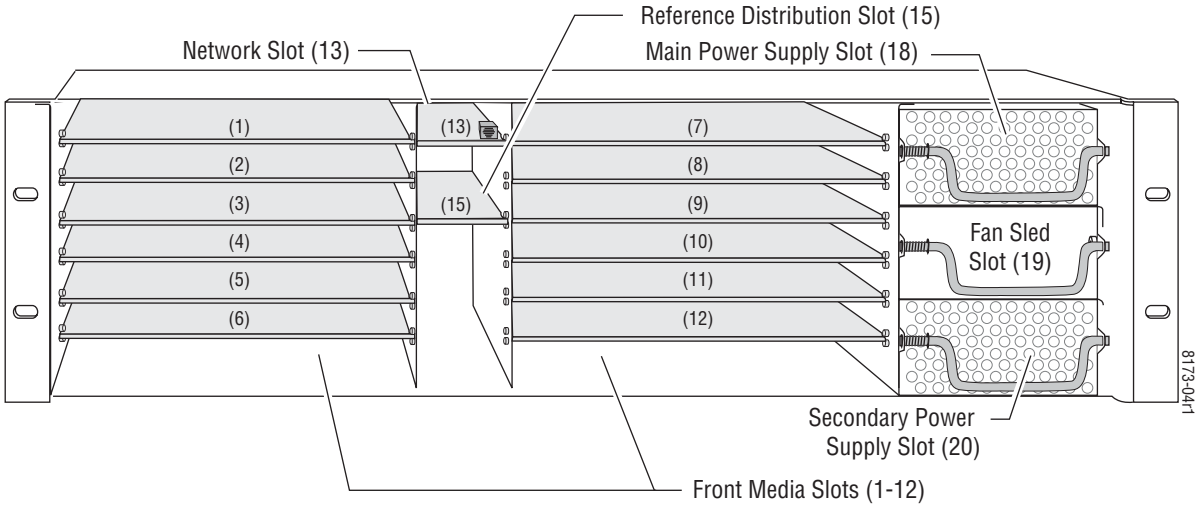
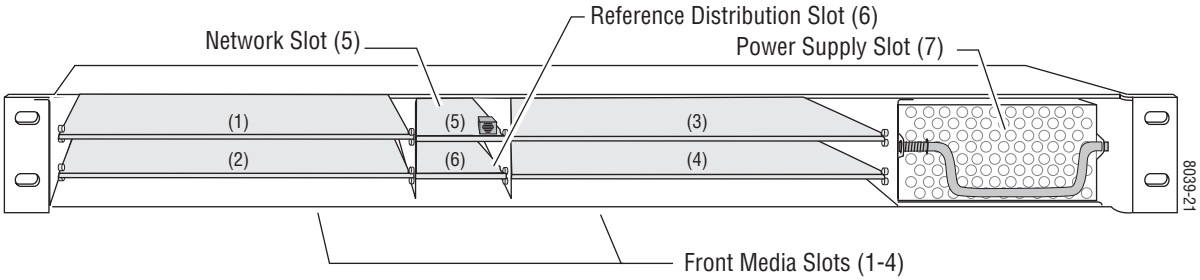


Figure 5. 2000T1DNG Kameleon Frame Front Slot

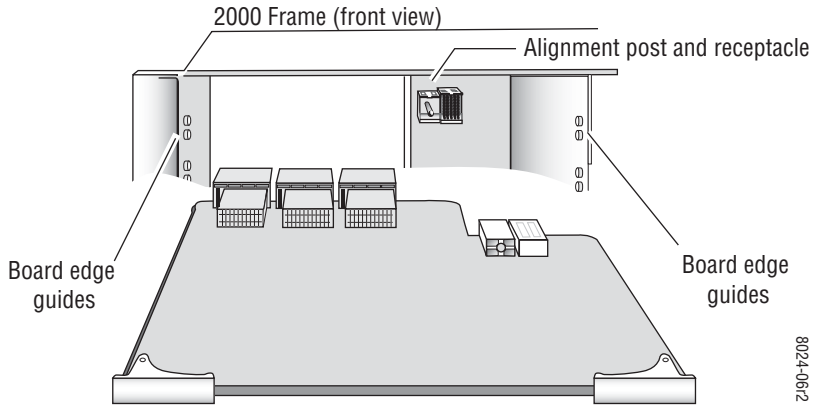


6. With the component side up, insert the front media module in the corresponding front slot (see Figure 6).

7. Verify that the module connector seats properly against the midplane and rear module connector.

8. Press firmly on both ejector tabs to seat the module.

Figure 6. Installing Front Media Module



Cabling

All cabling to the Kameleon HD module is done on the corresponding KAM-HD-MULTI-UR Rear (Figure 7 on page 13 for unbalanced audio inputs) or KAM-HD-MULTI-BR Rear (Figure 8 on page 13 for balanced audio inputs) at the back of the 2000 frame. There are a number of different input and output configurations possible depending on system configuration and module type.

To determine the correct cabling for your application, refer to *System Config Web Page* on page 46 and the *I/O Config Web Page* on page 42.

Serial or HD SDI Video Input

Connect an SD or HD SDI video input to the BNC connector, labeled **VI:**

- J8 on the KAM-HD-MULTI-UR Rear
- J10 on the KAM-HD-MULTI-BR Rear

Video Outputs

There are three SDI video outputs at the following BNC connectors labeled **SDO**:

- J1, J6, and J7 on the KAM-HD-MULTI-UR Rear
- J1, J8, and on the J9 KAM-HD-MULTI-BR Rear

Audio Input and Outputs

The balanced and unbalanced audio connectors on the KAM-HD-MULTI-BR and KAM-HD-MULTI-UR rear modules can be used as input or outputs. Configuration is done on the I/O Config web page (*I/O Config Web Page* on page 42) or using the Audio Preset Config buttons on the E-MEM web page (*E-MEM Web Page* on page 81).

The KAM-HD-MULTI-UR comes with two audio breakout cables for connection to the 9-pin D connectors J2 and J4. The outputs from the breakout cables are labeled A, B, C, and D which correspond to the outputs on the unbalanced connectors. Refer to Figure 20 on page 43 for 8 In/0 Out, Figure 21 on page 44 for 4 In/4 Out, and Figure 23 on page 45 for 0 In/8 Out configurations.

Data

This connection is for future use and currently not used.

Fiber IF

This connection is for future use and currently not used.

Figure 7. KAM-HD-MULTI-UR Rear Module

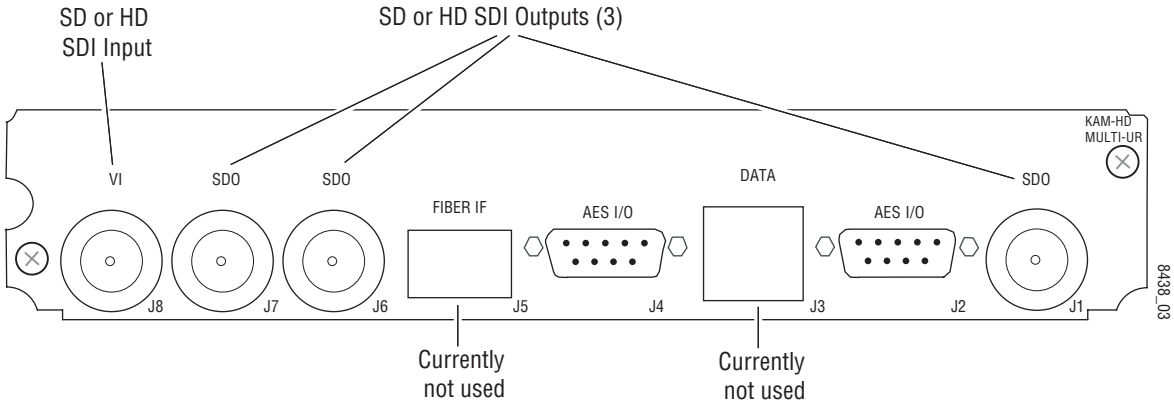
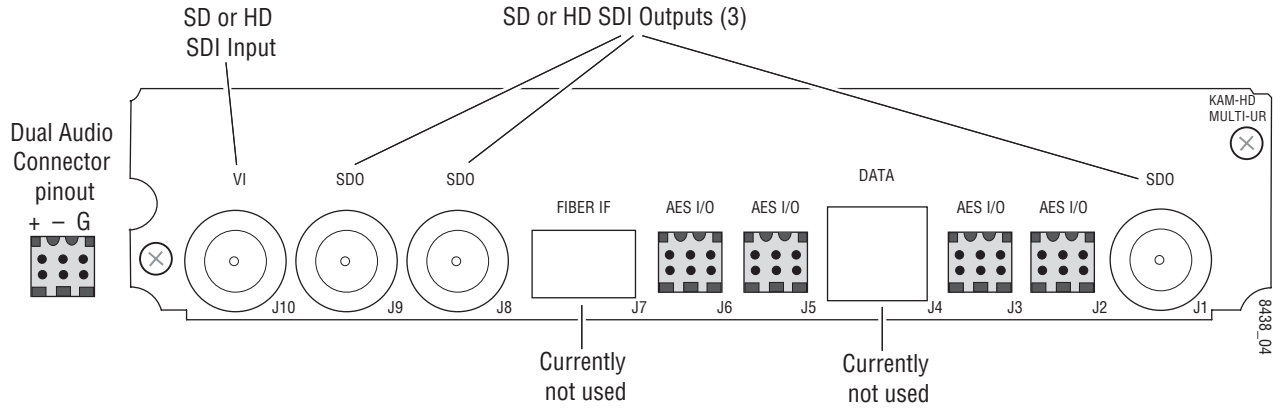


Figure 8. KAM-HD-MULTI-BR Rear Module



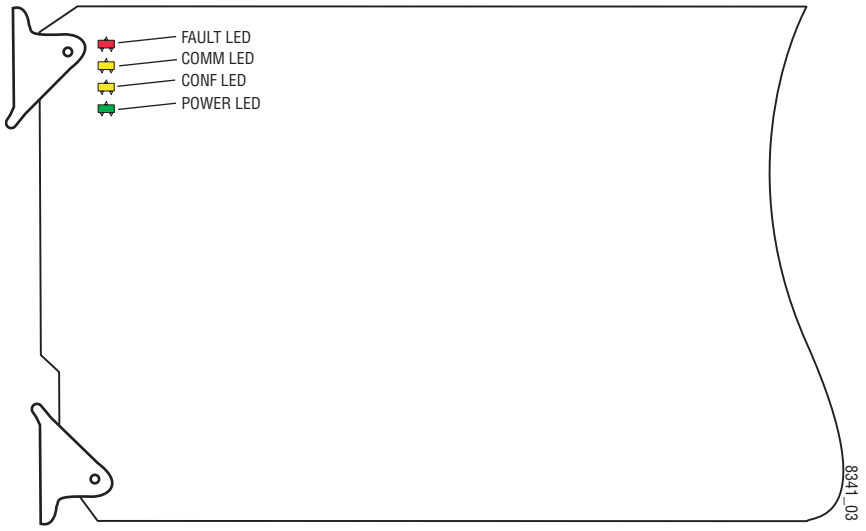
Power Up

The front LED indicators are illustrated in Figure 9. Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

With factory default configuration and valid input and reference signals connected, only the green PWR LED should be on.

Figure 9. Operation Indicator LEDs



A red FAULT LED indicates an error situation and, with the other LEDs, can indicate the operational conditions presented in Table 1.

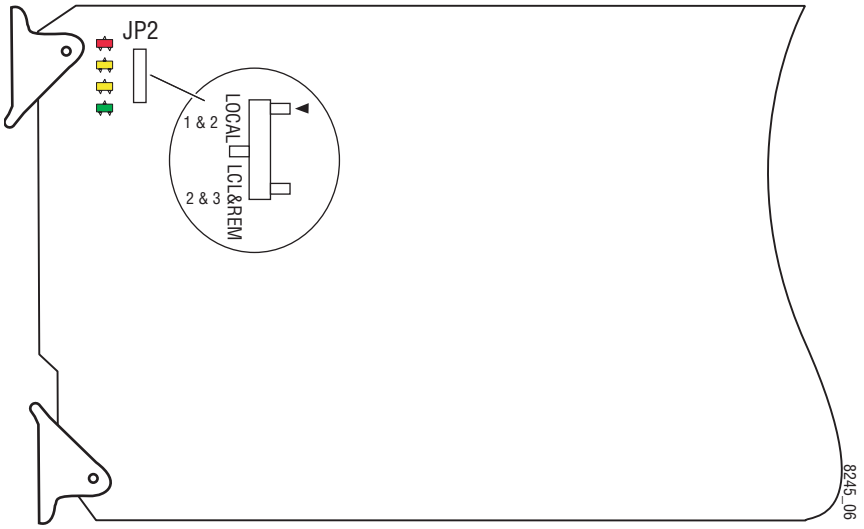
Table 1. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
FAULT (red)	Off	Normal operation.
	On continuously	Module has detected an internal fault.
	Flashing	Frame reference or video input is missing, input does not match manual selection.
COMM (yellow)	Off	No activity on frame communication bus.
	Long flash	Location Command received by the module from a remote control system.
	Short flash	The new system configuration is being stored to the module.
CONF (yellow)	Off	Module is in normal operating mode.
	On continuously	Module is initializing, changing operating modes or updating firmware. Simultaneous CONF and FAULT LEDs on indicate FPGA load error.
	Long flash	Location Command received by the module from a remote control system.
PWR (green)	Off	No power to module or module's DC/DC converter failed.
	On continuously	Normal operation, module is powered.

Remote Control Lockout

When a jumper is placed across pins 1 and 2 of jumper block JP2 (see Figure 10), module output mode settings are locked out from remote control. To have remote access, set the jumper across pins 2 and 3.

Figure 10. Local/Remote Jumper



Quick Start Procedure

Follow the procedure below for a quick start method configuration for the Kameleon HD module:

1. Go to the E-MEM web page (page 81) to select a preset audio configuration if your audio needs match one of the four preset modes explained in *Audio Preset Configurations* on page 21, or set the audio configuration on the I/O Config web page (*I/O Config Web Page* on page 42)
2. Go to the I/O Config web page (page 42) to name inputs and outputs.
3. Go to the System Config web page (page 46) to configure the input video type (HD or SD), the video input rate, and the output timing source. Split Screen controls are also available on this page as well as on the HD Video Proc, SD Video Proc, and Color Correction web pages.
4. If not already connected, connect all input and output signals and verify component and signal presence and condition on the Status web page (page 37).
5. Go to the Functional View web page (page 48) to use the block diagram links to configure each function in turn. Video processing must be enabled on the System Config web page or with the Newton control panel before adjustments can be made.

Note **Next**, **Functional View**, and **Back** links are provided to help you navigate through a logical configuration sequence.

6. Use the Slot Config web page (page 88) to assign Slot Configuration information such as slot name and asset number. Also link to the 2000NET module web pages to enable and disable Frame Health and SNMP trap reporting.
7. Use E-MEM memory (page 81) to store or recall configurations as necessary.
8. Refer to *Updating Software* on page 92 for information on updating software.

Configuration and Adjustments

Kameleon HD configuration and monitoring can be performed using a web browser GUI interface or a networked Newton Control Panel. This section provides an overview of each of these controls along with the configuration parameters available with each type of control device. It also provides an overview of the audio configurations available on this module.

Audio Overview

There are a number of audio paths through the KAM-HD-MULTI module that can be utilized depending on the type of audio application required. This section gives an overview of the overall audio system and describes the best uses of each of the audio paths and how to use the audio preset configurations.

Audio Input Sources

Embedded audio in the SD or HD video input stream is automatically demultiplexed and copied at the input of the module. Any or all of the eight demuxed audio streams can be selected to be input streams to the audio timing circuitry or bypass timing and processing completely, depending on the type of audio and the application, and be sent directly to the AES outputs. The embedded audio can also be passed to the video output of the module unmodified. Audio capabilities for different audio types are summarized in Table 2 on page 18.

Up to eight external AES audio inputs can be connected to the rear module, depending on the audio configuration set on the I/O Config web page (*I/O Config Web Page* on page 42).

Eight audio sources, can be selected from the list of demuxed inputs and/or the external AES inputs to make up the audio that can be multiplexed into the output video stream or output to external AES outputs depending on the I/O configuration of the rear module and other module configuration setups.

KAM-HD-MULTI audio capabilities are summarized in Table 2 below:

Table 2. KAM-HD-MULTI Audio Capabilities Summary

Audio Source	Audio Type	Asynchronous Audio Allowed	CUVZ Passthrough Permitted	SRC Bypass Enabled	Auto Track Enabled
AES Rear Connector Port	Audio	Yes	Yes[1]	Synchronous only	Yes or No
	Non-Audio	No	Yes[1]	Must be enabled	Disabled
Demultiplexed Audio	Audio	Yes	Yes[1, 2]	Synchronous only[2]	Automatically disabled when SRC Bypass is enabled.
	Non-Audio	No	Yes[1,2]	Must be enabled	Disabled
	Bypass to AES Output Ports	Force-flagged as Asynchronous	Mandatory	N/A	N/A

[1] CUVZ Pass Through with asynchronous inputs will cause entire blocks of C, U, and V bits to be periodically skipped or repeated.

[2] Only when the input video shares the same genlock reference as the module or when the module is in input-timed mode, are the Demultiplexed streams considered to be synchronous.

The KAM-HD-MULTI module can use a rear module with either balanced or unbalanced AES audio connectors. Eight audio streams can be connected in the following configurations set on the I/O Config web page:

- 8 inputs/0 outputs – when the module is set for 8 inputs and no outputs, all eight audio connectors on the rear module become inputs for external AES audio.
- 4 inputs/4 outputs – when the module is set for 4 inputs and 4 outputs, 4 audio connectors become inputs for AES audio and 4 audio connectors become AES audio outputs on the rear module. Refer to the I/O Config web page for the specific rear module connector numbers.
- 0 inputs/8 outputs – when the module is set for 8 inputs and no outputs, all eight audio connectors on the rear module become inputs for external AES audio.

AES C/U/V Bits Pass Through

The control bits that are part of each subframe of AES data are defined as C (Channel status), U (User), and V (Valid) bits and the Z bit, which carries the start position of the AES block frame. For the control and status bits in the CUV positions of each audio channel, and the Z marker for each stream (pair of channels), there is a buffer on the module that handles the asynchronous timebase slips between the input and output AES stream frequency.

This buffer will drop or repeat an entire block (occurring every 192 samples) of CUV bits when the two timebases cross a block boundary rather than drop or repeat individual bits from the block.

A control is provided on the AES Outputs web page for enabling or disabling the control bits in an AES signal called the AES C/U/V Bit Pass Through (*AES Outputs Web Page* on page 77). These bits may be generated

locally at the AES output of the module (Pass Through disabled) or taken from the AES stream coming from an audio input or demultiplexed from video (Pass Through enabled).

As shown in the Audio Capabilities Summary in Table 2 on page 18, enabling CUVZ pass through to preserve the original data is only permitted when audio is synchronous with the input video. Asynchronous sources (such as Dolby E and non-audio data) should have this control disabled. If the bits are becoming corrupted, this control can be used to diagnose whether the corruption is occurring before or after the KAM-HD-MULTI module.

Audio Paths

The main audio paths through the module are explained below and illustrated in the Functional View in Figure 11 on page 20. Refer to Table 2 for an overview of audio types and how they can be utilized in these paths.

Input Embedded Audio

The embedded audio present in the video input stream can be passed to the output of the module unchanged.

Demuxed AES Audio Streams G1.S1-G4.S2

The eight demuxed audio streams, labeled **Demuxed AES Streams G1.S1-G4.S4** in the Functional View (Figure 11 on page 20), are sent directly to the AES output connectors, bypassing all timing and processing. They are selectable as AES outputs (depending on module configuration) on the AES Outputs web page identified as **Demuxed Stream 1-8**, colored with a light blue background to match the corresponding path on the Functional View diagram.

Delayed Bypassed Audio Streams 1-8

Eight audio streams, either demuxed audio streams from the video input and/or the external AES audio inputs, can be selected as inputs on the Audio Select web page to pass through the audio synchronizing circuitry and be adjusted on the Audio Sync web page. These audio streams are identified as **Delayed and Bypassed Stream 1-8** on the functional diagram and represented by the cyan colored path.

The **Delayed and Bypassed Streams 1-8** can be multiplexed into the video output stream when the existing embedded audio has been deleted (no audio replacement is possible) on the Mux web page and/or sent to available AES outputs depending on module audio configuration.

These outputs are identified as **Delayed and Bypassed Streams 1-8** on the Mux and AES Outputs web pages, colored with a cyan background to match the corresponding path on the Functional View diagram.

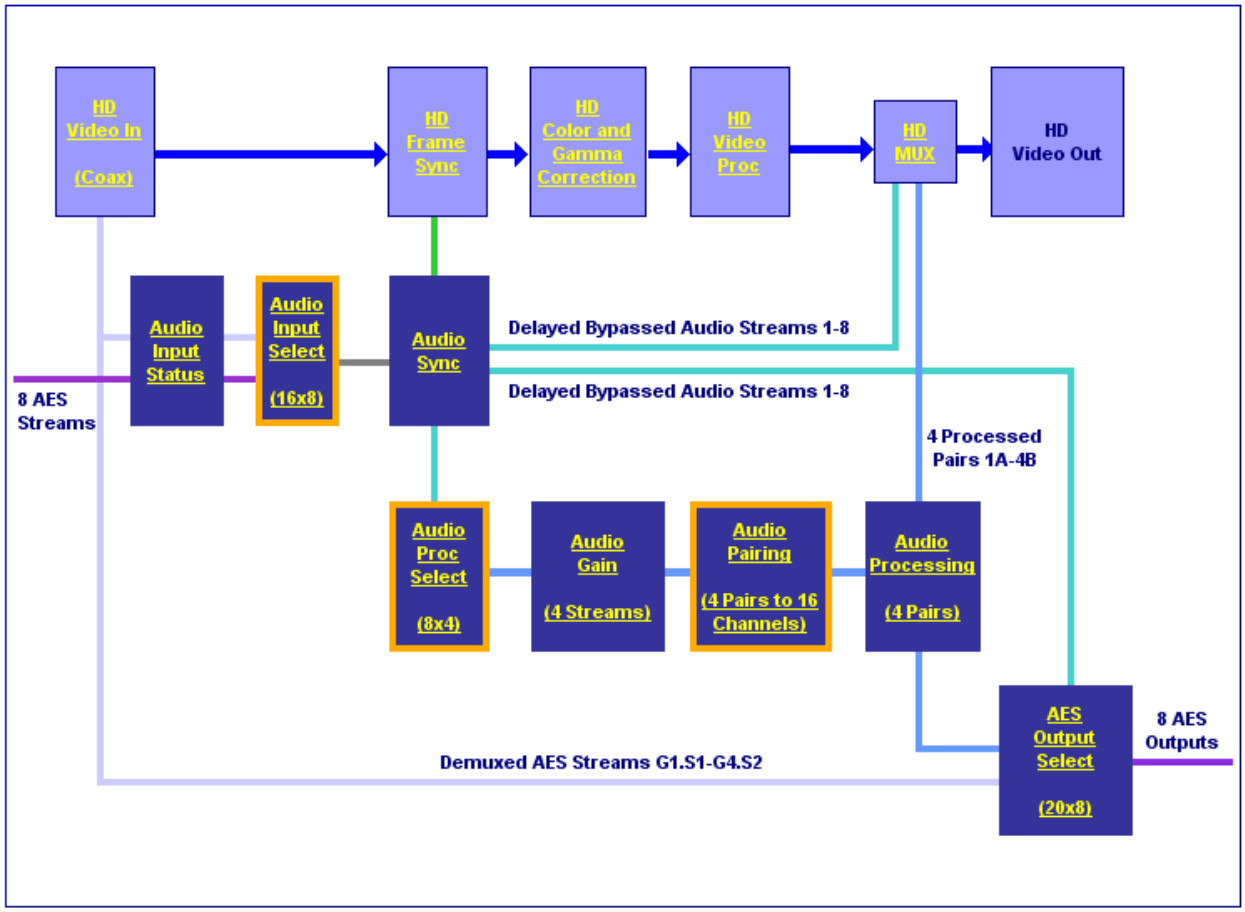
Processed Paired 1-4

Four of the eight audio streams selected in the Audio Input Select web page, either demuxed audio streams and/or the external AES audio inputs, can be selected as inputs to the audio processor. These four streams can be paired in any combination on the Audio Channel Pairing web page then processed as defined on the Audio Proc web page. These audio streams are identified as **Processed Pairs 1A-4B** on the functional diagram and represented by the blue color path.

Any or all of the four pairs can be multiplexed into the video output stream when the existing embedded audio has been deleted (no audio replacement is possible) and/or sent to available AES outputs on the rear module.

These outputs are identified as **Processed Pairs 1A-4B** on the Mux and AES Outputs web pages, colored with a blue background to match the corresponding path on the Functional View diagram.

Figure 11. Audio Functional View (HD Video Input)



Audio Preset Configurations

There are four different audio preset configurations. Selection of one of these configurations is done with the Audio Preset Config buttons on the E-MEM web page (*E-MEM Web Page* on page 81). Each of these configurations is intended to preset the audio inputs and outputs and set audio parameters for a specific audio application.

The following Audio Preset Configs can be selected:

DeEmbed

Selecting **DeEmbed** configures the module for no AES audio inputs and eight audio outputs. It is primarily for applications where demultiplexing embedded audio is required to be output to the external AES audio connectors.

Embed

Selecting **Embed** configures the module for eight AES audio inputs and no AES audio outputs. This application can be used for applications where external audio is fed to the module and embedded into the output video stream.

Universal 8 Ch

Selecting **Universal 8 Ch** configures the module for four AES audio inputs and four AES outputs. The Demuxed audio Groups 1-2 and sent to the four external AES outputs. External AES audio inputs 1-4 are multiplexed into Groups 1 and 2 of the output video stream.

Transcode

Selecting **Transcode**, configures the module for no AES audio inputs and eight audio outputs. All eight demuxed audio streams are delayed and bypassed then selected for insertion into the output audio stream (multiplexed) and to the eight AES connectors on the rear module.

Refer to Table 3 on page 22 for a complete summary of the settings for each Audio Preset Configuration.

Table 3 gives a summary of the parameter values set on the web pages when each of the four Audio Preset Configurations are selected.

Table 3. Audio Preset Configuration Summary

Parameters	DeEmbed	Embed	Universal 8 Channel	Transcode	Web Page
Number of AES Inputs	0	8	4	0	I/O Config
Number of AES Outputs	8	0	4	8	
Default Factory Names	Factory video and audio default names restored				
Sample Rate Conversion	Enabled				Audio Input Select
Report Loss of Signal	Enabled				
Audio Delay	0 ms				Audio Sync
Audio Input Selections	Demuxed Streams 1-8	AES 1-8	Demuxed Streams 1-4 and AES Streams 1-4	Demuxed Streams 1-8	Audio Input Select
AES Output Stream Selections	Delayed and Bypassed Streams 1-8	No AES Outputs	Delayed and Bypassed Streams 1-4	Delayed and Bypassed Streams 1-8	AES Outputs
Delete all Input Demuxed Groups	No Deletion	Delete			MUX
Group Insertion (muxing)	None	Delayed and Bypassed Streams 1-8 (Groups 1-4)	AES Streams 1-4 (Groups 1 and 2)	Delayed and Bypassed Streams 1-8 (Groups 1-4)	
AES Output Resolution	24 Bits				AES Outputs/ HD or SD MUX
AES C/U/V Bits Pass Through Mode	Enabled				

Configuration Summary

The configuration parameters and monitoring functions available with the web browser interface and the Newton Control Panel are summarized in Table 4. The parameter defaults, choices, ranges, and resolution are provided for each function.

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Input video type	HD 59.94	HD 59.94, SD, HD 50, or HD 24	System Config/ Input Type HD 59.94, SD, HD 50, or HD 24 radio button	HD/SDMode	Set video input type. This will reboot module to load a new configuration.
Input rate	1080i 59.94	HD 59.94: 1080i/59.94 or 720p/59.94 SD: 480i/59.94 or 576i/50 HD 50: 1080i/50 or 720p/50 HD 24: 1080sf/24 or 1080p/24	System Config/ Input Rate pulldown	VidRMode	Set video line rate.
Select output timing source	Input	Frame Reference or Input	System Config/ Output Timing Source Selection Frame Reference or Input radio button	OutClk	Controls available on all modules.
Genlock status	–	Locked or Unlocked	System Config/ Output Timing Genlock read-only status	Genlock	Frame Reference selected as Output Timing Source
Enable or disable all video processing: HD Video Proc, Color Correction, or SD Video Proc or set output to Color Bars test signal	Disable	Enable, Disable, or Color Bars	System Config/ Video Proc Amps Processing: Disabled, Enabled, or Color Bars radio button	VidPrcEn	Status of video processing is reported in each video proc web page header.
Enable or disable split screen	Disabled	Enabled or Disabled	System Config/, or Color Correction/, or HD Video Proc/, or SD Video Proc/ Split Screen Split: Enabled checkbox	SplitEn	Split screen controls appear on four different web pages and all controls are common, including control panel.
Split screen orientation	Vertical	Horizontal or Vertical	System Config/, or Color Correction/, or HD Video Proc/, or SD Video Proc/ Split Screen: Orientation: Vertical or Horizontal radio button	SSOrt	
Split screen position (% of unprocessed video)	50%	10 to 90% (1% steps)	System Config/, or Color Correction/, or HD Video Proc/, or SD Video Proc/ Split Screen: Position (%) control	SSPos	

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Report input signal status	–	Present or Not Present	HD/SD Video In/ Input Signal State report	SigStt	When input signal is Not Present, input video will be reported as No Signal.
Report input video standard line rate	–	See Input Rates above	HD/SD Video In/ Input Signal Standard report	VidInRt	
Adjust horizontal timing in pixels	0 pixels	HD 59.94: 1080i/59.94 = 0 to 2199 720p/59.94 = 0 to 1649 SD: 480i/59.94 = 0 to 857 576i/50 = 0 to 863 HD 50: 1080i/50 = 0 to 2639 720p/50 = 0 to 1979 HD 24: 1080sf/24 = 0 to 2749 1080p/24 = 0 to 2749 (1 pixel steps)	HD/SD Frame Sync/ Timing Adjustments H Timing control	HTiming	Timing reference is set on System Config web page.
Adjust vertical timing in lines	0 lines	HD 59.94: 1080i/59.94 = 0 to 1124 720p/59.94 = 0 to 749 SD: 480i/59.94 = 0 to 524 576i/50 = 0 to 624 HD 50: 1080i/50 = 0 to 1124 720p/50 = 0 to 749 HD 24: 1080sf/24 = 0 to 1124 1080p/24 = 0 to 1124 (1 line steps)	HD/SD Frame Sync/ Timing Adjustments V Timing control	VTiming	
Loss of signal operation (Frame Sync reference timing source selected)	Auto Freeze	Pass, Auto Freeze, or Auto Blue	HD/SD Frame Sync/ Loss of Signal Operation Pass, Auto Freeze, or Auto Blue radio button	LOS Oper	
Manual Freeze mode	None	None, Frame, or Field (SD input only)	HD/SD Frame Sync/ Manual Freeze Mode Selection None, Frame or Field radio button	ManFrzMode	

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Color Correction and Video Processing Adjustments					
Lock R, G, and B gains	Unlocked	Locked or Unlocked	HD/SD Color Correction/ Video Gain Lock checkbox	RGBGnLok	Web page will display either SD or HD Color Correction title depending on input video type selected. Video Proc Amps must be enabled on System Config web page.
Adjust R gain	100%	0 to 200% (1% steps)	HD/SD Color Correction/ R Gain (%)	RGn	
Adjust G gain	100%	0 to 200% (1% steps)	HD/SD Color Correction/ G Gain (%)	GGn	
Adjust B gain	100%	0 to 200% (1% steps)	HD/SD Color Correction/ B Gain (%)	BGn	
Adjust R offset	0	± 100% (1% steps)	HD/SD Color Correction/ R Offset (%)	ROff	
Adjust G offset	0	± 100% (1% steps)	HD/SD Color Correction/ G Offset (%)	GOff	
Adjust B offset	0	± 100% (1% steps)	HD/SD Color Correction/ B Offset (%)	BOff	
Lock Gamma correction controls	Unlocked	Locked or Unlocked	HD/SD Color Correction/ Gamma Lock checkbox	RGBGmLok	Video Proc Amps must be enabled on System Config web page.
Adjust R gamma	1.0	0.25 to 4.00	HD/SD Color Correction/ R Gamma Correction	RGmC	
Adjust G gamma	1.0	0.25 to 4.00	HD/SD Color Correction/ G Gamma Correction	GGmC	
Adjust B gamma	1.0	0.25 to 4.00	HD/SD Color Correction/ B Gamma Correction	BGmC	
Lock HD/SD Y, Cb. and Cr gains together	Unlocked	Lock or Unlock	HD/SD Video Proc/ Video Proc: Video Gain Lock checkbox	YSatGnLok or SdVidGnLk	Video Proc Amps must be enabled on System Config web page.
Adjust HD/SD Y gain (contrast)	100%	0 to 200% (1% steps)	HD/SD Video Proc/ Video Proc: Y Gain (%)	HdYGn or SdYGn	
Adjust HD/SD color saturation (chroma gain)	100%	0 to 200% (1% steps)	HD/SD Video Proc/ Video Proc: Color Saturation (%)	HdChroGn or SdChroGn	
Adjust HD/SD Cb gain	100%	0 to 200% (1% steps)	HD/SD Video Proc/ Video Proc: Cb Gain (%)	HdCbGn or SdCbGn	
Adjust HD/SD Cr gain	100%	0 to 200% (1% steps)	HD/SD Video Proc/ Video Proc: Cr Gain (%)	HdCrGn or SdCrGn	
Adjust HD/SD Y Offset (brightness)	0	± 100% (1% steps)	HD/SD Video Proc/ Video Proc: Y Offset (%)	HdYOff or SdYOff	
Adjust HD/SD Cb offset	0	± 100% (1% steps)	HD/SD Video Proc/ Video Proc: Cb Offset (%)	HdCbOff or SdCbOff	
Adjust HD/SD Cr offset	0	± 100% (1% steps)	HD/SD Video Proc/ Video Proc: Cr Offset (%)	HdCrOff or SdCrOff	
Adjust HD/SD Hue	0	-180 to +179 degrees (1 degree steps)	HD/SD Video Proc/ Proc Amp: Hue (Deg)	HdChroPhs or SdChroPhs	
Delete audio mux groups	No Delete	Delete or No Delete	HD/SD MUX/ Group Status and Delete/ Delete All Input Demuxed Groups checkbox	N/A	Existing embedded audio must be deleted for multiplexing new audio.

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Audio group View Select	Groups (1-2)	Groups (1-2) or Groups (3-4)	HD/SD MUX/ View Select/ Groups (1-2) or Groups (3-4) Radio buttons	N/A	
Audio group insertion choices for embedding in output video.	Pass	Pass Input Embedded Audio Processed Pair 1-4 Delayed and Bypassed Stream 1-8	HD/SD MUX/ Group Insertion/ Group 1-2 and Group 3-4 Streams A and B	G1SASdMux G1SBSdMux G2SASdMux G2SBSdMux G3SASdMux G3SBSdMux G4SASdMux G4SBSdMux or G1SAHdMux G1SBHdMux G2SAHdMux G2SBHdMux G3SAHdMux G3SBHdMux G4SAHdMux G4SBHdMux	Delete All Input Demuxed Groups checkbox must be checked to multi-plex audio streams into output.
Set AES Output Resolution for each output group	24 bit	20 or 24 bit	HD/SD MUX/ AES Output Resolution/ 20 or 24 bit radio button	N/A	
Set AES C/U/V Bits Pass Through	Enabled	Enabled or Disabled	HD/SD MUX/ AES C/U/V Pass Through/ Enabled Checkbox	N/A	Refer to *AES C/U/V Bits Pass Through* on page 18
SD video EDH Insertion	Enabled	Enabled or Disabled	SD Video Out/ Output Video EDH Insertion Enabled Checkbox	EDHInsert	SD input only
Audio input status reporting reset	–	–	Audio Input Status/ Reset button for individual audio streams or Reset All button for all audio stream reporting	N/A	
Select audio input streams. (Inputs available depend on module I/O configu-ration)	Force Silence	Force Silence SDI Input G1.S1 and S2 SDI Input G2.S1 and S2 SDI Input G3.S1 and S2 SDI Input G4.S1 and S2 SDI Input G5.S1 and S2 SDI Input G6.S1 and S2 SDI Input G7.S1 and S2 SDI Input G8.S1 and S2 AES 1-8	Audio Input Select/ Inputs Streams 1-4 or 5-8 radio button	N/A	
Enable sample rate con-version (SRC) for each audio stream	Enabled	Enabled or Disabled	Audio Input Select/ Inputs Streams 1-4 or 5-8 Sample Rate Convert Disable checkbox	N/A	Disabling SRC for an audio stream will automatically dis-able auto tracking for that stream. See also Table 2 on page 18
Report Loss of Signal to upper levels	Enabled	Enabled or Disabled	Audio Input Select/ Inputs Streams 1-4 or 5-8 Loss of Signal Report checkbox	N/A	

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Enable auto tracking for all audio streams 1-8	On	On or Off	Audio Sync/ Enable Auto Tracking On checkbox	AuTkEnbl	Not available in 1080sf/24 or 1080p/24 formats.
Select audio stream for adjustment or viewing	Streams (1-2)	Streams (1-2) Streams (3-4), Streams (5-6), or Streams (7-8)	Audio Sync/ View Select radio buttons	N/A	
Auto tracking status for each audio stream.	–	Enabled or Disabled	Audio Sync/ Auto Tracking Status	AuTkStt1 AuTkStt2 AuTkStt3 AuTkStt4 AuTkStt5 AuTkStt6 AuTkStt7 AuTkStt8	
Amount of Auto Tracking Delay	–	–	Audio Sync/ Stream (1-2), (3-4), (5-6), and (7-8) Auto Tracking Delay	AT_Delay	Read-only reporting of total auto tracking delay in ms.
Amount of total audio delay for each channel	–	–	Audio Sync/ Stream (1-2), (3-4), (5-6), and (7-8) Total Delay	S1Ch1TDly S1Ch2TDly S2Ch1TDly S2Ch2TDly S3Ch1TDly S3Ch2TDly S4Ch1TDly S4Ch2TDly S5Ch1TDly S5Ch2TDly S6Ch1TDly S6Ch2TDly S7Ch1TDly S7Ch2TDly S8Ch1TDly S8Ch2TDly	Read-only reporting of total amount of audio delay for each audio channel in ms.
Lock delay adjustments for each audio stream (Ch 1 and Ch 2)	Unlocked	Lock or Unlocked	Audio Sync/ Stream (1-2), (3-4), (5-6), and (7-8) Channel Delay Lock checkbox	AdjDTyp1 AdjDTyp2 AdjDTyp3 AdjDTyp4 AdjDTyp5 AdjDTyp6 AdjDTyp7 AdjDTyp8	

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Delay adjustments for each audio stream (Ch 1 and Ch 2)	0 ms	0 to 5180 ms	Audio Sync/ Stream (1-2), (3-4), (5-6), and (7-8) Ch 1 and Ch 2 Delay Adjust (ms)	S1Ch1Dly S1Ch2Dly S2Ch1Dly S2Ch2Dly S3Ch1Dly S3Ch2Dly S4Ch1Dly S4Ch2Dly S5Ch1Dly S5Ch2Dly S6Ch1Dly S6Ch2Dly S7Ch1Dly S7Ch2Dly S8Ch1Dly S8Ch2Dly	
Audio processing select	Force Silence	8 Audio Input Streams from Audio Input Select web page	Audio Processing Select/ Stream 1 – Stream 4 radio buttons	N/A	Select 4 streams of audio for processing from the 8 streams of audio selected on the Audio Input Select web page.
Audio Gain view selection	Streams (1-2)	Streams (1-2) or Streams (3-4)	Audio Gain/ View Select radio button	N/A	
Lock gain adjustments for each audio stream (Ch 1 and Ch 2)	Unlocked	Lock or Unlocked	Audio Gain/ Streams (1-2) or (3-4) Channel Gain Lock checkbox	N/A	
Gain adjustments for each audio stream (Ch 1 and Ch 2)	0 dB	-40 to + 6 dB (0.1 dB steps)	Audio Gain/ Streams (1-2) or (3-4) Ch 1 and Ch 2 Gain Adjust (dB)	S1Ch1Gn S1Ch2Gn S2Ch1Gn S2Ch2Gn S3Ch1Gn S3Ch2Gn S4Ch1Gn S4Ch2Gn	
Audio Channel Pairing view selection	Pairs (1-2)	Pairs (1-2) or Pairs (3-4)	Audio Gain/ View Select radio button	N/A	Create 16 Proc Amp Inputs.
Audio channel pairing	Force Silence	Proc Amp Inputs (audio stream choices made on the Audio Processing Select web page)	Audio Channel Pairing/ Pair 1-4 Ch A and B/ Proc In 1 and 2 radio buttons	N/A	
Audio Proc view selection	Pairs (1-2)	Pairs (1-2) and Pairs (3-4)	Audio Proc/ View Select radio button	N/A	

Table 4. Summary of KAM-HD-MULTI Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Notes/ Conditions
Audio processing output selection	In1	In1 -In1 In2 -In2 In1+In2 -(In1+In2) In1-In2 -(In1-In2) 1 Khz 400 Hz Silence ID	Audio Proc/ Pair 1 – Pair 4 ChA and ChB	Pr1AProc Pr1BProc Pr2AProc Pr2BProc Pr3AProc Pr3BProc Pr4AProc Pr4BProc	Select type of output processing for Ch A and Ch B of each Audio Pair.
AES Outputs view selection	First Set of AES Outputs	First Set of AES Outputs and Second Set of AES Outputs	AES Outputs/ First Set of AES Outputs and Second Set of AES Outputs radio buttons	N/A	
AES Output Pairs selection	–	**I/O Config 8/0:** There are no AES Outputs for First or Second Set. **I/O Config 4/4:** First Set of AES Outputs Silence Processed Pair 1-4, Delayed and Bypassed Stream 1-8, and Demuxed Streams 1-8 Second Set of AES Outputs: There are only 4 AES Outputs. **I/O Config 0/8:** First Set of AES Outputs Silence Processed Pair 1-4, Delayed and Bypassed Stream 1-8, and Demuxed Streams 1-8 Second Set of AES Outputs: Same as First Set	AES Outputs/ AES Output Pairs **KAM-HD-MULTI-UR Rear** First Set of AES Outputs: Output-J2A (AES 5) Output-J2B (AES 6) Output-J2C (AES 7) Output-J2D (AES 8) Second Set of AES Outputs: Output-J4A (AES 1) Output-J4B (AES 2) Output-J4C (AES 3) Output-J4D (AES 4) **KAM-HD-MULTI-BR Rear** First Set of AES Outputs: Output-J2A (AES 5) Output-J2B (AES 6) Output-J3A (AES 7) Output-J3B (AES 8) Second Set of AES Outputs: Output-J5A (AES 1) Output-J5B (AES 2 Output-J6A (AES 3) Output-J6B (AES 4	J2A or J3A J2B or J3B J2C or J2A J2D or J2B J4A or J6A J4B or J6B J4C or J5A J4D or J5B	AES Output connector JXX numbers will depend on type of rear module. Output choices will depend on audio I/O configuration.
Set AES Output Resolution for each output stream	24 bit	20 or 24 bit	AES Outputs/ AES Output Resolution/ 20 or 24 bit radio button	N/A	
Set AES C/U/V Bits Pass Through	Enabled	Enabled or Disabled	AES Outputs/ AES C/U/V Pass Through/ Enabled Checkbox	N/A	Refer to *AES C/U/V Bits Pass Through* on page 18. See also Table 2 on page 18.

Newton Control Panel Configuration

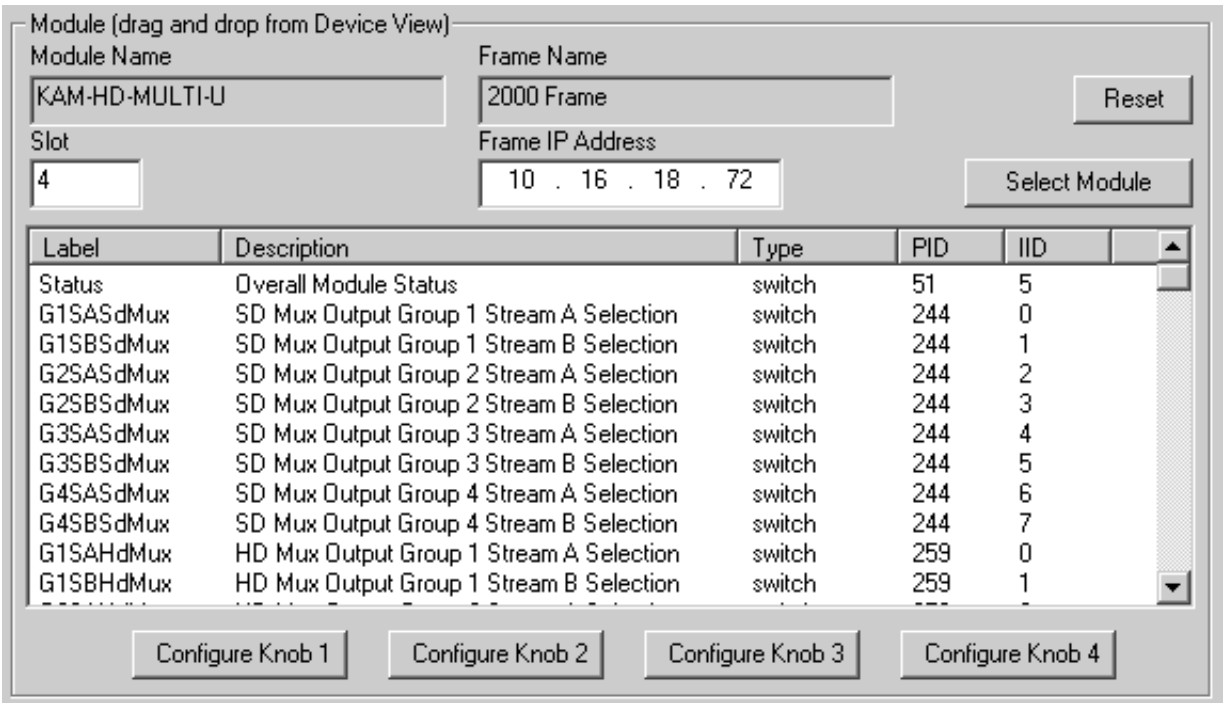
A Newton Control Panel (hard or soft version) can be interfaced to the Kameleon 2000 Series frame over the local network. Control panel access offers the following considerations for module configuration and monitoring:

- Ability to separate system level tasks from operation ones, minimizing the potential for on-air mistakes.
- Ability to group modular products—regardless of their physical locations—into logical groups (channels) that you can easily manipulate with user-configured knobs.
- Update software for applicable modules and assign frame and panel IP addresses with the NetConfig Networking application.
- Recommended for real-time control of module configuration parameters, providing the fastest response time.

Note Not all module functions are available with the control panel, such as E-MEM and factory default recalls. The available control panel controls for the module are listed in Table 4 on page 23.

An example of the Newton Configurator is shown in Figure 12.

Figure 12. Newton Configurator Example



Refer to the documentation that accompanies the Newton Modular Control System for installation, configuration, and operation information.

Web Browser Interface

The web browser interface provides a graphical representation of module configuration and monitoring.

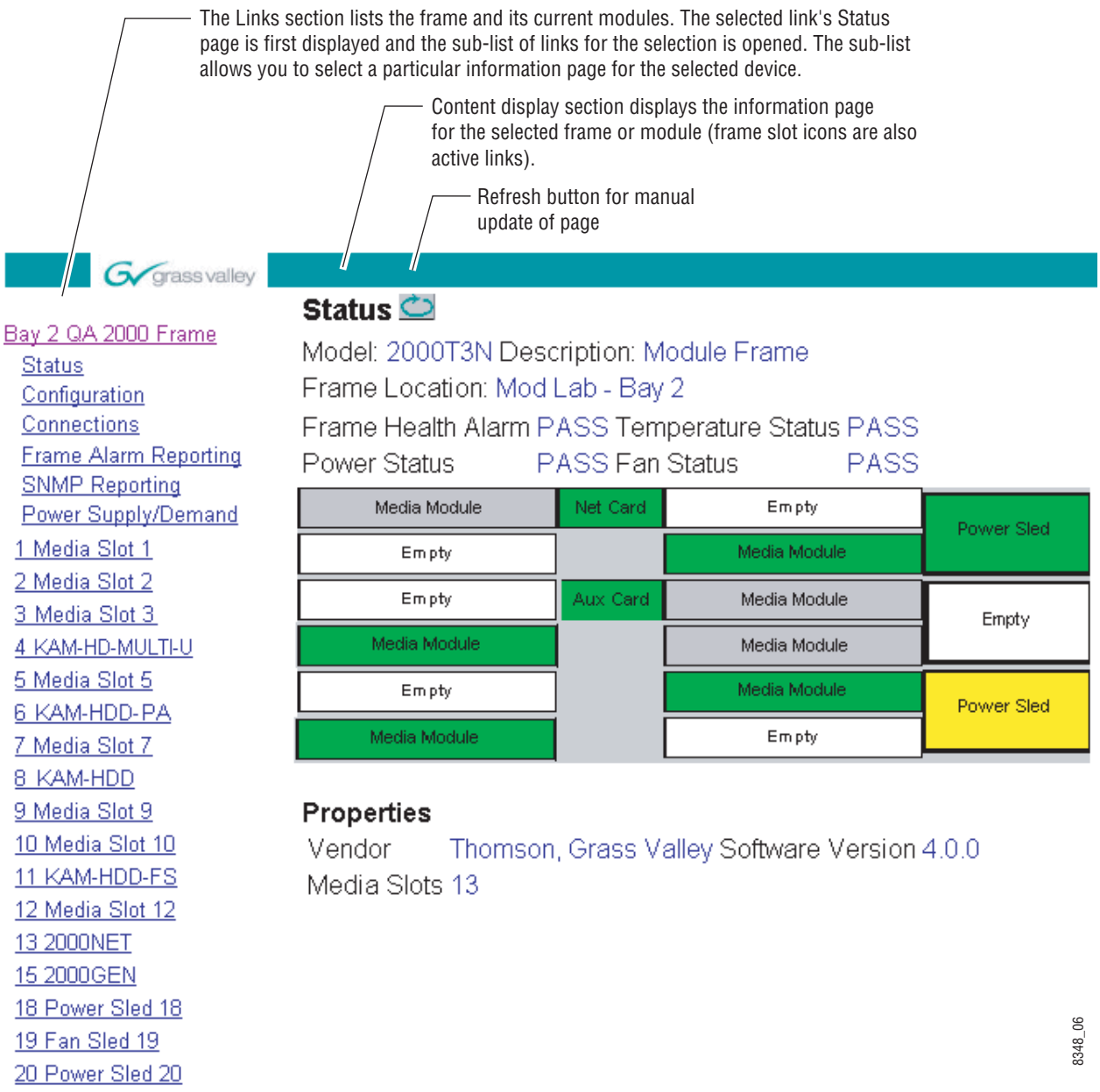
Use of the web interface offers the following considerations:

- Provides complete access to all module status and configuration functions, including naming of inputs and outputs, factory parameter and name default recalls, E-MEM functions, slot configuration, and SNMP monitoring controls.
- Web access will require some normal network time delays for processing of information.
- Configuration parameter changes may require pressing the **Apply** button or **Enter**, upload processing time, and a manual screen refresh to become effective.
- Web interface recommended for setting up module signal and slot names, E-MEMS, and reporting status for SNMP and monitoring.

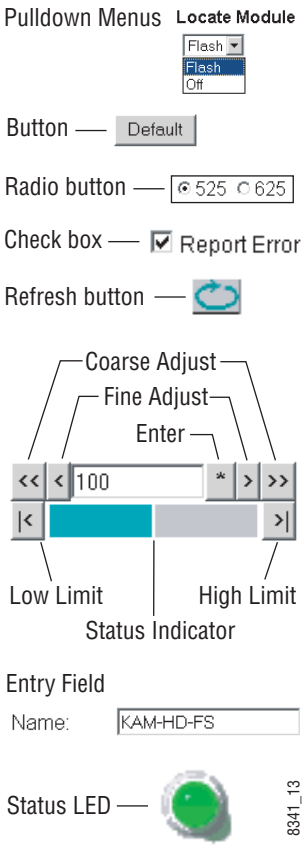
Refer to the Frame Status page shown in Figure 13 on page 32. The Kameleon and 2000 modules can be addressed by clicking either on a specific module icon in the frame status display or on a module name or slot number in the link list on the left.

Note The physical appearance of the menu displays on the web pages shown in this manual represent the use of a particular platform, browser and version of 2000NET module software. They are provided for reference only. Displays will differ depending on the type of platform and browser you are using and the version of the 2000NET software installed in your system. This manual reflects 2000NET software version 4.0.0.

Figure 13. 2000NET GUI



Web Page Operations and Functional Elements



The following conventions and functional elements (shown at left) are used in Kameleon web page operations. (The examples shown throughout this manual represent 2000NET software version 4.0.0 or later):

- Pulldown menus allow you to choose selections from a list.
- Clicking on a button performs an immediate action such as recall of defaults, clearing of states, learning configurations, and selecting all or none of a selection.
- Radio buttons are used to make a choice of one parameter in a group.
- Check boxes are used when a selection can be enabled or included in a group. Multiple check box selections or enables can be made for some parameters.
- A **Refresh** button (circular arrow) is provided at the top of each web page for manual refresh to view recently changed parameters.
- Each numerical adjustment control has a **Coarse** adjust button (left and right top double arrows) which increases or decreases the step value by a factor of 10. The **Fine** adjust button (left and right inside single arrows) increases or decreases the step value by 1.

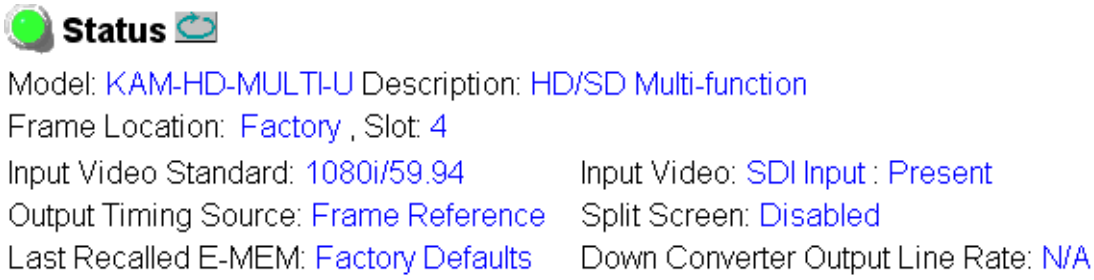
  To change a value, use the arrow button controls or enter a value into the number field and select the **Enter** button (*) or use the **Enter** key on your keyboard. The Status Indicator bar will follow the value selected.

  Use the **Low** and **High Limit** buttons to go directly to the lowest and highest limits for the parameter.
- An entry field allows naming of various module functions such as input or output signals, asset tag, and slot identification.
- The Status LED is explained in *Status LED Icon* on page 34.

Status and Identification Header

Each configuration web page has a Status and Identification Header reporting various status and configuration items on the module (Figure 14).

Figure 14. Status/ID Header



Status LED Icon

The Status LED icon reports communication status for the frame slot and is a link to the module Status web page where Warnings and Faults are displayed.

LED colors indicate:

- Green = Pass – no problems detected
- Yellow = Configuration error warning
- Red = Fault condition detected

Identification Header

The following module status items are reported in the header:

- **Model** and **Description** are read-only generated by the module.
- **Frame Location** is defined on the 2000 Series Kameleon Frame Configuration web page.
- **Slot** number reports the module's location in the frame.
- **Input Video Standard** reports the input video type and rate selected on the System Config web page.
- **Input Video** reports the status of the video input to the module.
- **Output Timing Source** reports the output timing source (Frame Reference or Input) chosen on the System Config web page.
- **Split Screen** status is reported (**Enabled** or **Disabled**) as set on the System Config, Color Correction, or HD and SD Video Proc Amp web pages.
- **Last Recalled E-MEM** reports the last E-MEM configuration recalled.
- **Down Converter Output Line Rate** – not applicable in this application.

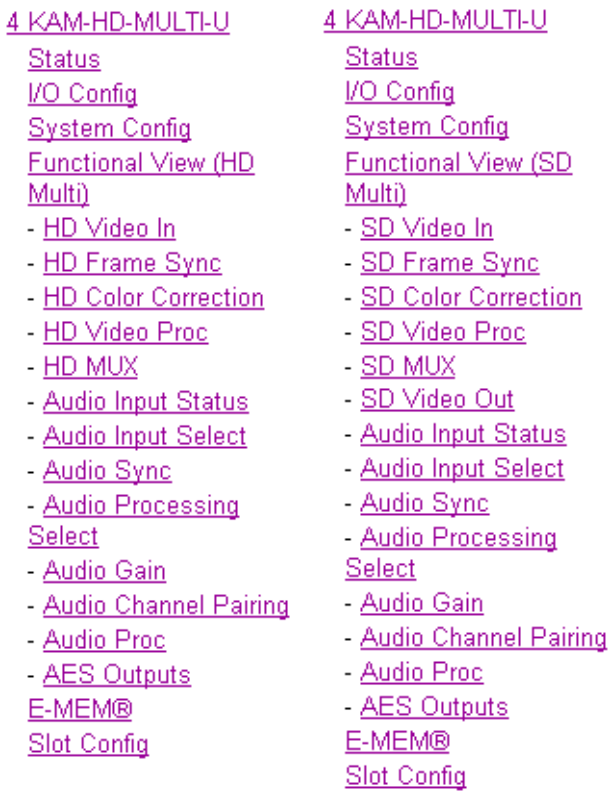
Kameleon HD Links and Web Pages

The 2000 GUI provides the following links and web pages for the KAM-HD-MULTI modules:

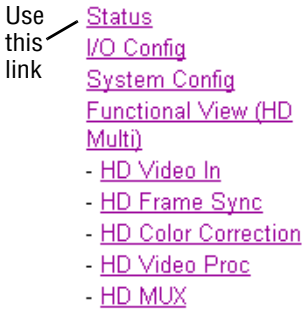
- Status – reports input, reference, and frame bus status and module information (page 37),
- I/O Config – shows a graphic representation of inputs and outputs to the module and allows naming of the input and output signals (page 42),
- System Config – provides output timing selection, input video type select, video rate select, video processor enable, color bars test signal enable, and split screen controls (page 46),
- Functional View – shows a block diagram of the module with links to each module configuration page (page 48),
- Module Configuration pages for setting up the module (page 50),
- E-MEM® – provides Standard and Advanced E-MEM for Learn and Recall functions for up to 5 E-MEM registers, and Recall of Factory settings and names, and four Preset Audio Config buttons for automatic audio configuration (page 81), and
- Slot Config – provides a Locate Module function, Slot Identification fields, Slot Memory, and links to the Frame Health and SNMP reporting on the 2000NET module (page 88), and

The KAM-HD-MULTI module links are shown in Figure 15 for available web pages when an HD input type is selected (left) or an SD input (right).

Figure 15. KAM-HD-MULTI Web Page Links



Status Web Page



The Status web page provides an overall indication of the health of the system, audio configuration information, rear module type installed, and provides links to web pages for the active components:

- Status Header – see *Status and Identification Header* on page 34,
- Color-coded communication status for each component and path,
- Summary of all fault/warning conditions, and
- Textual module status, front module, and rear module properties.

Status web page views differ according to the different audio configurations. The different audio configurations are shown in the following illustrations:

- **8 In/0 Out** – the Status web page for a module with an audio configuration of 8 inputs and no outputs is illustrated in Figure 16 on page 39. Refer to this illustration for an example of a full Status web page.
- **4 In/4 Out** – the reporting section of a Status web page for a module with an audio configuration of 4 inputs and 4 outputs is illustrated in Figure 17 on page 40.
- **0 In/ 8 Out** – the reporting section of a Status web page for a module with an audio configuration of no inputs and 8 outputs is illustrated in Figure 18 on page 40 (Unbalanced Rear) and Figure 19 on page 41 (Balanced Rear).

Status Boxes

Each box represents a Kameleon front or rear module. The KAM-HD-MULTI-UR or -BR link in the Rear I/O Module box will take you to the I/O Config web page for setting input and output names. The module link in the Front Processing module box will take you to the Functional view web page containing the configuration links.

The arrows represent audio and video signal paths that may or may not be monitored. Audio paths represent AES audio inputs. These elements act as links when their function is active (indicated by underlined function name).

Color code:

- Green = Pass – operating as expected.
- Yellow = Warning – signal is absent, has errors, or is misconfigured.
- Red = Fault – a component has failed.
- Gray = Not monitored.

Warning/Fault Summary

Warnings and faults are reported in the Warning/Fault summary section of the Status web page. When a fault or warning is detected, it will be reported in this area.

A Fault indicates a serious condition that prohibits proper operation.

A Warning indicates a condition which may or may not adversely affect operating conditions, but should be noted. Warnings may possibly be corrected by changing configuration, settings or input signals.

Status/Front Module Properties

The Status/Front Module properties in the footer provide a textual summary of the color-coded module status. Front module properties provide hardware, firmware, software identification, and serial number and asset tag assignment for the Kameleon HD module.

Figure 16. Kameleon HD Status Web Page – 8In/0 Out

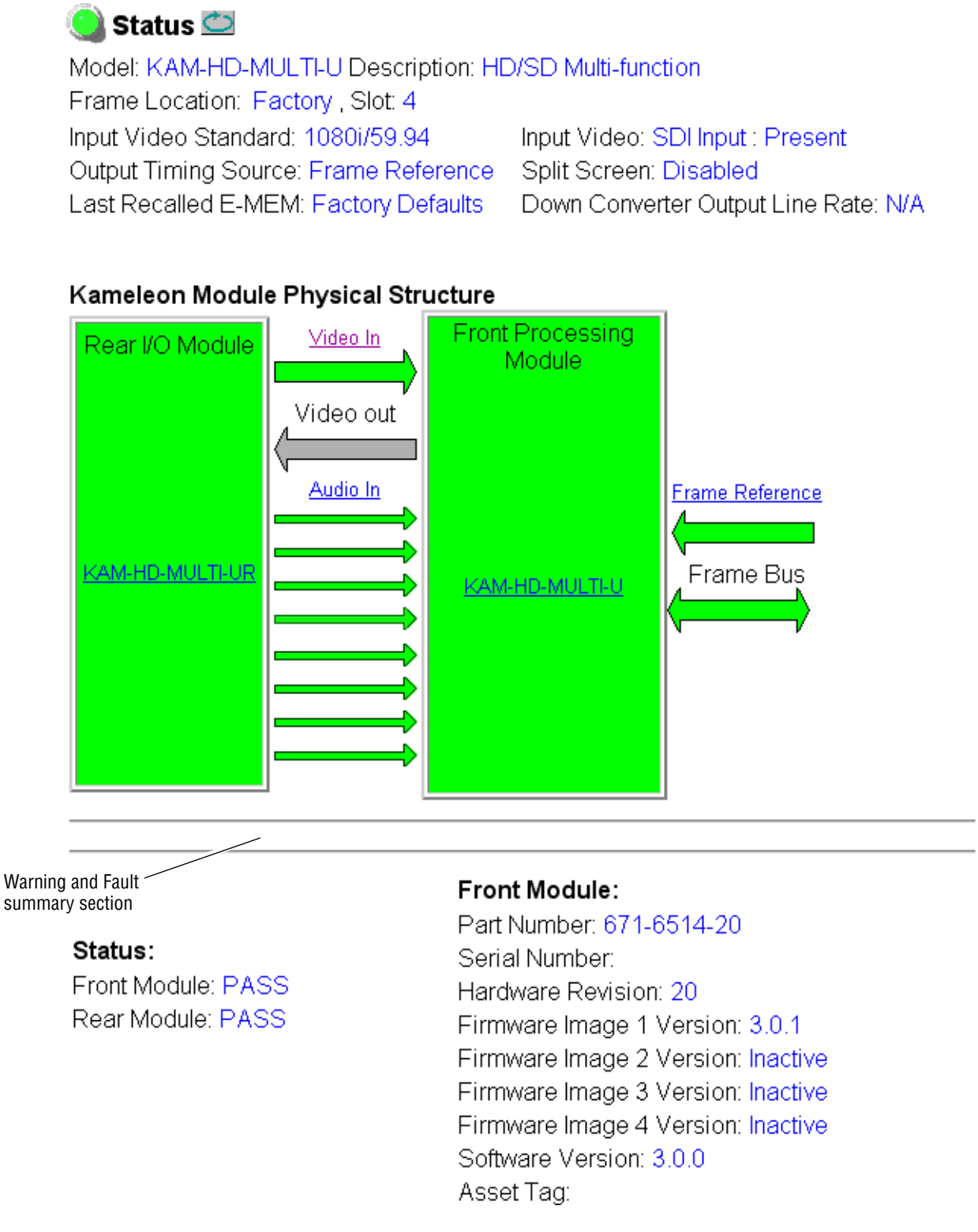


Figure 17. Kameleon HD Status Web Page – 4 In/4 Out

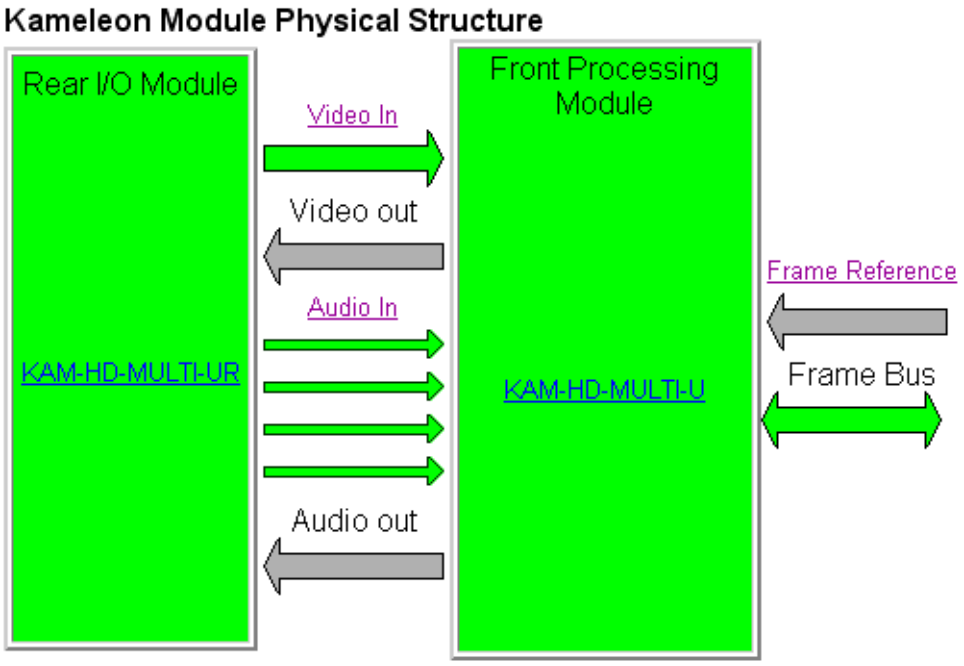


Figure 18. Kameleon HD Status Web Page – 0 In/8 Out

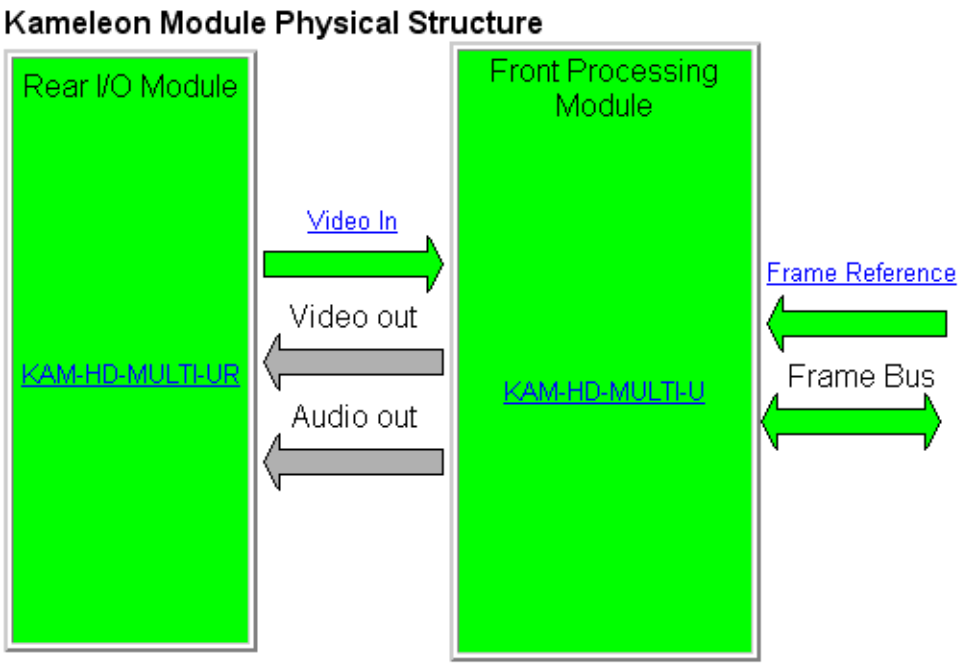
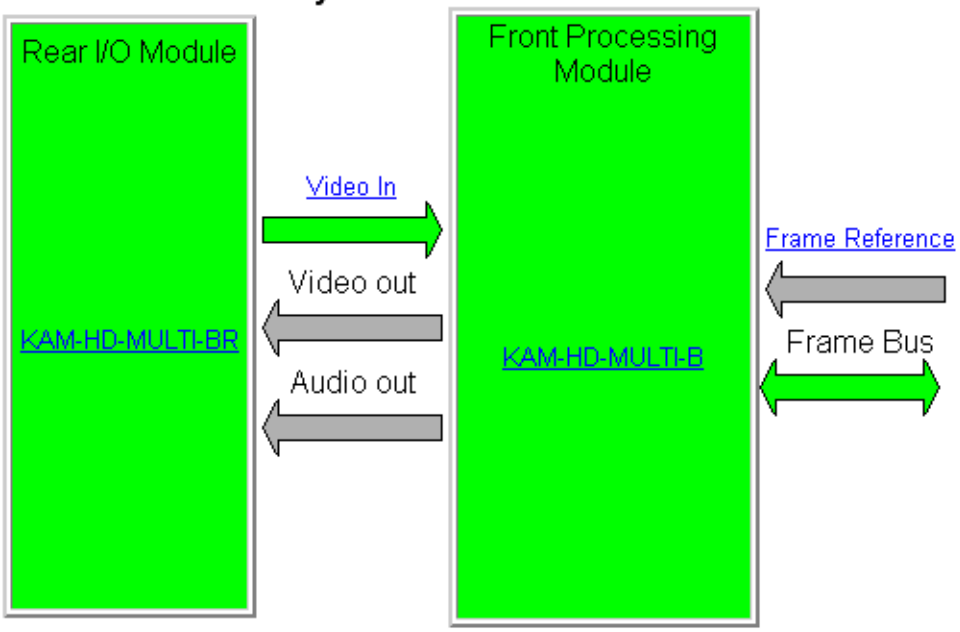


Figure 19. Kameleon HD Status Web Page – Balanced Rear (8 In/0 Out

Status

Model: KAM-HD-MULTI-B Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Source: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

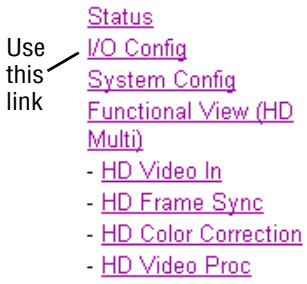
Kameleon Module Physical Structure



Status:
Front Module: PASS
Rear Module: PASS

Front Module:
Part Number: 671-6514-20
Serial Number:
Hardware Revision: 20
Firmware Image 1 Version: Inactive
Firmware Image 2 Version: 3.0.4
Firmware Image 3 Version: Inactive
Firmware Image 4 Version: Inactive
Software Version: 3.0.0
Asset Tag:

I/O Config Web Page



Use the I/O Config web page to:

- View a graphical overview of the rear module connectors,
- See signal status of inputs,
- Set audio input and output configuration, and
- Assign easily recognizable signal names that will help later in the configuration process.

Num AES I/O Select

Use the radio buttons to select the audio input/output configuration for the balanced or unbalanced audio.

The choices for audio inputs and outputs are the following:

- **8 In/0 Out** – the balanced or unbalanced AES connectors all become audio inputs (Figure 20 on page 43 for unbalanced rear). This setting is automatically selected when the Audio Preset Configs **Embed** button is selected on the E-MEM web page.
- **4 In/4 Out** – balanced or unbalanced AES connectors all become audio inputs (Figure 21 on page 44 for unbalanced rear and Figure 22 on page 44 for balanced rear). This setting is automatically selected when the Audio Preset Configs **Universal 8 Ch** button is selected on the E-MEM web page.
- **0 In/ 8 Out** – the balanced or unbalanced AES connectors all become audio outputs (Figure 23 on page 45). This setting is automatically selected when the Audio Preset Configs **DeEmbed** button is selected on the E-MEM web page.

Header Row

The top header row provides the connector hardware physical label (J#) and the dedicated signal type for the connector. This information is determined by the rear module type.

Connector

The connector row illustrates connector types provided for each port.

Input/Output Mode

The I/O mode is static read-only based on the type of module and the settings made on the I/O Config web page.

Signal Naming

Enter a signal name (up to 12 characters) for each operational input/output. The name will be used to identify the signal in other configuration web pages. Factory default names for all models are shown on the individual I/O web pages for each model. Use the Recall Factory Names **Defaults** button to return the signal names to factory defaults. This control is also available on the E-MEM web page.

Status Boxes

As shown in the Legend at the bottom of the I/O Config web page, each connector is monitored and status reported with the following color code:

- Green = Pass – signal is present.
- Yellow = Warning – signal is absent, has errors, or is misconfigured.
- Light gray = connector is not monitored.
- Dark gray = connector is unused.

Figure 20. KAM-HD-MULTI-UR I/O Config Web Page – 8 In/0 Out

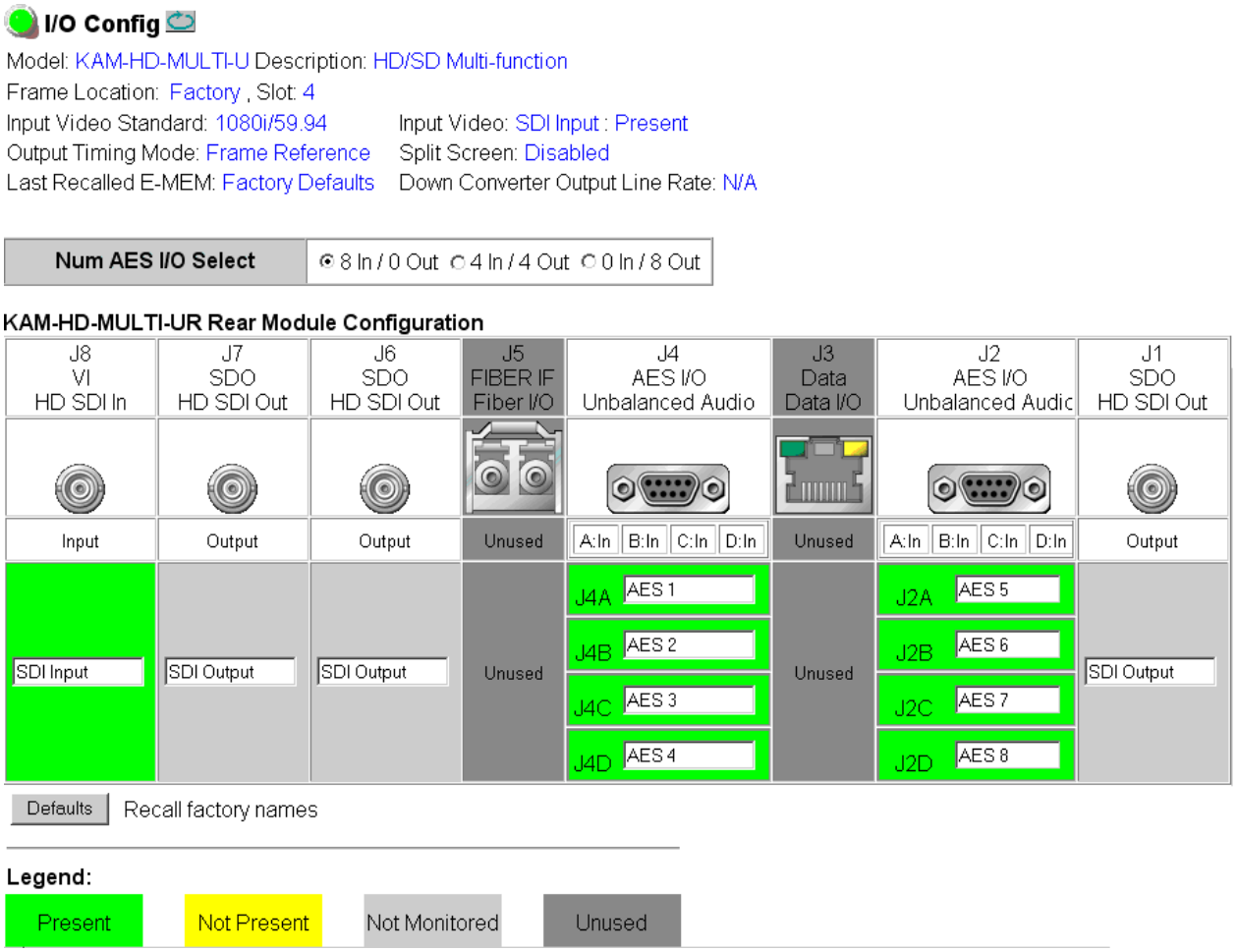


Figure 21. KAM-HD-MULTI-UR I/O Config Web Page – 4 In/4 Out

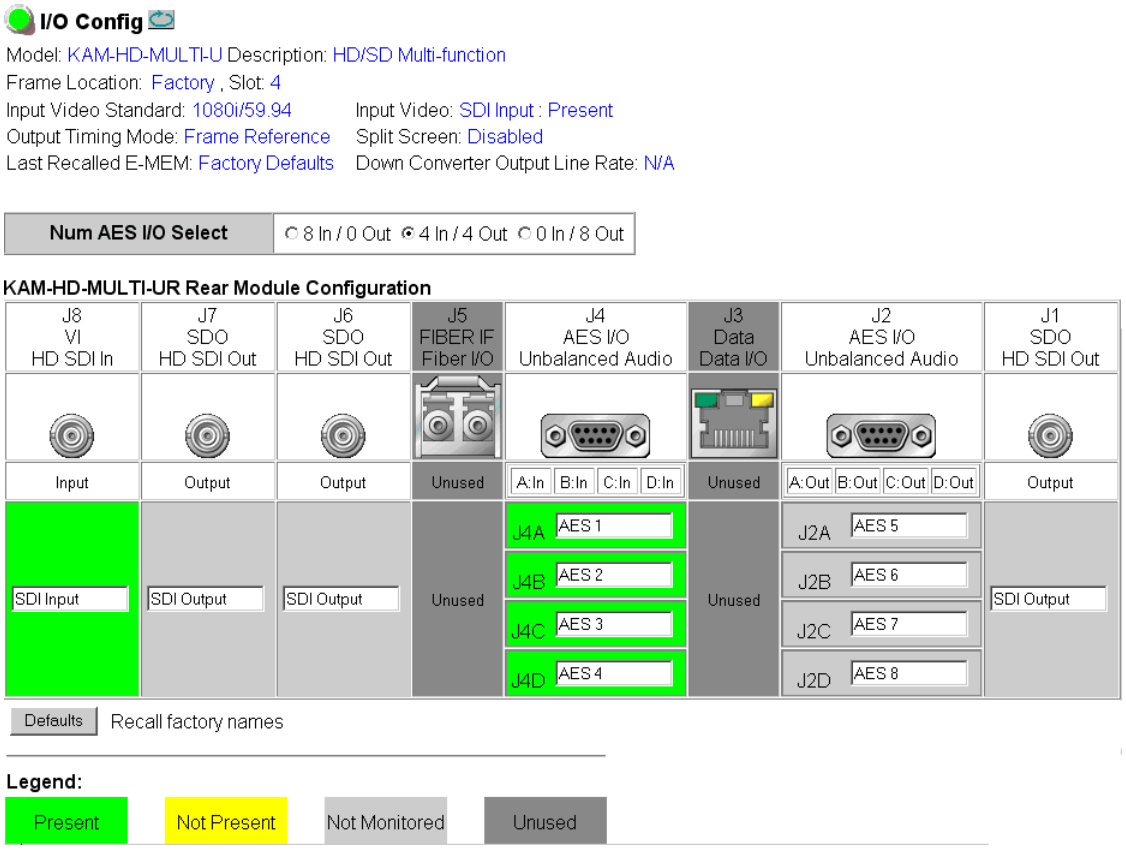


Figure 22. KAM-HD-MULTI-BR I/O Config Web Page – 4 In/4 Out

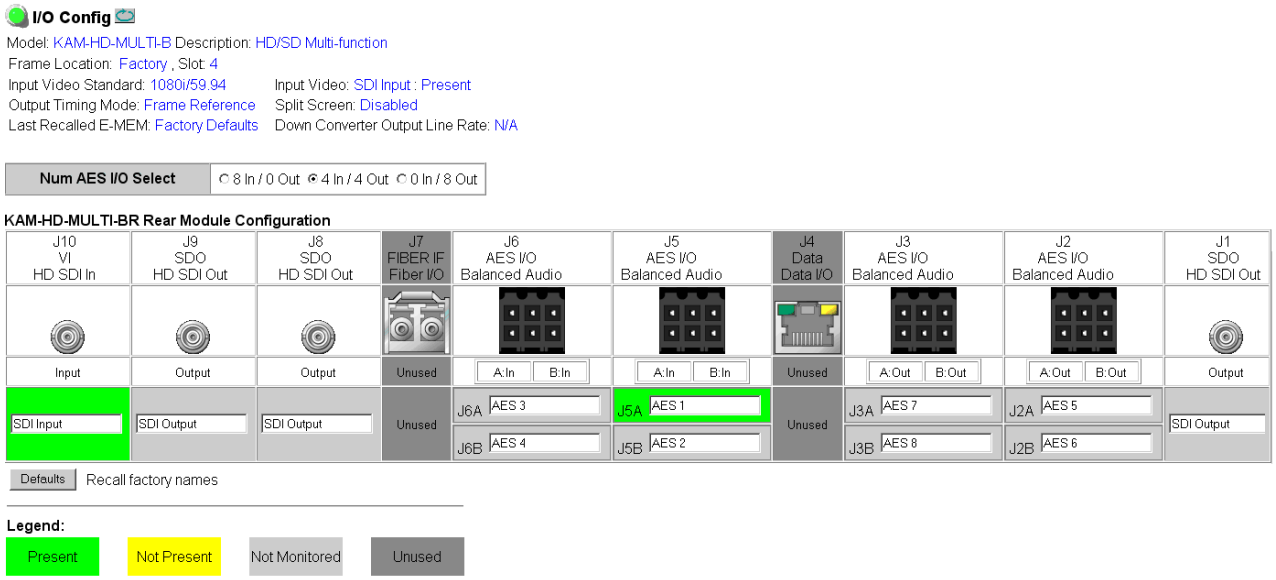
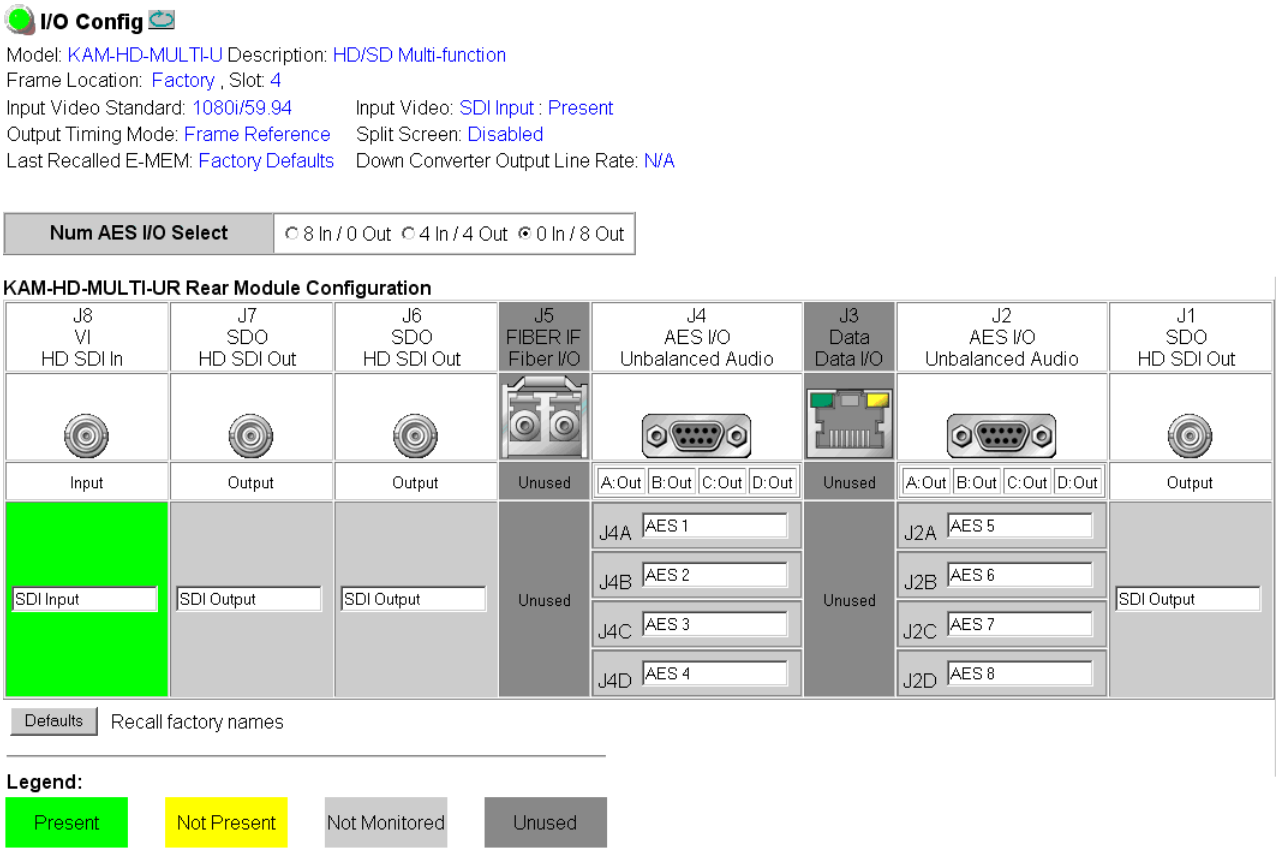
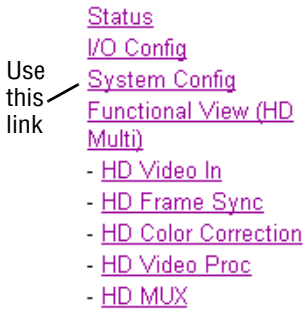


Figure 23. KAM-HD-MULTI-UR I/O Config Web Page – 0 In/8 Out



System Config Web Page



The System Config web page (Figure 25 on page 47) provides the following system configuration controls:

- Selection of the SD or HD input video type and rate for the module.
- Enabling or disabling all HD and SD video processing, including color correction or enable a color bars output test signal.
- Selection of an output timing source.
- Enabling or disabling of the split screen function and screen position for comparing the input video to the processed video. This function is also on the HD and SD Video Proc and Color Correction web pages.

Input Video

Select the desired video input type and rate from the **Input Type** radio buttons and **Input Rate** pulldowns. Refer to Table 4 on page 23 for a complete list of available input types and rates.

Note Pressing the **Defaults** button or changing the Input Type from HD to SD on the System Config web page or with an E-MEM recall will cause the module to reboot. It will take approximately 30 seconds to re-initialize. During this time a Wait Page (Figure 24) will appear. Wait for the operation to complete then select the **Refresh** button to update the web page.

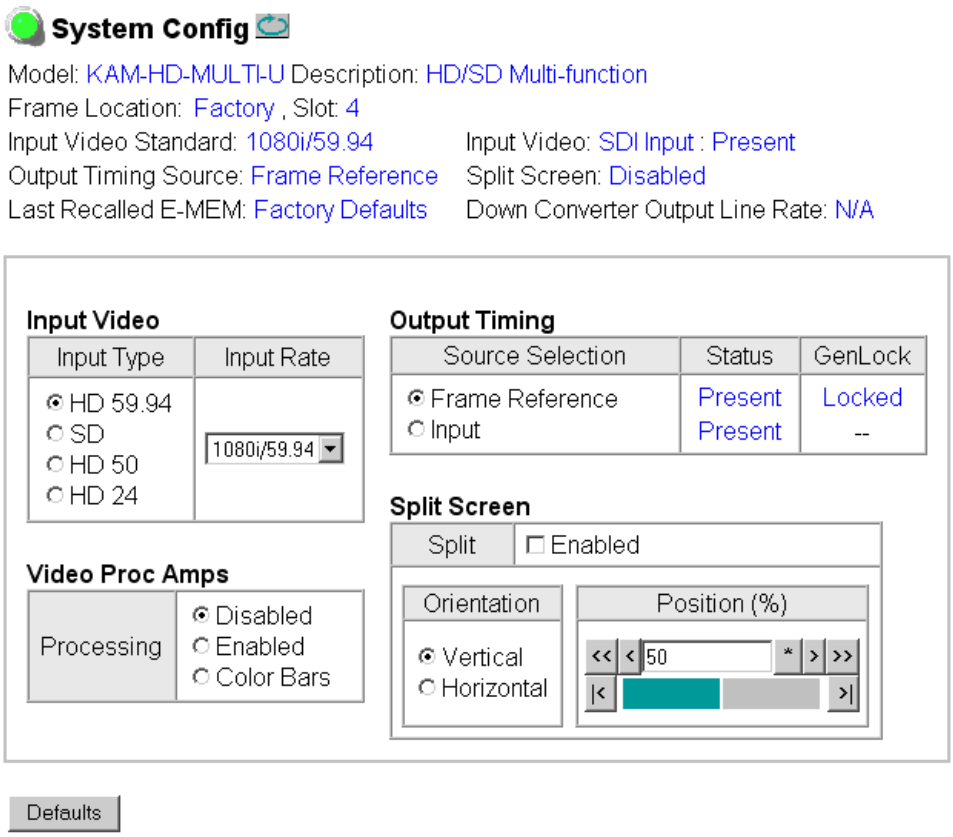
Figure 24. Wait Page

Video Proc Amps

Enable or disable all HD and SD video processing, including color correction on the module with the **Enable** or **Disable** radio button. Proc amp status will be reported on each of the Video Proc and Color Correction web pages. Select the **Color Bars** radio button to enable the internal color bars test signal on the module output.

Note The internal Color Bars test signal is inserted at the output after the video processing and is not adjustable with the video processor.

Figure 25. KAM-HD-MULTI System Config



Output Timing

For all modules, an output timing source can be selected from **Frame Reference** or **Input**. When **Frame Reference** is selected, modules with frame sync capability (KAM-HD-FS and KAM-HDD-FS) can be genlocked to the frame reference inserted into the 2000 frame. For these modules, a Frame Sync web page provides horizontal and vertical timing and freeze modes.

For modules without frame sync, when the Output Timing source is selected as **Frame Reference**, the start of any line of the output signal will sync to the start of any horizontal line in the frame reference.

Split Screen

Use a horizontal or vertical split screen to compare the unprocessed input video (top or right) to the processed output video (bottom or left). Enable the split screen by checking the Split **Enabled** checkbox.

Set the Orientation of the split screen with the **Vertical** or **Horizontal** radio button. Use the **Position** control to set the amount of horizontal or vertical split (10 to 90%) of unprocessed video to appear on the screen.

This control is the same as the other Split Screen controls on the Color Correction, HD Video Proc, and SD Video Proc web pages.

Functional View Web Pages

Use this link

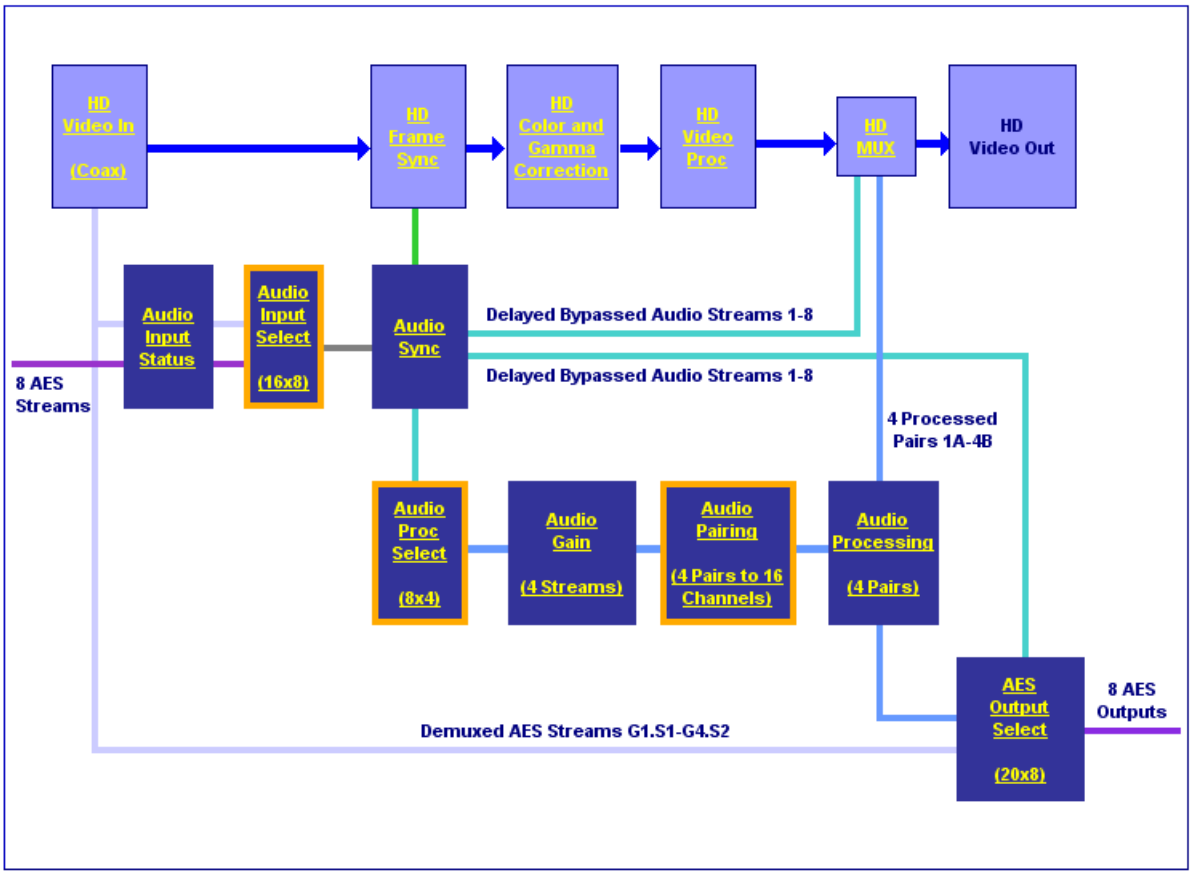
Status
I/O Config
System Config
Functional View (HD Multi)
- HD Video In
- HD Frame Sync
- HD Color Correction
- HD Video Proc
- HD MUX

The Functional View web pages illustrate a block diagram of the Kameleon HD front media module showing module functions and signal paths that are active or inactive in the current configuration. They can be used as a link map for configuring module functions. Each block has a link to the configuration page for that function. Use the Functional View to configure the Kameleon HD module in the order of the signal flow.

Color coding indicates active functions and signal flow. Grayed components are inactive due to hardware and/or software constraints. Underlined module functions are links to the web page for that function.

The Functional View for the KAM-HD-MULTI module with an HD input type selected is shown in Figure 26.

Figure 26. KAM-HD-FS Functional View Web Page – HD Input Type



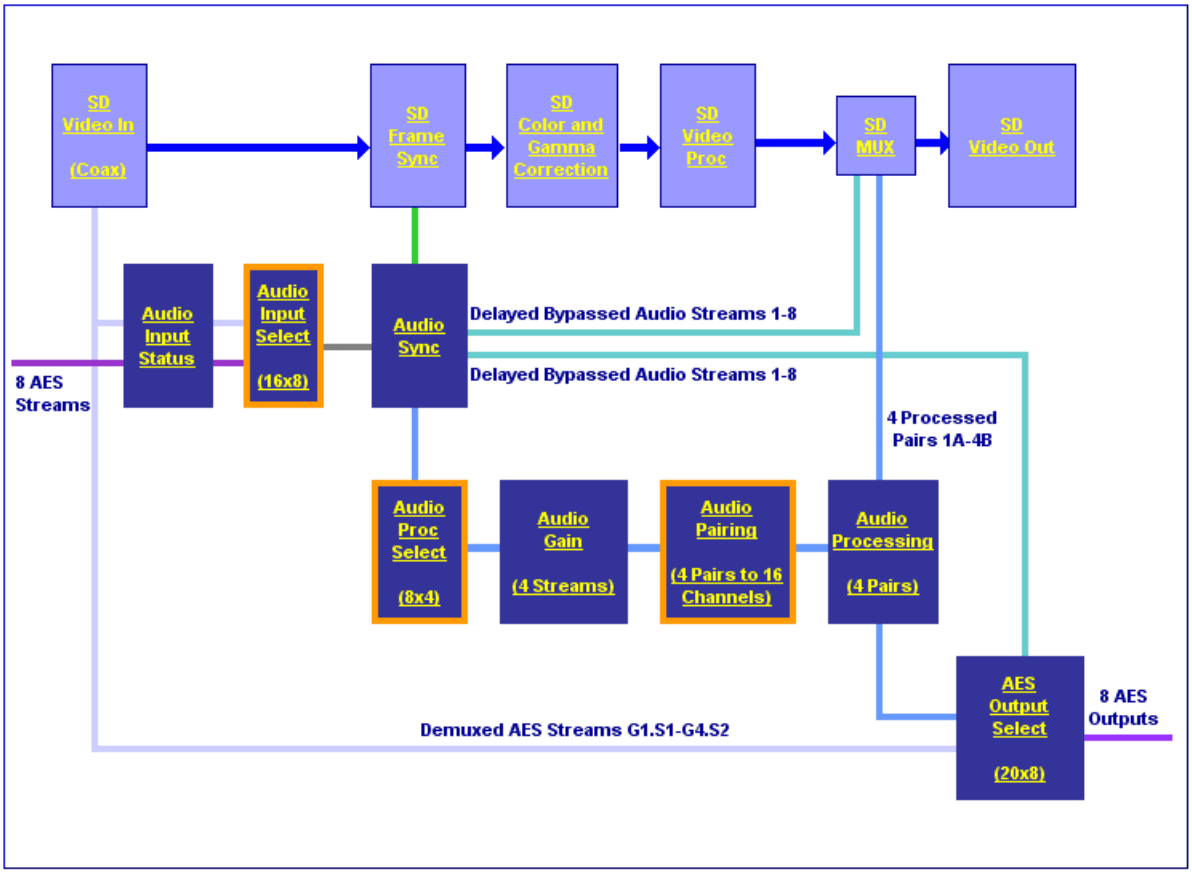
Status
I/O Config
System Config
Use this link → Functional View (HD Multi)
- HD Video In
- HD Frame Sync

Figure 27 shows a Functional View for a KAM-HD-MULTI module with an SD input type selected.

Figure 27. KAM-HD-MULTI Functional View Web Page – SD Input Type

Functional View (SD Multi)

Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 576i/50 Input Video: SDI Input : Present
Output Timing Source: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A



Module Configuration Web Pages

Module configuration and monitoring is provided for the following HD or SD video and audio functions (depending on video input type and audio configuration setting) with the web browser GUI or control panel interface:

- HD or SD Video In (page 51)
- HD or SD Frame Sync (page 52)
- HD or SD Color Correction (page 54)
- HD or SD Video Proc (page 56)
- HD or SD MUX (page 58)
- SD Video Out (page 61)
- Audio Input Status (page 62)
- Audio Input Select (page 65)
- Audio Sync (page 68)
- Audio Processing Select (page 70)
- Audio Gain (page 71)
- Audio Channel Pairing (page 73)
- Audio Proc (page 75)
- AES Outputs (page 77)

Note Presence of some of the web pages listed above depends on module type and system configuration. HD or SD video input type is set on the System Config web page.

A summarized list of all control parameters and default values is given in a Configuration Summary table on page 23.

Use the **Defaults** button on the bottom left of the configuration web pages to return the values on that page to the defaults listed in the Configuration Summary table.

Note Pressing the **Defaults** button on the System Config web page will reboot the module as it resets the Input Type. Refer to *System Config Web Page* on page 46.

Select the **Previous**, **Functional View**, or **Next** links on the bottom of each configuration web page to navigate to the next function or use the links on the left of the web page. Return to the **Functional View** at any time for configuration flow or to see where the control is in the block diagram for the module.

HD/SD Video In Web Page

Status
I/O Config
System Config
Functional View (HD Multi)
- HD Video In
- HD Frame Sync
- HD Color Correction
- HD Video Proc
- HD MUX

Use this link

The HD or SD Video In web page (Figure 28 shows HD input type) provides status on the HD or SD Video input for the following:

Input Signal State

This field reports the presence or absence of the input video signal.

Input Signal Standard

This field reports the HD or SD format standard of the input video signal detected by the module within the line rates supported by the current input type.

Figure 28. HD Video In Page

HD Video In

Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Source: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

Input Signal State	Present
Input Signal Standard	1080i/59.94

Functional View | Next >>

HD/SD Frame Sync Web Page

Status
I/O Config
System Config
Functional View (HD Multi)
- HD Video In
- HD Frame Sync
- HD Color Correction
- HD Video Proc
- HD MUX

Use this link

The HD or SD Frame Sync web page provides horizontal and vertical timing and loss of signal controls.

Note The controls available on the Frame Sync page depend on the Output Timing Source selected (Input or Frame Reference) on the System Config web page.

Figure 29 illustrates the Frame Sync web page in **Input** mode (output timing source = **Input** as set on System Config web page) for an HD input type.

Timing Adjustment

Horizontal and vertical timing adjustments can be made on the output video as required.

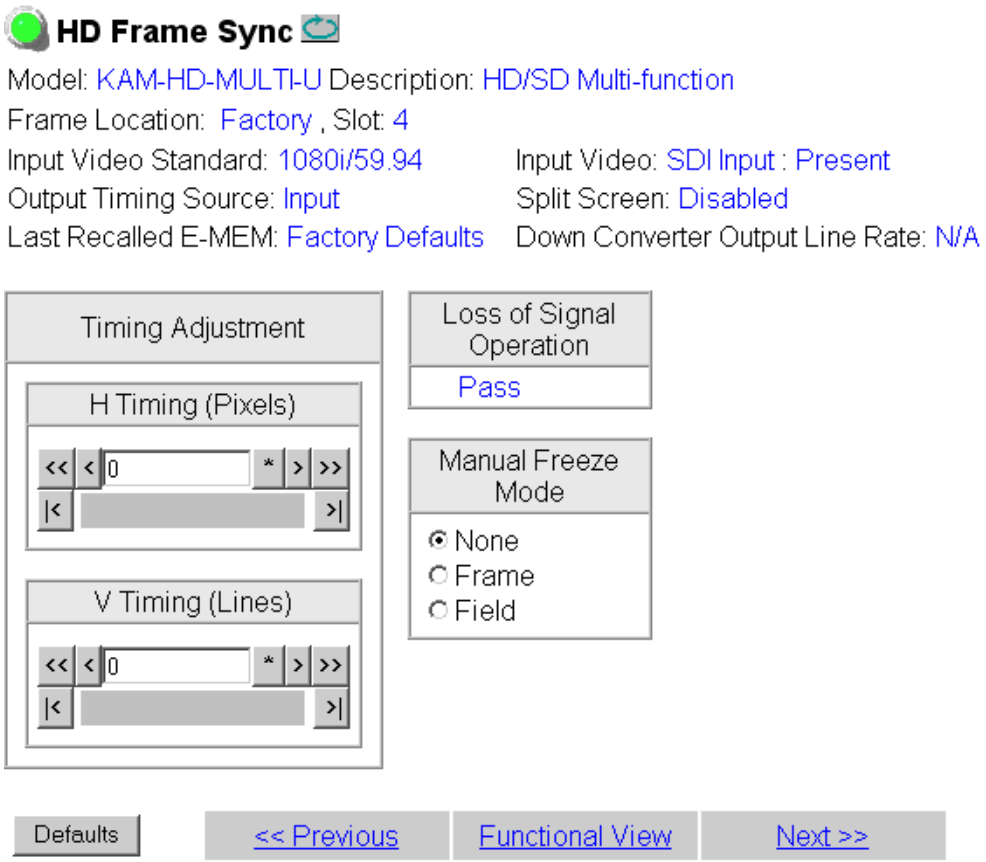
Loss of Signal Operation

This function will default to **Pass** (no auto freeze).

Manual Freeze Mode

Select a manual freeze mode from **None**, **Frame**, or **Field.**

Figure 29. Frame Sync Web Page – Input Mode



When the module is set for a Output Timing Source of **Frame Reference**, the web page will have the controls shown in Figure 30.

Timing Adjustment

Horizontal and vertical timing adjustments can be made on the output video as required.

Loss of Signal Operation

Define the action of the output to **Pass** the video, do an **Auto Freeze** or take the output to a blue screen (**Auto Blue**) when the input signal is detected as lost.

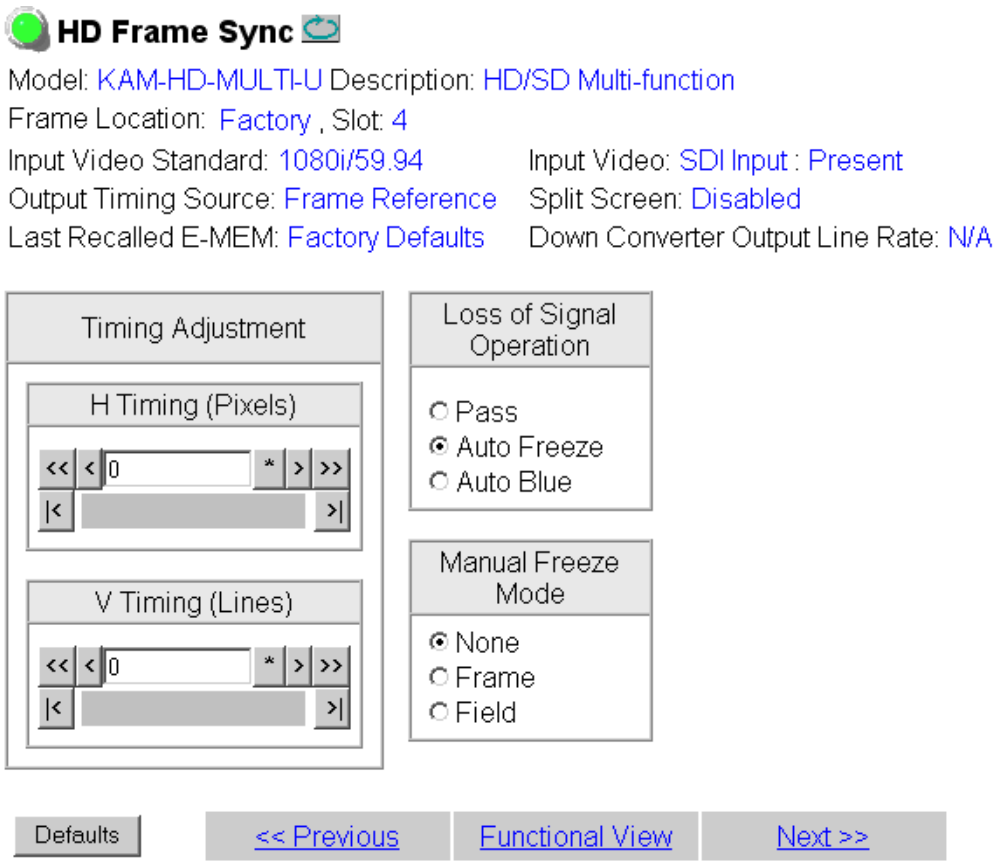
Manual Freeze Mode

Select a manual freeze mode from **None**, **Frame**, or **Field.**

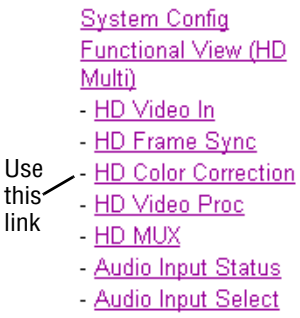
Pitch Change Feature

When a video frame is dropped or repeated, this module has been designed to slew the audio so that a slight pitch change will occur in the audio output instead of pops and clicks until the audio catches up to the video.

Figure 30. Frame Sync Web Page – Frame Sync Mode



HD/SD Color Correction Web Page



The HD or SD Color Correction web page (Figure 31 on page 55 for an HD input type) provides the following controls:

- Specific R, G, and B gain and offset video processing controls for the input signal,
- Gamma correction (lightening or darkening the intensity) of the signal, and
- A Split Screen control for comparing the input video to the processed video.

The Color Correction processing must be enabled on the *System Config Web Page* on page 46 with the Video Proc Amps Processing controls. Select the **Enabled** checkbox to enable these controls. Proc Amp status is reported in the Color Correction web page header.

R/G/B Controls

- **Gain Adjustments** – set the gain from 0 to 200% for the R, G, and/or B channel with the corresponding control or lock the controls together by checking the **Video Gain Lock** checkbox and adjust any one of the gain controls.
- **Offset Adjustments** – set the offset from ± 100% for the R, G, or B channel with the corresponding control.

Gamma Correction

Set gamma correction for the R, G, and/or B channel with the corresponding control or lock the controls together by checking the **Gamma Lock** checkbox and adjust any one of the gamma controls. Raising the gamma above 1.0, brightens the gray intensity. Lowering the gamma below 1.0, darkens the gray intensity.

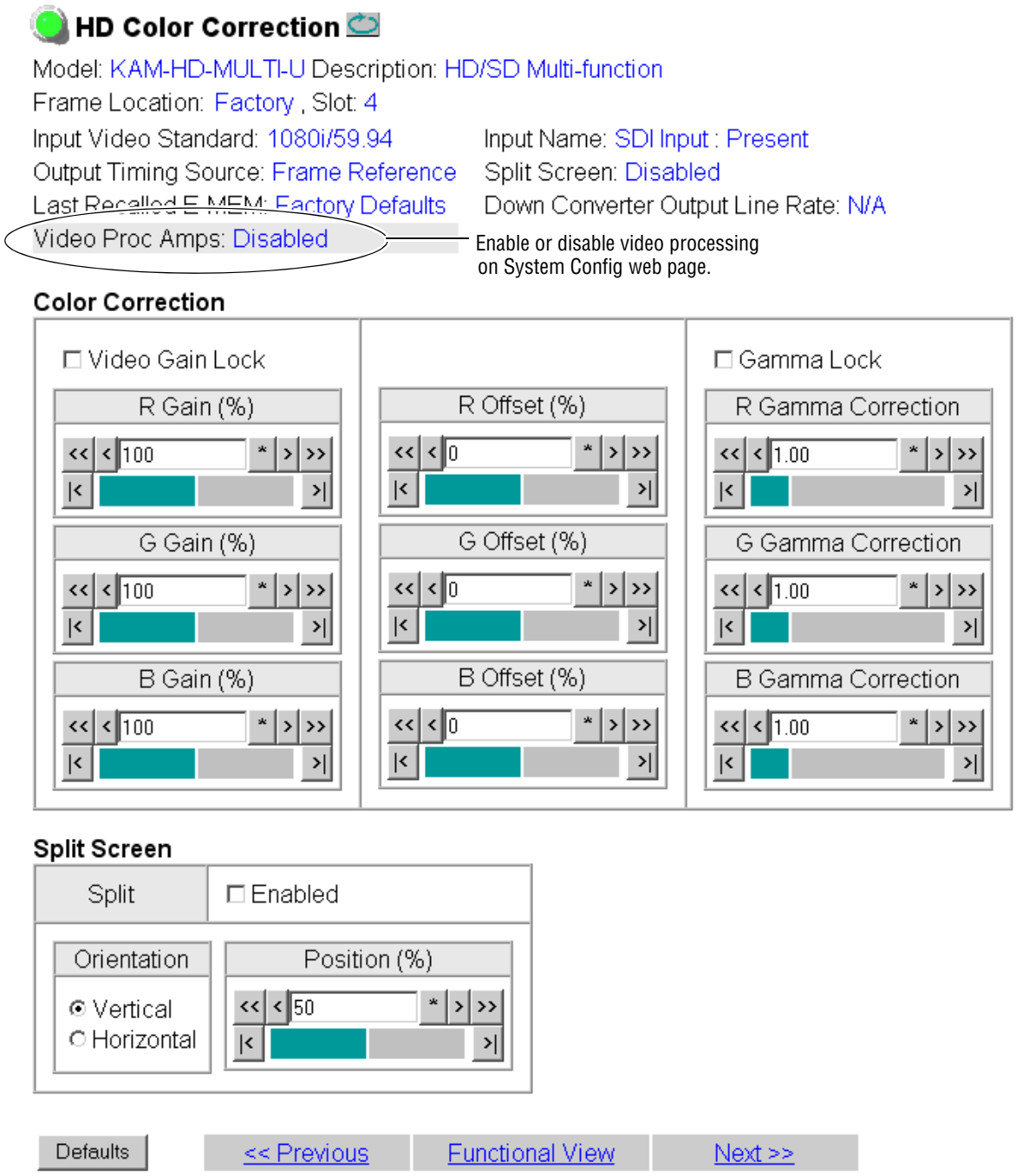
Split Screen

Use a horizontal or vertical split screen to compare the unprocessed input video (top or right) to the processed output video (bottom or left). Enable the split screen by checking the Split **Enabled** checkbox.

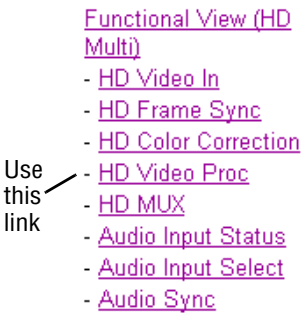
Set the Orientation of the split screen with the **Vertical** or **Horizontal** radio button. Use the **Position** control to set the amount of horizontal or vertical split (10 to 90%) of unprocessed video to appear on the screen.

This control also controls the other Split Screen controls on the System Config and HD and SD Video Proc web pages.

Figure 31. Color Correction Web Page



HD/SD Video Proc Web Page



The HD or SD Video Proc web page (Figure 32 on page 57) is active when the **Enabled** radio button is selected on the System Config web page (see page 46). It provides overall video processing for the HD or SD signal.

Note The internal Color Bars test signal (also selectable on the System Config web page) is not adjustable with the proc amp.

The HD Video Proc is enabled or disabled on the *System Config Web Page* on page 46 with the Video Proc Amps **Enabled/Disabled** control. Proc Amp status is reported in the HD Video Proc web page header.

Note Super black is always clipped to the black level in the video processor circuitry and is not passed to the output.

The HD Video Proc provides the following controls:

Y/Cb/Cr Adjustments

- **Gain** – set the gain for the Y, Cb, or Cr channel from 0 to 200% (total effective Y Gain will reach approximately 188%) with the corresponding control or lock the controls together by checking the **Video Gain Lock** checkbox and adjust any one of the gain controls.
- **Offset** – set the offset ± 100% for the Y, Cb, and Cr channels with the corresponding control.

Color Saturation

Set the overall color saturation (chroma gain) from 0 – 200%. (This setting will affect Cb and Cr gain slightly.)

Hue

Adjust the output hue from -180 to + 179 degrees.

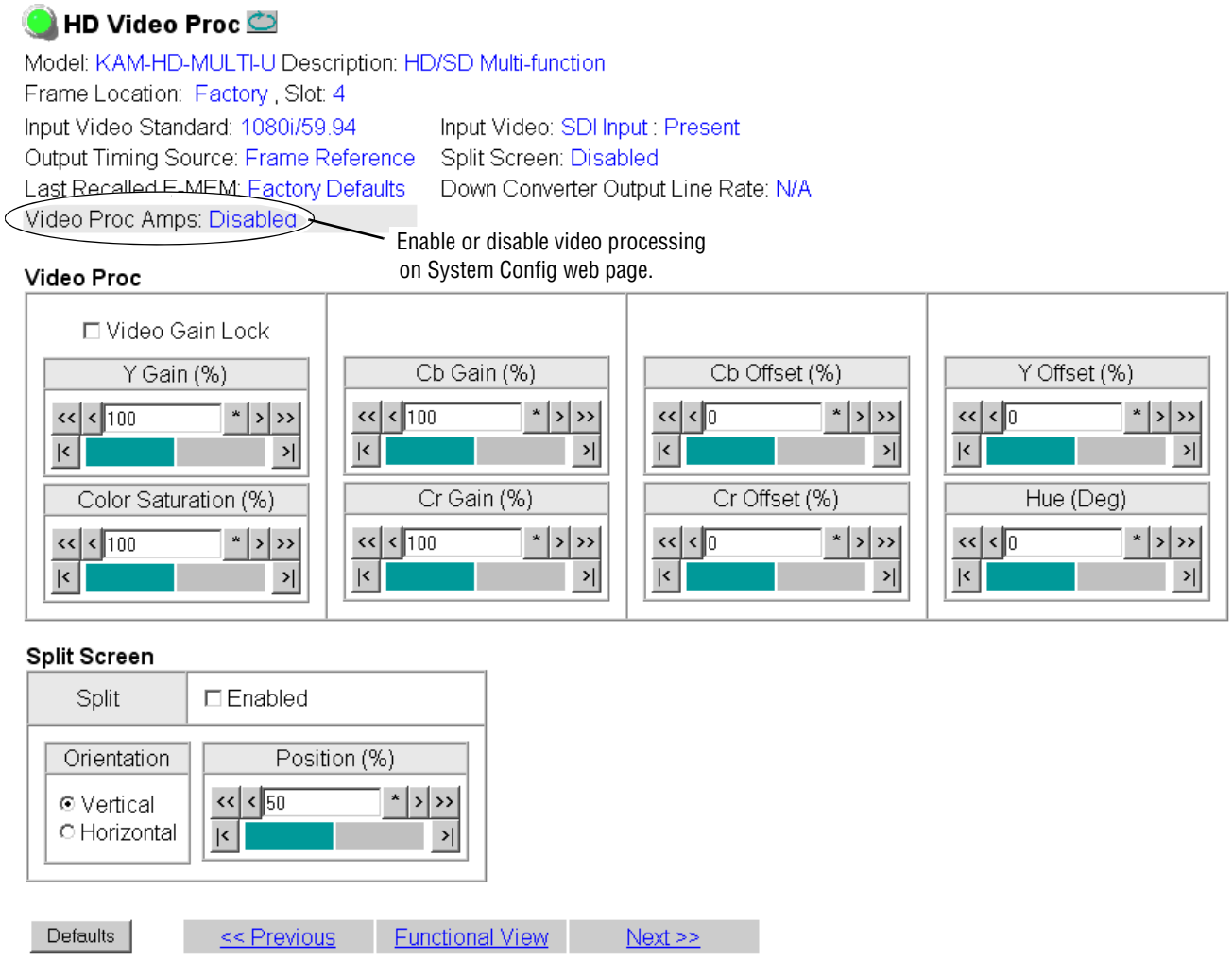
Split Screen

Use a horizontal or vertical split screen to compare the unprocessed input video (top or right) to the processed output video (bottom or left). Enable the split screen by checking the Split **Enabled** checkbox.

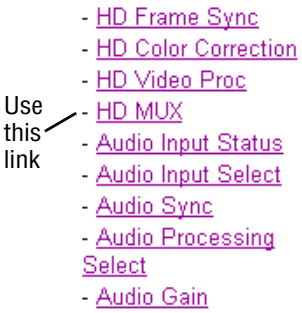
Use the **Position** control to set the amount of horizontal or vertical split (10 to 90%) of unprocessed video to appear on the screen.

This control is the same as the other Split Screen controls on the Color Correction, SD Video Proc, and System Config web pages.

Figure 32. HD Video Proc Web Pager



HD/SD MUX Web Page



Use the HD or SD MUX (multiplex) web page (Figure 34 on page 60) to:

- Delete all input demuxed audio groups from the SDI video output signal to allow insertion of audio (no replacement) on the video output,
- Select the audio groups to be inserted into the empty SDI video output stream from the list of available audio streams,
- Set the AES Output Resolution, and
- Enable or disable the AES C/U/V Pass Through.

View Select

Select either the **Groups (1-2)** or **Groups (3-4)** radio button to bring up the correct web page for the audio group you want to multiplex into the video output stream.

Group Status and Deletion

The Group Status and Delete area of the MUX web page reports the input status of embedded audio groups in the video input signal. Embedded audio present in the video input stream is demultiplexed and copied automatically at the input of the module and sent to the audio input select and AES output circuitry.

The following items are provided in the Group Status and Delete section:

- **Input Status** – the input status of embedded audio Group 1-4 is reported in this section (Present or Not Present).

Note The status of individual streams of audio in each embedded audio group can be seen on the Audio Input Status web page (see the *Audio Input Status Web Page* on page 62).

- **Delete** checkbox – check the **Delete All Input Demuxed Groups** checkbox to remove all embedded audio so new audio can be inserted into the output video stream.

Note There is no replacement function in this application. To insert new audio into the video output stream (multiplex), all existing audio must be deleted or an error message will be reported. Audio may be inserted into an empty group.

- **Output Status** – the status of the embedded audio is reported (Deleted, Inserted, Error, or Passed).

Group Insertion

Up to four audio groups (Groups 1-4, Stream A and B) can be inserted into the SDI output stream. Audio groups present in the video output stream cannot be replaced. Existing audio groups must be deleted by checking the **Delete All Input Demuxed Groups** checkbox or a new group can be inserted into any empty group location. The group pairs for insertion are chosen from the Group Insertion choices given in the list on the MUX web page.

The following choices are available for insertion:

- **Input Embedded Audio** – selecting a group from this choice passes the embedded audio present in the video input stream to the video output with no audio processing.
- **Processed Pair 1-4** – the processed audio pairs are audio streams that have been defined on the Audio Channel Pairing web page and processed in the Audio Proc.
- **Delayed and Bypassed Stream 1-8** – these audio streams have been adjusted on the Audio Sync web page. Auto Tracking to the video frame sync can be enabled and delay can be added.

Figure 33 depicts an example of the multiplexing of the selected audio Mux groups into the SDI video stream. Group insertion selections are made on the MUX web page. The **Groups (1-2)** view is illustrated in Figure 34 on page 60. Make selections for **Groups (3-4)** by selecting the other view.

Figure 33. Multiplexing into the SDI Stream

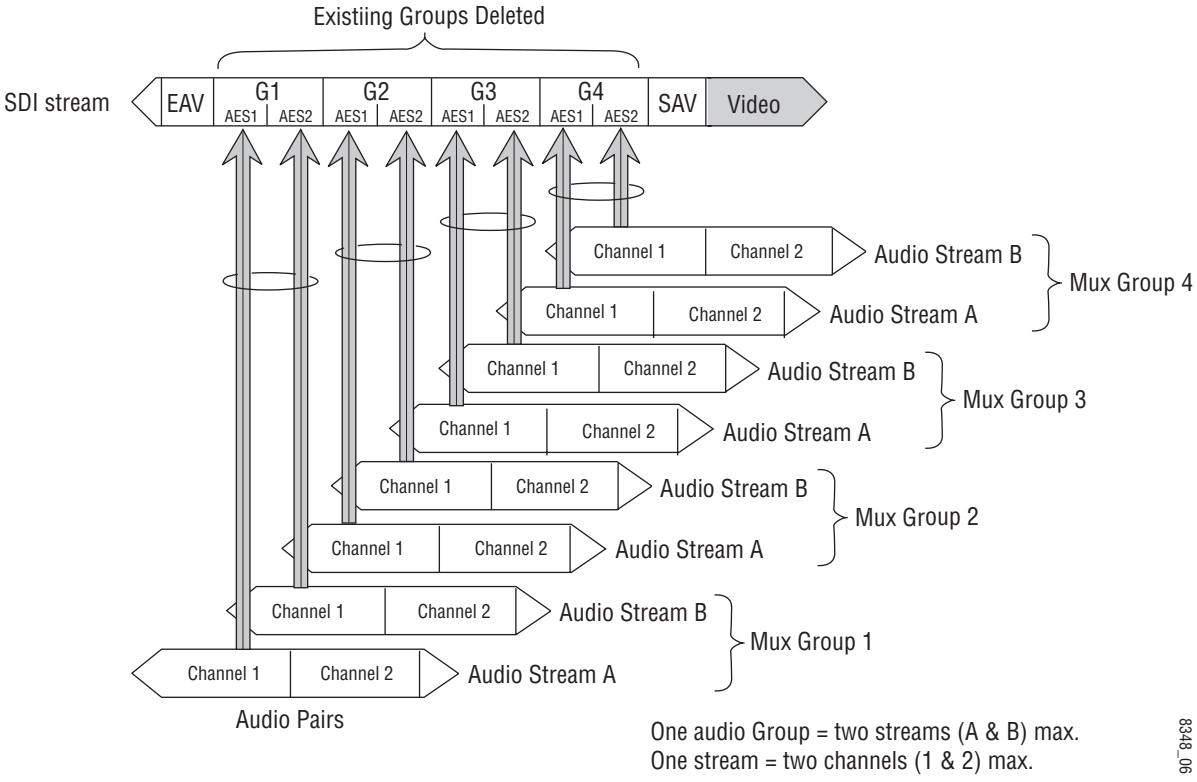
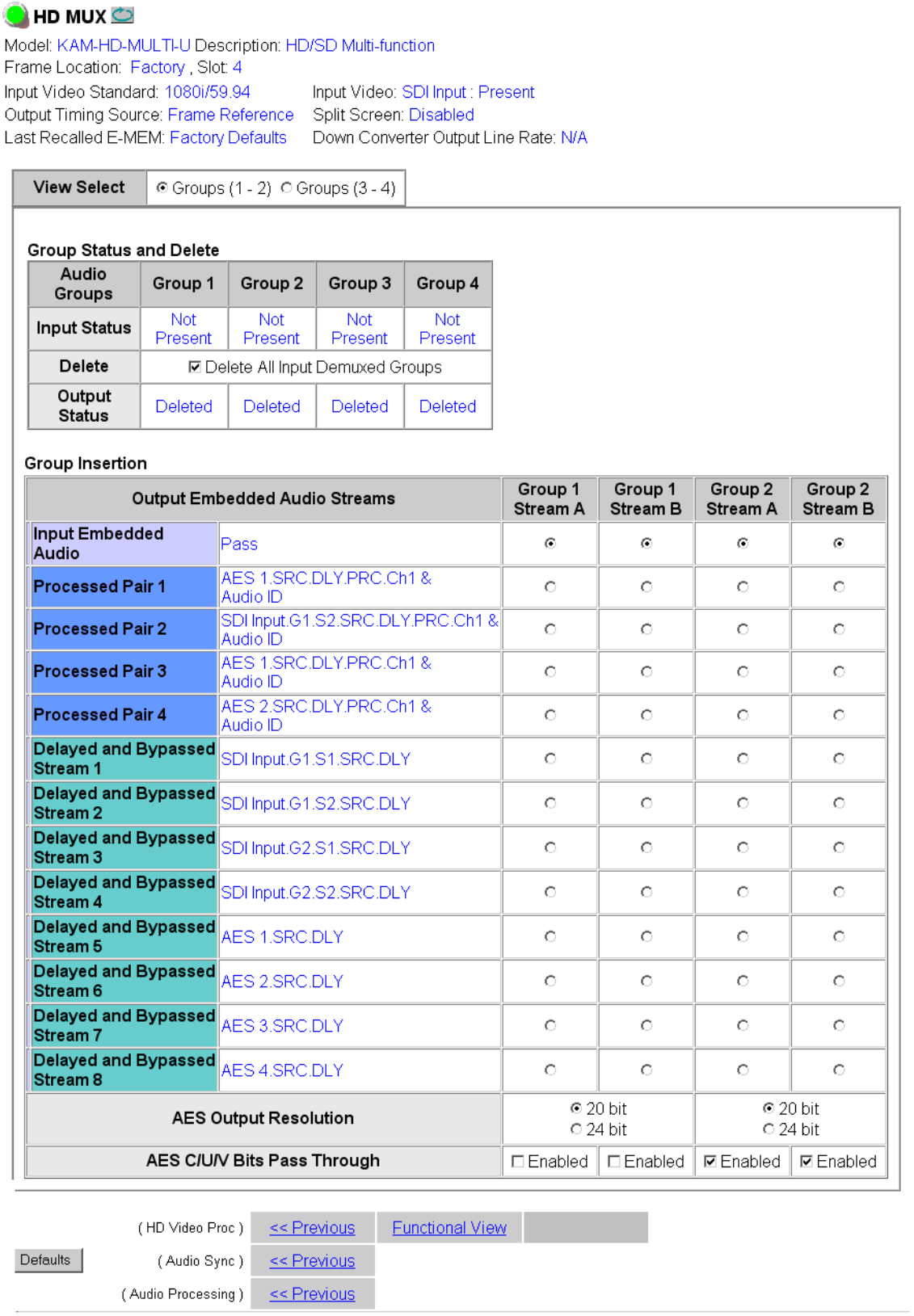


Figure 34. MUX Web Page – Group Insertion for Groups (1-2)



HD MUX

Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Source: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

View Select	◉ Groups (1 - 2) ○ Groups (3 - 4)

Group Status and Delete

Audio Groups	Group 1	Group 2	Group 3	Group 4
Input Status	Not Present	Not Present	Not Present	Not Present
Delete	☑ Delete All Input Demuxed Groups			
Output Status	Deleted	Deleted	Deleted	Deleted

Group Insertion

Output Embedded Audio Streams		Group 1 Stream A	Group 1 Stream B	Group 2 Stream A	Group 2 Stream B
Input Embedded Audio	Pass	◉	◉	◉	◉
Processed Pair 1	AES 1.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Processed Pair 2	SDI Input.G1.S2.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Processed Pair 3	AES 1.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Processed Pair 4	AES 2.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Delayed and Bypassed Stream 1	SDI Input.G1.S1.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 2	SDI Input.G1.S2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 3	SDI Input.G2.S1.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 4	SDI Input.G2.S2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 5	AES 1.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 6	AES 2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 7	AES 3.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 8	AES 4.SRC.DLY	○	○	○	○
AES Output Resolution		◉ 20 bit ○ 24 bit		◉ 20 bit ○ 24 bit	
AES C/U/V Bits Pass Through		☐ Enabled	☐ Enabled	☑ Enabled	☑ Enabled

(HD Video Proc) << Previous Functional View
Defaults (Audio Sync) << Previous
(Audio Processing) << Previous

AES Output Resolution

Select the AES output resolution for each output with the **20 bit** or **24 bit** radio button.

AES C/U/V Bit Pass Through

Enable or disable the AES C/U/V Bits Pass Through by selecting the **Enable** checkbox. Refer to *AES C/U/V Bits Pass Through* on page 18 for an overview of this control.

SD Video Out Web Page

- SD Color Correction
- SD Video Proc
- SD MUX
- SD Video Out
- Audio Input Status
- Audio Input Select
- Audio Sync
- Audio Processing

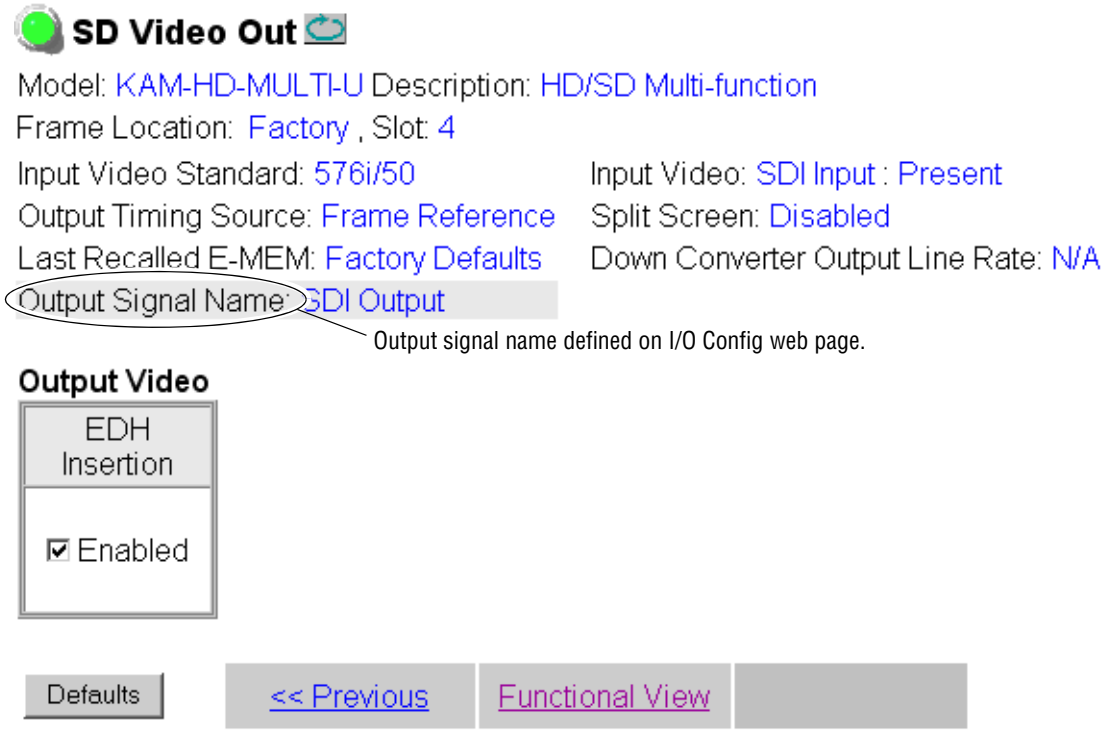
Use this link

The SD Video Out web page (Figure 35) is present when an SD input type signal is selected as the input to the module on the System Config web page. A control is provided for enabling or disabling EDH insertion in the SD video output stream.

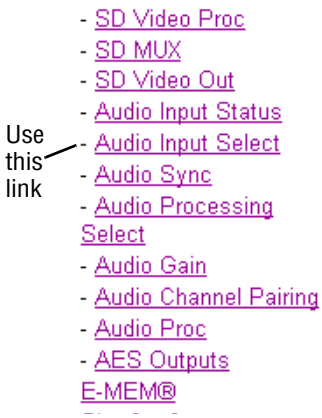
Output Video EDH Insertion

Check the **Enabled** checkbox to insert EDH into the output signal or uncheck to not insert. EDH Insertion is on (inserted) by default.

Figure 35. SD Video Out Web Page



Audio Input Status Web Page



Use the Audio Input Status web page to see the status of each available audio input. The Audio Input Select web pages for each of the possible audio input and output configurations are shown in the following figures:

- 8 inputs/0 outputs – Figure 36 on page 63
- 4 inputs/4 outputs – Figure 37 on page 64
- 0 inputs/8 outputs – Figure 38 on page 64

Audio Status

The Audio Input Status web page provides the following status reporting items for each available audio input:

- Input Stream Name – this name is based on the name of the video input and the AES inputs on the I/0 Config web page. Default Factory names are shown in the example.
- Signal Present status – reports signal present status (Present or Not Present) for both de-embedded and AES audio input streams.

Note Audio input status is only reported on the main Status web page when an input has been selected for use on the Audio Input Select web page.

- Mode – reports audio mode (20 or 24 bit).
- Audio Mode – shows the audio mode (Audio or Non-Audio).
- Async Audio – reports the audio sync status (Sync or Async).
- Emphasis – reports whether audio signal has Emphasis (On or Off).
- AES Errors Detected – reports any errors detected since the last time the error status was cleared (Errors or None).

Note If AES errors are detected, each input can be reset by pressing the corresponding **Reset** button or reset all audio inputs using the **Reset All** button.

Figure 36. Audio Input Status – 8 in/0 Out

Audio Input Status

Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Mode: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

Input Stream Name	Signal Present	Sample Rate	Mode	Audio Mode	Async Audio	Emphasis	AES Errors Detected
SDI Input.G1.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G1.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G2.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G2.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G3.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G3.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G4.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G4.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
AES In 1	Not Present	------	------	------	----	---	Reset
AES In 2	Not Present	------	------	------	----	---	Reset
AES In 3	Not Present	------	------	------	----	---	Reset
AES In 4	Present	24 Bit	Audio	Async	Off	None	Reset
AES In 5	Not Present	------	------	------	----	---	Reset
AES In 6	Not Present	------	------	------	----	---	Reset
AES In 7	Not Present	------	------	------	----	---	Reset
AES In 8	Not Present	------	------	------	----	---	Reset

Reset All

<< Previous | Functional View | Next >>

Figure 37. Audio Input Status – 4 In/4 Out

Input Stream Name	Signal Present	Mode	Audio Mode	Async Audio	Emphasis	AES Errors Detected	
SDI Input.G1.S1	Not Present	------	------	------	----	---	Reset
SDI Input.G1.S2	Not Present	------	------	------	----	---	Reset
SDI Input.G2.S1	Present	20 Bit	Audio	Sync	On	Errors	Reset
SDI Input.G2.S2	Present	20 Bit	Audio	Sync	On	Errors	Reset
SDI Input.G3.S1	Present	20 Bit	Audio	Sync	Off	Errors	Reset
SDI Input.G3.S2	Present	20 Bit	Audio	Sync	Off	Errors	Reset
SDI Input.G4.S1	Present	20 Bit	Audio	Sync	Off	Errors	Reset
SDI Input.G4.S2	Present	20 Bit	Audio	Sync	Off	Errors	Reset
AES 1	Present	24 Bit	Audio	Async	Off	None	Reset
AES 2	Present	24 Bit	Audio	Async	Off	None	Reset
AES 3	Present	24 Bit	Audio	Async	Off	None	Reset
AES 4	Present	24 Bit	Audio	Async	Off	None	Reset

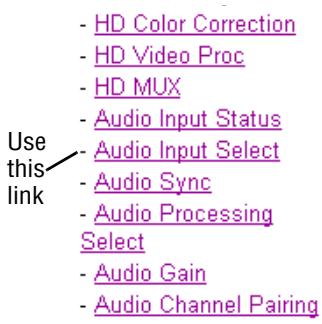
Reset All

Figure 38. Audio Input Status – 0 In/8 Out

Input Stream Name	Signal Present	Sample Rate	Mode	Audio Mode	Async Audio	Emphasis	AES Errors Detected
SDI Input.G1.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G1.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G2.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G2.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G3.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G3.S2	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G4.S1	Present	20 Bit	Audio	Sync	Off	None	Reset
SDI Input.G4.S2	Present	20 Bit	Audio	Sync	Off	None	Reset

Reset All

Audio Input Select Web Page



Use the Audio Input Select web page to define the eight audio streams from the available audio inputs that will be sent to the Audio Sync web page for delay adjustments.

The Audio Input Select web pages for each of the possible audio input and output configurations are shown in the following figures:

- 8 inputs/0 outputs – Figure 39 on page 66
- 4 inputs/4 outputs – Figure 40 on page 67
- 0 inputs/8 outputs – Figure 41 on page 67

Define Input Streams

Select the **Input Streams (1-4)** radio button in the **View Select** section to define the first four input streams from the list of available audio inputs or **Force Silence**. Use the **Input Streams (5-8)** to define the last four input streams in the same manner.

Each stream selected has the following reporting functions and controls:

- Input Status – reports the input stream as **Present**, **Not Present**, or **Silence**.

  If a selected audio stream is not present, the Status LED on this page will turn yellow. Audio status on the main Status web page will be indicated as follows for each audio type:

  - When selected AES inputs are not present, the audio arrow indicators on the module Status web page will be yellow.
  - When selected de-embedded audio inputs are not present, a textual warning will be reported on the main Status web page.

- Sample Rate Convert – enable or disable sample rate conversion for the input stream with the **Disable** checkbox. Selecting Sample Rate Conversion will correct and synchronize the audio sample rate to 48 kHz.

Note Disabling sample rate conversion (SRC) for an audio stream will automatically disable auto tracking for that stream.

- Loss of Signal Reporting – select the **Report** checkbox to send the reporting status of the input stream to report to higher levels (such as the 2000NET module or NetCentral)
- Reporting Status – displays what status is being reported to higher levels. When Report is unchecked, the display will display **Not Monitored**.

Figure 39. Audio Input Select Web Page – 8 In/0 Out

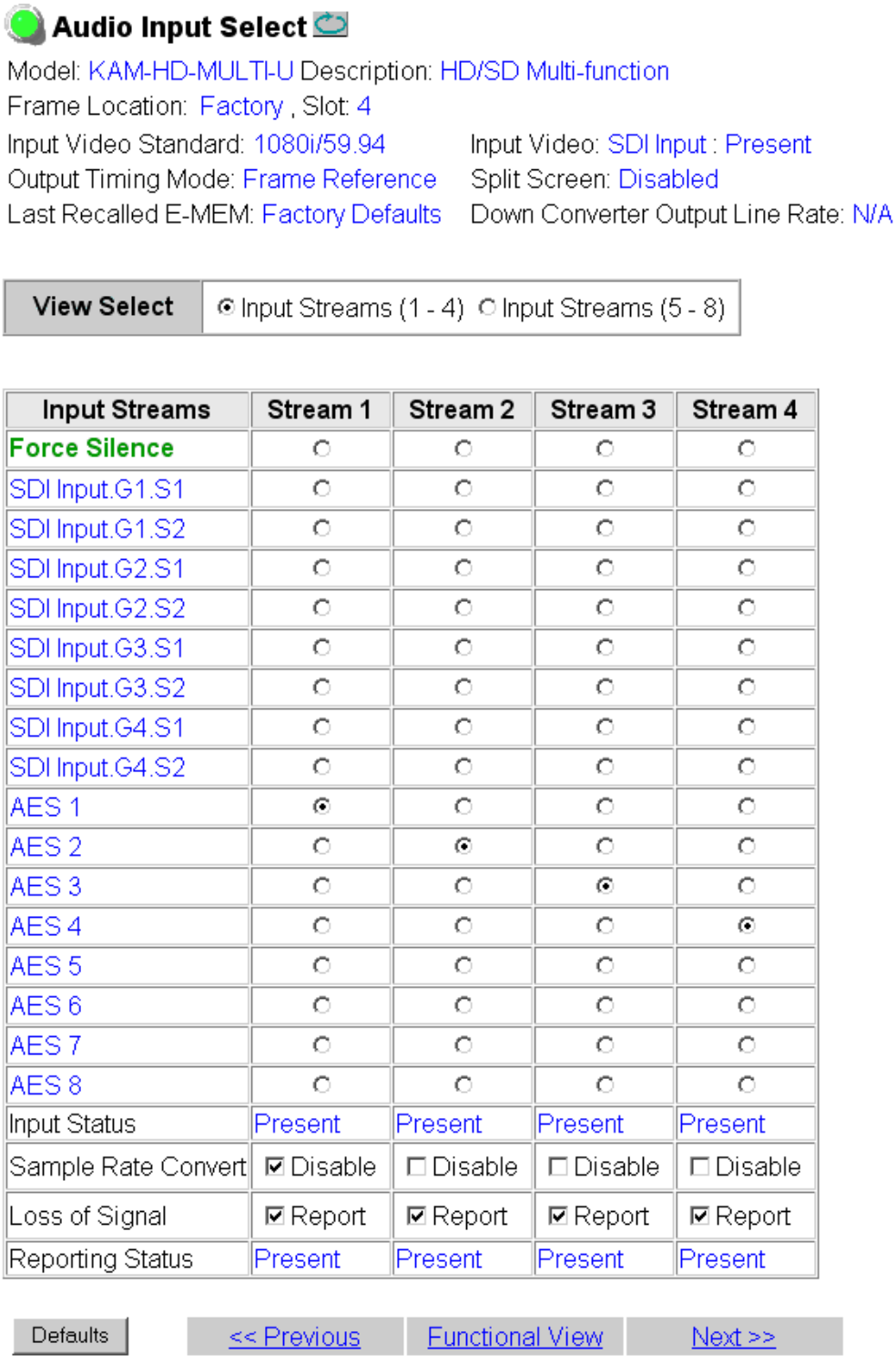


Figure 40. Audio Input Select Web Page – 4 In/4 Out

Input Streams	Stream 1	Stream 2	Stream 3	Stream 4
Force Silence	○	○	○	○
SDI Input.G1.S1	○	○	○	○
SDI Input.G1.S2	○	○	○	○
SDI Input.G2.S1	○	○	○	○
SDI Input.G2.S2	○	○	○	○
SDI Input.G3.S1	○	○	○	○
SDI Input.G3.S2	○	○	○	○
SDI Input.G4.S1	○	○	○	○
SDI Input.G4.S2	○	○	○	○
AES 1	◉	○	○	○
AES 2	○	◉	○	○
AES 3	○	○	◉	○
AES 4	○	○	○	◉
Input Status	Present	Present	Present	Present
Sample Rate Convert	☐ Disable	☐ Disable	☐ Disable	☐ Disable
Loss of Signal	☑ Report	☑ Report	☑ Report	☑ Report
Reporting Status	Present	Present	Present	Present

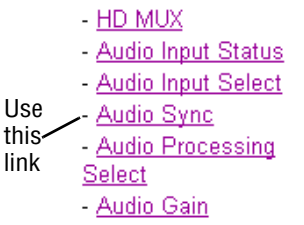
Defaults << Previous Functional View Next >>

Figure 41. Audio Input Select Web Page – 8 In/0 out

Input Streams	Stream 1	Stream 2	Stream 3	Stream 4
Force Silence	○	○	○	○
SDI Input.G1.S1	◉	○	○	○
SDI Input.G1.S2	○	◉	○	○
SDI Input.G2.S1	○	○	◉	○
SDI Input.G2.S2	○	○	○	◉
SDI Input.G3.S1	○	○	○	○
SDI Input.G3.S2	○	○	○	○
SDI Input.G4.S1	○	○	○	○
SDI Input.G4.S2	○	○	○	○
Input Status	Present	Present	Present	Present
Sample Rate Convert	☐ Disable	☐ Disable	☐ Disable	☐ Disable
Loss of Signal	☑ Report	☑ Report	☑ Report	☑ Report
Reporting Status	Present	Present	Present	Present

Defaults << Previous Functional View Next >>

Audio Sync Web Page



The Audio Sync web page (Figure 42 on page 69) provides controls for setting the following:

- Enabling auto tracking, and
- Setting delay adjustments for the two channels in each of the eight audio input streams either in locked mode or separately.

Enable Auto Tracking

Select the **On** checkbox to enable auto tracking for all input audio streams (1-8) to track the input video frame sync.

Note When Sample Rate Conversion has been disabled on the Audio Input Select web page for an audio stream, the auto tracking will be disabled for that stream and the audio tracking status will be reported in the Audio Tracking Status field described below.

Note Auto tracking is not available in 1080sf/24 or 1080p/24 format at this time.

View Select

Use the **Stream (1-2)**, **Stream (3-4)**, **Stream (5-6)**, or **Stream (7-8)** View Select radio buttons to select the input audio stream (Ch 1 and Ch 2) to be adjusted.

Delay Adjustments

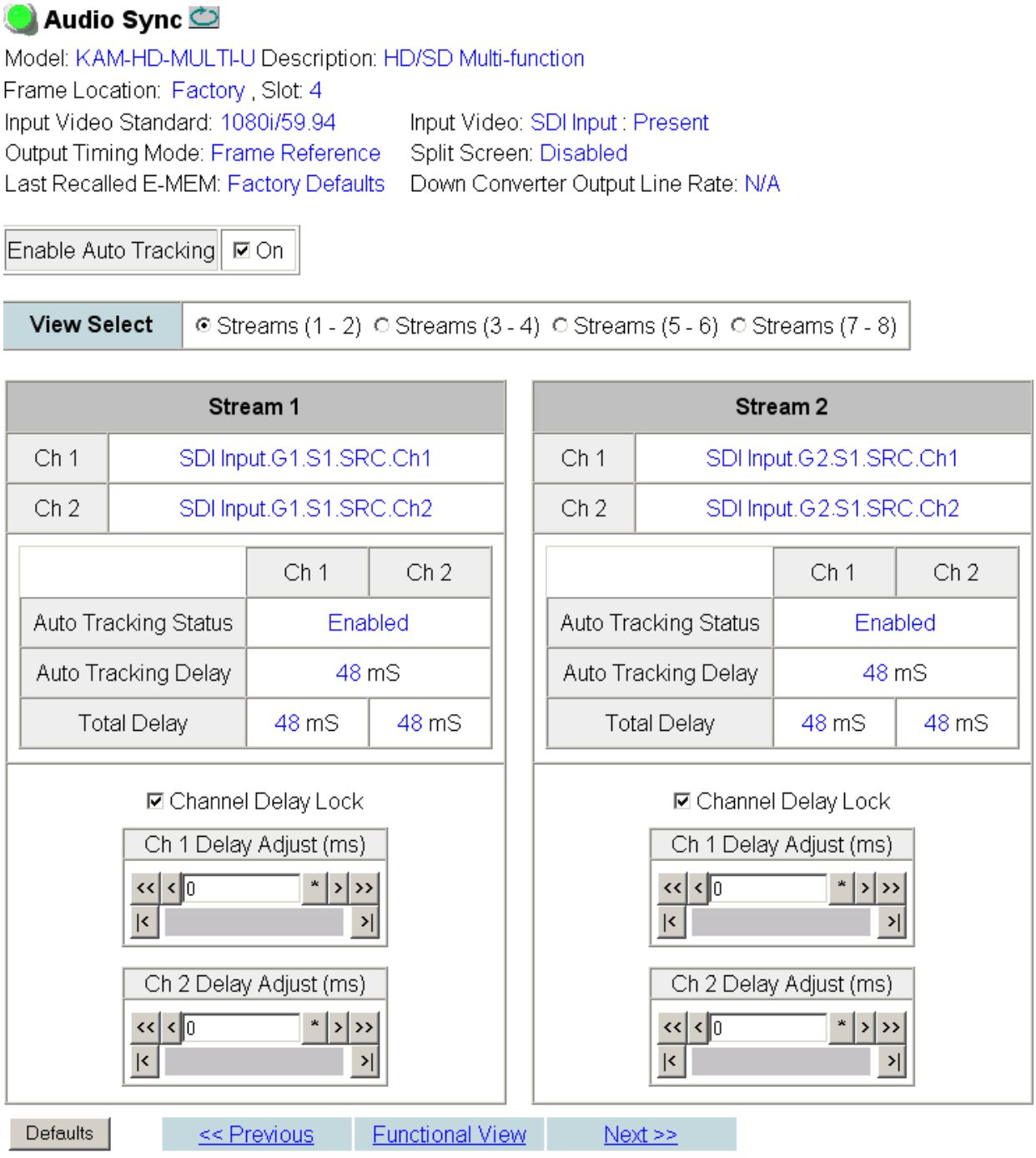
Use the following controls to adjust audio delay:

- Channel Delay Lock – select the **Channel Delay Lock** checkbox to lock the Ch 1 and Ch 2 delay controls for the selected stream together. Adjusting either control will change both controls.
- Ch 1 and Ch 2 Delay Adjust – adjust the amount of delay for each channel or both channels together if **Channel Delay Lock** has been checked.

Status reporting for each audio stream includes the following:

- The auto tracking status of each audio stream will be reported as **Enabled** or **Disabled**. See Note under *Enable Auto Tracking* above.
- The amount of auto tracking delay will be reported for each audio stream if the **Enable Audio Tracking** is set to **On.**
- The total amount of delay will be reported in the Total Delay field for each audio stream.

Figure 42. Audio Sync Web Page



Audio Processing Select Web Page

- Audio Input Status
- Audio Input Select
- Audio Sync
- Audio Processing Select
- Audio Gain
- Audio Channel Pairin
- Audio Proc
- AES Outputs

Use this link

The Audio Processing Select web page (Figure 43) allows selection of four of the eight audio streams selected on the Audio Input Select web page to be processed in the audio gain, audio channel pairing, and audio processing sections of the module.

Select the four streams of audio to be processed by selecting the corresponding radio buttons under **Stream 1 – Stream 4.**

Note The signal names in the list indicate that the audio streams have been Sample Rate Converted (SRC) and delayed (DLY).

Figure 43. Audio Processing Select Web Page

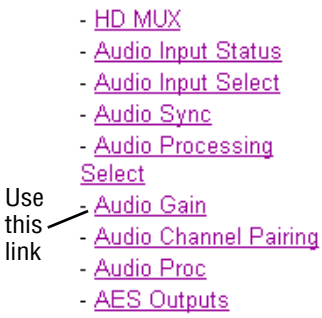
Audio Processing Select

Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Mode: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

Audio Streams	Stream 1	Stream 2	Stream 3	Stream 4
Force Silence	○	○	○	○
SDI Input.G1.S1.SRC.DLY	◉	○	○	○
SDI Input.G1.S2.SRC.DLY	○	◉	○	○
SDI Input.G2.S1.SRC.DLY	○	○	○	○
SDI Input.G2.S2.SRC.DLY	○	○	○	○
AES 1.SRC.DLY	○	○	◉	○
AES 2.SRC.DLY	○	○	○	◉
AES 3.SRC.DLY	○	○	○	○
AES 4.SRC.DLY	○	○	○	○

Defaults << Previous Functional View Next >>

Audio Gain Web Page



The Audio Gain web page is shown in Figure 44 on page 72 with View Select set for **Streams (1-2)** as an example. These web pages provide gain adjustments for the four streams of audio that have been selected to be processed on the Audio Processing Select web page.

View Select

Use the **Stream (1-2)** and **Stream (3-4)** View Select radio buttons to select the input audio stream (Ch 1 and Ch 2) to be adjusted.

Note The signal names in the list indicate that the audio streams have been Sample Rate Converted (SRC), delayed (DLY), and processed (PRC).

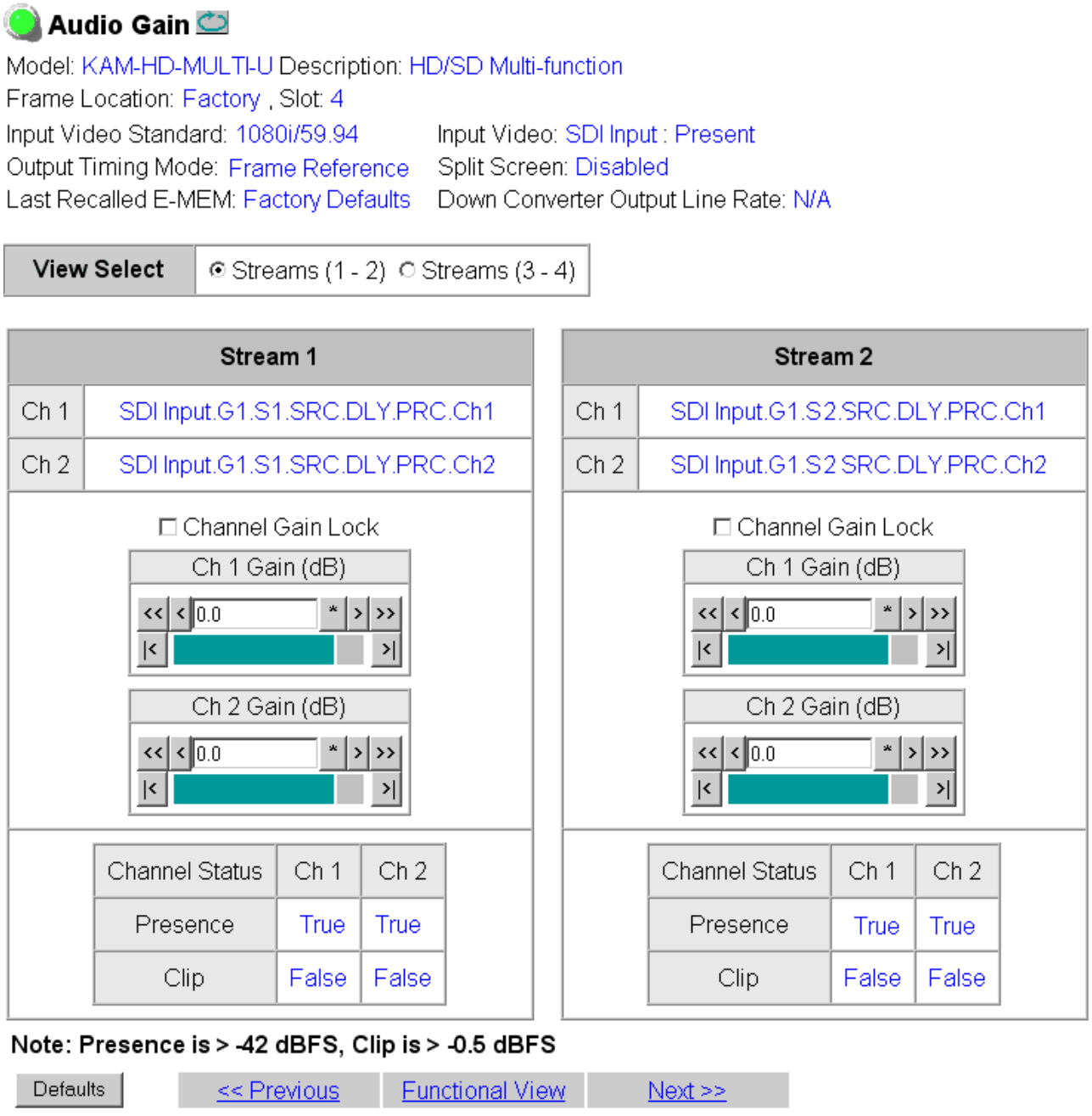
Audio Gain Adjustments

Use the following controls to adjust the audio gain:

- Channel Gain Lock – select the **Channel Gain Lock** checkbox to lock the Ch 1 and Ch 2 gain controls together for the selected stream. Adjusting either Gain adjust control will change both controls the same amount.
- Ch 1 and Ch 2 Gain (dB) – adjust the amount of gain for each channel or both channels together if **Channel Gain Lock** has been checked.

The Presence and Clipping status of each audio channel is reported as **True** or **False** in the read-only Channel Status displays. If the audio is > -42 dBFS, it will be reported as **True**. If clipping is < 0.5 dBFS, it will be reported as **False**.

Figure 44. Audio Gain Web Page – Streams (1-2)



Audio Channel Pairing Web Page

- Audio Input Select
- Audio Sync
- Audio Processing Select
- Audio Gain
- Audio Channel Pairing
- Audio Proc
- AES Outputs

E-MEM®
Slot Config

Use this link

The Audio Channel Pairing web page allows the audio streams that have been selected for processing to be passed through with no re-pairing as shown in Figure 45 for **Pairs (1-2)** and Figure 46 on page 74 for **Pairs (3-4)** or recombined into new pairs, streams, and groups for output to existing AES outputs or muxed into the output video stream if desired. The rows represent the audio input channels and the columns represent the audio output pairs. The columns are grouped together into four different pairs.

Use the **Pairs (1-2)** and **Pairs (3-4)** View Select radio buttons to select which audio pairs to define.

The selected audio pairs can be routed as follows:

- Any output pair can be routed to any of the AES/EBU output streams of the module when the audio I/O Configuration is set for 4/4 or 0/8 (see *AES Outputs Web Page* on page 77).
- Audio Groups can be inserted into the HD or SD SDI output video (see *HD/SD MUX Web Page* on page 58).

Figure 45. Audio Channel Pairing Web Page – Pairs (1-2)

Audio Channel Pairing

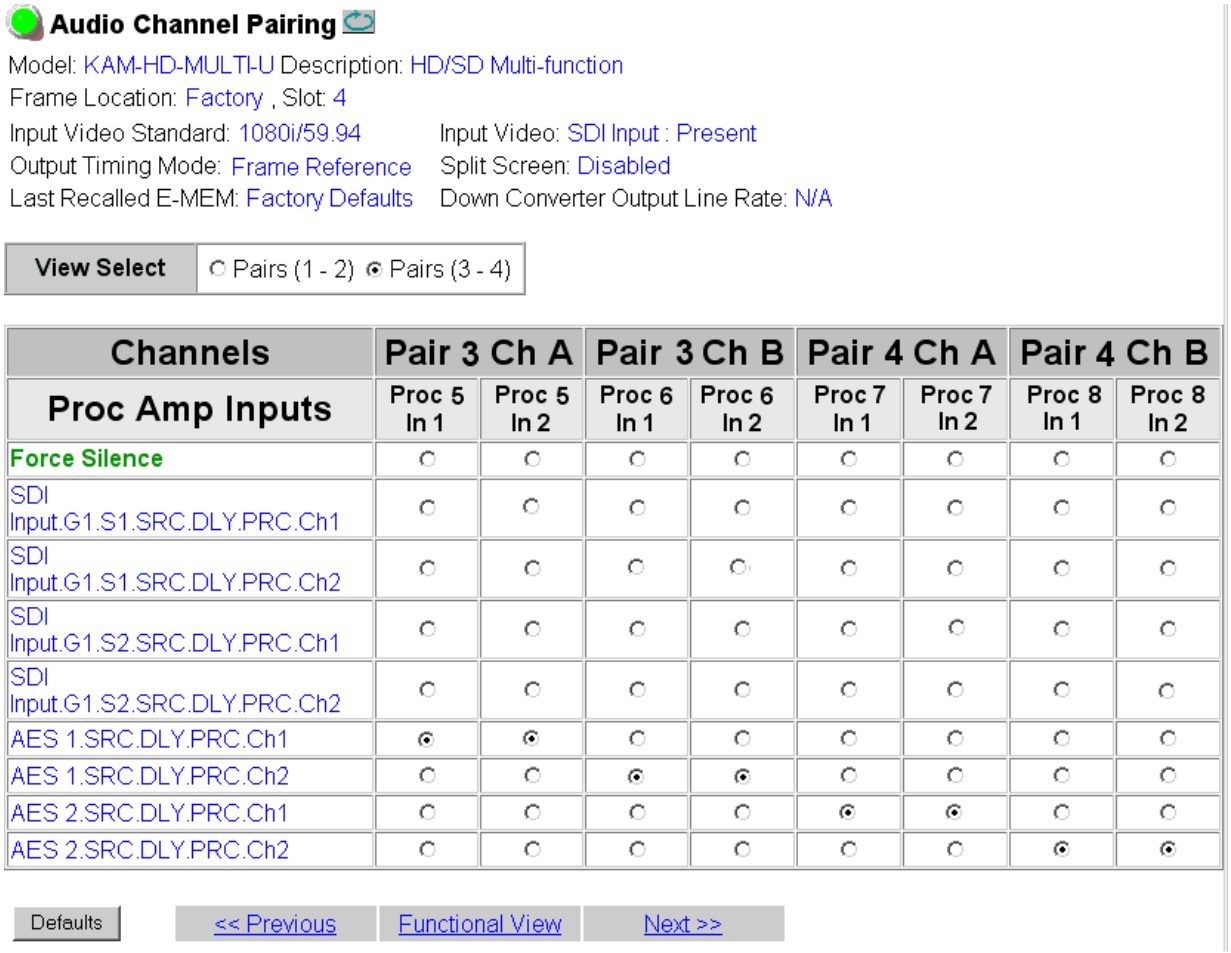
Model: KAM-HD-MULTI-U Description: HD/SD Multi-function
Frame Location: Factory , Slot: 4
Input Video Standard: 1080i/59.94 Input Video: SDI Input : Present
Output Timing Mode: Frame Reference Split Screen: Disabled
Last Recalled E-MEM: Factory Defaults Down Converter Output Line Rate: N/A

View Select: (•) Pairs (1 - 2) ( ) Pairs (3 - 4)

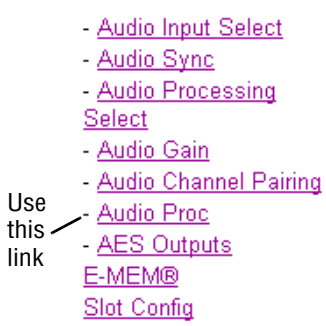
Channels	Pair 1 Ch A		Pair 1 Ch B		Pair 2 Ch A		Pair 2 Ch B	
Proc Amp Inputs	Proc 1 In 1	Proc 1 In 2	Proc 2 In 1	Proc 2 In 2	Proc 3 In 1	Proc 3 In 2	Proc 4 In 1	Proc 4 In 2
Force Silence	○	○	○	○	○	○	○	○
SDI Input.G1.S1.SRC.DLY.PRC.Ch1	●	●	○	○	○	○	○	○
SDI Input.G1.S1.SRC.DLY.PRC.Ch2	○	○	●	●	○	○	○	○
SDI Input.G1.S2.SRC.DLY.PRC.Ch1	○	○	○	○	●	●	○	○
SDI Input.G1.S2.SRC.DLY.PRC.Ch2	○	○	○	○	○	○	●	●
AES 1.SRC.DLY.PRC.Ch1	○	○	○	○	○	○	○	○
AES 1.SRC.DLY.PRC.Ch2	○	○	○	○	○	○	○	○
AES 2.SRC.DLY.PRC.Ch1	○	○	○	○	○	○	○	○
AES 2.SRC.DLY.PRC.Ch2	○	○	○	○	○	○	○	○

Defaults | << Previous | Functional View | Next >>

Figure 46. Audio Channel Pairing Web Page – Pairs (3-4)



Audio Proc Web Page



Use the Audio Proc web page as shown in the example in Figure 47 on page 76 to select a processing output mode for each of the two channels in the audio pairs created on the Audio Channel Pairing web page.

View Select

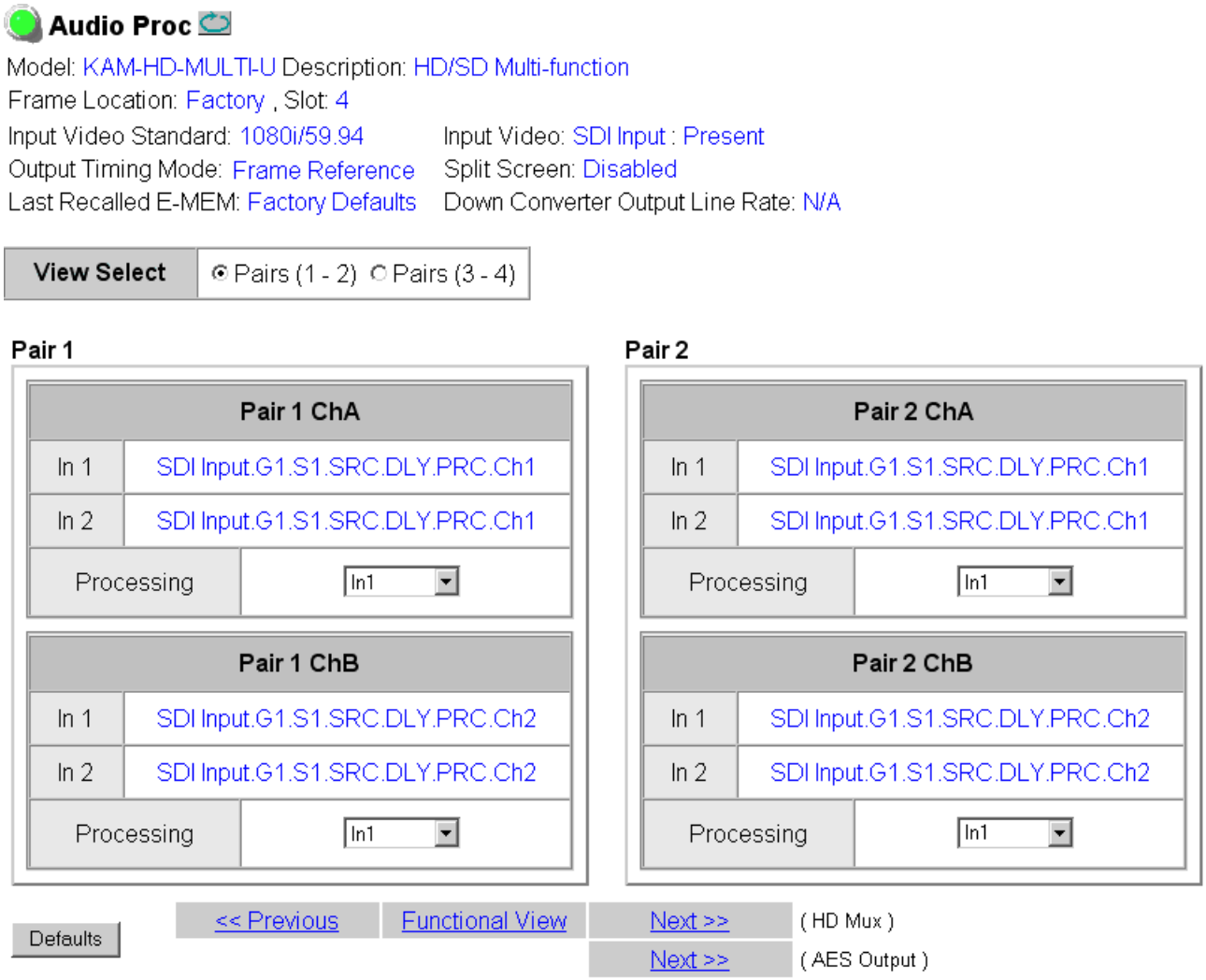
Use the **Pairs (1-2)** and **Pairs (3-4)** View Select radio buttons to select which audio pairs to define.

Output Processing

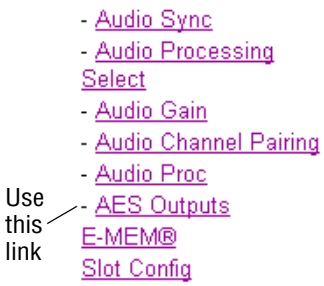
Set the output processing for each channel (A and B) for each Audio Pair (Pair 1-4) with the Processing pulldown to one of the following output conditions:

- In1 - selects the audio present on In1 as the channel output.
- -In1 - inverts the audio present on In1 as the channel output.
- In2 - selects the audio present on In2 as the channel output.
- -In2 - inverts the audio present on In2 as the channel output.
- In1+In2 - audio present on In1 and In2 are added together as the channel output.
- -(In1+In2) - audio present on In1 and In2 are added together then inverted as the channel output.
- In1-In2 - audio present on In 2 is subtracted from audio on In1 as the channel output.
- -(In1-In2) - audio present on In 2 is subtracted from audio on In1 then inverted as the channel output.
- 1 kHz - places a 1kHz tone on the channel output.
- 400 Hz - places a 400 Hz test tone on the channel output.
- Silence - forces the channel output to silence.
- ID - identifies channel A and B (left/right ID) with a 1 kHz tone at a -20 dBFS level that switches between Channel A and Channel B with a repeating cadence of 1 second on Channel A (left) followed by a 3 second tone on Channel B. Each pair from 1-4 is indicated by that number of bursts of 400 Hz at an 8 Hz rate when the 1 kHz tone starts on a new channel.

Figure 47. Audio Proc Web Page – Pairs (1-2)



AES Outputs Web Page



Use the AES Outputs web page to:

- Select audio streams to send to the available AES/EBU connectors designated as outputs on the rear module. The number of connectors available depends on the audio input/output configuration set on the I/O Config web page (*I/O Config Web Page* on page 42).
- Select the AES output resolution for each output with the **20 bit** or **24 bit** radio button.
- Enable or disable the AES C/U/V Bits Pass Through by selecting the **Enable** checkbox. Refer to *AES C/U/V Bits Pass Through* on page 18 for an overview of this control.

The AES Outputs web pages for each of the possible audio input and output configurations are shown in the following figures:

- 8 inputs/0 outputs – in this configuration there are no AES output connectors designated as shown in Figure 48 on page 78 (First Set of Outputs) and Figure 49 on page 78 (Second Set of Outputs).
- 4 inputs/4 outputs – in this configuration there are four AES connectors designated as outputs on the rear module. The output audio streams available to these four outputs are shown in Figure 50 on page 79 (First Set of Outputs). The other four AES connectors are designated as inputs and the web page for the Second Set of Outputs will appears as shown in Figure 51 on page 80. The connectors for these outputs are illustrated on the I/O Config web page and will depend on the type of rear module installed.
- 0 inputs/8 outputs – in this configuration all of the AES connectors on the rear module are designated as outputs.The output audio streams available to these eight outputs are shown in Figure 50 on page 79 (First Set of Outputs). The list for the Second Set of Outputs is identical to the First Set of Outputs. The connectors for these outputs are illustrated on the I/O Config web page and will depend on the type of rear module installed.

Figure 48. AES Outputs Web Page – First Set – 8 In/0 Out

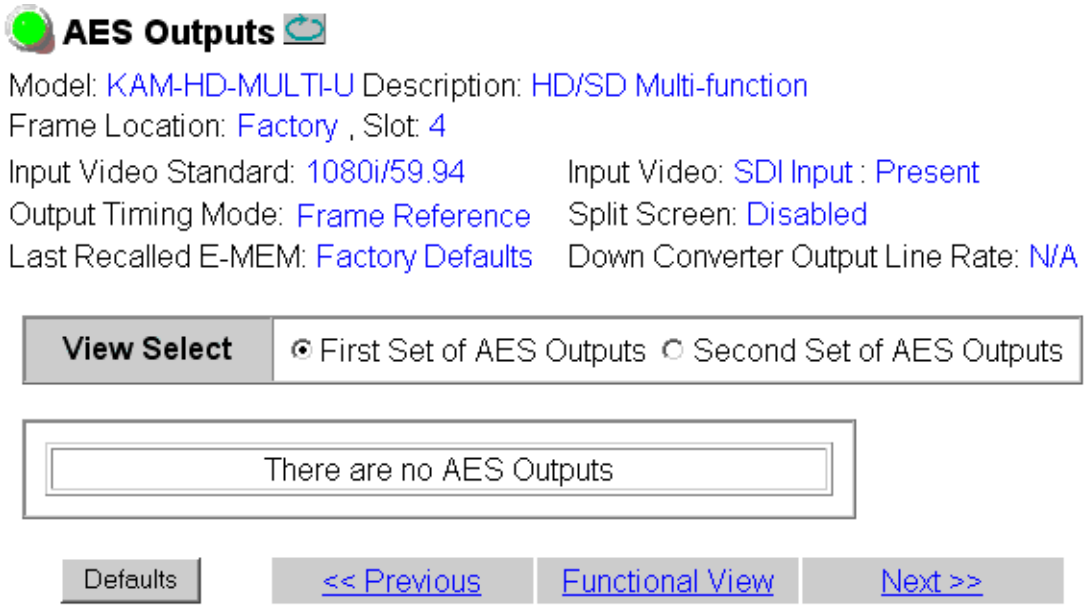


Figure 49. AES Outputs Web Page – Second Set – 8 In/0 Out

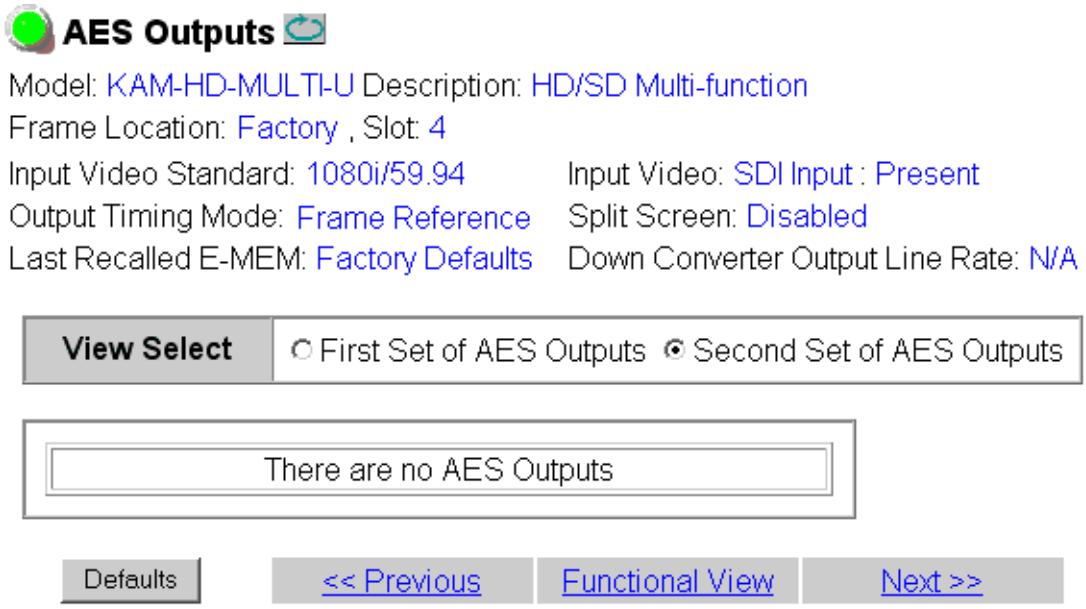


Figure 50. AES Outputs Web Page – First Set – 4 In/4 Out and 0 In/8 Out

View Select	◉ First Set of AES Outputs ○ Second Set of AES Outputs

AES Output Pairs		Output-J2A: AES 5	Output-J2B: AES 6	Output-J2C: AES 7	Output-J2D: AES 8
Silence	Force Silence	◉	○	◉	○
Processed Pair 1	(SDI Input.G1.S1.SRC.DLY.PRC.Ch1 + SDI Input.G1.S1.SRC.DLY.PRC.Ch1) & (SDI Input.G1.S1.SRC.DLY.PRC.Ch2 + SDI Input.G1.S1.SRC.DLY.PRC.Ch2)	○	○	○	○
Processed Pair 2	SDI Input.G1.S2.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Processed Pair 3	AES 1.SRC.DLY.PRC.Ch1 & AES 1.SRC.DLY.PRC.Ch2	○	○	○	○
Processed Pair 4	AES 2.SRC.DLY.PRC.Ch1 & Audio ID	○	○	○	○
Delayed and Bypassed Stream 1	SDI Input.G1.S1.SRC.DLY	○	○	○	◉
Delayed and Bypassed Stream 2	SDI Input.G1.S2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 3	SDI Input.G2.S1.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 4	SDI Input.G2.S2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 5	AES 1.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 6	AES 2.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 7	AES 3.SRC.DLY	○	○	○	○
Delayed and Bypassed Stream 8	AES 4.SRC.DLY	○	○	○	○
Demuxed Stream 1	SDI Input.G1.S1	○	◉	○	○
Demuxed Stream 2	SDI Input.G1.S2	○	○	○	○
Demuxed Stream 3	SDI Input.G2.S1	○	○	○	○
Demuxed Stream 4	SDI Input.G2.S2	○	○	○	○
Demuxed Stream 5	SDI Input.G3.S1	○	○	○	○
Demuxed Stream 6	SDI Input.G3.S2	○	○	○	○
Demuxed Stream 7	SDI Input.G4.S1	○	○	○	○
Demuxed Stream 8	SDI Input.G4.S2	○	○	○	○
AES Output Resolution		○ 20 bit ◉ 24 bit	○ 20 bit ◉ 24 bit	○ 20 bit ◉ 24 bit	○ 20 bit ◉ 24 bit
AES C/U/V Bits Pass Through		☑ Enabled	☑ Enabled	☑ Enabled	☑ Enabled
Balanced/Unbalanced		Unbalanced	Unbalanced	Unbalanced	Unbalanced

Defaults << Previous Functional View Next >>

Figure 51. AES Outputs Web Page – Second Set – 4 In/4 Out

E-MEM Web Page

- Audio Input Status
- Audio Input Select
- Audio Sync
- Audio Processing Select
- Audio Gain
- Audio Channel Pairing
- Audio Proc
- AES Outputs
- E-MEM®
- Slot Config

Use this link

The E-MEM web page provides local operations for learning and recalling configurations into E-MEM registers and audio preset configurations. File operations are also available for saving or loading the learned E-MEM files to and from a hard disk or other accessible media.

The following functions are available on the E-MEM web page:

- Five E-MEM registers, **E-MEM 1-5**, for storing and recalling setups,
- Two E-MEM view selections: **Standard** and **Advanced**.,
- **Recall factory settings** button for returning the module to factory defaults (listed in Table 4 on page 23),
- **Recall factory names** button to return the module to default factory signal names (such as the signal inputs),
- Audio Preset Config button selections to allow presetting an audio configuration for the module (see *Audio Preset Configurations* on page 21 for a complete description of each setting).

E-MEM Functions

In Standard view (Figure 53 on page 82), any one of five learned E-MEMs can be recalled by selecting the corresponding **Recall** button in the Local Operations window. This will place the configuration learned into that E-MEM into the module.

An E-MEM Wait web page (Figure 52) will appear when a recall is performed. This allows any changes in input rate or other module configuration stored in E-MEM to be performed.

Figure 52. E-MEM Wait Web Page

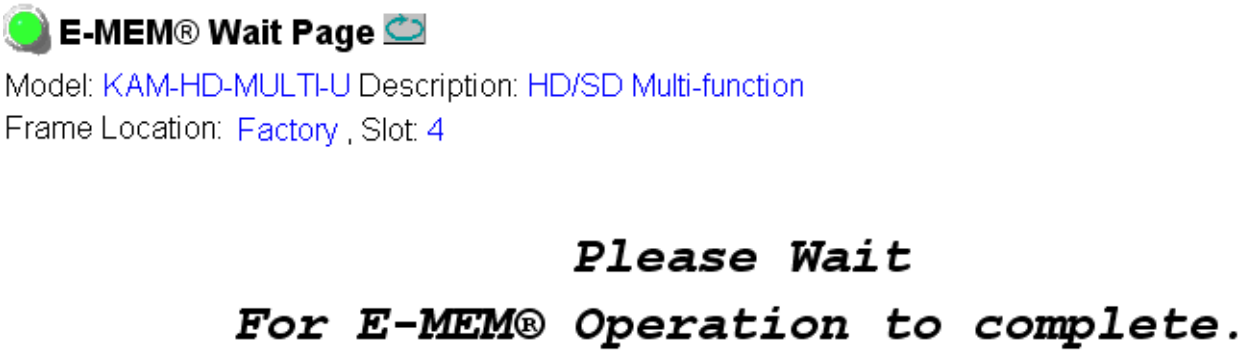
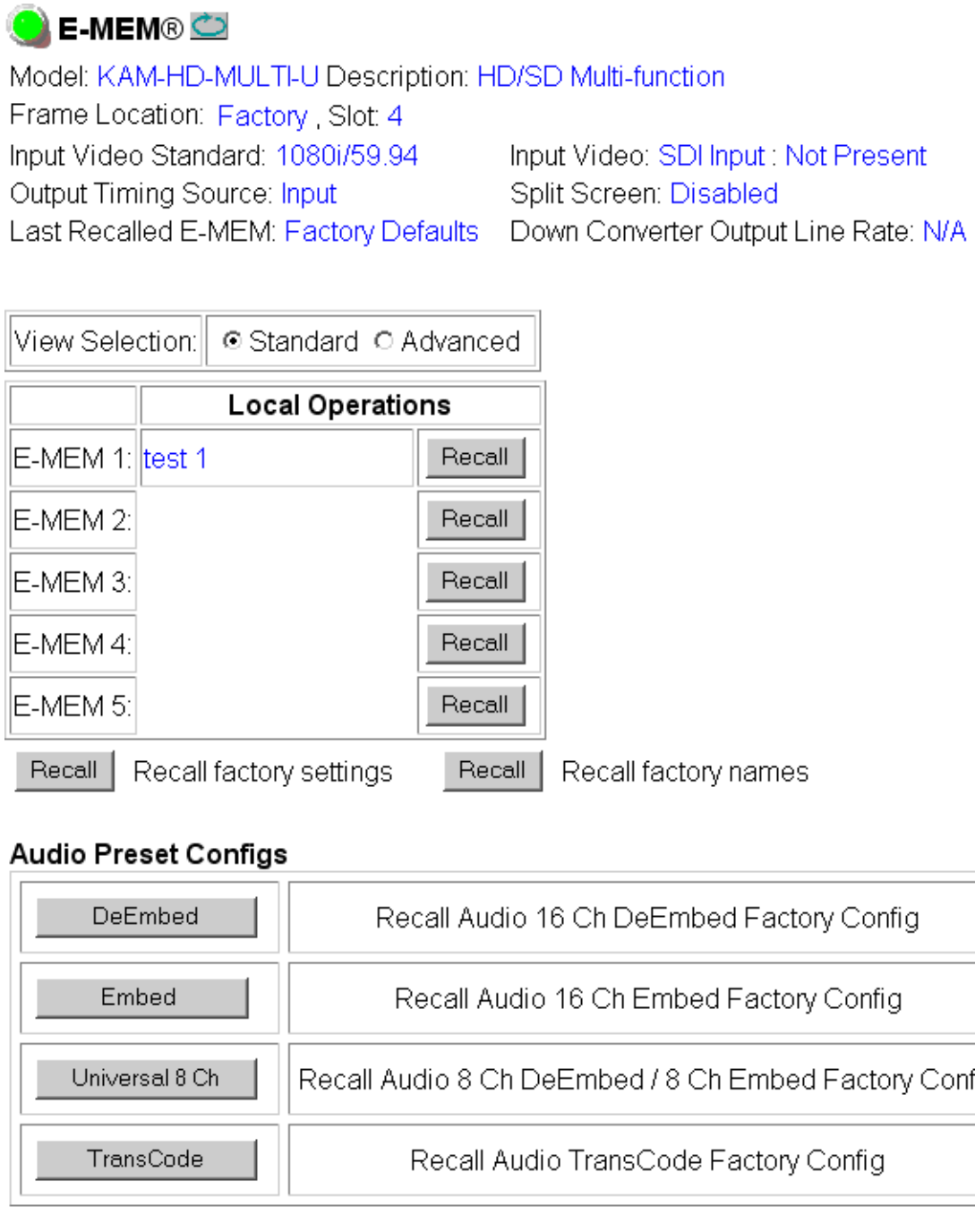


Figure 53. E-MEM Web Page (Standard View)

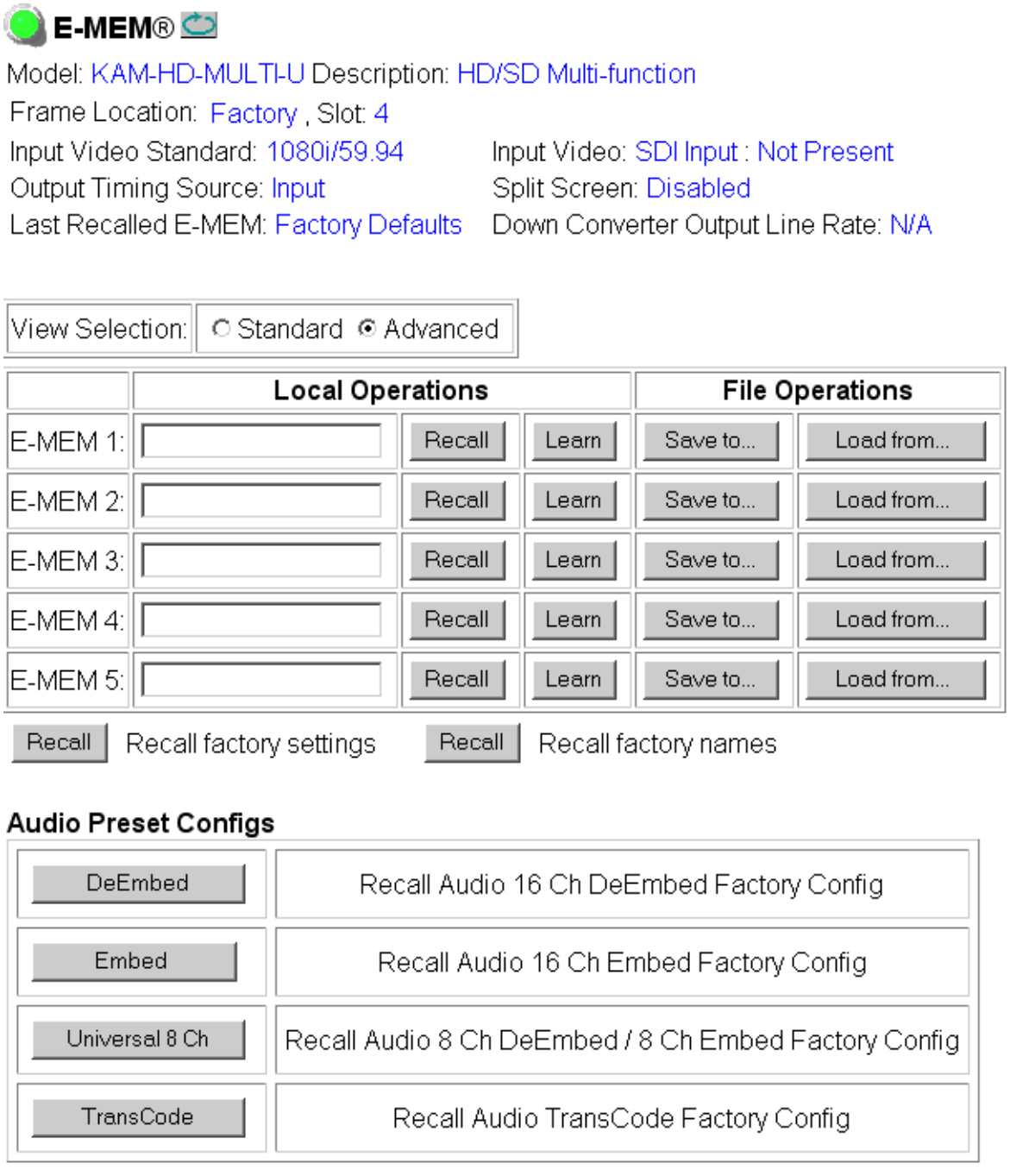


The Advanced View (Figure 54 on page 84) includes a Local Operations section to Learn and Recall configurations and a File Operations section to provide a **Save to**... or **Load from**... function for saving or loading E-MEM files to and from an external storage location.

To learn an E-MEM:

1. Open the **Advanced** view.
2. When the configuration is complete for the module, type a descriptive name for the configuration into an unused E-MEM register (or overwrite an existing one) and press **Enter** on the PC to save the new name.
3. Then, learn the E-MEM to memory by selecting the corresponding **Learn** button. All module parameters are learned at once and stored in the same register. This register is now learned and ready for recall.

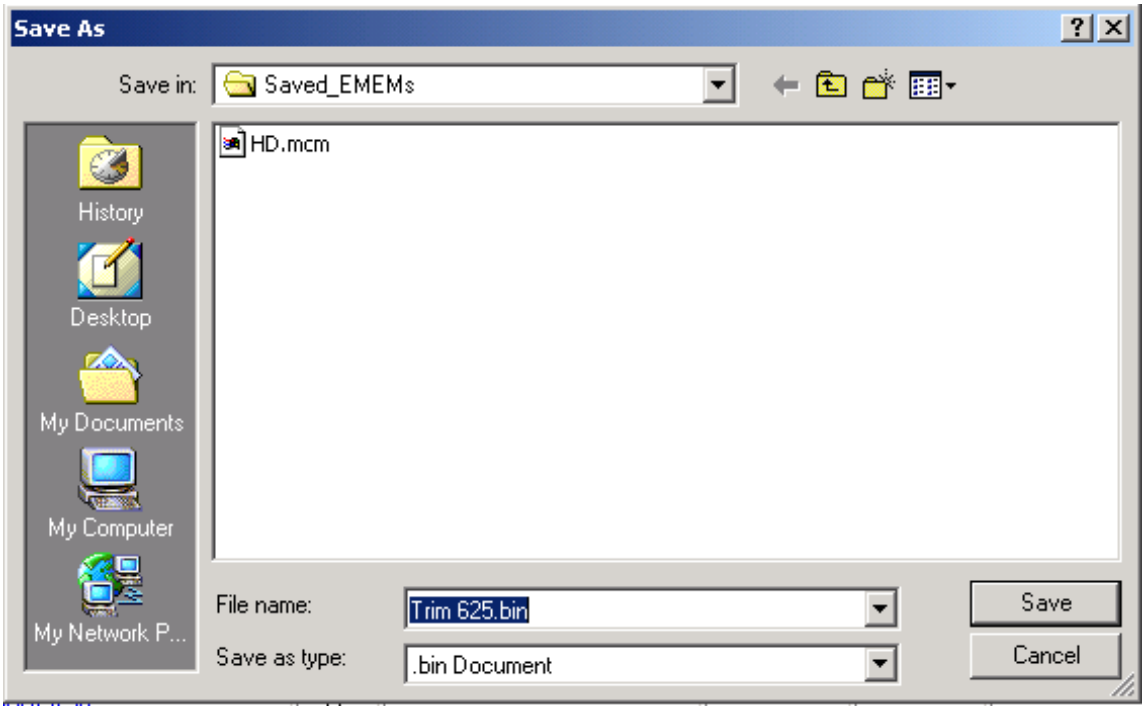
Figure 54. E-MEM Web Page (Advanced View)



To Save an E-MEM configuration to a file on a hard drive or other accessible media:

1. Select the corresponding **Save to…** button in the File Operations section.
2. This will bring up a File Download screen (not shown), select **Save** to bring up the Save As screen shown in Figure 55.

Figure 55. E-MEM Save to Operation



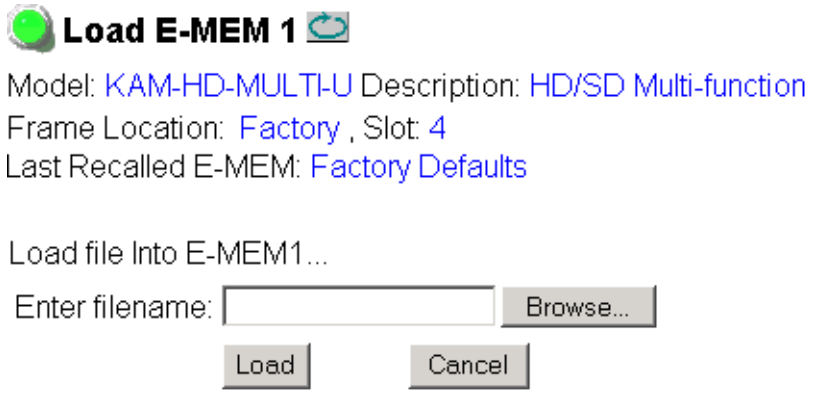
3. In the Save As dialog box, the file name will default to the E-MEM name. Browse to the folder where you want to save the configuration and select **Save**. The file saves as a .bin file type.

Note You may rename the file during the Save process but the E-MEM name entered into the Local Operations window will not change on the web page to match the Save As name. Best practice is to leave the Save As file name the same as the E-MEM name.

To load a saved E-MEM from a location:

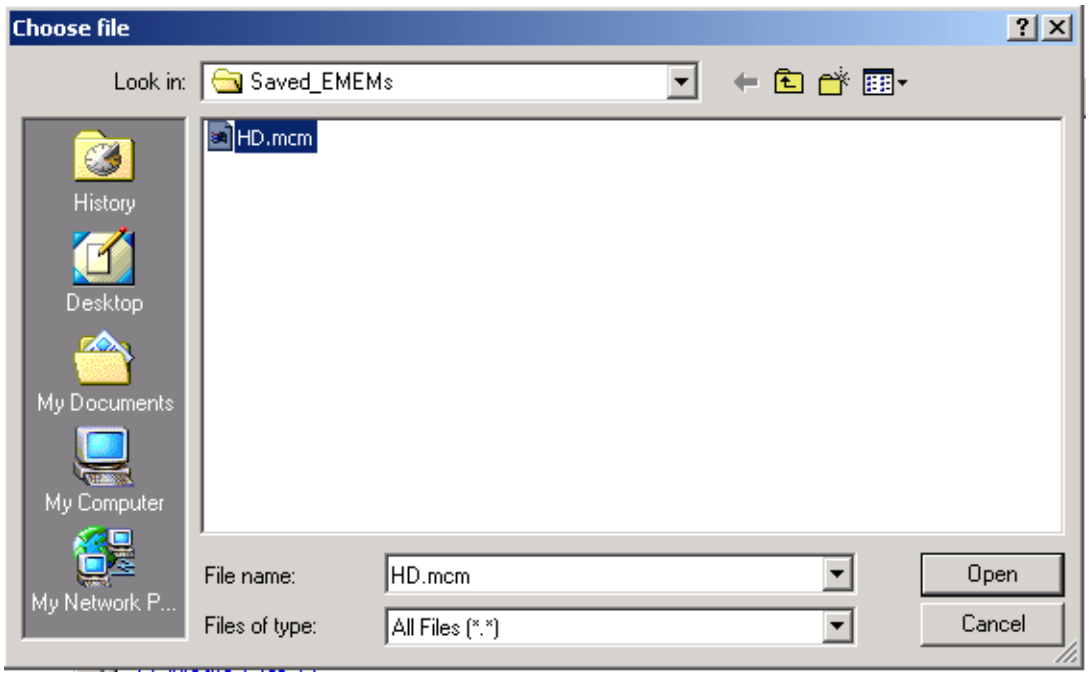
1. Select the **Load from ...** button in the File Operations section.
2. This will bring up the Load E-MEM page (Figure 56).

Figure 56. Load E-MEM Page



3. Select **Browse** to open the Choose File window (Figure 57). Browse to the location of the file you wish to load and select the file then the **Open** button to load the file or enter the filename and path in the Enter filename box.

Figure 57. Choose File Window



4. Once the correct path and filename is loaded, select the **Load** button on the Load E-MEM page.

5. This should place the recalled E-MEM file into the corresponding E-MEM window.

6. Select the corresponding **Recall** button to invoke this configuration.

Audio Preset Configs

Four Audio Preset Configs buttons are provided for setting up audio I/O configuration for the rear module and various audio parameters on the module. A preset configuration can be selected depending on the particular audio application required as described in *Audio Preset Configurations* on page 21. This overview describes each preset configuration in detail and explains which configuration is required for different audio applications

The following audio preset configurations are available:

- **DeEmbed**
- **Embed**
- **Universal 8 Ch**
- **Transcode**

Refer to Table 3 on page 22 for a summary of each parameter set when the Audio Preset Configurations are selected.

Slot Config Web Page

- Audio Processing Select
- Audio Gain
- Audio Channel Pairing
- Audio Proc
- AES Outputs
- E-MEM®
- Slot Config

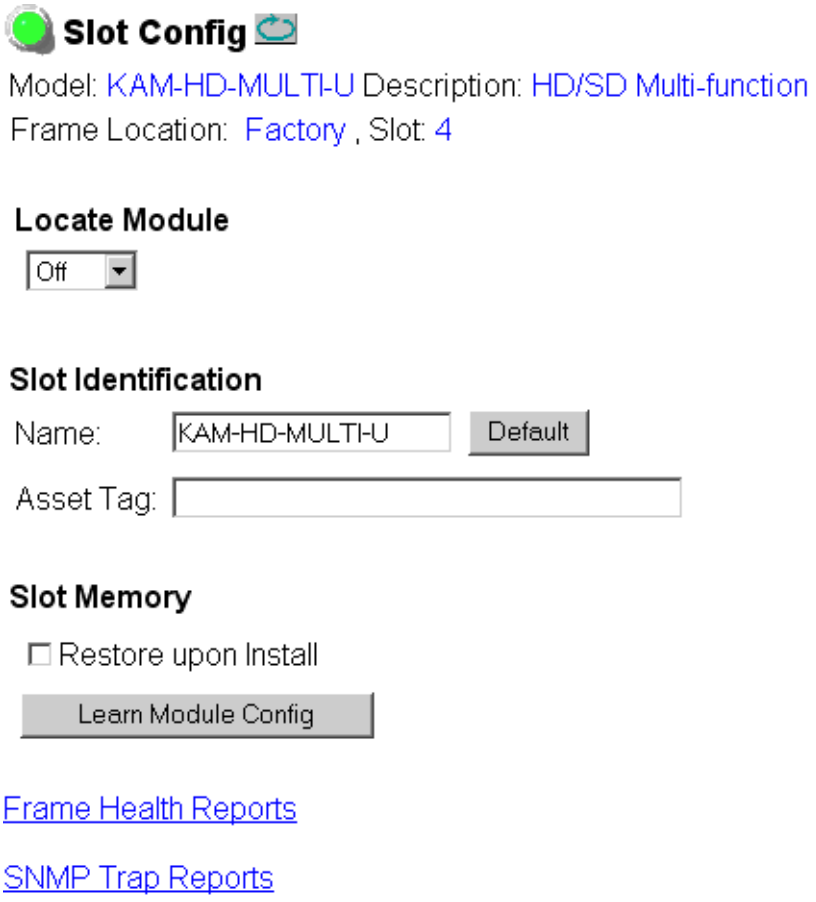
Use this link

Use the Slot Config web page shown in Figure 58 to perform the following functions on the module:

- Locate Module
- Slot Identification
- Slot Memory
- Frame Health Reporting
- SNMP Trap Reporting

Each of these functions is described in detail below.

Figure 58. Slot Config Web Page



Locate Module

Selecting **Flash** from the **Locate Module** pulldown flashes the yellow COMM and CONF LEDs on the front of the module so it can be located in the frame.

Slot Identification

You may identify the module by typing a specific name in the **Name** field. The assigned name is stored on the 2000NET module and travels with the 2000NET module if it is moved to another frame. Select **Default** to enter the factory default module name.

An asset identification may be entered in the **Asset Tag** field. This will appear on the module Status web page and in the NetConfig inventory report.

Slot Memory

The slot configuration for each media module is automatically saved periodically (once an hour) to the 2000NET module in that frame. You may also select the **Learn Module Config** button at any time to save the current configuration for this slot. The configuration is saved on the 2000NET module. If the 2000NET module is removed or powered down, the stored configurations are not saved.

When the **Restore upon Install** box has been checked, the current configuration saved to this slot is saved as slot memory. When the current module is removed and another module of the same type and software version is installed, the configuration saved to the 2000NET module will be downloaded to the new module. The box must be checked before the current module with the saved configuration is removed.

Only the same module type, with the same version software should be installed in this slot. Inserting a similar module with a different version software can cause unexpected results.

If a different type of module is installed in this slot, a warning message will state that the original module type has been replaced with another module type. In this case, a **Clear** button will appear allowing you to clear the stored configuration from the previous module.

Note Uncheck the **Restore Upon Install** button before downloading new software.

Frame Health Reports Link

Select the Frame Health Reports link to open the 2000NET module Frame Alarm Reporting web page. This web page allows configuration of the alarms and warnings that are reported to the external Frame Health Alarm connector on the rear of the 2000T3 frame (not present on the 2000T1 frame).

This web page contains the following sections:

- **Hardware Switch Status** – the Hardware Switch Status section of this web page displays the current settings of the alarm and warning configuration DIP switches, S1 and S2, on the 2000NET circuit board in this frame. These switches allow enabling and disabling of the overall status reporting information that is provided to the external Frame Alarm.
- **Output Format for Warnings** – set the Output Format for Warnings on the external RS-232 Frame Alarm output on the rear of the frame. When the **Open** radio button is selected, warnings are not reported to the external frame alarm. Selecting the **Closed** radio button, causes warnings to be reported in the same manner as alarms.
- **Frame Health Reporting** – this section provides a table showing the presence and status of all frame devices such as modules, power supplies, and fans and other frame functions such as Module Health and Frame Bus status. Use the corresponding **Report** checkboxes to indicate which alarms and warnings should be reported to the Frame Health alarm for the following conditions:
  - Faults
  - Signal Loss
  - Reference Loss
  - Config Error

SNMP Trap Reports Link

Select the SNMP Trap Reports link to open the 2000NET SNMP Reporting web page. This link will only be present when SNMP Agent software has been installed on the 2000NET module. This web page allows configuration of which alarms and warnings that are reported to the SNMP management software.

- **Hardware Switch Status** – The Hardware Switch Status section of this web page displays the current settings of the alarm and warning configuration DIP switches, S1 and S2, on the 2000NET circuit board in this frame. These switches allow enabling and disabling of the overall status reporting information provided to the SNMP traps.

Note Slot SNMP traps can be enabled only when the hardware switches for Module Fault reporting and Asynchronous Status reporting are in enabled on the 2000NET module (DIP switch S1 segment 7 and DIP switch S2 segment 1).

- **SNMP Trap Reporting** – This section provides a table showing the presence and/or status of all frame devices such as modules, power supplies, power and fan sleds and other frame functions such as fan and Frame Bus status.

  Use the corresponding **Report** checkboxes to indicate which trap warnings and alarms you want to be reported to the SNMP manager for the following conditions:

  - Faults
  - Devices removed
  - Signal Loss
  - Reference Loss
  - Config Error

  The enabled SNMP traps will be reported to any SNMP manager that is identified as an SNMP Report Destination in 2000NET configuration. Trap severity is read-only hard-coded information that is interpreted and responded to by the SNMP Manager software configuration.

  Refer to the *2000NET Instruction Manual* for complete details on using the 2000NET web pages.

Updating Software

Software updating is done using the NetConfig PC application option available from Grass Valley.

Acquiring the Latest Software

The latest software for this module, the latest version of NetConfig, and the 2000NET module is available from the Thomson Grass Valley FAQ web site at the following URL:

`http://gvg.custhelp.com`

This will take you to the Grass Valley Customer Service FAQ data base. The information provided here is the most up-to-date. You may also subscribe to software updates through the FAQ site. This is recommended so that when new versions of software are released, you are notified by email.

To download the latest Kameleon HD software for NetConfig updating, do the following:

1. Navigate to the FAQ site and click on the first FAQ, DOWNLOAD THE LATEST SOFTWARE?
2. Select the 2000 Series link.
3. Select the link to the latest Kameleon HD Interface module software.
4. Follow the instructions to download the files to your PC.

If you cannot find the software you need you may also go directly to the Thomson Grass Valley FTP site to download the software at the following location:

`ftp://ftp.thomsongrassvalley.com/pub/modular`

Software Updating With NetConfig

To use this method, your 2000NET module must be running version 4.0.0 or later and you must have the NetConfig Networking Application option running on a networked PC on the same subnet as the frame with the 2000NET module. Two files are required for updating software, an .fld and an .sw2 for the module being updated. For acquiring software, refer to *Acquiring the Latest Software* on page 92.

To use NetConfig for software updating, follow the steps below:

1. Locate the PC directory in which the NetConfig application has been installed. The default location is C:\Program Files\Grass Valley Group\NetConfig.

   If this is not where NetConfig was installed, right-click on the Net-Config desktop shortcut and select **Properties**, click on the **Shortcut** tab and note the location of the installation in the **Start In** field.

2. Copy the .sw2 file for the module update into the main NetConfig directory.

3. Create a subdirectory named **modular** (if one does not already exist) in the main NetConfig directory.

4. Copy the .fld file for the update into this **modular** subdirectory.

5. Open NetConfig and click on the **Load SW** icon on the top toolbar (shown at left).

Note Different versions of NetConfig may differ in the software update directory structure used for accessing software. This manual shows NetConfig version 2.0.6. Refer to the NetConfig manual for the version you are using.

6. The NetConfig Load Software window will open showing the software files available (Figure 59 on page 94). There are two directories when using NetConfig version 2.0.6. If the software does not appear in the **modular** directory, open the **Misc** directory.

   These device types and versions represent the .sw2 and .fld files loaded in the NetConfig main directory and the **modular** subdirectory. These files must be present on the PC running NetConfig for them to appear in the **Select devices to load** list.

7. Select the Device in the list on the left you wish to update. In the example in Figure 59 on page 94, the KAM-HD-MULTI module has been selected and will be highlighted. All of the modules of this type accessible on the network will appear in the window on the right under the **Client Name** heading.

   The current software loaded on each module will be listed as well as the IP address and other information for the module client.

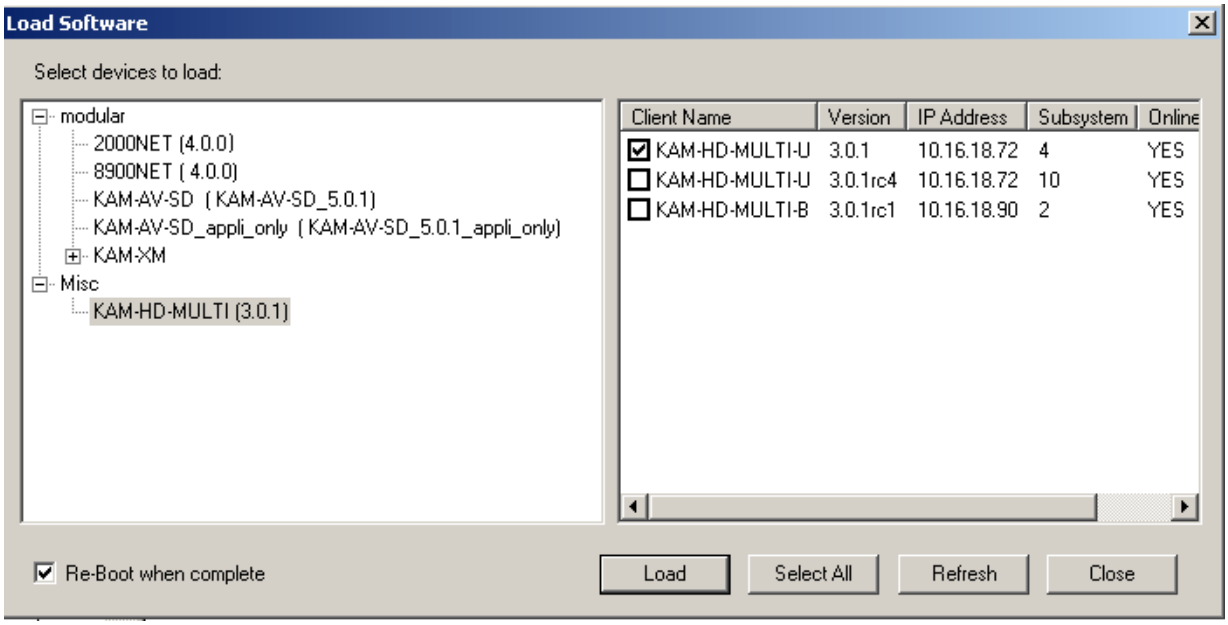
8. Check the corresponding **Client Name** boxes to upgrade the modules or use the **Select All** button to update all modules of this type present on the network.

9. Press the **Load** button to perform the update to all the selected modules.

10. Once the loading is complete, select the **Refresh** button to make sure all selected modules have updated to the correct software version which will be reported in the window.

11. Select the Recall factory settings **Recall** button on the E-MEM web page of each module after each successful download and check the module for proper operation.

Figure 59. NetConfig Load Software Window



12. For more information on using NetConfig, refer to the *NetConfig Networking Application Instruction Manual* which is included with the NetConfig option, available on the Thomson Grass Valley web site, and may also be present in the NetConfig directory from other NetConfig installations (Newton Control Panel installation is one example).

Service

The Kameleon HD modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field unless directed otherwise by Customer Service.

If your module is not operating correctly, proceed as follows:

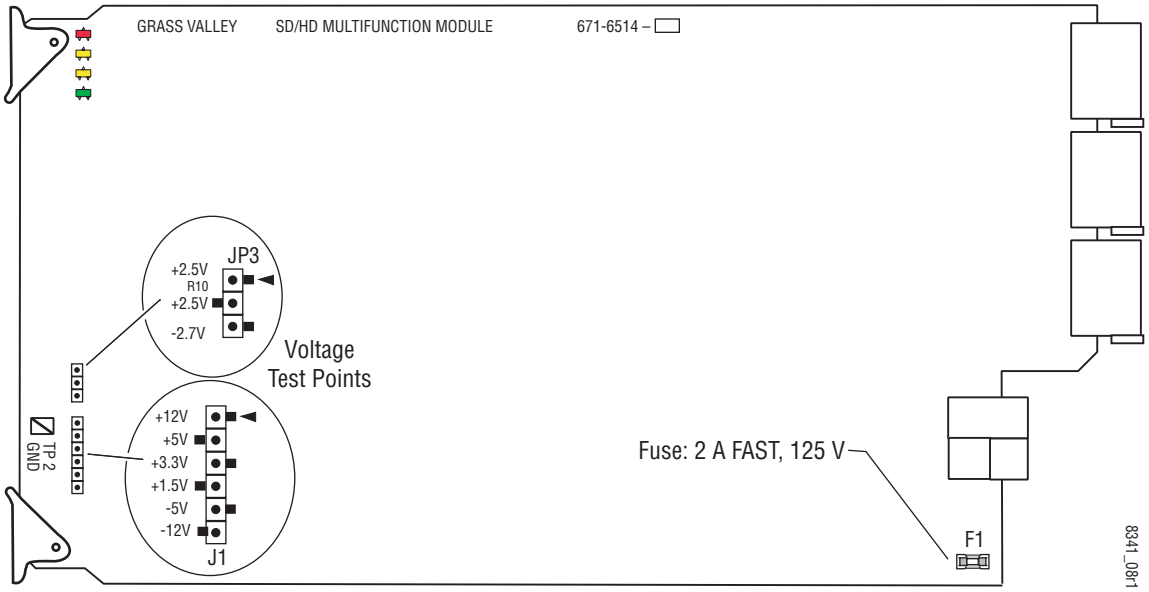
- Check frame and module power and signal present LEDs.
- Verify power at the voltage testpoints at the front of the module and check Fuse F1 if no voltage is detected (Figure 60).
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.

Refer to Figure 9 on page 14 for the location of PWR LED and Table 1 on page 14 for proper LED indications.

If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

Refer to the *Contacting Grass Valley* at the front of this document for the Grass Valley Customer Service Information number.

Figure 60. Test Point and Fuse Locations



Specifications

Table 5. KAM-HD-MULTI-Function Module Specifications

Parameter	Value
Serial Digital Input	
Number of inputs	1 HD or SD
Signal type	1080i @ 59.94, 50 1080sF @ 24 1080p @ 24 720p @ 59.94, 50 480i @ 59.94 (PAL-B) 576i @ 50 (NTSC)
Connector type	75 ohm BNC
Return loss	> 15 dB, from 5 MHz to 1.5 GHz
Auto equalization cable length	300 m (Belden 1694A cable or similar for 270 Mb/s) 100 m (Belden 1694A cable or similar for 1.5 Gb/s)
Serial Digital Outputs	
Number of Outputs	3 HD or SD (follows serial digital input)
Signal type	Follows serial digital input
Connector type	75 ohm BNC
Return loss	> 15 dB, from 5 MHz to 270 MHz > 10 dB, from 270 MHz to 1.5 GHz
Signal level	SDI 800 mV p-p + 10% maximum
Rise and fall time (20-80%)	< 270 ps for reclocked HD 400 to 800 ps for SD and bypass mode
Output polarity	Non-inverted. all outputs
Output jitter	< 0.2 ui (in Frame Sync mode)
AES/EBU Audio Inputs and Outputs	
Audio type	AES3id-2001
Audio input/output modes	8 In/0 Out 4 In/4 Out 0 In/8 Out
Audio input/output connectors	
KAM-HD-MULTI-UR Rear Module	2 (unbalanced D9 connectors with 2 audio breakout cables)
KAM-HD-MULTI-BR Rear Module	4 (balanced dual 3-terminal audio connectors)
Output resolution	20- or 24-bit
Input to Output Minimal Electrical Length (Delay)	
480i	33 ms
1080i	33 ms
720p	16.6 ms
Power	
Power dissipation	22 W
Mechanical	
Frame type	2000T1DNG or 2000T3NG Kameleon frame
Environmental	
Operating temperature	Refer to Kameleon 2000 frame specifications
Operating humidity	0 to 90%, non-condensing

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