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Kameleon

MULTI-FUNCTION MODULES

Instruction Manual

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Preface

About This Manual

This manual describes the features of a specific 2000 Series module in the Kameleon Media Processing System. As part of this module family, it is subject to Safety and Regulatory Compliance described in the 2000 Series frame and power supply documentation (see the Kameleon 2000 Series Frames Instruction Manual).

Kameleon Series Multi-function Modules

Introduction

This manual contains a Quickstart guide supported by references to the complete manual and supporting documents (see *Quickstart Guide* on page 12). Detailed installation, power up, and configuration information follows the Quickstart Guide.

The Kameleon Series multi-function modules are for use in 2000 Series Kameleon Frames. They are designed for facilities that receive multiple feeds that need considerable audio and video processing. They are particularly well suited for broadcasters and cable facilities that need to manipulate or add audio channels to multiple program streams.

Note Kameleon operation requires 2000NET Network Interface Module hardware revision 01A1 or greater with software version 3.2.2 or greater.

Kameleon systems installed in the 2000T3N frame require the 2000FAN fan sled (refer to Figure 7 on page 18).

Kameleon offers processing modules that provide a flexible, compact system of conversion, multiplexing, timing and signal processing functions for standard definition, analog and digital, video and audio.

The Kameleon Modular Series consists of the following:

- Two versions of the front processing module are available,
  - SD – SDI video processor with SDI Video I/O and AES/EBU and/or analog audio I/O (with submodules), and
  - AV – Composite or SDI video I/O and AES/EBU or analog audio I/O (with submodules).

Standard front processing module functions include:

- 3D video decoding (KAM-AV only),
- Up to 8 channels of audio A/D or D/A conversion (with submodules),
- Video and audio synchronization,
- 8 channels of audio embedding/de-embedding,
- Audio remapping to specific I/O,
- AES/EBU sample rate conversion,
- Video and audio processing amplifiers,
- Automatic EDH insertion in SD output video,
- Video and audio test signal generators,
- Individual Analog and Digital video timing controls, and
- Powerful VBI (vertical blanking interval) processing.

Four types of rear I/O modules are available:

- KAM-AA-R Analog Audio Rear module,
- KAM-MIX-R Mixed Audio Rear module,
- KAM-AES-R AES Rear module, and
- KAM-AA-AES-UR Rear module.

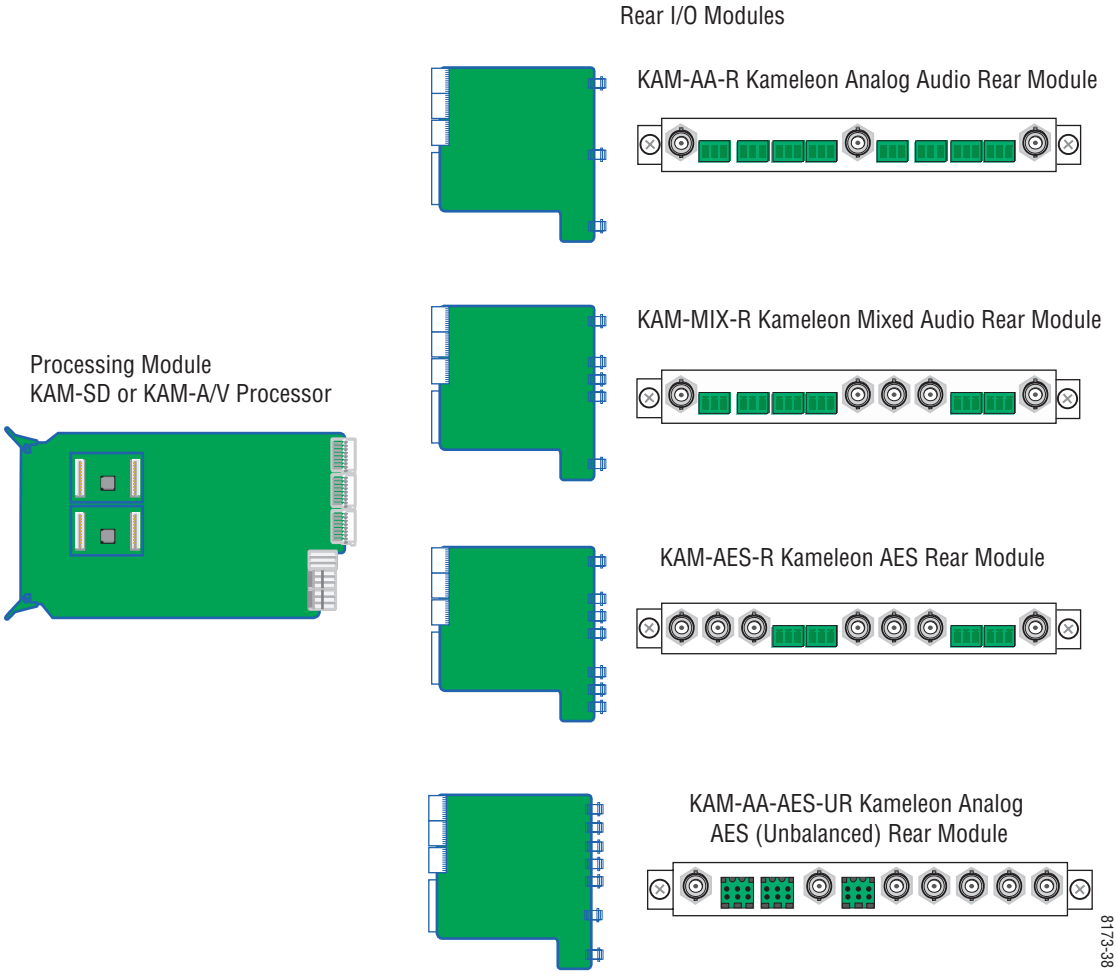
Two audio conversion submodules that can be installed on the processing module,

- Four-channel Analog to Digital Conversion Submodule (ADC), and
- Four-channel Digital to Analog Conversion Submodule (DAC).

Note Frame synchronization requires a 2000GEN Genlock Reference Module installed in the 2000 Series Kameleon Frame.

A front and rear module pair are required. The front processing modules provide the signal processing power while the rear module determines the specific I/O connections (refer to Figure 1 on page 11). Separate audio A-to-D and D-to-A converter submodules may be installed in two slots on either version of the processing module.

Figure 1. Kameleon Processing and Rear Modules



Quickstart Guide

1. Install modules in the frame.

   Install the rear I/O Module. Install submodules on the front Processing Module if needed (page 18) then install the module in the frame.

2. Connect the frame to the network and navigate the web browser to the frame.

   See the 2000NET Instruction Manual for information on configuring your frame IP address and connecting to the network.

3. Navigate to the module you would like to configure and click on the appropriate slot to open configuration links.

4. Navigate to I/O Configuration page to configure AES ports as:

   - Inputs or outputs, and
   - Balanced or unbalanced (see page 46).

   Click on the **I/O Config** page link on the left side of the page. I/O Configuration also allows you to assign names for all of the module's incoming and outgoing signals. Assigning easily recognized names will help later in the configuration process.

5. Connect signal cables.

   Configuration will be easier if all of the input signals are connected at this time.

6. Configure the **Video Input Select** page (see page 63).

   Configure the video source and the output timing source. If you have the 2000GEN reference installed in the frame and want the Kameleon to work as a frame sync, set the output timing source to Frame Reference. If not, set the output timing source to Video In.

7. Configure the **DEMUX** (demultiplex) page (see page 62).

   If you are de-multiplexing audio out of the video signal, **DEMUX** is configured next. The audio Demux page is used to extract digital audio groups from incoming SDI video for processing. These audio groups become inputs to the Audio Input Select page.

8. Configure the remaining audio/video pages.

   Navigate to the **Functional View** web page (see page 52 for the KAM-AV or page 53 for the KAM-SD). Starting from the left, use the block diagram links to access and configure the different blocks for the desired operation by clicking on any link in a block.

9. Configure vertical blanking interval (VBI) control.

To support data carried on particular lines, the Kameleon controls certain functions within the vertical blanking interval (VBI) and on some of the active video lines.

We refer to active video lines that are used to carry data as "Data Lines". Clicking the **Advanced (VBI Config)** radio button at the top of the **Video Input Select** page (page 63) displays the controls that allow you to specify which active video lines will be carrying data.

After making selections on this page, use the following pages for configuring the VBI/Data Lines:

- **VBI Decode** – for the composite input (page 58),
- **VBI Encode** – for the composite output (page 79), and
- **VBI SDI** – for serial digital output (page 81).

Installation

To install the Kameleon modules:

1. Place the passive rear module in a frame slot and tighten the screws on each side of the rear module,
2. Place the processor module in the corresponding front slot, and
3. Cable the signal ports.

All Kameleon modules can be inserted and removed from a 2000 Series Kameleon Frame with power on.

Note Remove the front processing module before removing the rear I/O module.

Audio submodules must be installed or removed with the processing module removed from the frame (processor module powered down).

Frame Capacity

Kameleon modules can be installed in any 2000 Series frame with a 2000NET interface.

The one rackunit 2000T1DN (with dual 130W power supplies and 2000NET module) or 2000T1DNG (with dual 130W power supplies, 2000NET and 2000GEN modules) frames have no Kameleon module capacity limitations.

The three rackunit 2000T3N (single 240W p/s, 2000FAN, and 2000NET module) and 2000T3NG (single 240W p/s, 2000FAN, 2000NET and 2000GEN modules) frames can be fully populated with Kameleon modules when the 2000FAN fan sled and two power sleds are installed.

Table 1 provides the maximum Kameleon module count for frame types.

Table 1. Power, Cooling, and Module Capacity of 2000 Series Kameleon Frames

Item	2000T3N/DNG Kameleon Frame Capacity	2000T1DN/NG Kameleon Frame Capacity
KAM-SD Module set	12	4
KAM-AV Module set	12	4

Module Placement in the Kameleon Frame

There are twelve slot locations in both the front and rear of a 3 RU frame and four slot locations in a 1 RU frame to accommodate 2000 and Kameleon Series media modules (audio/video signal handling modules).

The Kameleon media modules consist of a two-module set with a processing module and a passive rear module that can be plugged into any of the frame slot pairs. The rear modules provide the input and output interface connectors.

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

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

Figure 2. 2000T3NG Frame, Rear View

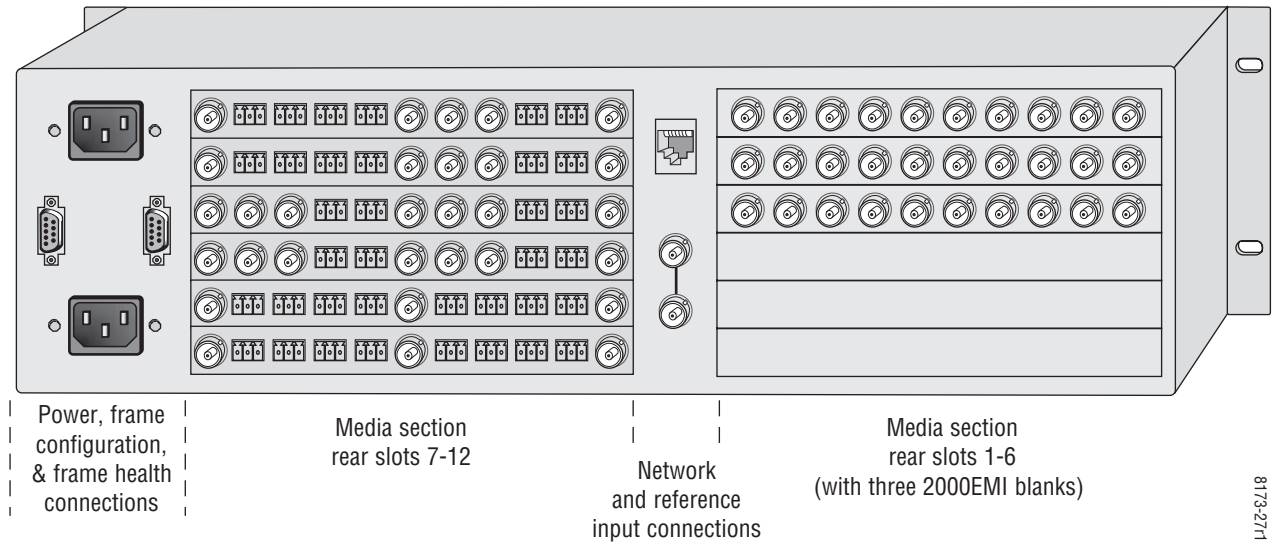
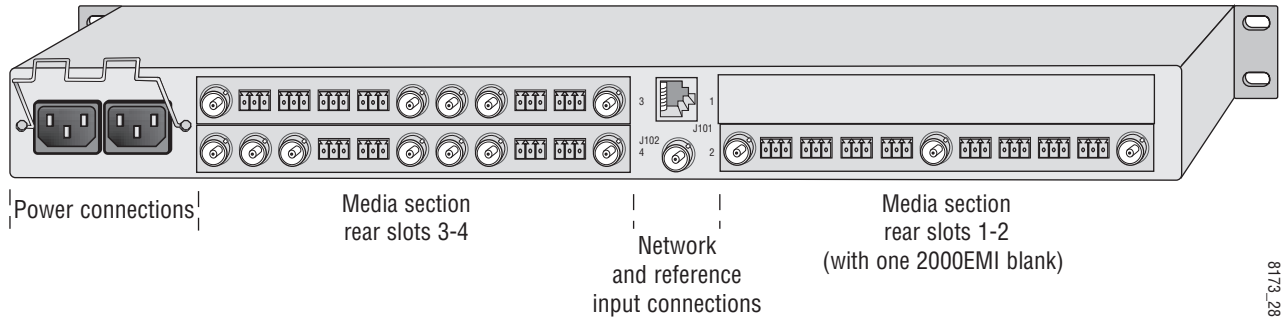
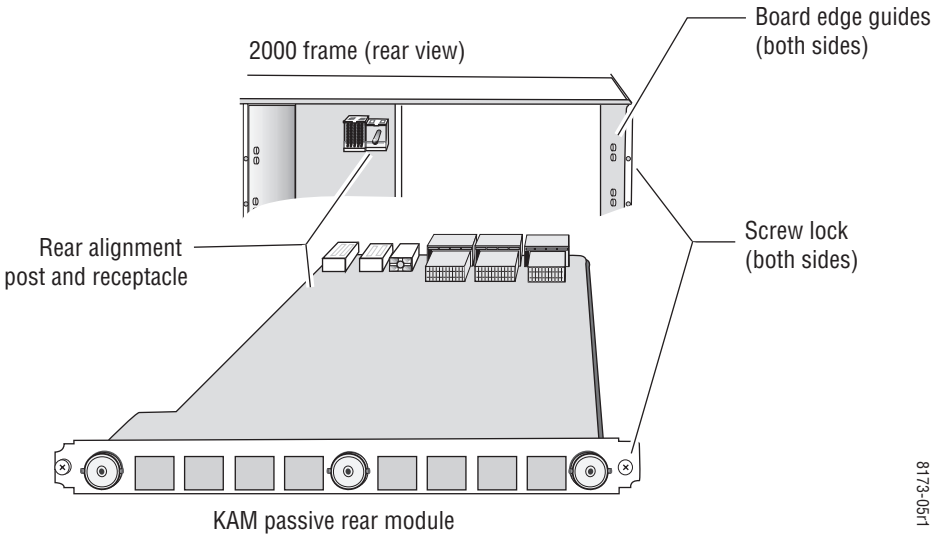


Figure 3. 2000T1DNG Frame, Rear View



2. Insert the passive rear module into the vacant rear slot of the frame as illustrated in Figure 4.

Figure 4. Installing Passive Rear Module



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

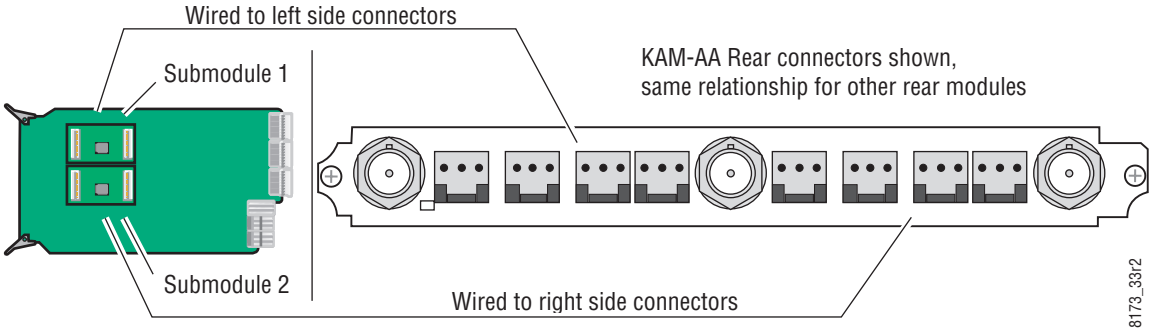
4. Using a crossblade screwdriver, tighten the two screw locks to secure the module in the frame.

5. If an ADC and/or DAC audio submodule option has been ordered, the submodule will be provided with the front processing media module.

   Placement of the submodule depends on the desired audio I/O configuration from the rear module type being used. The installation of the submodule will determine the functionality of the input and output audio connectors on each side of the rear module.

   As illustrated in Figure 5 on page 17, Submodule 1 is wired to the connectors on the left side of the rear module. Submodule 2 is wired to the right side connectors.

Figure 5. Submodule/Rear Connector Relationship



Refer to the rear module cabling information tables for correct placement of the submodules to match your requirements as follows:

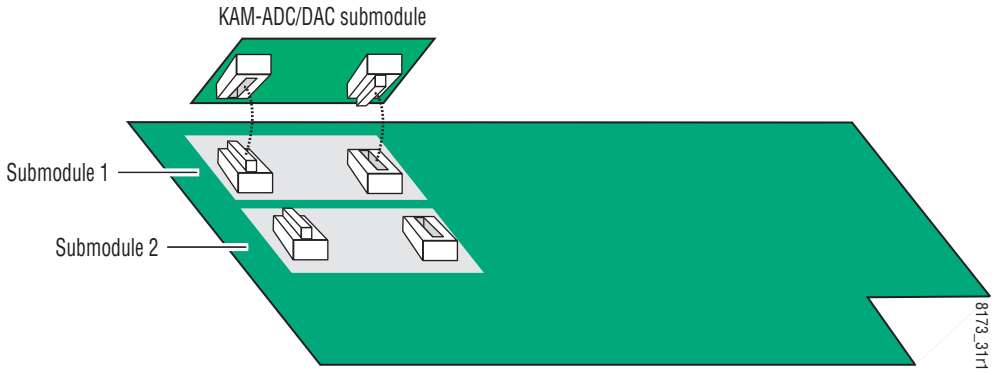
- KAM-AA-R – designed for eight-channel analog audio I/O (see Table 2 on page 21),
- KAM-MIX-R – designed for mixed I/O of two AES/EBU streams (balanced or unbalanced) and four analog audio channels, (see Table 3 on page 22),
- KAM-AES-R – designed for eight AES/EBU audio, balanced or unbalanced I/O connections (see Table 4 on page 24). No submodules are used with this application, and
- KAM-AA-AES-UR – designed for mixed I/O of three dual balanced analog audio inputs or outputs (six channels) and four BNC audio connections for four streams of AES audio inputs, outputs, or two inputs and two outputs (see Table 5 on page 24),

If the submodule(s) needs to be installed, refer to Figure 4 on page 16 for the location of the submodule depending on the application.

To install a submodule, line up the connectors on the bottom of the submodule with the correct submodule position on the top of the media module circuit board (Figure 6). Press firmly to seat the submodule.

After power-up, installation status of the submodule will be reported on the Status web page as described in *Status Web Page* on page 41.

Figure 6. Kameleon Submodule Installation



6. Locate the corresponding front media slot (1 -12) in the 3 RU frame frame (Figure 7) or front media (slot 1-4) the 1 RU frame (Figure 8 on page 19).

Figure 7. 2000T3NG Kameleon Frame, Front Slots

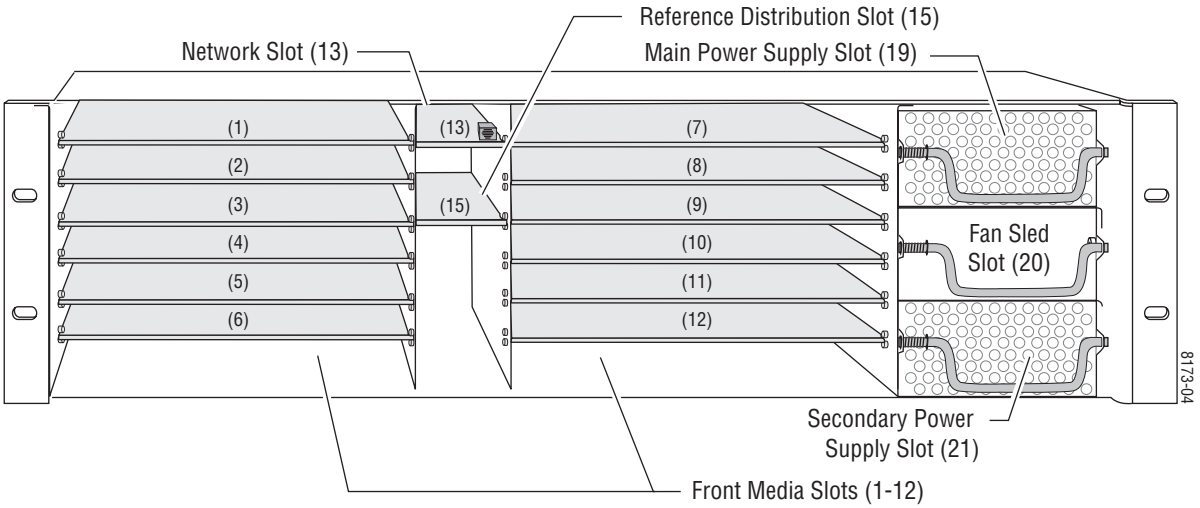
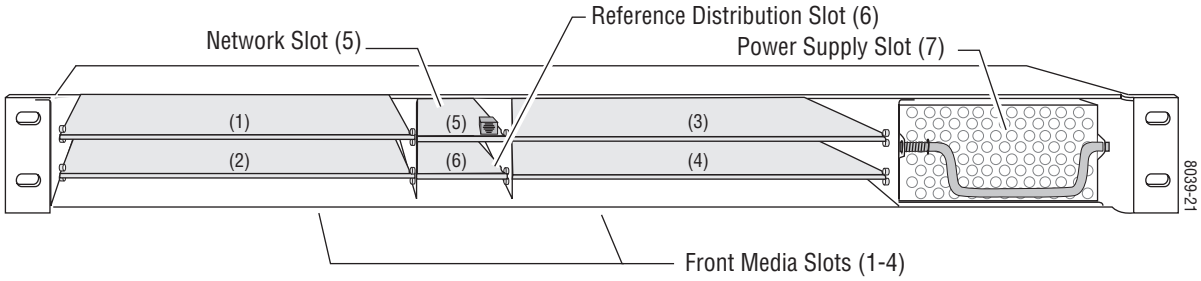
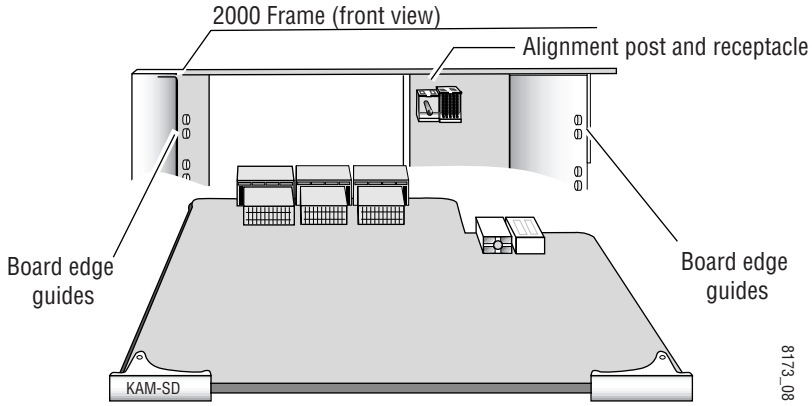


Figure 8. 2000T1DNG Kameleon Frame Front Slots



7. With the component side up, insert the front processing module in the corresponding front slot (see Figure 9).
8. Verify that the module connector seats properly against the midplane and rear module connector.
9. Press firmly on both ejector tabs to seat the module.

Figure 9. Installing Front Media Module



Cabling

All cabling is done at the corresponding rear module. Four different rear modules are available for various audio and video I/O configurations.

Note The newer KAM-AA-AES-UR model is referred to as an extended rear module because it uses different firmware and has dual analog audio connectors.

All modules accept SDI video in and provide SDI video out. Composite video inputs and outputs are only available with the KAM-AV front module.

Analog audio functions require the use of the audio ADC (analog to digital) and DAC (digital to analog) conversion submodules installed on the front module. Use of the submodules depends on the type of rear module and the audio requirements as described in each rear module cabling section.

Figure 5 on page 17 illustrates the relationship of submodule to rear connector for KAM rear modules. AES audio input or output configuration is set by configuring the connector as an input or output on the I/O Config web page (Figure 25 on page 49).

Cabling for each type of rear module is illustrated in the figures listed below:

- KAM-AA-R – see Figure 10 on page 21,
- KAM-MIX-R – see Figure 11 on page 22,
- KAM-AES-R – see Figure 12 on page 23, and
- KAM-AA-AES-UR – see Figure 13 on page 25.

Specific signal names are assigned for each connector using the 2000 GUI using the **I/O Config** web page (see *Configuration and Adjustments* on page 29).

KAM-AA-R Configurations

The KAM-AA-R rear I/O module (Figure 10) accepts either SDI or composite video (KAM-AV only). Three video BNC connectors are provided—one each for video in, composite video out (KAM-AV only), and SDI video out. Eight three-terminal audio connectors are provided for analog audio input or output I/O as determined by placement of the audio conversion submodules.

Figure 10. KAM-AA-R Input/Output Connectors

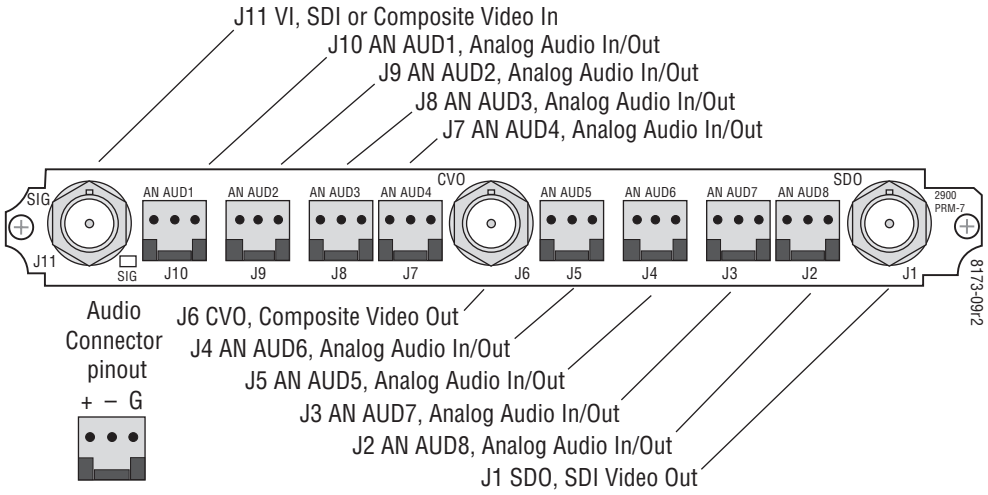


Table 2 provides the various audio input and output I/O configurations based on the positioning of the audio ADC and DAC submodules and the available video outputs. Figure 5 on page 17 illustrates the relationship of submodule to rear connector for KAM rear modules. Submodule installation is shown in Figure 6 on page 18.

Table 2. KAM-AA-R I/O Configurations

Submodule 1	Submodule 2	Video Input	Audio Inputs	Audio Outputs	Video Output
A to D	A to D	1 SDI or Composite[1] (J11)	8 analog	None	1 SDI (J1) and 1 Composite[1] (J6)
D to A	D to A		Demux from SDI input	8 analog	
A to D	D to A		4 analog	4 analog	

[1] Only KAM-AV modules support composite video I/O.

KAM-MIX-R Configurations

The KAM-MIX-R rear I/O module (Figure 11) accepts either SDI or composite video (KAM-AV only). Five BNC connectors are provided—three for video and two for unbalanced AES/EBU I/O. Six three-terminal audio connectors are provided— four for analog audio I/O and two for analog or balanced AES/EBU I/O.

Figure 11. KAM-MIX-R Input/Output Connectors

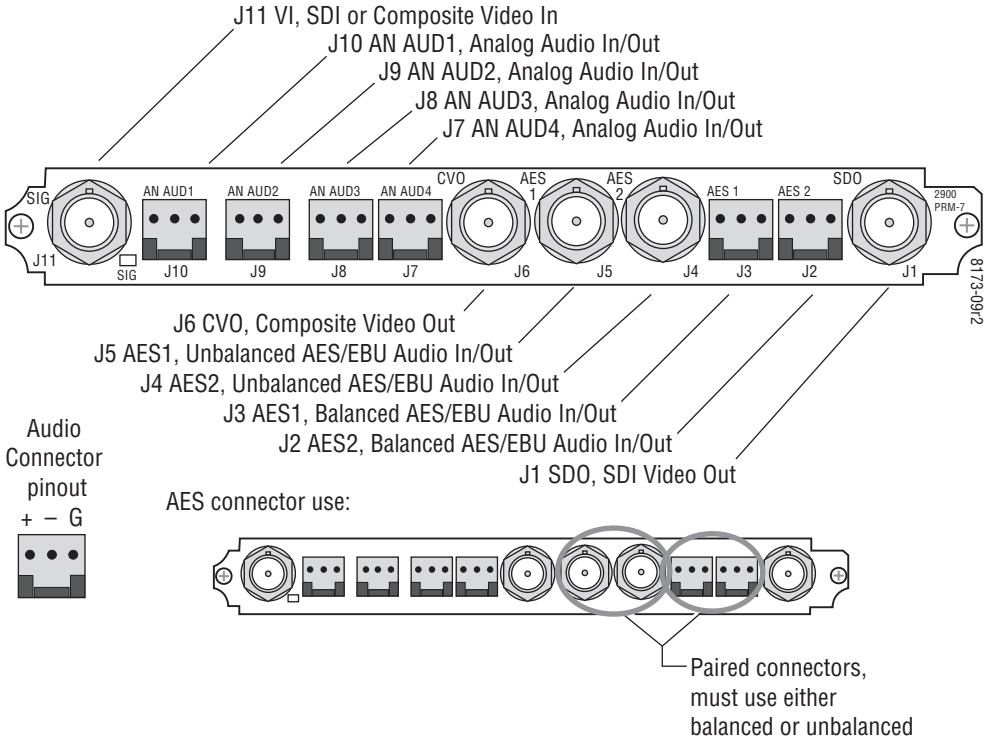


Table 3 provides the various audio input and output I/O configurations based on the positioning of the audio ADC and DAC submodules in Position 1 only and the available video outputs. Figure 5 on page 17 illustrates the relationship of submodule to rear connector for KAM rear modules. Submodule installation is shown in Figure 6 on page 18.

Table 3. KAM-MIX-R I/O Configurations

Submodule 1	Submodule 2	Video Input	Audio Inputs	Audio Outputs	Video Output
A to D	None	1 SDI or Composite[1] (J11)	4 analog, 2 AES/EBU balanced or unbalanced	None	1 SDI (J1) and 1 Composite[1] (J6)
D to A	None		2 AES/EBU balanced or unbalanced	4 analog	
A to D	None		4 analog	2 AES/EBU balanced or unbalanced	
D to A	None		None	4 analog, 2 AES/EBU balanced or unbalanced	

[1] Only KAM-AV modules support composite video I/O.

KAM-AES-R Configurations

The KAM-AES-R rear I/O module accepts either SDI or composite video (KAM-AV only). Seven BNC connectors are provided—three for video and four for unbalanced AES/EBU I/O. Four three-terminal audio connectors are provided for AES/EBU balanced audio I/O. AES/EBU connectors are configured in pairs as shown in Figure 12.

Figure 12. KAM-AES-R Input/Output Connectors

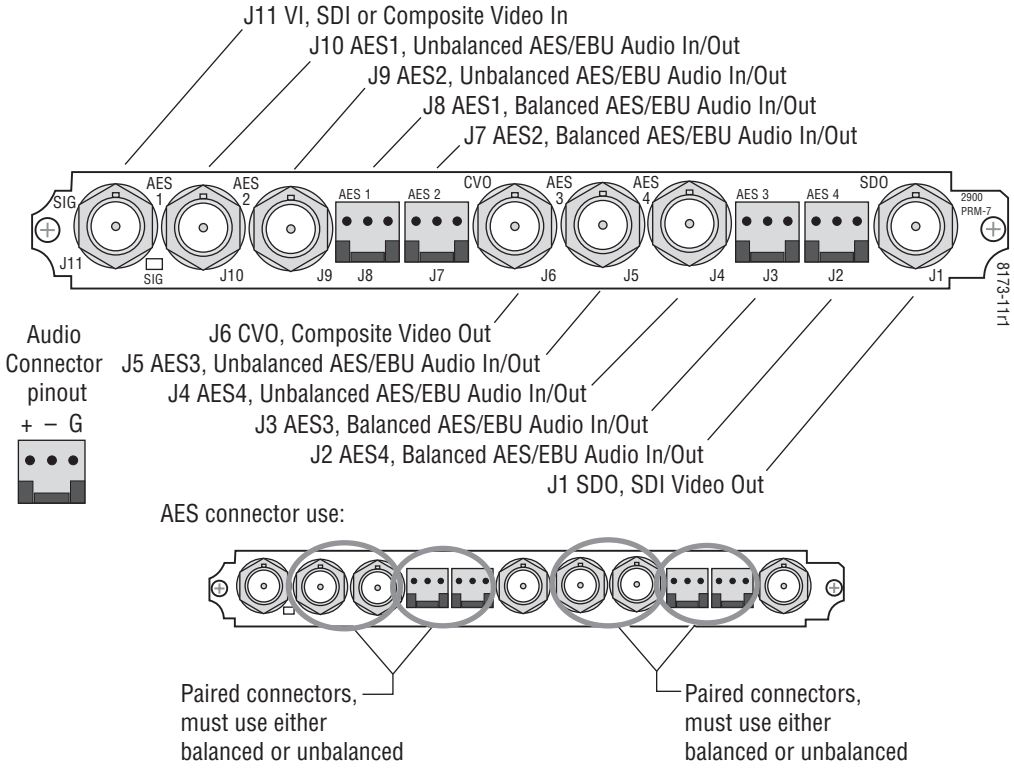


Table 4 provides the various audio input and output I/O configurations and the available video outputs. Submodules are not used in these configurations.

Table 4. KAM-AES-R I/O Configurations

Submodule1	Submodule 2	Video Input	Audio Inputs	Audio Outputs	Video Output
None	None	1 SDI or Composite[1] (J11)	4 balanced or unbalanced AES/EBU	None	1 SDI (J1') and 1 Composite[1] (J6)
None	None		None	4 balanced or unbalanced AES/EBU	
None	None		2 balanced or unbalanced AES/EBU	2 balanced or unbalanced AES/EBU	

[1] Only KAM-AV modules support composite video I/O.

Table 5 lists the active and inactive connections for the KAM-AES-R module when the Balanced or Unbalanced mode is selected.

Note Only the selected AES outputs are valid. Unconfigured AES outputs are invalid and should not be used.

Table 5. KAM-AES-R AES/EBU Connector Selections

Channel Pair	Mode	Active Connectors	Inactive Connectors
AES 1 & AES 2	Unbalanced	J10 and J9	J8 and J7
AES 1 & AES 2	Balanced	J8 and J7	J10 and J9
AES 3 & AES 4	Unbalanced	J5 and J4	J3 and J2
AES 3 & AES 4	Balanced	J3 and J2	J5 and J4

KAM-AA-AES-UR Configurations

The KAM-AA-AES-UR rear I/O module (Figure 13) accepts either SDI or composite video (KAM-AV only). Three BNC connectors are provided for video—one video input, one composite output (KAM-AV only), and one SDI video output. Three dual terminal audio connectors are provided for analog audio input or output I/O. Four BNCs are provided for unbalanced input or output AES I/O.

Figure 13. KAM-AA-AES-UR Input/Output Connectors

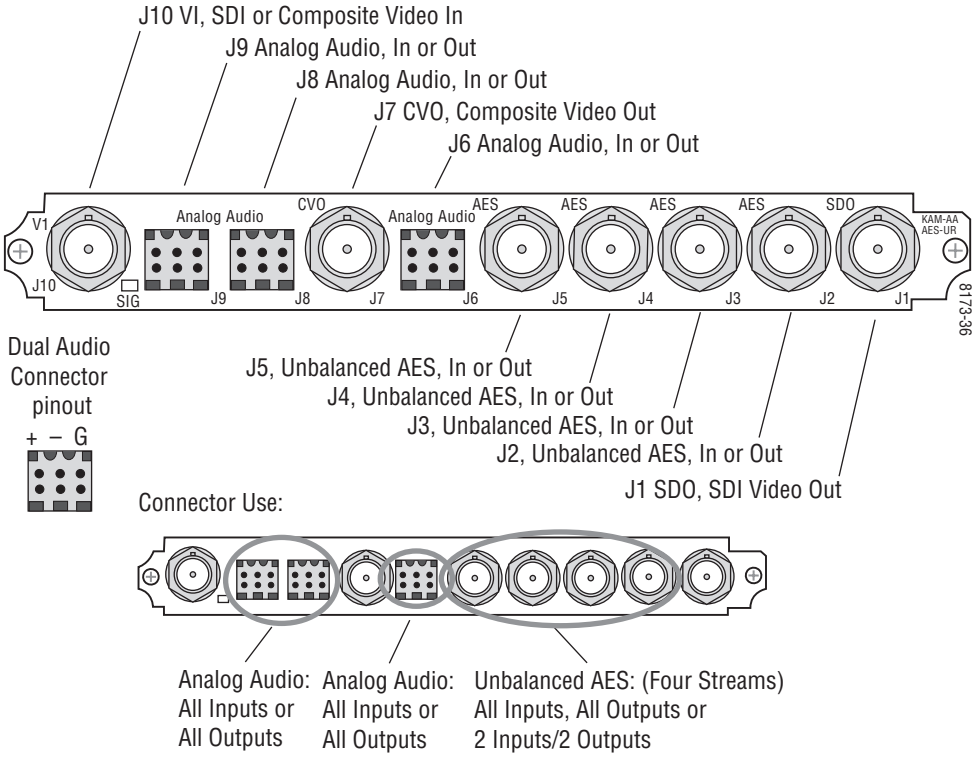


Table 6 provides the various audio input and output I/O configurations and the video outputs. Analog audio input or output configuration depends on the positioning of the audio ADC and DAC submodules.

Any number of audio inputs can be configured but there is a limit of four audio output pairs with any configuration.

Table 6. KAM-AA-AES-UR I/O Configurations

Submodule 1	Submodule 2	Video Input	Analog Audio Inputs/Outputs[1]	AES Audio Inputs/Outputs[1]	Video Output
A to D	A to D	1 SDI or Composite[2] (J10)	3 dual analog inputs (J6[3], J8, and J9)	4 AES/EBU unbalanced BNCs J2-J5 selectable as all inputs, all outputs, or 2 inputs and 2 outputs. on I/O Config web page	1 SDI (J1) and 1 Composite[2] (J6)
A to D	D to A		2 dual analog inputs (J8 and J9) and 1 dual analog output (J6[3])		
A to D	None		2 dual analog inputs (J8 and J9)		
None	A to D		1 dual analog input (J6[3])		
D to A	D to A		3 dual analog outputs (J6[3], J8, and J9)		
D to A	A to D		2 dual analog outputs (J8 and J9) and 1 dual analog input (J6[3])		
D to A	None		2 dual analog outputs (J8 and j9)		
None	D to A		1 dual analog output (J6[3])		
None	None		None		

[1] There may be any number of audio inputs but there is a limit of four output audio streams with any configuration.

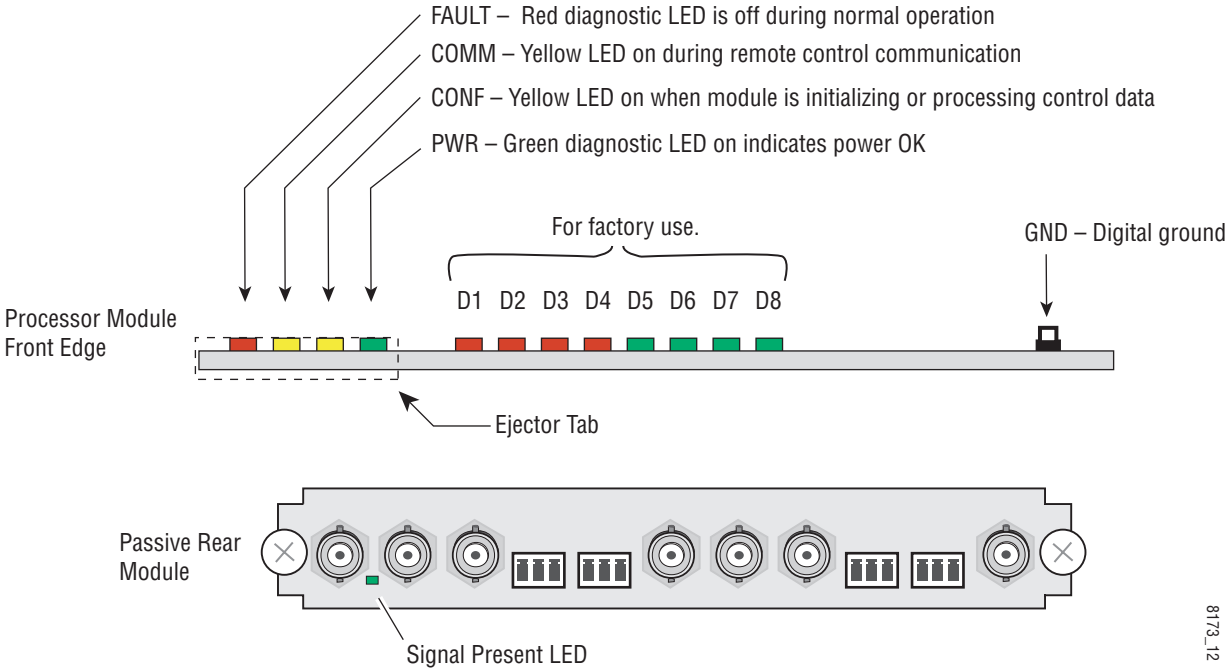
[2] Only KAM-AV modules support composite video I/O.

[3] Analog Audio connector J6 supports only Analog Audio Channels 1 and 2.

Power Up

The front LED indicators are illustrated in Figure 14.

Figure 14. Front and Rear Module Indicator LEDs



A green Signal Present LED can be seen on the Passive Rear Module (PRM) on all model types when a valid input signal is present.

Operation Indicator LEDs

Table 7 provides a complete list of possible operating conditions and the resulting indicator status.

A red FAULT LED indicates an error situation. Table 7 describes signal output and LED indications for the various input/reference combinations and user settings.

Table 7. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
Fault (red)	Off	Normal operation
	On continuously	Module has detected internal fault
	Long flash	One of the inputs is missing or is wrong standard
	Short flash	Errors present in SDI and/or AES/EBU input
COMM (yellow)	Off	No activity on frame communication bus
	Three flash/off pattern	Module Location command received from a remote control system
	Short flash	Activity present on the frame communication bus
CONF (yellow)	Off	Module is in normal operating mode
	Three flash/off pattern	Module Location command received from a remote control system
	On continuously	Module is initializing, changing operating modes or updating firmware. (When solid on along with Fault LED on, board has failed to load data.)
PWR (green)	Off	No power to module or module's DC/DC converter failed
	On continuously	Normal operation, module is powered

Note The yellow **COMM** and **CONF** LEDs are used for the module location function that is enabled using the 2000NET GUI. The module location function causes these LEDs to repeatedly flash concurrently three times followed by an off state of 900 ms duration (see *Slot Configuration Web Page* on page 106).

Configuration and Adjustments

KAM-AV/SD 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.

Configuration Summary

The configuration parameters and monitoring functions available with the web browser interface and the Newton Control Panel are summarized in Table 8. The parameter defaults, choices, ranges, and resolution are provided for each function

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
Composite video in	100%	44 to 219.5% (0.5% steps)	Composite In/ Input Video Gain%	IVidGain	KAM-AV only
Black level	0%	–21.6 to 22.4% (0.1% steps)	Composite In/ Black Level%	BlackLVL	
Input signal setup (525 only)	Setup	No Setup or Setup	Composite In/ Input Signal Setup No Setup or Setup radio button	N/A	
3D motion type	Mixed Motion	Low Motion Mixed Motion High Motion	Composite In/ 3D Decoder Control Low Motion, Mixed Motion or High Motion radio button	N/A	
3D motion threshold	Low – 60 Mixed – 25 High – 5	0 to 127 (1 unit steps)	Composite In/ 3D Decoder Control 3D Motion Threshold	MotThrld	
3D Comb filter	Luma + Chroma	Luma + Chroma Luma Chroma	Composite In/ 3D Decoder Control Comb Filter pulldown	decmodeL	
3D Luma bandwidth	Low – Wide Mixed – Wide High – Narrow	Narrow or Wide	Composite In/ 3D Decoder Control Luma Bandwidth Narrow or Wide radio button	LumaBw	
3D Luma level	56	0 to 255 (1 unit steps)	Composite In/ 3D Decoder Control Luma Level control	YLevel	
3D Chroma level	56	0 to 255 (1 unit steps)	Composite In/ 3D Decoder Control Chroma Level control	CLevel	
3D Decoder reset to default	Mixed Motion Defaults	–	Composite In/ 3D Decoder Control Reset 3D Decoder to Default button	N/A	
Blank VBI lines (Field 1 and Field 2)	Pass Through	Blanking, Notch Decode, Pass Through, and Remove setup (525 mode)	VBI Decode/ VBI Line radio buttons	N/A	KAM-AV/SD

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
SDI In web page view selection	Summary	Summary or Detail	SDI In/ Summary or Detail radio button	N/A	KAM-AV/SD
Set error reporting for SDI input video	Enabled	Enabled or Disabled	SDI In/Detail View/ Check or uncheck error checkboxes	N/A	
Demultiplex embedded audio from SDI in	No Extraction	No Extraction, Video In.G1 to G4	DEMUX/ Str1 & Str2 column radio button	N/A	
Input status loss of signal report	Enable	Enable or Disable	Video Input Select/ Input Status Report Loss of Signal checkbox	N/A	
Select video line rate	Auto	525, 625, or Auto	Video Input Select/ Video Line Rate radio button	N/A	
Frame reference loss of signal report	Enable	Enable or Disable	Video Input Select/ Frame Reference Loss of Signal checkbox	N/A	
Warning on SDI input errors	Warn	Warn or No Warning	Video Input Select/ SDI Input Errors/ Warn SDI Errors checkbox	N/A	
Select output timing source	Video In	Video In or Internal Frame Reference	Video Input Select/ Output Timing Selection radio buttons	N/A	
Define VBI data lines	None	525: None, 21/284, 22/285, 23/286 or 24/287 625: None, 24/337, 25/338, 26/339 or 27/340 or 28/341	Video Input Select/ Advanced (VBI Config) radio button VBI/Data Lines Last Data Line radio button	N/A	
Main video horizontal timing adjustment	0	525: 0 to 857.5 pixels 625: 0 to 863.5 (0.5 pixel steps)	Frame Sync/ HTiming control (pixels)	HTiming	
Main video vertical timing adjustment	0	525: 0 to 524 lines 625: 0 to 624 lines (1 line steps)	Frame Sync/ VTiming control (Lines)	VTiming	
Freeze mode selection (Video In timing source)	None	None, Field 1, Field 2, or Frame	Frame Sync/ Freeze Mode Selection radio buttons	N/A	
Freeze mode selection (Internal timing source)	None	None, AutoBlack, AutoFreeze, Field 1, Field 2, or Frame	Frame Sync/ Freeze Mode Selection radio buttons	N/A	
Enable video processing	Enable	Disable, Enable, or Color Bars	Video Proc/ Video Processing radio buttons	N/A	
Video gain lock	Off	On or Off	Video Proc/ Video Gain Lock radio button	N/A	
Main video contrast/Y gain	100%	50 to 149.6% (0.4% steps)	Video Proc/Standard View Y Gain control (%)	YGain	
Main video chroma gain	100%	50 to 149.6% (0.4% steps)	Video Proc/Standard View Chroma Gain control (%)	ChroGain	
Enable Clip controls	Disable	Enable or Disable	Video Proc/Standard View Clip Settings radio button	N/A	

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
Apply clips to VBI/Data Lines	Off	On or Off	Video Proc/Standard View Apply Clips to VBI/Data Lines checkbox	N/A	KAM-AV/SD
Main video soft/Y black clip	-6.8%	-6.8 to 109% (0.1% steps)	Video Proc/Standard View Soft/Y Black Clip control (%)	YBClip	
Main video hard/video black clip	-37.3% (525) -30.0% (625)	-37.3 to -7.3% (525) -30.0 to 0% (625) (0.1% steps)	Video Proc/Standard View Hard/Video Black Clip control (%)	VBClip	
Main video soft/Y white clip	109%	-6.8 to 109% (0.1% steps)	Video Proc/Standard View Soft/Y Clip control (%)	YWClip	
Main video hard/video white clip	138.7%	-6.8 to 138.7% (0.1% steps)	Video Proc/Standard View Hard/Video Clip control (%)	VidWClip	
Main video brightness/Y offset	0%	-3.55 to 3.44% (0.11% steps)	Video Proc/Standard View Brightness/Y Offset control (%)	YOffset	
Main video hue/chroma phase (525 only)	0.0 degrees	± 89.8 degrees (0.1 degree steps)	Video Proc/Standard View Hue/Phase control (degrees)	ChroPhs[1]	
Main video B-Y gain	100%	50 to 149.6% (0.4% steps)	Video Proc/Advanced View B-Y Gain control (%)	BYGain	
Main video B-Y balance/offset	0.0%	-3.55 to 3.44% (0.11% steps)	Video Proc/Advanced View B-Y Balance/Offset control (%)	N/A	
Main video R-Y gain	100%	50 to 149.6% (0.4% steps)	Video Proc/Advanced View R-Y Gain control (%)	RYGain	
Main video R-Y balance/offset	0.0	-3.55 to 3.44% (0.11% steps)	Video Proc/Advanced View R-Y Balance/Offset control (%)	N/A	
Audio group deletion	No Deletion	Delete Group 1 to 4	MUX/ Group Deletion (1-4) checkboxes	N/A	
Clear all HANC data in SDI video in	Don't Clear	Clear or Don't Clear	MUX/ Clear all HANC data checkbox	N/A	
Mux Group A/B insert to Stream A and B	No Insert	Insert or No insert	MUX/ Mux Group A and Mux Group B Group Replacement Insert checkboxes	N/A	
Mux group number for insertion	Group 1	Group 1 to Group 4	MUX/ Group number radio buttons	N/A	
Mux Bits/Sample rate	20 Bits	20 or 24 bits	MUX/ 20 or 24 Bit radio buttons	N/A	
VBI encoding blank lines	Pass	Pass or Blank	VBI Encode/ Check corresponding line Blank checkbox	N/A	
VBI encoding add setup (525 only)	Setup	Setup or No Setup	VBI Encode/ Check corresponding line Setup checkbox	N/A	
Blank VBI SDI lines (line-by-line)	Not Blanked	Blank/Not Blanked	VBI SDI/ Field 1/Field 2 Blank VBI line checkboxes	N/A	
Apply clips set in video processor to all VBI/Data lines	Not Apply	Apply /Not Apply	VBI SDI/ Apply Clips to VBI/Data Lines checkbox	N/A	

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
Add setup to composite output	Setup	Setup or No Setup	Composite Out/ Setup or No Setup radio button	N/A	KAM-AV only
Cross Color Removal (composite out)	Disable	Enable or Disable	Composite Out/ Cross Color Removal Disable or Enable radio button	N/A	
Chrominance Signal (composite out)	Enable	Enable or Disable	Composite Out/ Chrominance Signal Disable or Enable radio button	N/A	
Burst Signal (composite out)	Enable	Enable or Disable	Composite Out/ Burst Signal Disable or Enable radio button	N/A	
Adjust Coarse Video Delay (composite out)	0 pixels	0 to 4095.5 pixels (0.5 pixel steps)	Composite Out/ Delay Coarse (pixels)	Coarse Dly	
Adjust Fine Video Delay (composite out)	0 pixels	0 to 100% (1% steps)	Composite Out/ Delay Fine (%)	Fine Dly	
Composite Out video gain	100%	61 to 138.5% (0.5% steps)	Composite Out/ Output Video Gain (%)	OVidGain	
Output Video Adjustment	Calibrated	Calibrated or User adjustable	Composite Out/ Calibrated or User Adjustable radio button	N/A	
Adjust Composite Out luma gain	100%	50 to 150% (1% steps)	Composite Out/User Adjustable view Luma Gain (%)	N/A	
Adjust Composite Out black level	0.0%	-7.5 to + 15% (0.1% steps)	Composite Out/User Adjustable view Black Level (%)	N/A	
Adjust Composite Out chroma gain	0.0%	50 to 150% (1% steps)	Composite Out/User Adjustable view Chroma Gain (%)	N/A	
Adjust Composite Out hue (525 only)	0.0%	± 22.5 degrees (0.5 degree steps)	Composite Out/User Adjustable view Hue (deg)	N/A	
SDI output delay adjustment	0 pixels	0.0 to 4095.5 pixels (0.5 pixels)	SDI Out Output Delay Coarse (pixels)	N/A	KAM-AV/SD
Set analog audio input levels (Ch 1–Ch 4)	24.0 dBu	-2 to 28 dBu (0.1 dBu steps)	Analog Audio Inputs Max Input Level (dBu) Ch1-4	N/A	KAM-AV/SD with KAM-ADC
Audio input select	Silence	Silence, AES In 1 Unbal Ch1&2 AES In 2 Unbal Ch1&2 AES In 1 Bal Ch1&2 AES In 2 Bal Ch1&2 G1.S1.Ch1&Ch2 G1.S2.Ch1&Ch2 G2.S1.Ch1&Ch2 G2.S2.Ch1&Ch2 G3.S1.Ch1&Ch2 G3.S2.Ch1&Ch2 G4.S1.Ch1&Ch2 G4.S2.Ch1&Ch2 AA In Ch1&Ch2 AA In Ch3&Ch4	Audio Input Select/ Input Stream Select Input Stream1-4 radio button	N/A	Available audio inputs depend on rear module types and embedded audio present in SDI input

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
AES input sample rate	Disable	Enable or Disable	Audio Input Select/ Sample Rate Convert disable checkbox	N/A	KAM-AV/SD
AES input loss of signal report	Enable	Enable or Disable	Audio Input Select/ Loss of Signal Report checkbox	N/A	
AES input AES error warning	Enable	Enable or Disable	Audio Input Select/ AES Error Warn checkbox	N/A	
Audio channel pair swap	–	–	Audio Channel Pairing/ Pair 1 and 2 Ch A and Ch B and Pair 3 and 4 Ch A and Ch B radio buttons	Pair1Swp Pair2Swp Pair3Swp Pair4Swp	
Define audio Pair 1-4 Ch A and Ch B audio streams	Pair1ChA = Str1.Ch1 Pair1ChB = Str1.Ch2 Pair2ChA = Str2.Ch1 Pair2Ch B= Str2.Ch2 Pair3ChA = Str3.Ch1 Pair3ChB = Str3.Ch2 Pair4ChA = Str4.Ch1 Pair4ChB= Str4.Ch2	Str1.Ch1 Str1.Ch2 Str2.Ch1 Str2.Ch2 Str3.Ch1 Str3.Ch2 Str4.Ch1 Str4.Ch2	Audio Channel Pairing/ Pair 1 and 2 Ch A and Ch B radio buttons	Pair1ChA Pair1ChB Pair2ChA Pair2ChB Pair3ChA Pair3ChB Pair4ChA Pair4ChB	
Enable auto tracking for Pair 1-4 Ch A and Ch B	Off	On or Off	Audio Sync/ Pair 1 and Pair 2 Ch A and Ch B Enable Auto Track On checkbox	N/A	
Lock Pair 1-4 Ch A and Ch B delay adjustments	Unlocked	Lock or Unlocked	Audio Sync/ Pair 1 and Pair 2 Ch A and Ch B and Pair 3 and 4 Ch A and Ch B Channel Lock Locked checkbox	N/A	
Audio Pair 1 Ch A delay adjust Audio Pair 1 Ch B delay adjust Audio Pair 2 Ch A delay adjust Audio Pair 2 Ch B delay adjust Audio Pair 3 Ch A delay adjust Audio Pair 3 Ch B delay adjust Audio Pair 4 Ch A delay adjust Audio Pair 4 Ch B delay adjust	0 ms	0 to 5180 ms (20 ms steps)	Audio Sync/ Pair 1 and Pair 2 Ch A and Ch B and Pair 3 and 4 Ch A and Ch B Delay controls (ms)	Ch1ADly Ch1BDly Ch2ADly Ch2BDly Ch3ADly Ch3BDly Ch4ADly Ch4BDly	
Lock Pair 1-4 Ch A and Ch B gain adjustments	Unlocked	Lock or Unlocked	Audio Proc/ Pair 1 and Pair 2 Ch A and Ch B and Pair 3 and 4 Ch A and Ch B Locked checkbox	N/A	

Table 8. Summary of KAM-AV/SD Configuration Controls

Function	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Panel	Module/ Submodule
Audio Pair 1-4 Ch A gain and Ch B gain adjust	0 dB	- 40 to + 6 dB (0.1 dB steps)	Audio Proc/ Pair 1 and Pair 2 Ch A and Ch B and Pair 3 and 4 Ch A and Ch B Gain (dB)	Ch1AGain Ch1BGAin Ch2AGain Ch2BGain Ch3AGain Ch3BGAin Ch4AGain Ch4BGain	KAM-AV/SD
Select audio processing option for Pair 1-4 Ch A' and Ch B'	Pass	Pass Invert, A+B A – B, - (A+B) 1 kHz 400 Hz Silence A + B (Pair 2) Pair 1 A + B (Pair 1) Pair 2 A + B (Pair 4) Pair 3 A + B (Pair 3) Pair 4	Audio Proc/ Pair 1 and Pair 2 Ch A' and Ch B' and Pair 3 and Pair 4 Ch A' and Ch B' Processing pulldowns	Ch1AProc Ch1BProc Ch2AProc Ch2BProc Ch3AProc Ch3BProc Ch4AProc Ch4BProc	
Assign analog audio pairs to output connectors	–	Audio Pairs	Analog Audio Outputs/ J10 & J9 and J8 & J7 radio buttons	N/A	KAM-AV/SD with KAM-DAC
Set maximum analog audio output audio level	+24 dBu	-2 to + 24 dBu (0.1 dB steps)	Analog Audio Outputs/ AA Out Ch 1–Ch 4 (dBu)	N/A	
Assign AES pairs to output connectors	–	Audio Pairs	AES Outputs/ J4 & J5 (Unbalanced) or J2 & J3 (Balanced) radio buttons	N/A	KAM-AV/SD

[1] This control is valid only for a 525 line rate signal but will still appear in the Newton controls when a 625 line rate is selected. This control is not valid for 625 and should not be used.

Newton Control Panel Configuration

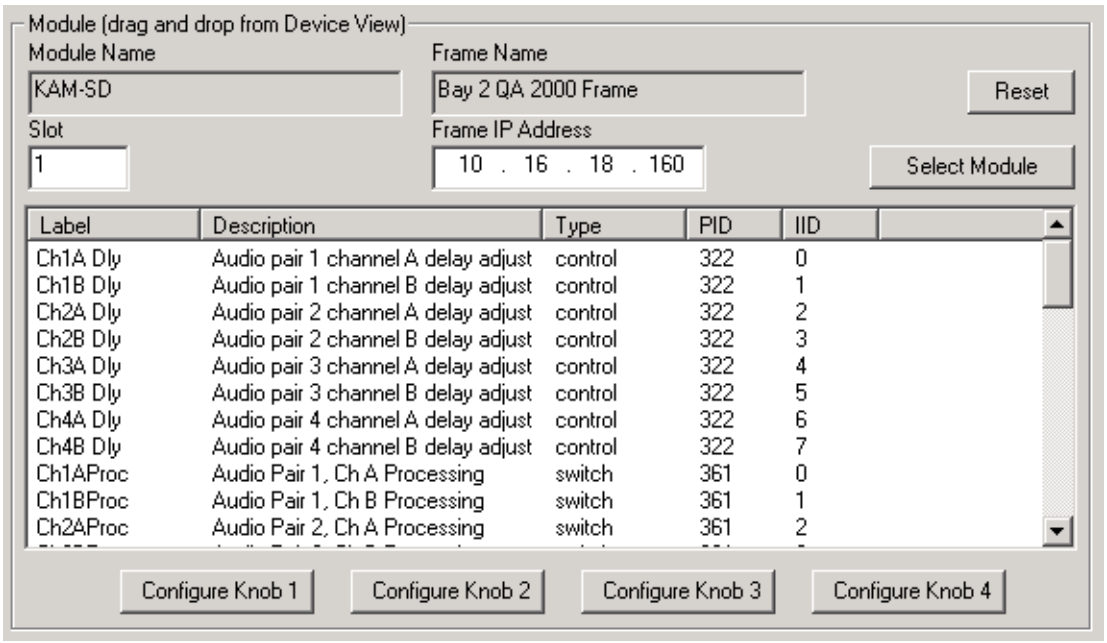
A Newton Control Panel (hard or soft version) can be interfaced to the Kameleon 2000 Series frame over the local network. Control panel access offers the following considerations for module configuration and monitoring:

- 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 8 on page 29.

An example of the Newton Configurator is shown in Figure 15.

Figure 15. 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.

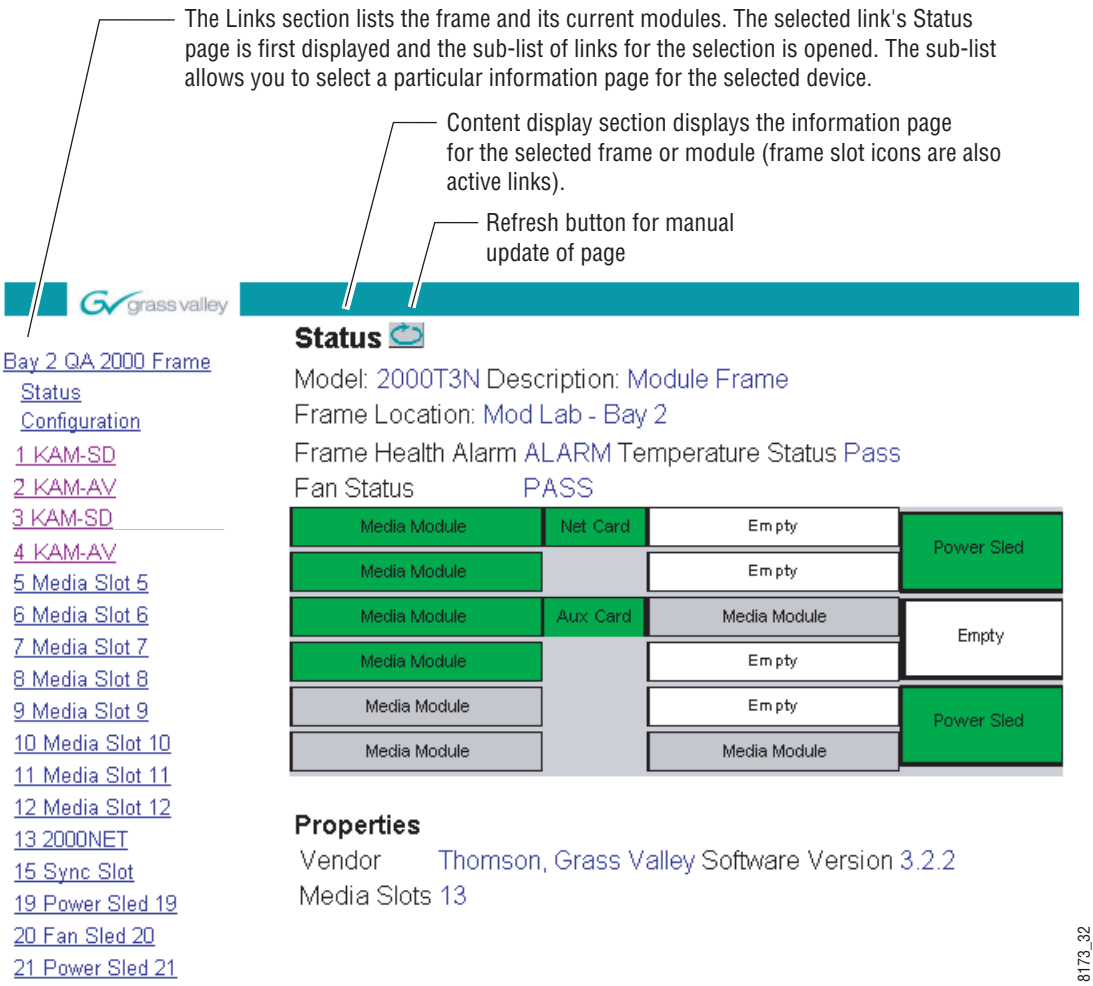
Use of the web interface offers the following considerations:

- 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.

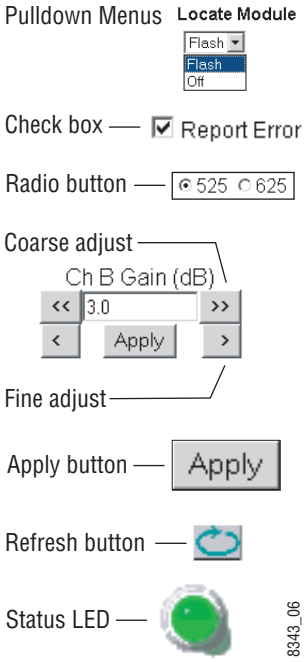
Refer to the Frame Status page shown in Figure 16 on page 37. The Kameleon and 2000 modules can be addressed by clicking either on a specific module icon in the frame status display or on a module name or slot number in the link list on the left.

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 3.2.2.

Figure 16. 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 3.2.2 or later):

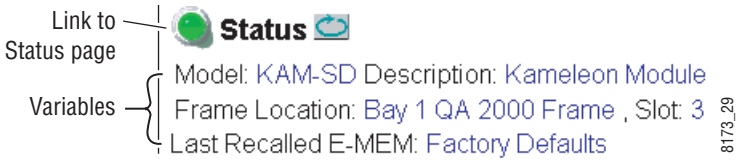
- Pulldown menus allow you to choose selections from a list.
- Check boxes are used when a selection can be enabled or included in a group. Multiple check box selections or enables can be made for some parameters.
- Radio buttons are used to make a choice of one parameter in a group.
- Each numerical adjustment control has a **Coarse** adjust button (left and right top double arrows) and a **Fine** adjust button (left and right bottom single arrows).

  To change a value, use the arrow button controls or enter a value into the number field and select the **Apply** button. You may also enter a number into the number field from a keyboard and hit the **Enter** key to apply the value.
- A **Refresh** button (circular arrow) is provided for manual refresh of the web page to view recently changed parameters.
- The Status LED is explained below.

Status and Identification Header

Each Kameleon configuration page has a Status and Identification Header as shown in Figure 17.

Figure 17. Typical 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 page where Warnings and Faults are displayed. LED colors indicate:

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

Variables:

- Model and Description are read-only generated by the module.
- Frame Location is entered in 2000 Series Kameleon Frame configuration.
- Slot number reports the module's location in the frame.

Initial Configuration Process Overview

To configure the Kameleon module proceed as follows:

1. Go to the **I/O Config** page to setup and name inputs and outputs.
2. If not already connected, connect all input and output signals. Go to the module **Status** page to verify component and signal presence and condition.
3. Go to the **Video Input Select** page to configure the video source (not required for KAM-SD) and output timing source.
4. Go to **DEMUX** if you are demultiplexing audio from the video signal.
5. Go to the **Functional Views** page to:
   - Verify the module's functional configuration is correct, and
   - Begin with the Input block links to configure each function in turn.

Note **Next** links are provided to help you navigate through a logical configuration sequence.

6. Use **E-MEM** memory to store or recall configurations as necessary.

KAM-AV and KAM-SD Links and Web Pages

The 2000 GUI provides the following links and web pages for the KAM-SD and the KAM-AV modules (Figure 18):

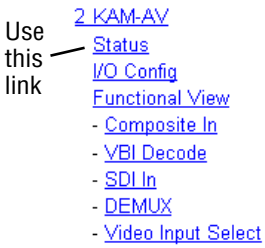
- Status, I/O Config, and Functional View web pages showing
  - Module operation status,
  - Rear module I/O configuration.
  - Functional block diagram showing active/inactive functional blocks and providing links to the related web pages,
- Module Configuration web pages for setting up the module,
- E-MEM configuration storage and recall web page, and
- Slot Configuration, SNMP, and software update web pages.

Logical subject links are also available on each configuration web page.

Note Some listed links may not appear when the Kameleon hardware configuration does not support that function. (For example, when no DAC submodule is installed, Analog Audio Output links will not appear.) When this occurs, the Functional View web page will indicate the related block is inactive (see Figure 27 on page 52 for the KAM-AV module and Figure 28 on page 53 for the KAM-SD module).

Figure 18. KAM-SD and KAM-AV Web Page Links

Status Web Page



The Status web page for the KAM-AV (Figure 19 on page 42), KAM-SD module (Figure 20 on page 43), and KAM-AV or SD with extended rear modules (Figure 21 on page 44), provide an overall indication of the health of the system and links to web pages for the active components:

- Status Header – the same on all Kameleon configuration pages (see *Web Page Operations and Functional Elements* on page 38),
- Color-coded communication status for each component and path,
- Summary of all fault/warning conditions, and
- Textual module status, front module, and submodule properties.

Color-coded Status Indicators and Links

Each box on the Status page represents a Kameleon module or submodule as shown for example in Figure 19 on page 42. Arrows represent signal paths that may or may not be monitored. 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.
- Grey = Not monitored.
- White = Not present.

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 (different between the KAM-AV and KAM-SD and KAM-AV or SD modules using an extended rear module), software identification, and asset tag number for the KAM-SD or KAM-AV front processing module. ADC or DAC submodule properties are also reported if they are installed on the processing module.

Submodule Properties

The Submodule properties in the footer provide a textual summary of the color-coded submodule status. If the front module has the ADC or DAC submodule installed, the bottom of the Status web page will display part number, serial number, and hardware revision for each submodule.

Figure 19. KAM-AV Status Web Page

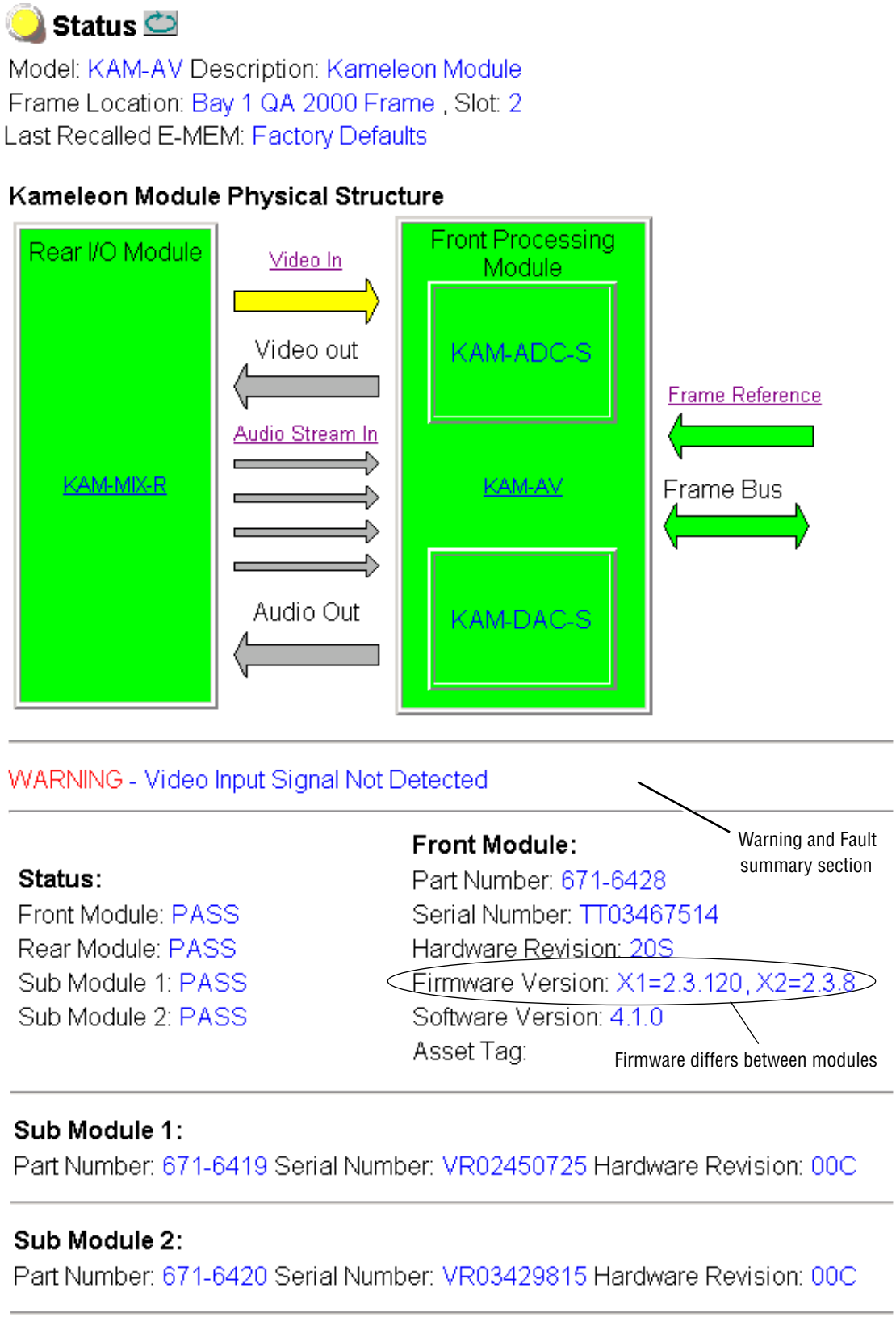


Figure 20. KAM-SD Status Web Page

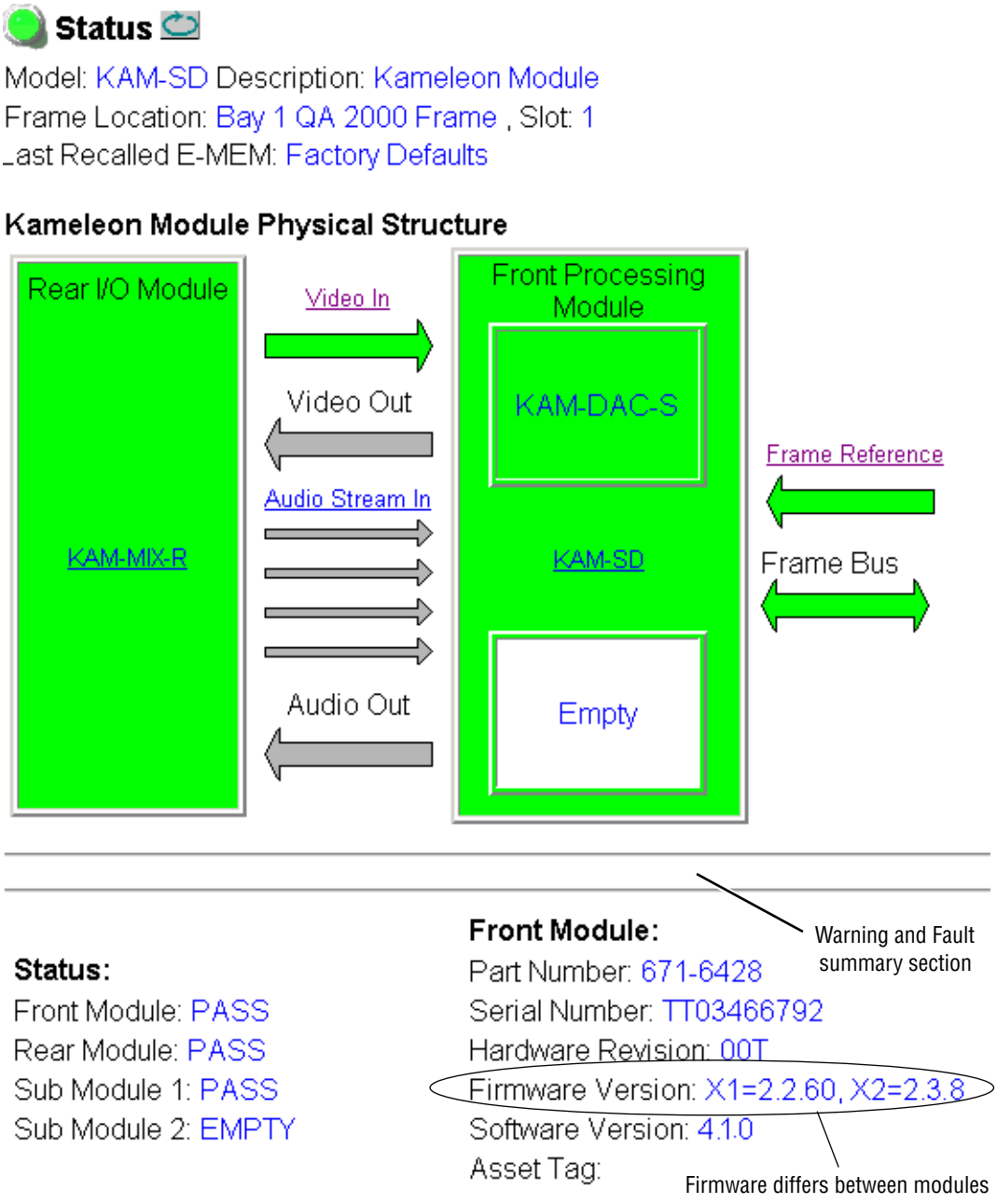
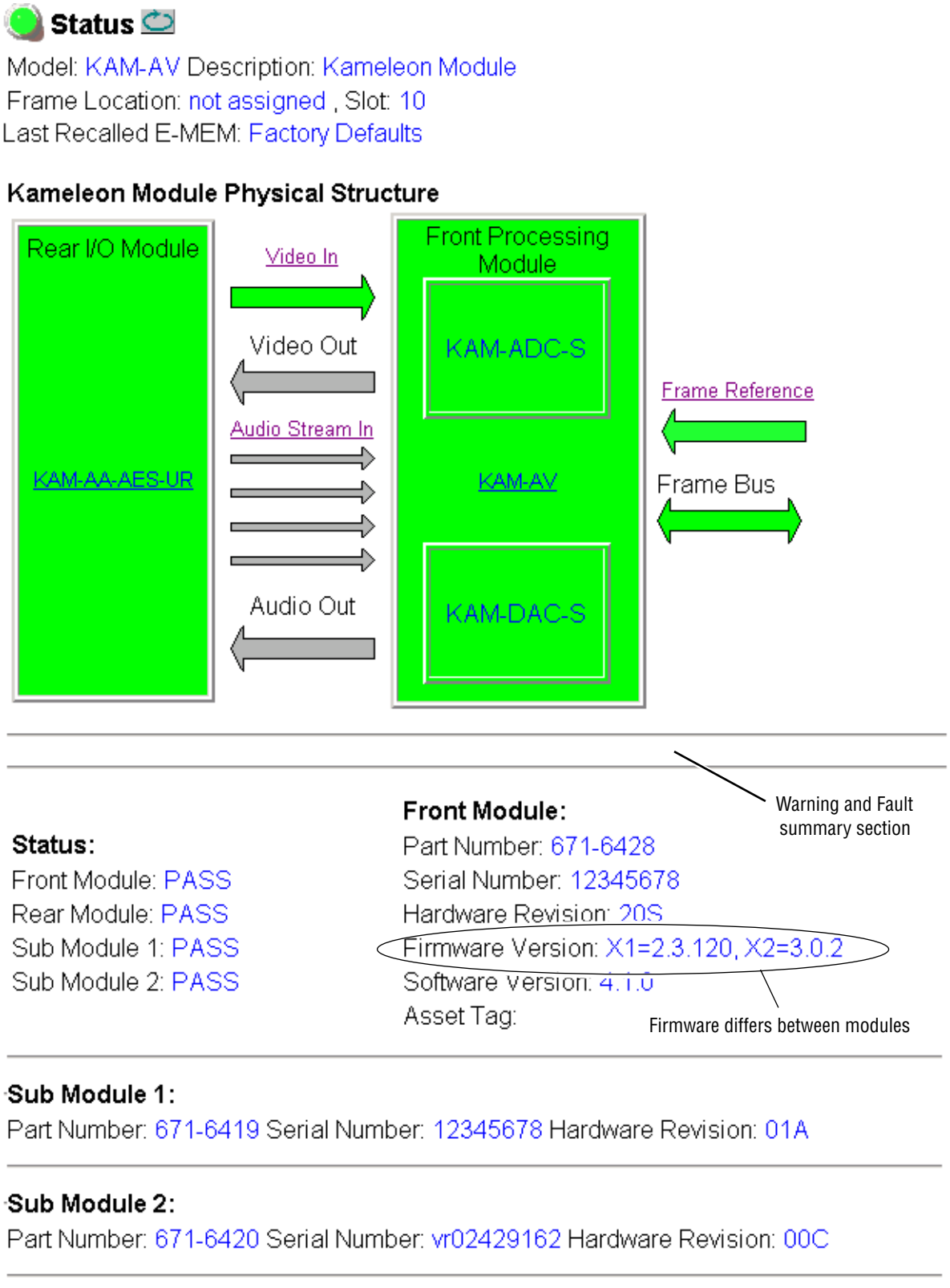


Figure 21. KAM-AV Status Web Page with Extended Rear Module



Warning/Fault Summary

The warnings and faults shown below are reported in the summary section of the Status web page (Figure 19 on page 42). 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.

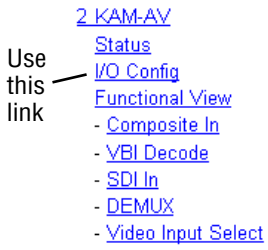
Warnings

- WARNING - Rear Module is not connected
- WARNING - Wrong Rear Module (incompatible with Kameleon)
- WARNING - Wrong Rear Module (no communication)
- WARNING - Wrong Rear Module (unknown type, incompatible)
- WARNING - Video Input is 625 and reference is 525 lines
- WARNING - Video Input is 525 and reference is 625 lines
- WARNING - Video Input is 625 but configuration is 525 lines
- WARNING - Video Input is 525 but configuration is 625 lines
- WARNING - Video Input Signal not detected
- WARNING - Frame Reference is not present
- WARNING - Frame Reference is not locked to input
- WARNING - Frame Reference is not present
- WARNING - No Video output - GenLock selected but not present
- WARNING - 1 or more Audio Input signals not detected
- WARNING - 1 or more Audio Input signals have had AES stream errors
- Internal Error - Unknown submodule type

Faults

- FAULT - nnV power supply bad. (nn = variable: 24 V, 12.5 V, 5 V, 3.3 V, 1.5 V, -5 V, or -12.5 V)
- FAULT - A/D failed (A /D system measuring power supplies and bus levels)
- FAULT - Xilinx 1 failure (main video processor)
- FAULT - Xilinx 2 failure (main audio processor)
- FAULT - MFM (Multi-function module) EEPROM checksum fails
- FAULT - DS1803 not responding (digital video in adjustment)
- Internal Error - Unknown front module type

Input/Output Configuration Web Page



Use the I/O Config web page to:

- Assign easily recognized signal names that will help later in the configuration process, and
- Configure AES audio ports as inputs or outputs, balanced or unbalanced.

Figure 23 illustrates the KAM-AA-R Rear module I/O Config web page. The type of submodule in Position 1 will determine whether Analog Audio connectors J7-J10 are all inputs or all outputs. The type of submodule in Position 2 will determine whether Analog Audio connectors J2-J5 are all inputs or all outputs.

Refer to Table 2 on page 21 for submodule I/O combinations and Figure 10 on page 21 for cabling information.

Figure 22. KAM-AA-R Rear Module Configuration Web Page

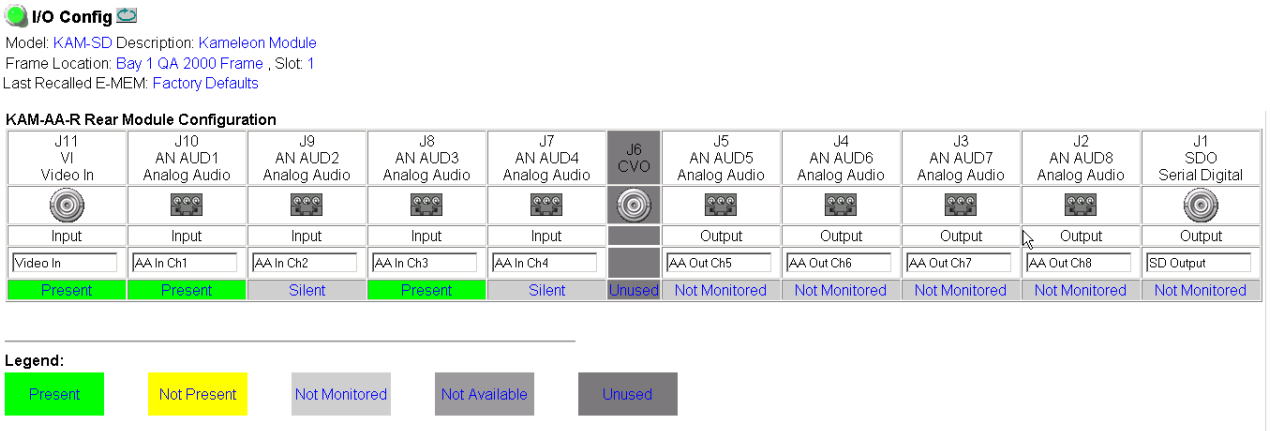


Figure 23 illustrates the KAM-MIX-R Rear module I/O Config web page. The type of submodule in Position 1 will determine whether Analog Audio connectors J7-J10 are all inputs or all outputs. Submodule 2 is not used with this rear module.

Select the type of AES I/O with the **Unbalanced** or **Balanced** radio buttons. The selected AES connectors can be defined as inputs or outputs with the pull-down controls on this web page.

Refer to Table 3 on page 22 for submodule I/O combinations and Figure 11 on page 22 for cabling information.

Note Only the selected AES outputs are valid. Unconfigured AES outputs are invalid and should not be used.

Figure 23. KAM-MIX-R Rear Module Configuration Web Page

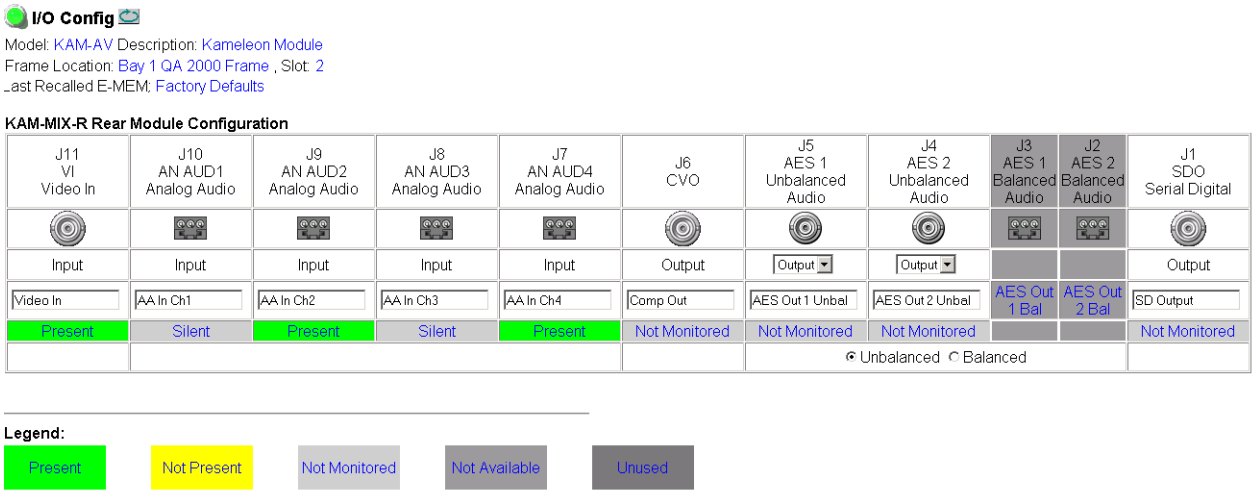


Figure 24 illustrates the KAM-AES-R Rear module I/O Config web page. Select the type of AES I/O with the two sets of **Unbalanced** or **Balanced** radio buttons. The selected AES connectors can be defined as inputs or outputs with the pulldown controls.

Refer to Table 4 on page 24 for submodule I/O combinations and Figure 12 on page 23 for cabling information.

Note Only the selected AES outputs are valid. Unconfigured AES outputs are invalid and should not be used.

Figure 24. KAM-AES-R Rear Module I/O Configuration Web Page

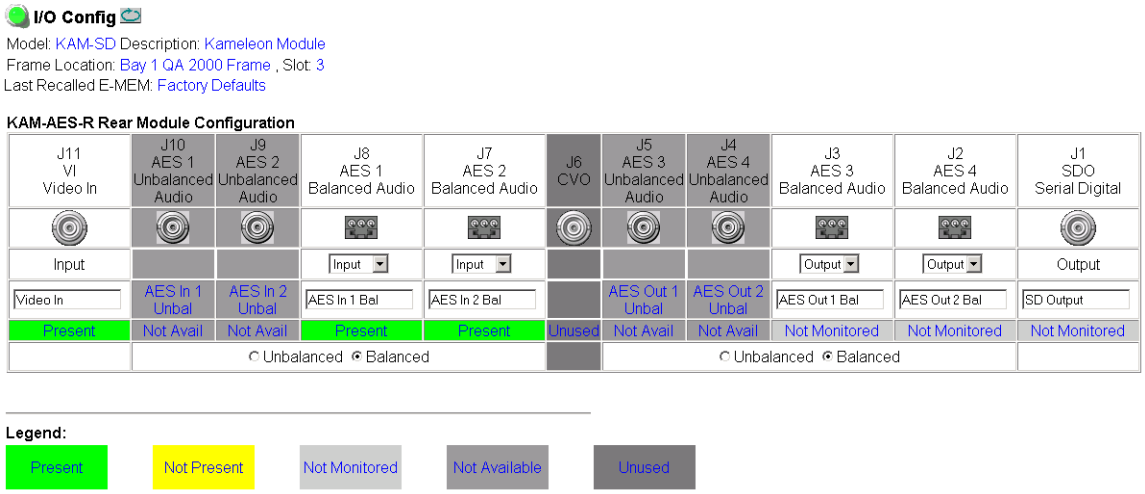


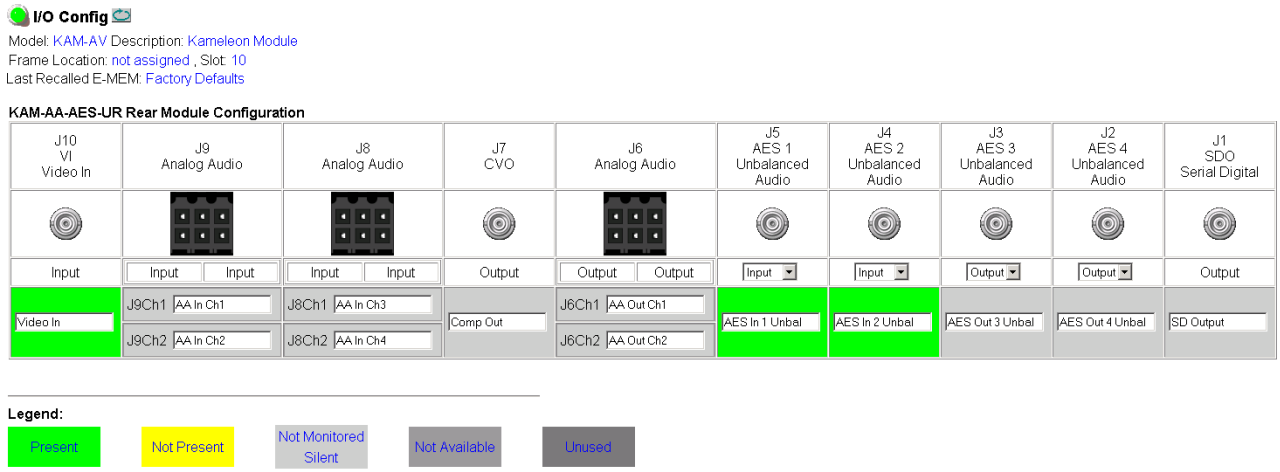
Figure 25 illustrates the KAM-AA-AES-UR Rear module I/O Config web page. The type of submodule in Position 1 will determine whether Analog Audio connectors J8 and J9 are inputs or outputs. The submodule in Position 2 will determine whether Analog Audio connector J6 is an input or an output.

AES unbalanced connectors J2, J3, J4 and J5 can be defined as all inputs, all outputs, or 2 inputs and 2 outputs with the pulldown controls on this I/O web page.

Note If the KAM-AA-AES-UR Rear module is installed in a frame with a 2000NET card running version 3.2.2 software, the dual Analog Audio graphics will be shown as boxes with red X's. The dual audio graphic is not recognized by this version 2000NET card. Functionality is not affected.

Refer to Table 6 on page 26 for submodule I/O combinations and Figure 13 on page 25 for cabling information.

Figure 25. KAM-AA-AES-UR Rear Module I/O Configuration Web Page



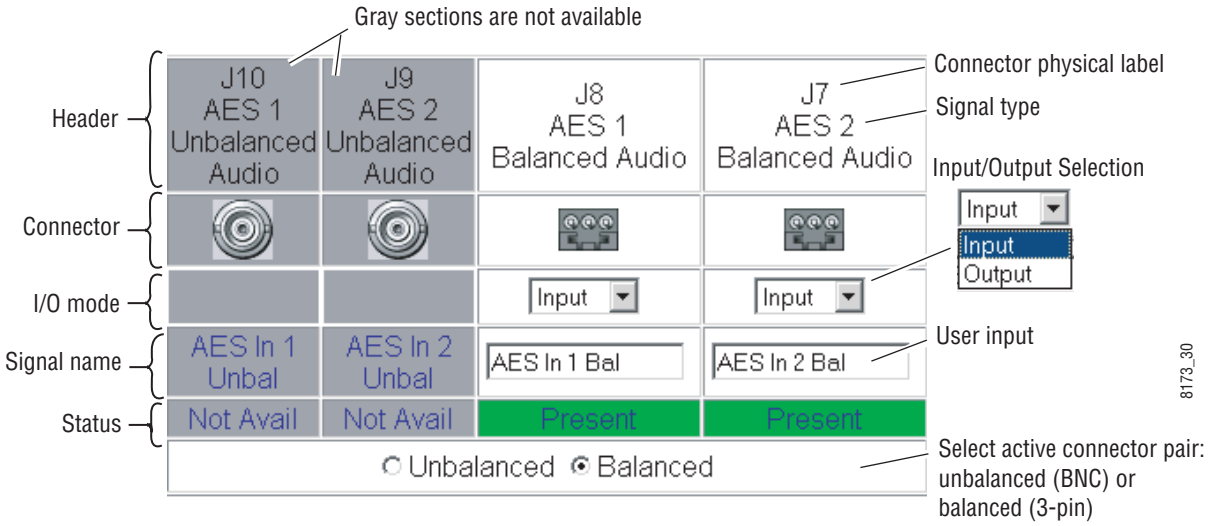
I/O Config Page Elements

Four of the AES-Rear module audio connectors are shown in Figure 26 to illustrate the function of each row of the diagram.

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 type of rear module and front processor module installed (refer to the *Functional View Web Page* on page 52).

Figure 26. Balanced/Unbalanced AES/EBU Inputs



Connectors

The Connector row illustrates connector type provided (BNC or 3-pin terminal) for each port. Connector type and input/output possibilities vary according to the rear I/O module used or with the presence of ADC or DAC submodules.

Input/Output Mode

I/O mode is either static read-only or an operational Input/Output selection (determined by the rear module used).

Signal Name

Enter a signal name (up to 15 characters) for each operational input/output. The name will be used to identify the signal in other configuration pages.

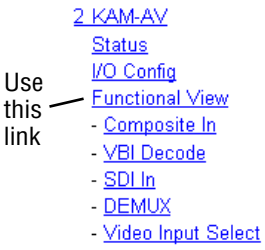
Status

Table 9 shows, by color and signal type, the signal status reports that may be displayed in the Status row:

Table 9. I/O Config Status Report Messages

Color	Video In	Analog Audio In	Analog Audio Out	Digital Audio In	Digital Audio Out	Video Out
Green	Present	Present	None	Present	None	None
Yellow	Not present or 525/625 mismatch	None	None	Not present	None	None
Light Grey	None	Silent/Unused	Not Monitored	None	Not Monitored	Not Monitored
Medium Grey	None	Not Available	None	Not Available	Not Available	None
Dark Grey	None	None	None	None	None	Unused

Functional View Web Page



Use the Functional View web page (KAM-AV – Figure 27, KAM-SD – Figure 28 on page 53) to:

- Monitor module functions and signal paths, and
- Navigate to pages for configuring active functions.

The Functional View page is a block diagram of the installed Kameleon system that reports the module functions and signal paths that are active or inactive in the current configuration. It can be used as a link map for configuring module functions. Begin configuring with one of the input function blocks on the left.

Color coding indicates active functions and flow. Greyed components are inactive due to hardware and/or software constraints. Underlined module functions are links to the page for that function. Return links and logical next step links are provided at the bottom of each configuration page.

Figure 27. Functional View – KAM-AV Web Page

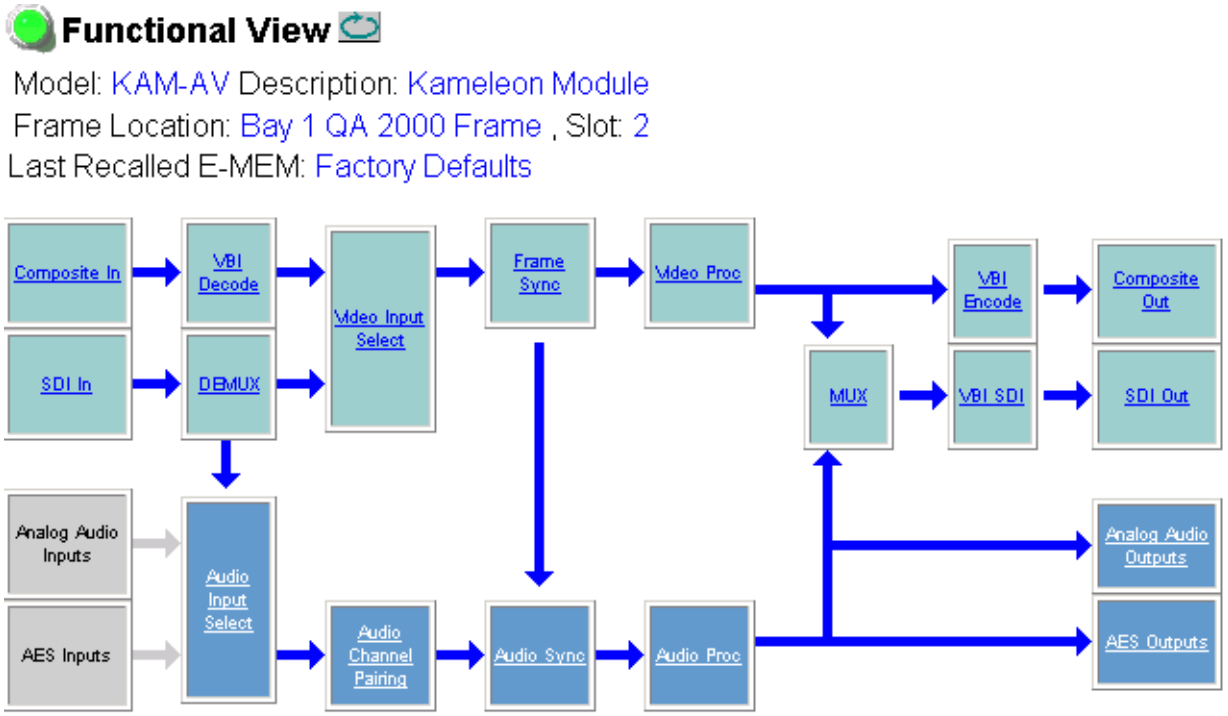
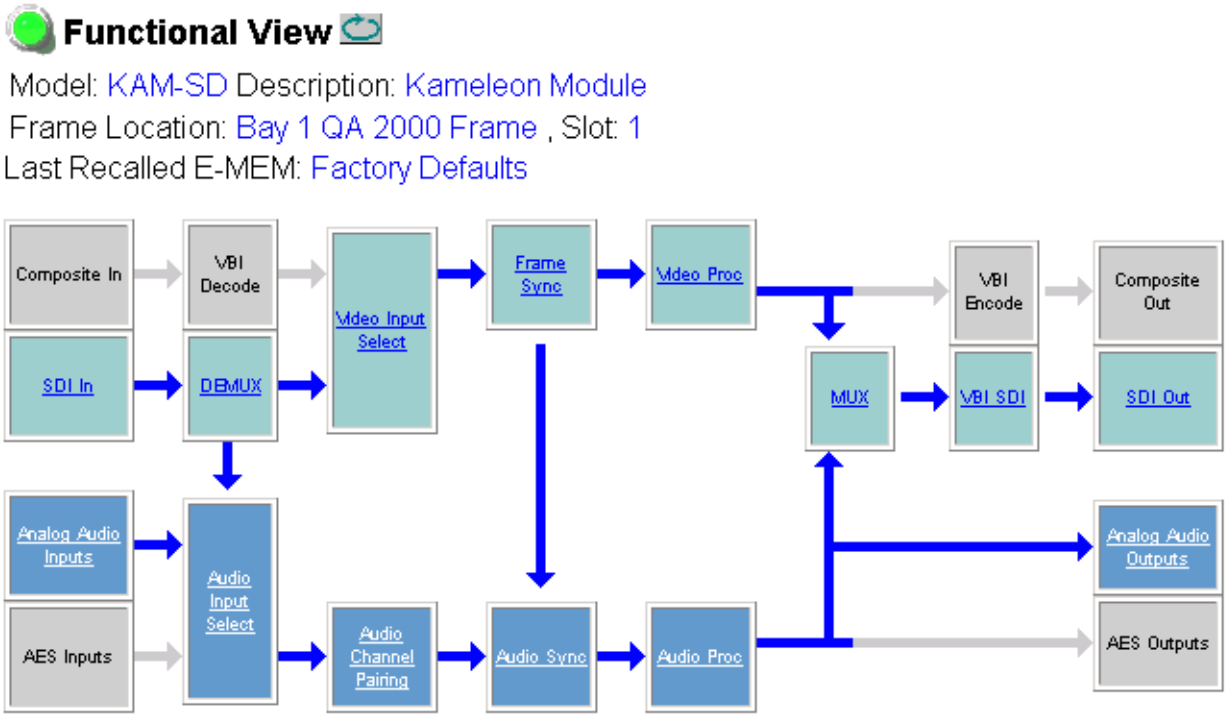
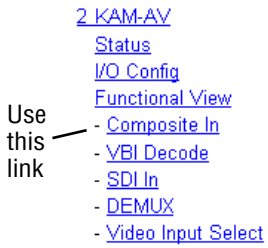


Figure 28. Functional View – KAM-SD Web Page



Composite In Web Page



Use the Composite In web page (Figure 29 on page 57) to set parameters for a composite video input (if present) on the KAM-AV module as listed below:

- Adjust input signal gain and black level,
- Select input signal format for 525 line mode (NTSC),
- Include or omit black level Setup for 525 line mode, and
- Select the type of 3D decoding required for the application and adjust 3D Decoder parameters.

Video Input Status

The Input Status section is read-only. The Input Signal name is the one assigned on the *Input/Output Configuration Web Page* on page 46. Input Standard can be affected by settings on the 2000GEN module (if present) and the *Video Input Select Web Page* on page 63.

Settings for Standard 525/625

The Composite input signal may be adjusted as required before decoding by using the controls on this page. 625 line rate settings do not require and do not show Video Input Signal Option or Input Signal Setup.

Note The PAL-M standard is not supported for 3D decoding.

Input Video Gain

Input Video signal gain can be adjusted approximately ± 6dB.

Black Level

Black level can be adjusted ±20% of peak black-to-white amplitude. With a video input at nominal level, 1% equals 7 mV in PAL-B and 0.93 IRE in NTSC.

Input Signal Setup

For 525 line rate, if the composite input to the module includes setup, click on the **Setup** radio button. The setup will be removed from the video signal as part of the conversion process.

Note When setup is selected, artifacts or spikes are sometimes detected at the start or end of the active picture due to the positioning of the start of setup. These can be minimized by adjusting the clipping controls on the Video Proc web page, then applying the clips to the VBI/Data Lines.

3D Decoder Control

The composite input is processed through a 3D decoder which offers three preset decoder modes and a user defined mode. Preset modes are selected according to the amount of motion present in the input video.

Each decoder mode has a set of default values when selected. User controls are provided for setting motion threshold, the type of comb filtering, luma and chroma threshold levels, and luma bandwidth.

To determine the best preset decoding mode for your application, select one of the 3D preset decoding modes at the bottom of the 3D Decoder Control section depending on the amount of motion in the input video:

- **Low Motion** – this is a 3D temporal filter ideal for applications where there is little motion in the video, such as scenes involving sitting and other scenes involving little motion.
- **Mixed Motion** – a general purpose filter, this is the default choice for most video applications involving mixed motion.
- **High Motion** – a 2D adaptive filter is employed for handling change in motion recommended for video where there will be a great deal of motion such as sports. Once motion is detected in a scene, the high motion decoder should be used.
- **User Defined** – changing any preset value in the Motion decoders will switch to the user mode.

After setting the preset decoder mode for the amount of motion in the video application, use the following controls to maximize video quality.

3D Motion Threshold

This control sets the limit between the use of 3D or 2D adaptive decoding modes. 3D decoding is used below the motion threshold, otherwise the mode is 2D adaptive decoding. This decoding mode decision is automatically evaluated for each pixel.

As a general rule to get the best decoding result, it is recommended to reduce the motion threshold as the motion increases in the video. Use the default threshold values of each preset decoder as a guide to setting the 3D motion threshold and the correct preset decoder mode.

The preset modes and default thresholds are as follows:

- **High Motion** preset set the threshold to 5,
- **Mixed Motion** preset sets the threshold to 25, and
- **Low Motion** preset sets the threshold to 60.

The recommended mode is **Mixed Motion** which is the factory default mode.

Comb Filter

The comb filter is part of the 2D adaptive comb filter mode. It determines what component of the video will be used to detect motion (Luma and Chroma or just the Luma or Chroma portion of the video).

- **Luma + Chroma** – when set for both luminance and chrominance, the 2D adaptive decoder motion detector is controlled by both the luminance and chrominance difference level magnitude.
- **Luma** – in this mode, the 2D adaptive decoder motion selector is controlled by only the luminance difference level magnitude in the video.
- **Chroma** – in this mode, the 2D adaptive decoder motion selector is controlled by only the chrominance difference level magnitude in the video.

Luma Level

The Luma Level control sets the magnitude of the difference level threshold for the Y or luminance component of the video signal in the comb filter. The default value is 56.

Chroma Level

The Chroma Level control sets the magnitude of the difference level threshold for the chrominance portion of the video signal in the comb filter. The default value is 56.

Luma Bandwidth

The Luma Bandwidth sets the frequency at which the comb filtering occurs. It can be set for **Narrow** or **Wide**.

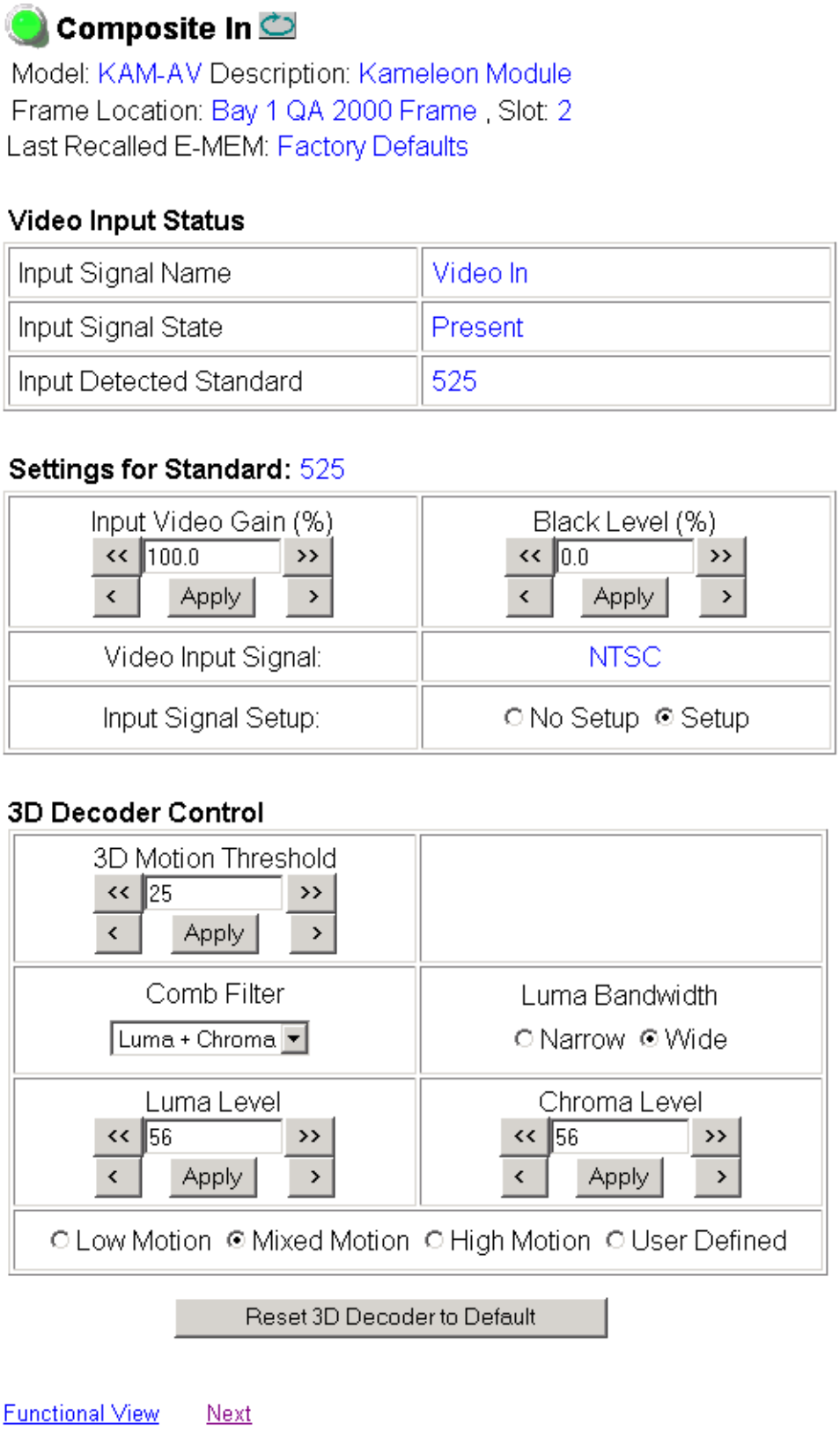
- **Narrow** – extends the 2D comb filter to lower frequencies and is the default bandwidth for the **High Motion** preset mode.
- **Wide** – allows 2D comb filtering only at higher frequencies. This is the **Mixed** and **Low Motion** default.

Note Narrow or Wide bandwidth may be selected according to the chrominance subcarrier frequency and chrominance bandwidth.

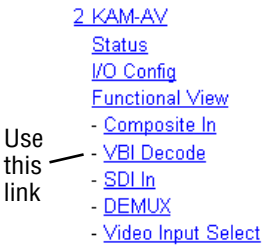
Reset 3D Decoder

Press the **Reset 3D Decoder to Default** to return to the default **Mixed Motion** mode with the defaults listed in Table 8 on page 29.

Figure 29. Composite Input Web Page



VBI Decode Web Page for Composite Input



Use the VBI decode web page (Figure 30 for 525, Figure 31 on page 59 for 625) to configure the VBI and Data Line decoding of the composite input signal (KAM-AV only).

The currently detected line rate will be reported. Use the View Selection to view the page at the correct line rate with the **525** or **625** radio button.

On a line-by-line basis you can remove black level setup (in NTSC video) and select one of the following three decoding options:

- Blank existing VBI and Data Line information,
- Select Notch Decoding of the composite signal, or
- Pass through decoded VBI and Data Lines (active video lines) information as is.

Note The data lines not reserved for carrying data on the previous page will appear greyed out.

Figure 30. VBI Decode Web Page (Composite Input, 525 Line Rate Shown)

VBI Decode

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

Current Line Rate	525
View Selection:	◉ 525 ○ 625

Field 1

	VBI Line											Data Line			
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Remove Setup	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				
Blanking	○	○	○	○	○	○	○	○	○	○	○				
Notch Decode	○	○	○	○	○	○	○	○	○	○	○				
Pass Through	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉				

Field 2

	VBI Line											Data Line			
	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
Remove Setup	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				
Blanking	○	○	○	○	○	○	○	○	○	○	○				
Notch Decode	○	○	○	○	○	○	○	○	○	○	○				
Pass Through	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉				

Back Functional View Next

Figure 31. VBI Decode Web Page (Composite Input, 625 Line Rate Shown)

VBI Decode

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

Current Line Rate	625
View Selection:	○ 525 ◉ 625

Field 1

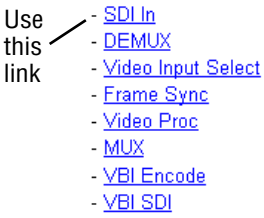
	VBI Line																	Data Line				
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Blanking	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			
Notch Decode	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			
Pass Through	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉			

Field 2

	VBI Line																		Data Line				
	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341
Blanking	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			
Notch Decode	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			
Pass Through	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉			

Back Functional View Next

SDI Input Web Page



On the KAM-AV or KAM-SD, use the SDI In web page to view the status of the SDI input signal in Summary view or Detail view:

- Select the **Summary** radio button to bring up the summary view shown in Figure 32.
- Use the **Clear All Status** button to clear and reset the status reporting.

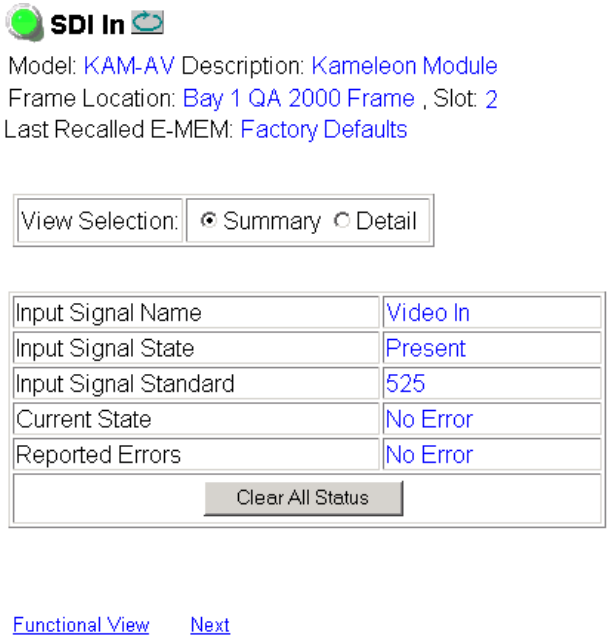
Current State

The **Current State** summary window will indicate **Error** if any error report shown in the **Detail** status field is logged.

Reported Errors

If any error report shown in the **Detail** status field is logged, the **Reported Errors** window in the Summary field will say **Error**. Error reports are not reported to Kameleon status pages or SNMP monitoring devices unless they are enabled (checked) in the **Detail** field.

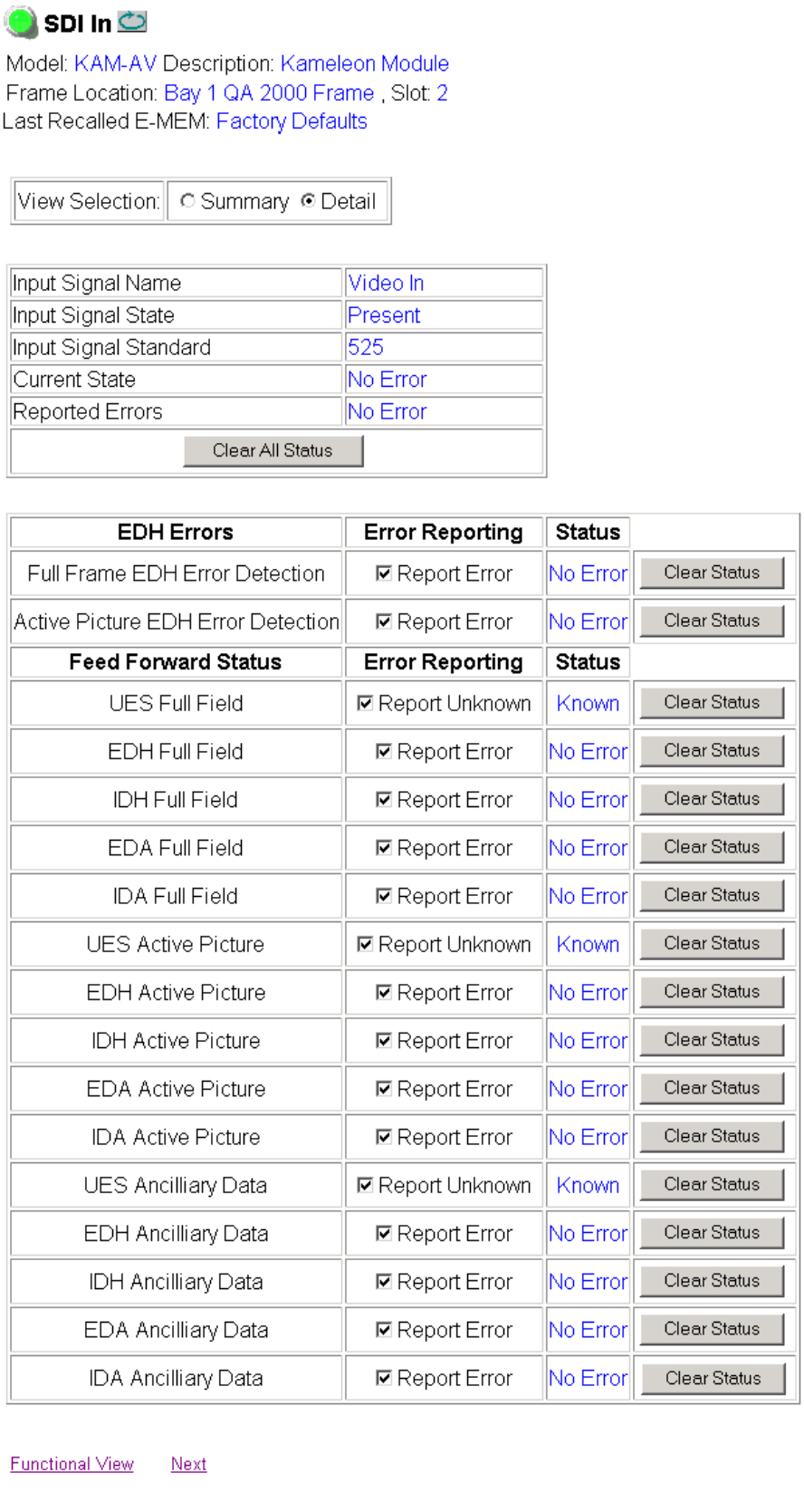
Figure 32. SDI In Web Page – Summary View



To view a detailed view of the SDI input status, select the **Detail** radio button to bring up the view shown in Figure 33 on page 61.

This view provides input signal status for both EDH Error and Feed Forward status. Each status report can be disabled by deselecting the corresponding **Reporting** checkbox. Each status report can also be cleared and reset by selecting the corresponding **Clear Status** button.

Figure 33. SDI Input Web Page (Detail View)



SDI In

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

View Selection: ○ Summary ◉ Detail

Input Signal Name	Video In
Input Signal State	Present
Input Signal Standard	525
Current State	No Error
Reported Errors	No Error

Clear All Status

EDH Errors	Error Reporting	Status	
Full Frame EDH Error Detection	☑ Report Error	No Error	Clear Status
Active Picture EDH Error Detection	☑ Report Error	No Error	Clear Status
Feed Forward Status	**Error Reporting**	**Status**	
UES Full Field	☑ Report Unknown	Known	Clear Status
EDH Full Field	☑ Report Error	No Error	Clear Status
IDH Full Field	☑ Report Error	No Error	Clear Status
EDA Full Field	☑ Report Error	No Error	Clear Status
IDA Full Field	☑ Report Error	No Error	Clear Status
UES Active Picture	☑ Report Unknown	Known	Clear Status
EDH Active Picture	☑ Report Error	No Error	Clear Status
IDH Active Picture	☑ Report Error	No Error	Clear Status
EDA Active Picture	☑ Report Error	No Error	Clear Status
IDA Active Picture	☑ Report Error	No Error	Clear Status
UES Ancilliary Data	☑ Report Unknown	Known	Clear Status
EDH Ancilliary Data	☑ Report Error	No Error	Clear Status
IDH Ancilliary Data	☑ Report Error	No Error	Clear Status
EDA Ancilliary Data	☑ Report Error	No Error	Clear Status
IDA Ancilliary Data	☑ Report Error	No Error	Clear Status

Functional View Next

DEMUX Web Page

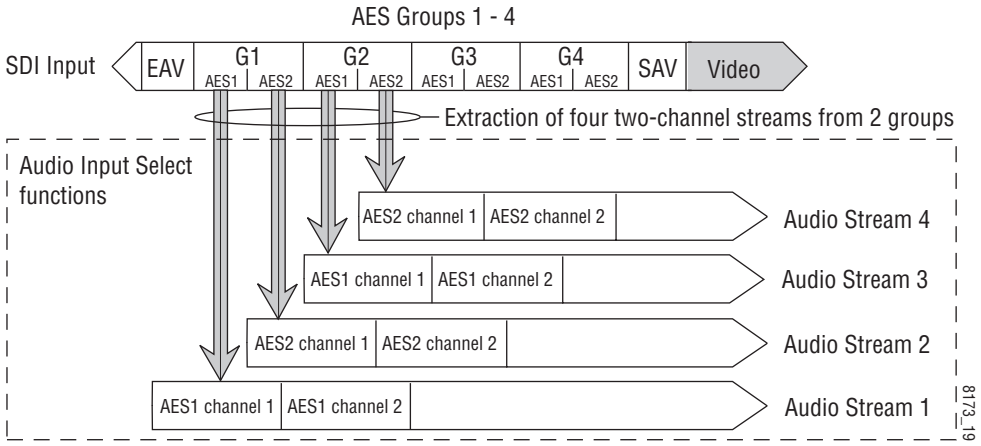
Use this link

- SDI In
- DEMUX
- Video Input Select
- Frame Sync
- Video Proc
- MUX
- VBI Encode
- VBI SDI

Use the DEMUX (demultiplex) web page to extract AES/EBU audio groups that are present in the incoming SDI video. These audio groups become inputs on the Audio Input Select web page (Figure 62 on page 93) and any pair can be routed to one of the four audio processing paths. The two extracted groups also remain in the SDI video signal. To delete groups from the SDI signal, go to the *MUX Web Page* on page 74.

In Figure 34, two groups (G1 and G2) have been extracted from the SDI input providing four two-channel audio streams for input into the Audio Input Select stage. Any two of Groups G1-G4 may be extracted.

Figure 34. Demultiplexing Capacity



NOTE
One audio group = two streams (AES1 & 2)
One stream = two channels

Use the DEMUX web page to demultiplex the desired streams (Figure 35).

Figure 35. Audio Demultiplex Web Page

DEMUX

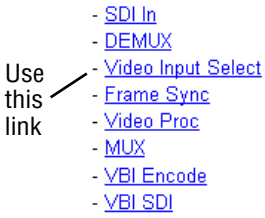
Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

SD Input Signal State: Present

Inputs	Str1 & Str2	Str3 & Str4	Status	AES 1	AES 2	Bits / Sample
No Extraction	○	○	-------	-------	-------	-------
Video In.G1	◉	○	Present	Present	Present	20
Video In.G2	○	◉	Present	Present	Present	20
Video In.G3	○	○	Empty	-------	-------	-------
Video In.G4	○	○	Empty	-------	-------	-------

Back Functional View Next (Video)
Next (Audio)

Video Input Select Web Page



Use the Video Input Select web page (Figure 36 on page 65) to:

- Configure input video type and line rate,
- Enable or disable Loss of Signal reporting to the Status page and SNMP monitoring (refer to the 2000NET manual for SNMP information),
- Configure Vertical Blanking Interval (in Advanced mode), and
- Select the output timing reference.

View Setting

In the View Selection display, choose the **Standard** radio button to display the standard settings shown in Figure 36 on page 65. Use the **Advanced** view for configuring the Vertical Blanking Interval for selecting active video lines to carry data (see *Advanced VBI Configuration* on page 66).

Video Selection Settings

The following functions are provided in the Video Selection section:

- Input Name – (read-only) signal name is entered on the **I/O Config** page
- Input Status –
  - Signal presence reported
  - Enable/disable Loss of Signal report to both Kameleon status pages and SNMP monitoring devices.

Note The disabling of video and reference Loss of Signal reports and SDI Input Error warnings allow you to filter these reports from higher level Kameleon status displays and SNMP monitoring. They will still be reported on this page.

- Video Format –
  - Current input video format reported.
  - Choose between SDI and Composite video format or select Automatic signal format detection.
- Video Line Rate – select 525 or 625 line rate or enable automatic line rate detection.
- Flywheel Video Decoder – use of the Flywheel Video Decoder is recommended when working with noisy input signals, such as satellite feeds. Once the optimum input signal has been acquired, turn the Flywheel Video Decoder off during normal operation.

  For best results, turn the Flywheel Video Decoder on by selecting the **On** checkbox and set the Output Timing Selection source to **Video In**. Locate the optimum video input signal, then turn the flywheel off (uncheck).

When the Flywheel Video Decoder is turned on, a caution will appear as shown in Figure 36 on page 65. Since the Flywheel decoder generates its own video timing for the incoming video stream to deal with noise and interruptions, leaving it on during normal operation may cause undesirable re synchronization delays if the source changes or is lost. It will take about 7 seconds to change states.

- Frame Reference –
  - 2000GEN frame reference signal presence reported,
  - Enable/disable Loss of Signal report to both Kameleon status pages and SNMP monitoring devices.
- SDI Input Errors – displayed only for SDI input (SDI or Auto)
  - 'Input signal errors reported.
  - Enable/disable SDI error warning report to both Kameleon status pages and SNMP monitoring devices.
- Frame Sync/Delay – (read-only) Frame Sync mode is reported when Output Timing Selection is **Internal Frame Reference** and timing is provided from the 2000GEN module. Delay mode is reported when the input signal (**Video In**) is used for timing reference

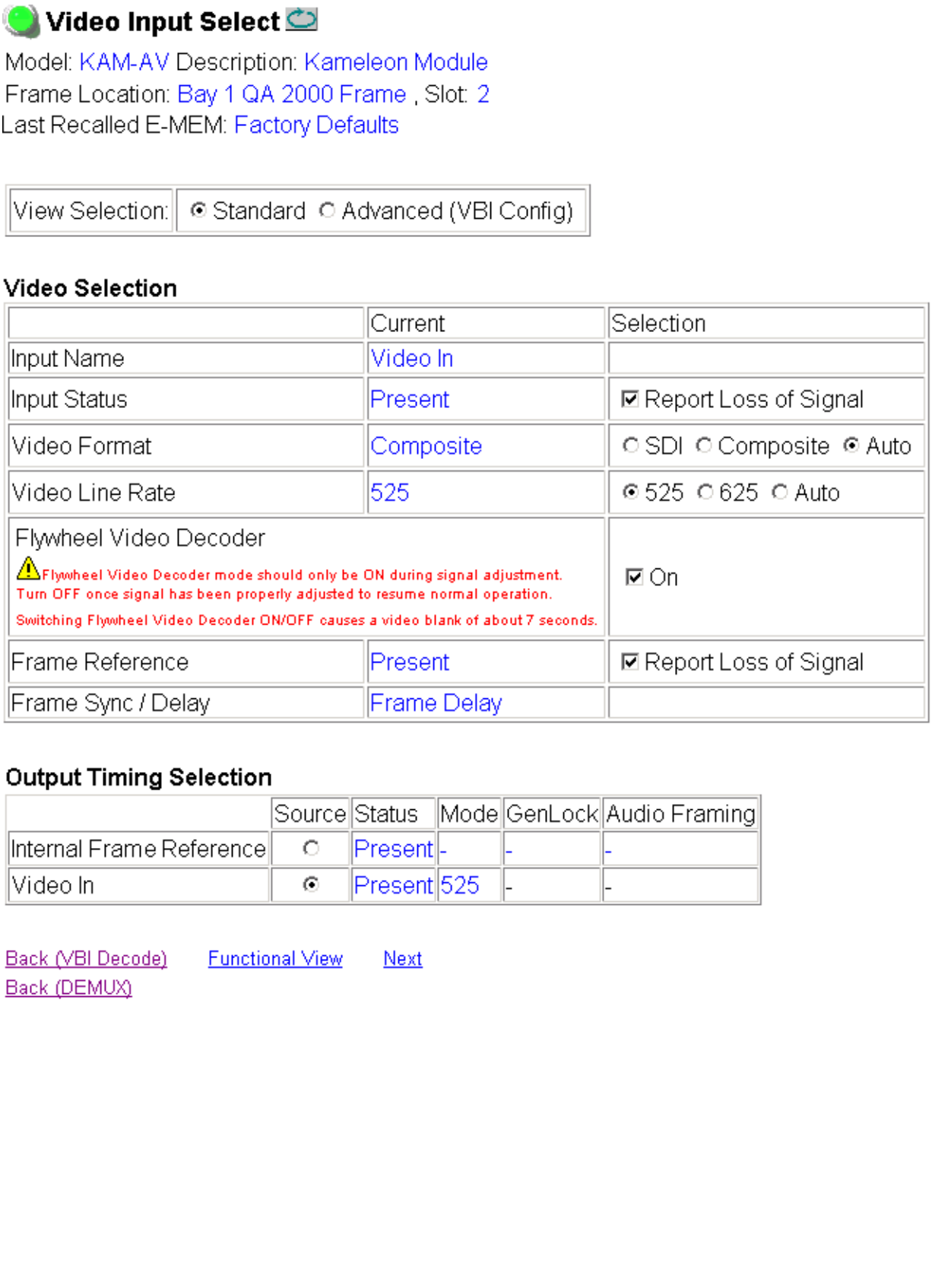
Output Timing Selection

If you have a 2000GEN reference module installed in the frame and want the Kameleon to work as a frame synchronizer, set the output timing source to **Internal Frame Reference**. Otherwise, set the output timing source to **Video In**.

Note For correct composite out color framing in PAL-B, always use the Internal Frame Reference.

Note When a video input with embedded audio is switched, the audio will mute when the module is set to Delay mode (Video In reference). To avoid any audio muting, use the Internal Frame reference (Frame Sync).

Figure 36. Video Input Select Web Page



Video Input Select

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

View Selection:	◉ Standard ○ Advanced (VBI Config)

Video Selection

	Current	Selection
Input Name	Video In	
Input Status	Present	☑ Report Loss of Signal
Video Format	Composite	○ SDI ○ Composite ◉ Auto
Video Line Rate	525	◉ 525 ○ 625 ○ Auto
Flywheel Video Decoder ⚠ Flywheel Video Decoder mode should only be ON during signal adjustment. Turn OFF once signal has been properly adjusted to resume normal operation. Switching Flywheel Video Decoder ON/OFF causes a video blank of about 7 seconds.		☑ On
Frame Reference	Present	☑ Report Loss of Signal
Frame Sync / Delay	Frame Delay	

Output Timing Selection

	Source	Status	Mode	GenLock	Audio Framing
Internal Frame Reference	○	Present	-	-	-
Video In	◉	Present	525	-	-

Back (VBI Decode) Functional View Next
Back (DEMUX)

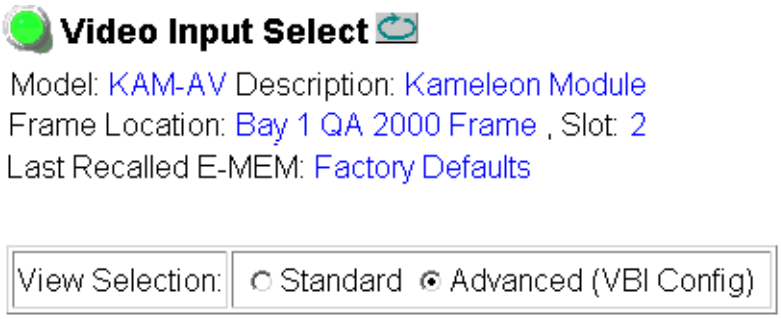
Advanced VBI Configuration

Advanced VBI configuration allows you extend VBI into the active picture range for special data insertion requirements. Active video lines that are used to carry data are referred to as Data Lines.

To add Data Lines to VBI:

1. Choose **Advanced (VBI Config)** on the Video Input Select web page (Figure 37).

Figure 37. Standard and Advanced View Selection



   The **VBI/Data Lines** panel will appear at the bottom of the web page (see Figure 38 on page 67 for 525 line rate and Figure 39 on page 67 for 625 line rate).

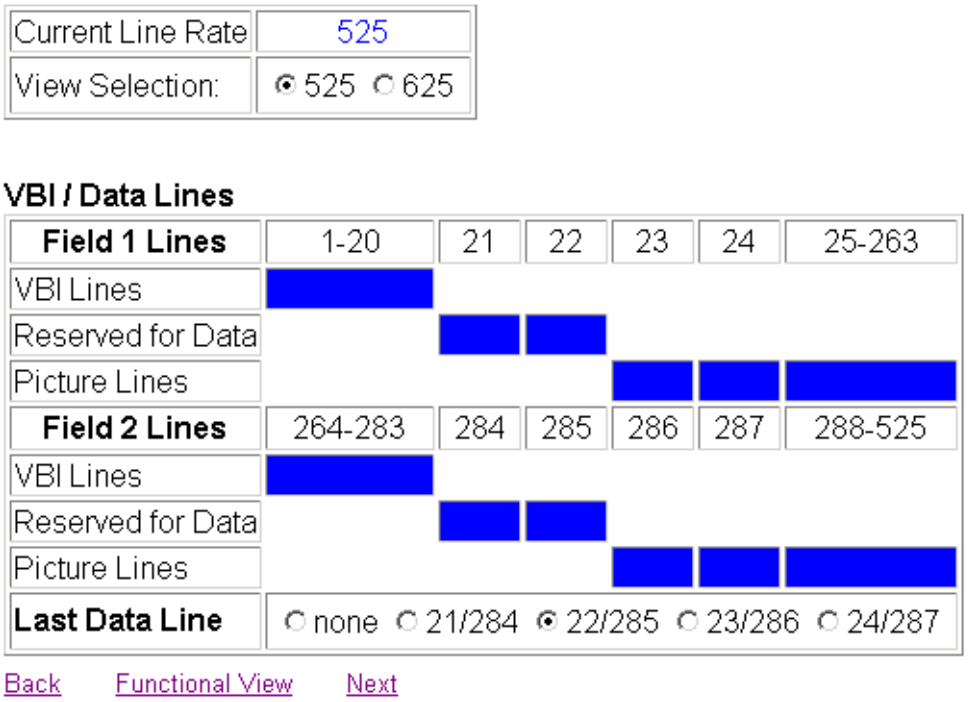
2. Select the last line (includes all previous active video lines) that will be used for data.

Selected active video lines will be shown in the **Reserved for Data** section of the web page as shown for lines 21/284 and 22/285 in Figure 38 on page 67 and lines 24/337 and 25/338 in Figure 39 on page 67.

Active video lines that can be made available for data insertion are:

- For 525, lines 21 – 24 in Field 1, lines 284 – 287 in Field 2
- For 625, lines 24 – 28 in Field 1, lines 337 – 341 in Field 2

Figure 38. Advanced VBI Configuration – 525 Line Rate



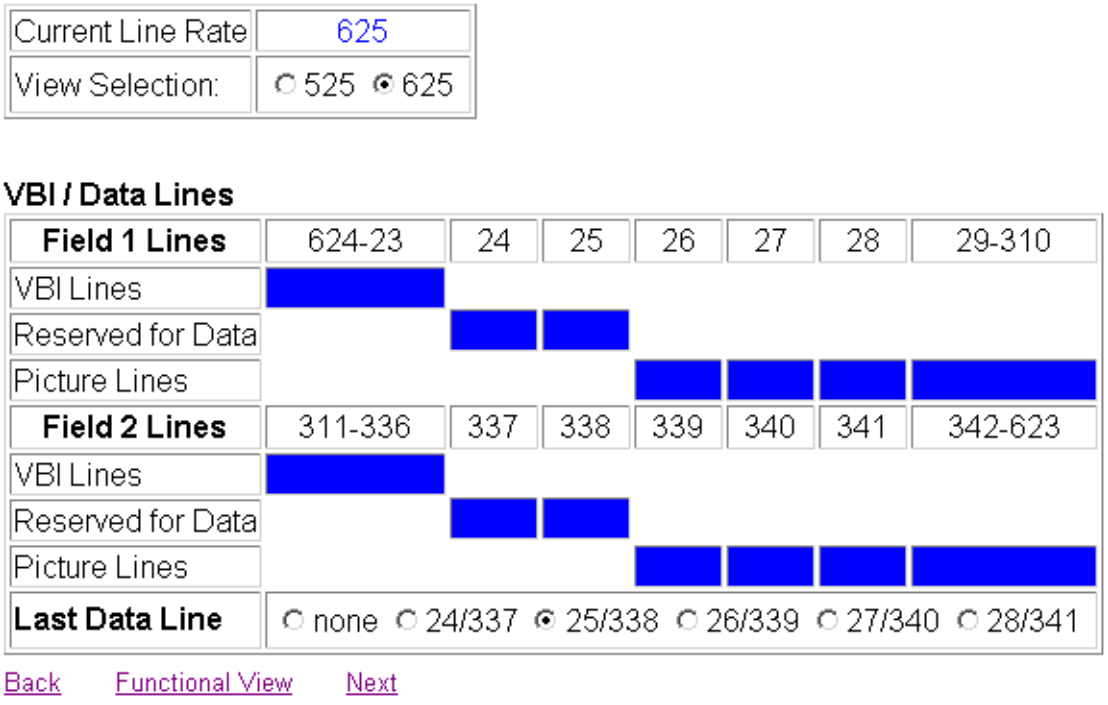
Current Line Rate	525
View Selection:	◉ 525 ○ 625

VBI / Data Lines

Field 1 Lines	1-20	21	22	23	24	25-263
VBI Lines	■					
Reserved for Data		■	■			
Picture Lines				■	■	■
Field 2 Lines	264-283	284	285	286	287	288-525
VBI Lines	■					
Reserved for Data		■	■			
Picture Lines				■	■	■
Last Data Line	○ none ○ 21/284 ◉ 22/285 ○ 23/286 ○ 24/287					

Back Functional View Next

Figure 39. Advanced VBI Configuration – 625 Line Rate



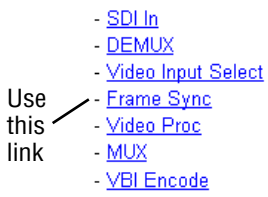
Current Line Rate	625
View Selection:	○ 525 ◉ 625

VBI / Data Lines

Field 1 Lines	624-23	24	25	26	27	28	29-310
VBI Lines	■						
Reserved for Data		■	■				
Picture Lines				■	■	■	■
Field 2 Lines	311-336	337	338	339	340	341	342-623
VBI Lines	■						
Reserved for Data		■	■				
Picture Lines				■	■	■	■
Last Data Line	○ none ○ 24/337 ◉ 25/338 ○ 26/339 ○ 27/340 ○ 28/341						

Back Functional View Next

Frame Sync Web Page



Use the Frame Sync web page to:

- Adjust horizontal and vertical timing, and
- Freeze the current output or, if using a 2000GEN reference signal, select an automatic freeze mode for output when the signal is lost.

Timing Adjustment

Table 10 shows the ranges of timing for 525 and 625 signal formats.

Table 10. Timing Adjustment Ranges

Line Rate	Max Horizontal Adjustment	Max Vertical Adjustment
525/NTSC	857.5 pixels	524 lines
625/PAL	863.5 pixels	624 lines

Freeze Mode Selection

The Freeze mode controls available depend on the output timing reference selected on the *Video Input Select Web Page* on page 63.

Frame Sync mode (using the 2000GEN **Internal Frame Reference** output timing reference) provides the manual activation selections plus **AutoBlack** and **AutoFreeze** modes to be used when the video signal is lost (Figure 40 on page 69). AutoBlack outputs a black signal while AutoFreeze outputs the last complete video field.

When set to Frame Delay mode (using the **Video In** output timing reference), Freeze Mode allows you to manually freeze the output using **Field 1**, **Field 2**, or one **Frame** (Figure 41 on page 69). A field freeze provides less resolution and no motion artifacts in the output. In Frame mode the resolution is higher since both fields are present, but the presentation of two fields can cause motion artifacts.

Figure 40. Frame Synchronizer Web Page – Internal Frame Reference

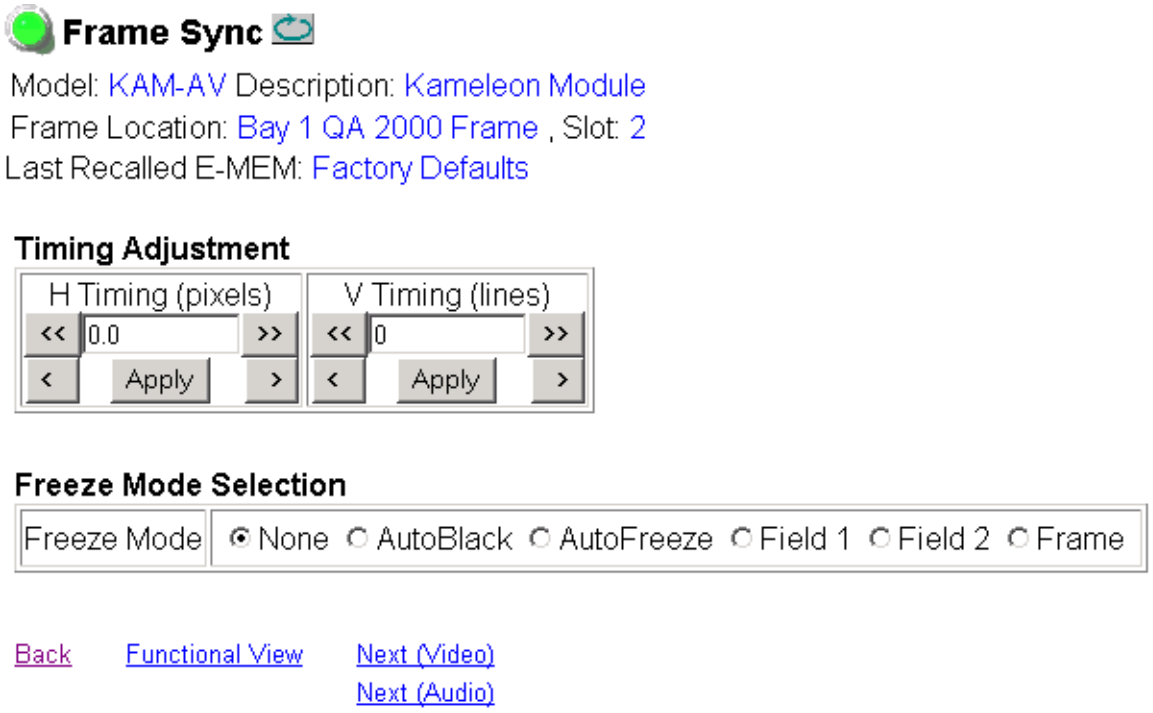
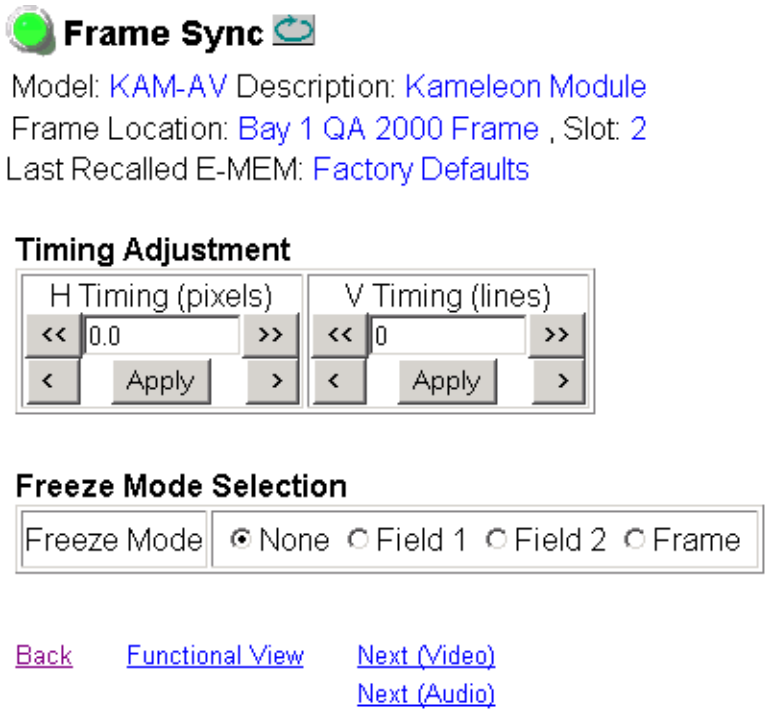
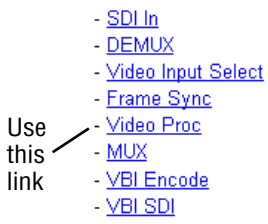


Figure 41. Frame Synchronizer Web Page – Video In Reference



Video Processing Web Page



Use the Video Processing page (Figure 42 on page 71) to:

- Enable/disable Standard or Advanced video processing,
- Turn on Color Bars test signal,
- Enable/disable video gain lock,
- Adjust component video gain (Y, B-Y, R-Y),
- Adjust component video DC Offset (Y, B-Y, R-Y),
- Enable/disable soft and hard clipping controls, and
- Apply selected clip settings to VBI/Data lines.

Video Processing Controls

Video Processing Enable

To bypass Video Processing on the SDI signal select **Disable** (Figure 42 on page 71). To make video processing adjustments to the SDI signal select **Enable** or select **Color Bars** to use the internally generated 100% vertical color bars test signal.

Two modes of video processing are available, Standard or Advanced. With **Standard** selected, only the Y Channel Video Processing controls on the left will be visible along with the clipping controls.

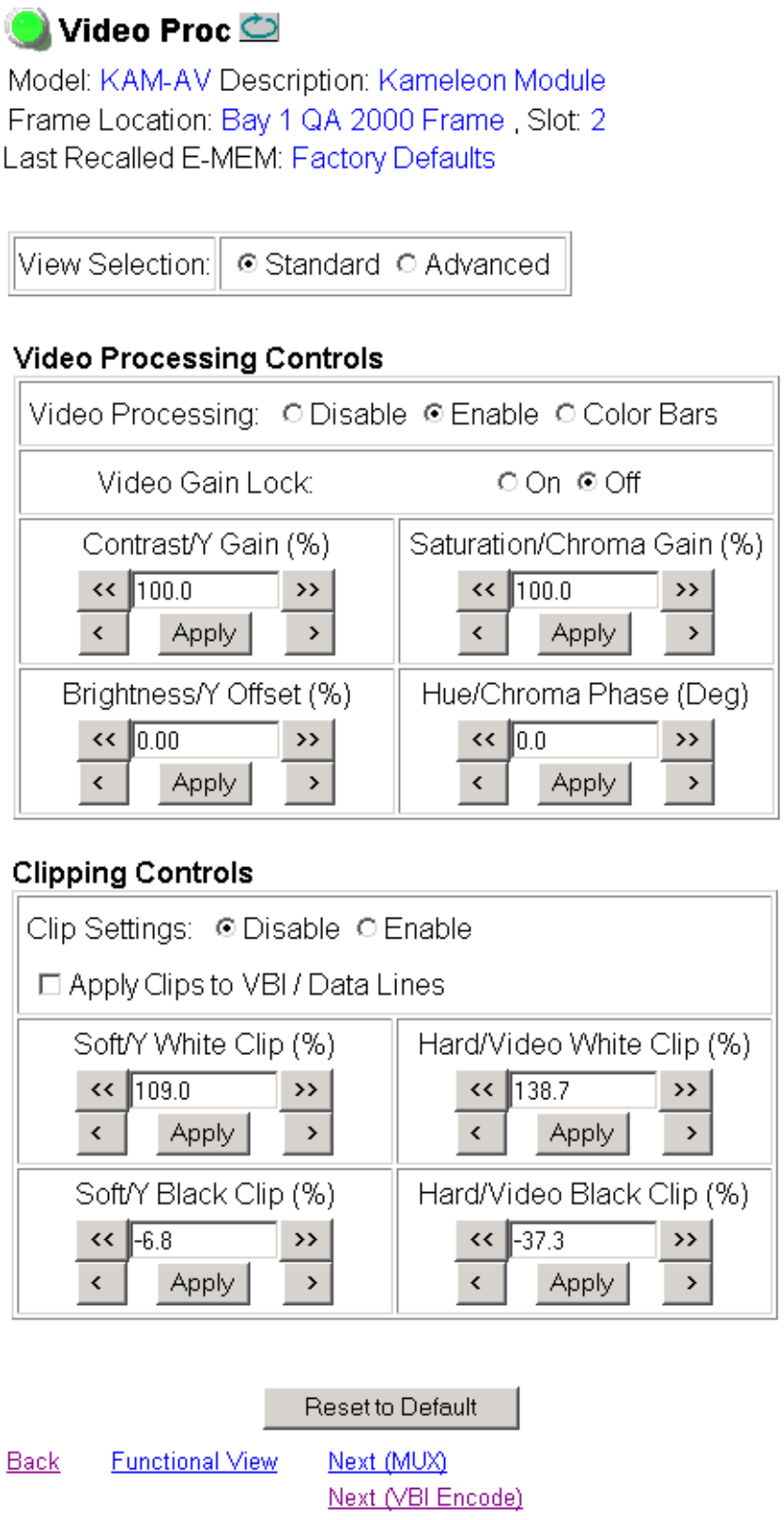
When **Advanced** is selected, the B-Y and R-Y Gain and Balance/Offset controls will also be displayed as shown in Figure 43 on page 73.

Standard View

In Standard View (Figure 42 on page 71), adjust the following for the Y Channel:

- Contrast/Y Gain – adjust the percentage of luminance relative to white (50 to 149.6%).
- Saturation/Chroma Gain – adjust the percentage of saturation and chroma gain relative to 100% saturation (50 to 149.6%).
- Brightness/Y Offset – adjust the amount of brightness/Y offset in mV (-3.55 to 3.44%)
- Hue/Chroma Phase – for 525 signals only, adjust the hue/chroma phase in degrees (-89.8 to 89.8 degrees).

Figure 42. Video Processing Web Page



Clipping Controls

Clipping controls are provided that affect the luminance (soft/Y) and overall saturation (hard/video) levels of the output signal.

Refer to Figure 42 on page 71. To enable the clip controls select the **Enable** radio button. You may also apply the clip levels to the vertical blanking interval by checking the **Apply Clips to VBI/Data Lines** box. This control is also available on the VBI SDI web page (page 81).

Use the following clipping controls to adjust levels on the video output:

- Use the **Soft/Y White Clip** control to set the clipping level for the top end (white) of the luminance signal (positive excursions).
- Use the **Soft/Y Black Clip** control to set the clipping level for the bottom end (black) of the luminance signal (negative spikes and Super Black).
- Use the **Hard/Video White Clip** control to set the clipping level for the top end (white) of the overall video signal (clips white and reduces overall saturation level to fit within clip).
- Use the **Hard/Video Black Clip** control to set the clipping level for the bottom end (black) of the overall video signal (clips black and reduces overall saturation level to fit within clip).

Advanced View

In Advanced View (Figure 43 on page 73), adjust the following for the B-Y and R-Y Channels:

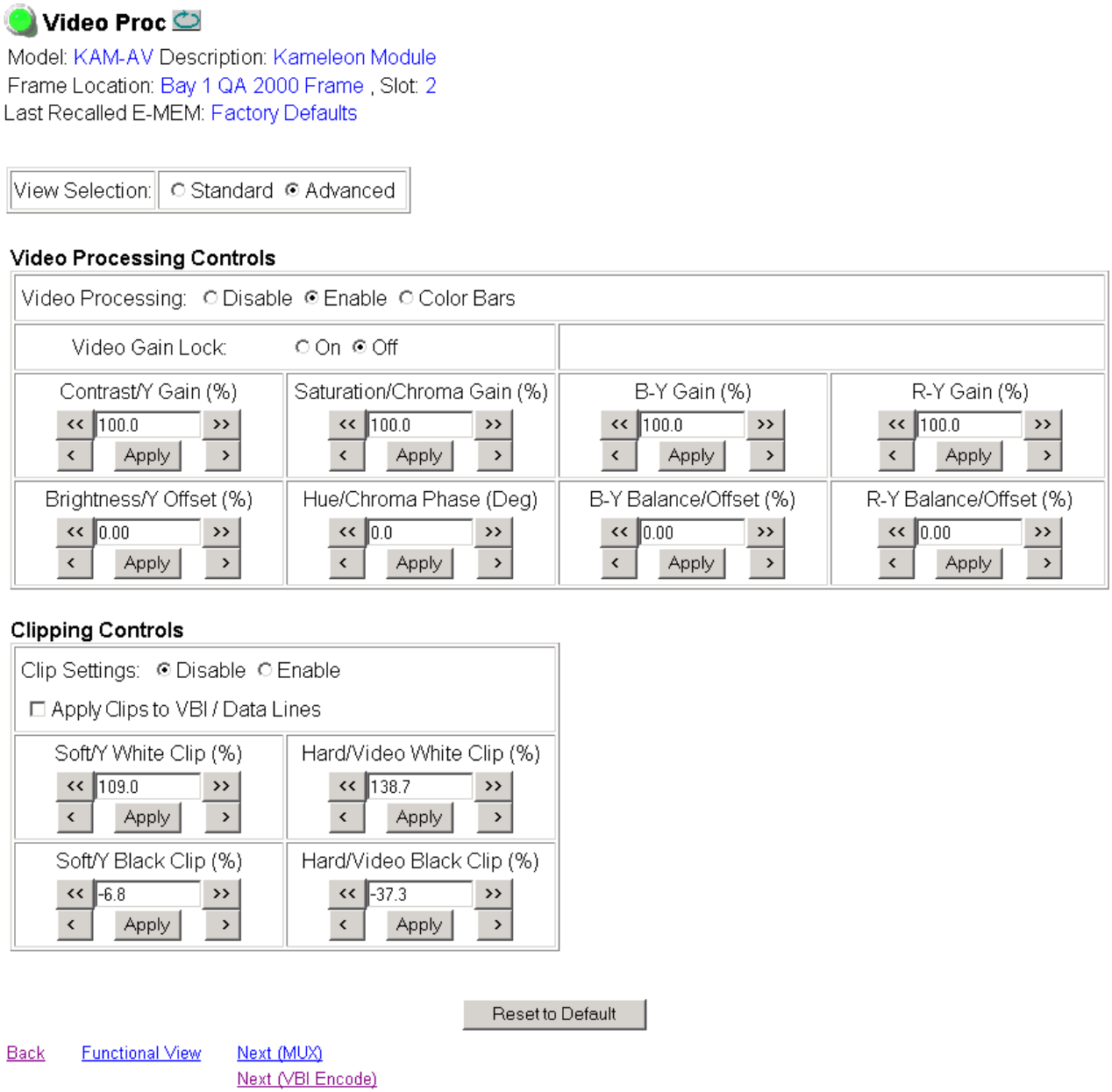
Note To adjust gain for all channels simultaneously, set **Video Gain Lock** to **On**. This locks Y, B-Y, and R-Y adjustments together. Adjustment of one gain setting changes all gain values (Y, B-Y, R-Y) the same amount.

- B-Y/R-Y Gain – adjust the percentage of B-Y and R-Y gain relative to 100% (50 to 149.6%).
- B-Y/R-Y Balance/Offset – adjust the amount of B-Y and R-Y DC offset in mV (-3.55 to 3.44%)

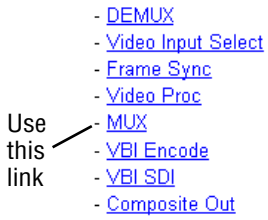
Reset To Default

Select the **Reset To Default** button on the bottom of the screen to return all values to the factory defaults.

Figure 43. Video Proc Web Page – Advanced View



MUX Web Page



Use the MUX (multiplex) web page to:

- Delete unwanted audio groups from the SDI input video signal or clear all horizontal ancillary data (HANC), and
- Insert or replace audio groups into the SDI video stream that have been selected on the Audio Input Select web page, paired on the Audio Channel Pairing web page and configured in the Audio Proc, Audio Sync, and Audio Delay web pages.

Note The audio channel pairs available to each Mux Group below are determined by the Audio Channel Pairing web page (see page 94).

Note The Kameleon multiplexing circuit assumes there are no gaps between Groups in the input SDI video signal. If there are gaps, and one or more groups are inserted or replaced, all input Groups after the gap will be removed.

The MUX web page provides two functions: Group Deletion and Group Replacement.

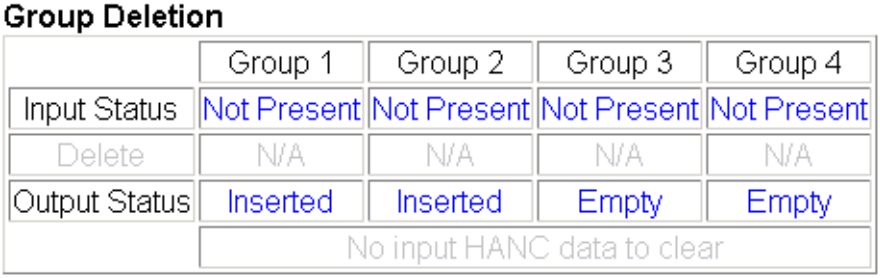
Group Deletion

The Group Deletion area of the MUX web page reports if an embedded audio signal is present in any of the four possible audio groups in the incoming SDI signal and the output status of each group. It is the same as the Status reporting on the DEMUX web page (Figure 35 on page 62). It can be used to delete unwanted embedded audio groups or clear all HANC (horizontal ancillary data) in the SDI video input signal if present.

Composite Video Input

When composite video is selected as the input to the module (no embedded audio is possible), the MUX web page Group Deletion section will appear as shown in Figure 44 with the **Delete** and **No Input HANC data to clear** greyed out.

Figure 44. Composite Video Input



No Embedded Audio

If no embedded audio groups are present in the incoming SDI signal, the Group Deletion input status section will appear as shown in Figure 45. Input Status is **Not Present** and Output Status is **Empty** for each audio group. No deletion or Group Replacement is possible with this status.

Figure 45. No Embedded Audio Present

Group Deletion

	Group 1	Group 2	Group 3	Group 4
Input Status	Not Present	Not Present	Not Present	Not Present
Delete	☐ Delete	☐ Delete	☐ Delete	☐ Delete
Output Status	Empty	Empty	Empty	Empty
	☐ Clear all input HANC data			

Pass and Delete Embedded Audio

If an embedded audio group is present in the incoming SDI signal and has been selected for **No Extraction** on the DEMUX web page, the audio group will be passed to the output as shown in Figure 46. Input Status is **Present** and Output Status is **Passed.**

Audio groups present in the incoming SDI stream may also be deleted. Check the corresponding **Delete** checkbox to remove an audio group completely that is reported as **Present** from the SDI stream. The Output Status will report **Deleted**.

Figure 46. Pass and Delete Embedded Audio

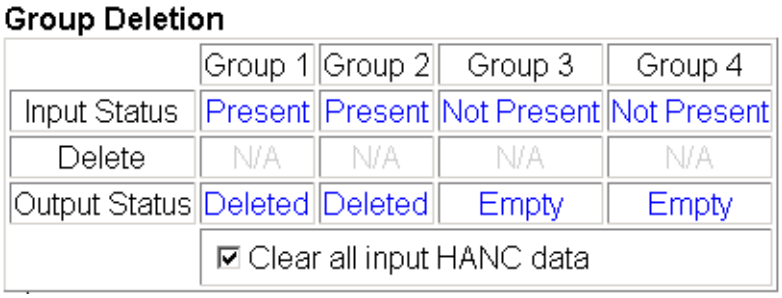
Group Deletion

	Group 1	Group 2	Group 3	Group 4
Input Status	Present	Present	Not Present	Not Present
Delete	☐ Delete	☑ Delete	☐ Delete	☐ Delete
Output Status	Passed	Deleted	Empty	Empty
	☐ Clear all input HANC data			

Clear All HANC Data

All horizontal ancillary data can be cleared from the SDI input signal by selecting the **Clear all HANC data** checkbox. The Output Status will then show all present groups as being deleted (Figure 47).

Figure 47. Clear All HANC Data from SDI Video



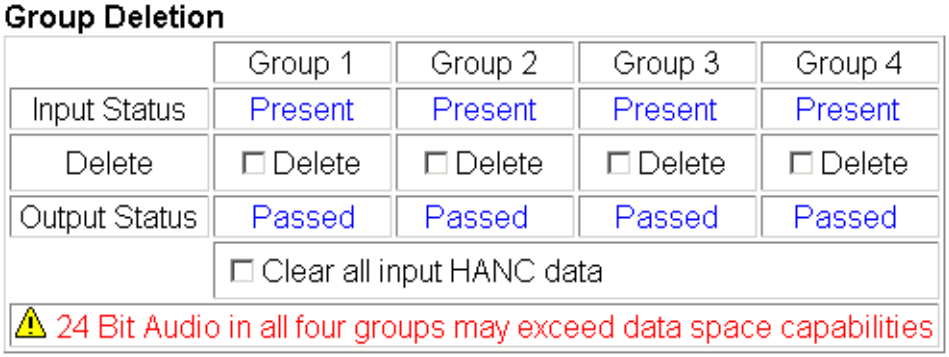
24-Bit Audio Warning

The warning "24 Bit Audio in all four groups may exceed data space capabilities" may appear under the Group Deletion section when any of the following conditions occur:

- SDI Video In,
- 525 line video format,
- 24 bit audio format for Mux Group A, or
- 24 bit audio format for Mux Group B.

An example of this is shown in Figure 48.

Figure 48. 24 Bit Audio Warning



Group Replacement

Mux groups A and B can replace existing audio groups in the SDI stream and/or be inserted into an empty group space with the Group Replacement function (Figure 50 on page 78). Mux Group A and Mux Group B are configured using the inputs to the Audio Input Select web page (page 91) then the Audio Channel pairing web page (page 94). Two Mux groups can be multiplexed (embedded) into the SDI output stream.

A multiplexing example of replacing and inserting audio is shown in Figure 50 on page 78. In this case, Audio Group 1, present in the incoming SDI video stream, has been replaced with Mux Group A by selecting the **Stream A** and **Stream B** checkboxes and the **Group 1** radio button in the Group column.

Mux Group B has been inserted into empty Audio Group 3, not present in the incoming SDI video stream, by selecting the **Stream A** and **Stream B** checkboxes and the **Group 3** radio button in the Group column.

The Sample rate (**20** or **24 Bits**) can be set for each Mux group before embedding.

Figure 49 depicts an example of the multiplexing of the selected audio Mux groups into the SDI video stream based on the selections made on the Mux web page in Figure 50 on page 78.

Figure 49. Multiplexing into the SDI Stream

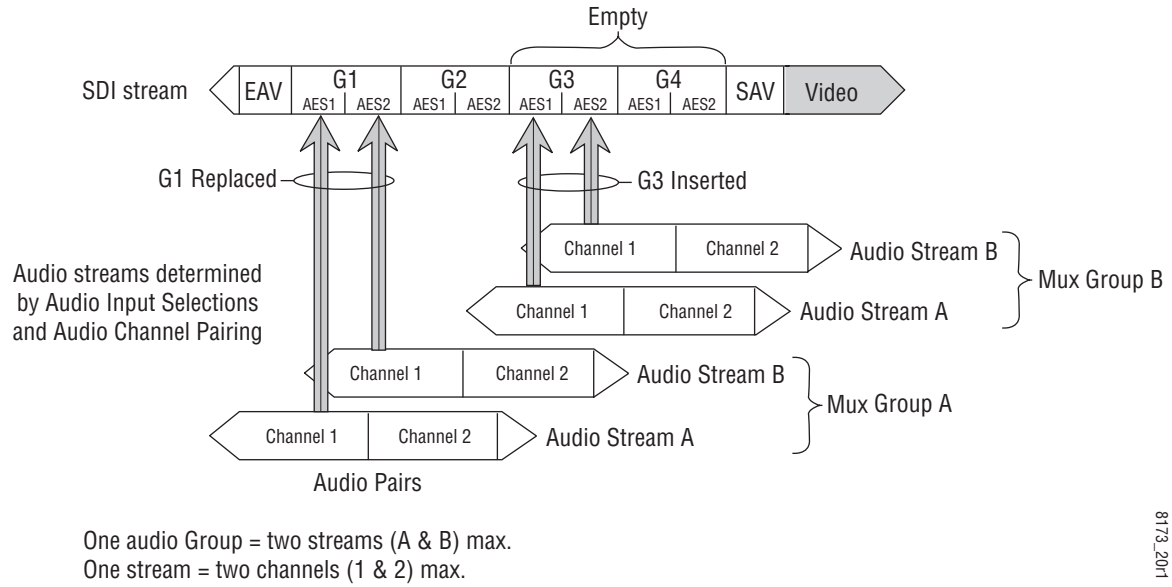


Figure 50. MUX Web Page – Replace and Insert Audio

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

Group Deletion

	Group 1	Group 2	Group 3	Group 4
Input Status	Present	Present	Not Present	Not Present
Delete	N/A	☐ Delete	☐ Delete	☐ Delete
Output Status	Replaced	Passed	Inserted	Empty
	☐ Clear all input HANC data			

Group Replacement

Mux Group A	Insert	Group	Bits/Sample
Pair 1: Video In.G1.S2 Ch1 & Video In.G1.S2.Ch2	☑ Stream A	◉ Group 1 ○ Group 2 ○ Group 3 ○ Group 4	◉ 20 bits ○ 24 bits
Pair 2: AES In 1 Unbal.Ch1 & AES In 1 Unbal.Ch2	☑ Stream B		

Mux Group B	Insert	Group	Bits/Sample
Pair 3: AES In 2 Unbal.Ch2 & AES In 2 Unbal.Ch1	☑ Stream A	○ Group 1 ○ Group 2 ◉ Group 3 ○ Group 4	◉ 20 bits ○ 24 bits
Pair 4: AA In Ch1 &AA In Ch2	☑ Stream B		

Back (Video) Functional View Next
Back (Audio)

VBI Encode Web Page for Composite Output

- DEMUX
- Video Input Select
- Frame Sync
- Video Proc
- MUX
- VBI Encode
- VBI SDI
- Composite Out

Use this link

Use the VBI Encode web page (Figure 51 for 525, Figure 52 on page 80 for 625 line rate) to configure the VBI and Data Line encoding for the composite output signal (KAM-AV module only).

The currently detected line rate will be reported. Use the View Selection to view the web page at the correct line rate with the **525** or **625** radio button.

This web page allows you to do the following on a line-by-line basis:

- Blank existing VBI and Data Line information
- Remove black level setup (in 525 line rate only)

You may also apply the clipping done in the Video Processor to all VBI lines by checking the **Apply Clips to VBI/Data Lines** checkbox.

Note The data lines not reserved for carrying data on the Video Input Select web page will appear greyed out. See *Advanced VBI Configuration* on page 66.

Figure 51. VBI Encode Web Page – 525 Line Rate

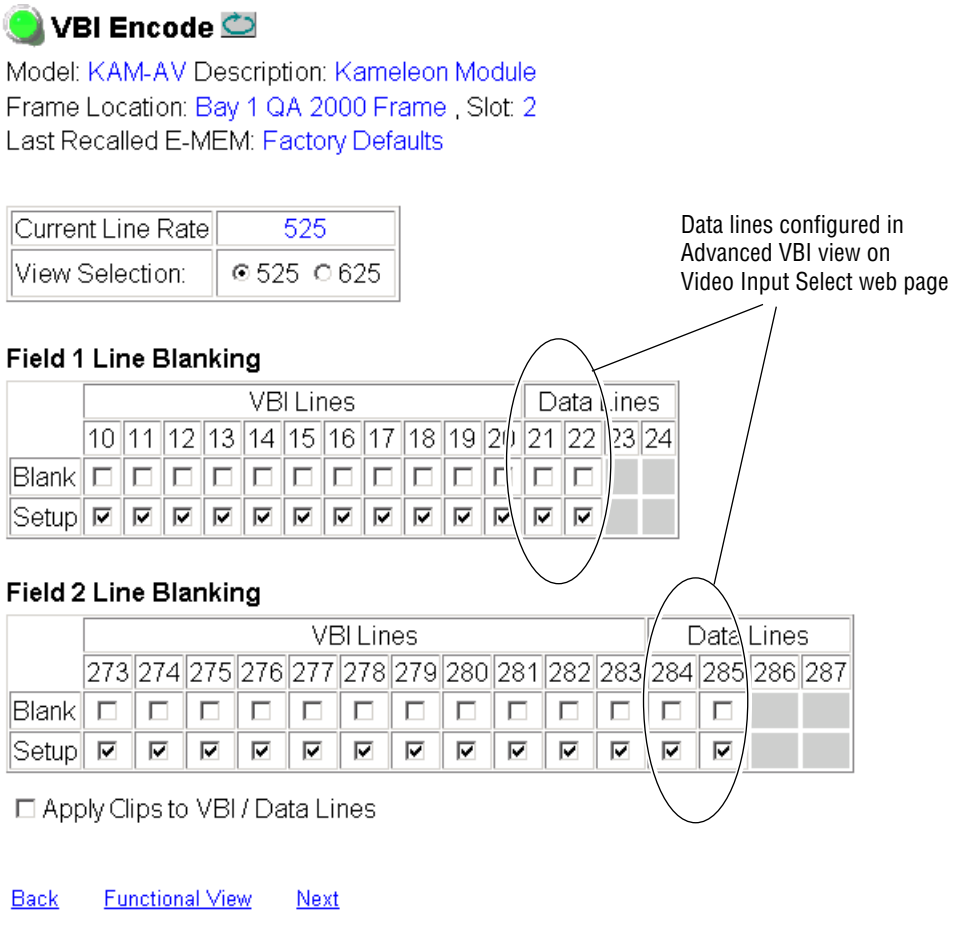
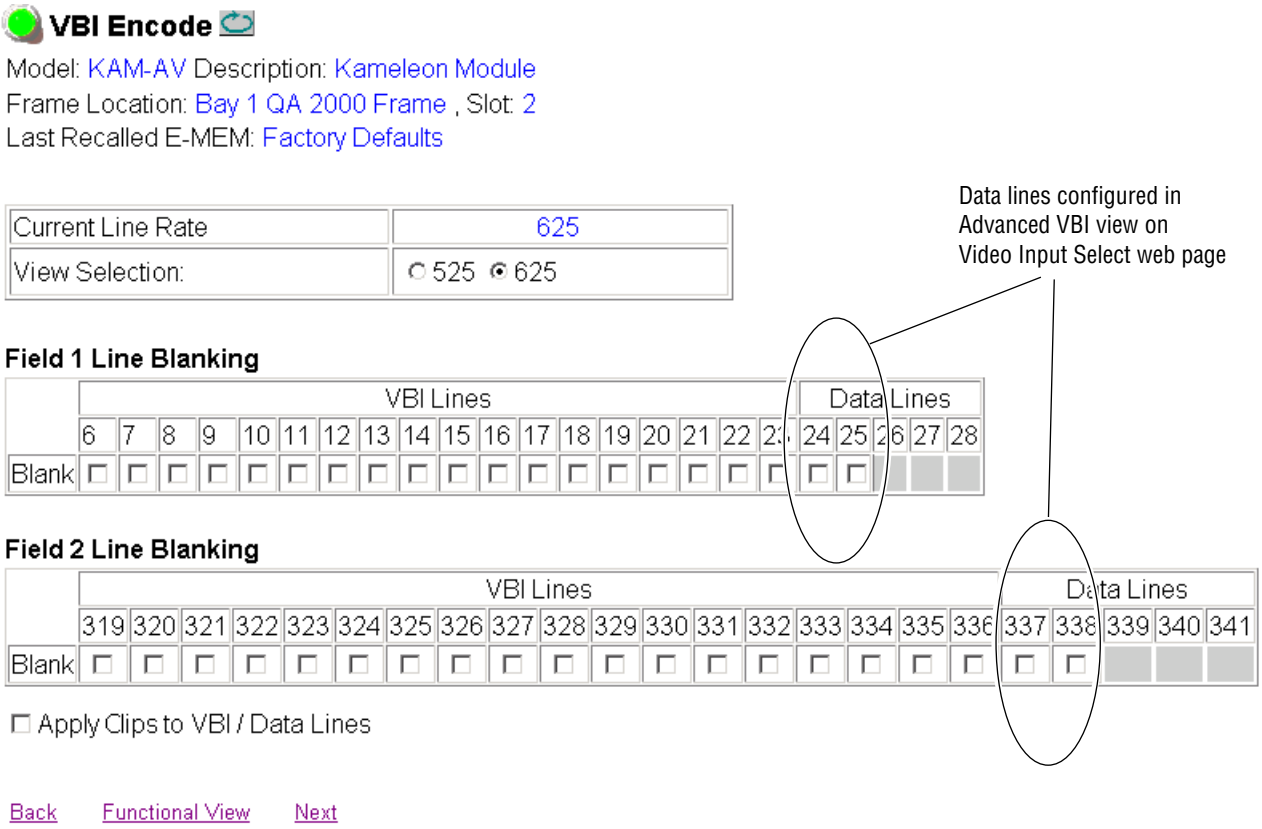
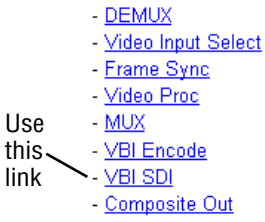


Figure 52. VBI Encode Web Page – 625 Line Rate



VBI Data Line Configuration for SDI Output



Use the VBI SDI web page (Figure 53 for 525, Figure 54 on page 82 for 625 line rate) to configure blanking for the VBI and Data Lines.

- The currently detected line rate will be reported. Use the View Selection to view the web page at the correct line rate with the **525** or **625** radio button.
- On a line-by-line basis you can blank existing VBI and Data Line information by selecting the corresponding checkbox.
- Check the **Apply Clips to VBI/Data Lines** checkbox to apply the clip values made with the Video Processor to all of the VBI lines. This control is also available on the Video Processing web page (page 70).

Note The data lines not reserved for carrying data on the Video Input Select web page will appear grayed out. See *Advanced VBI Configuration* on page 66.

Figure 53. VBI SDI Web Page – 525 Line Rate

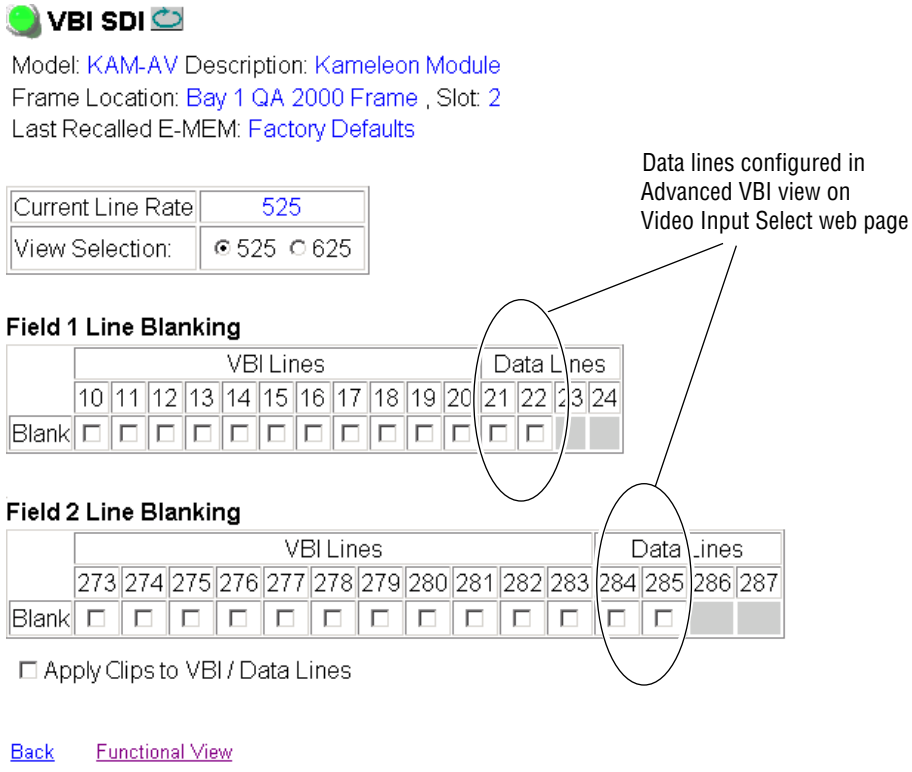
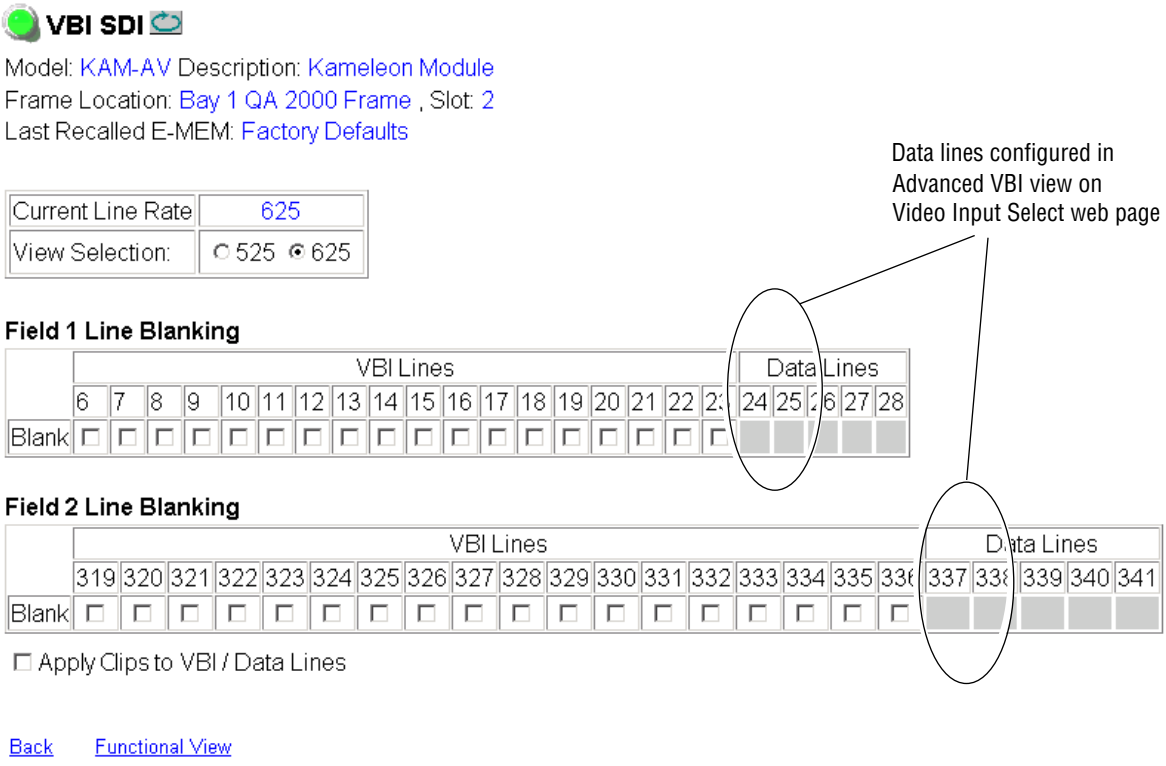
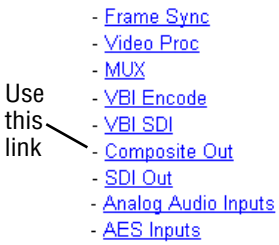


Figure 54. VBI SDI Web Page – 625 Line Rate



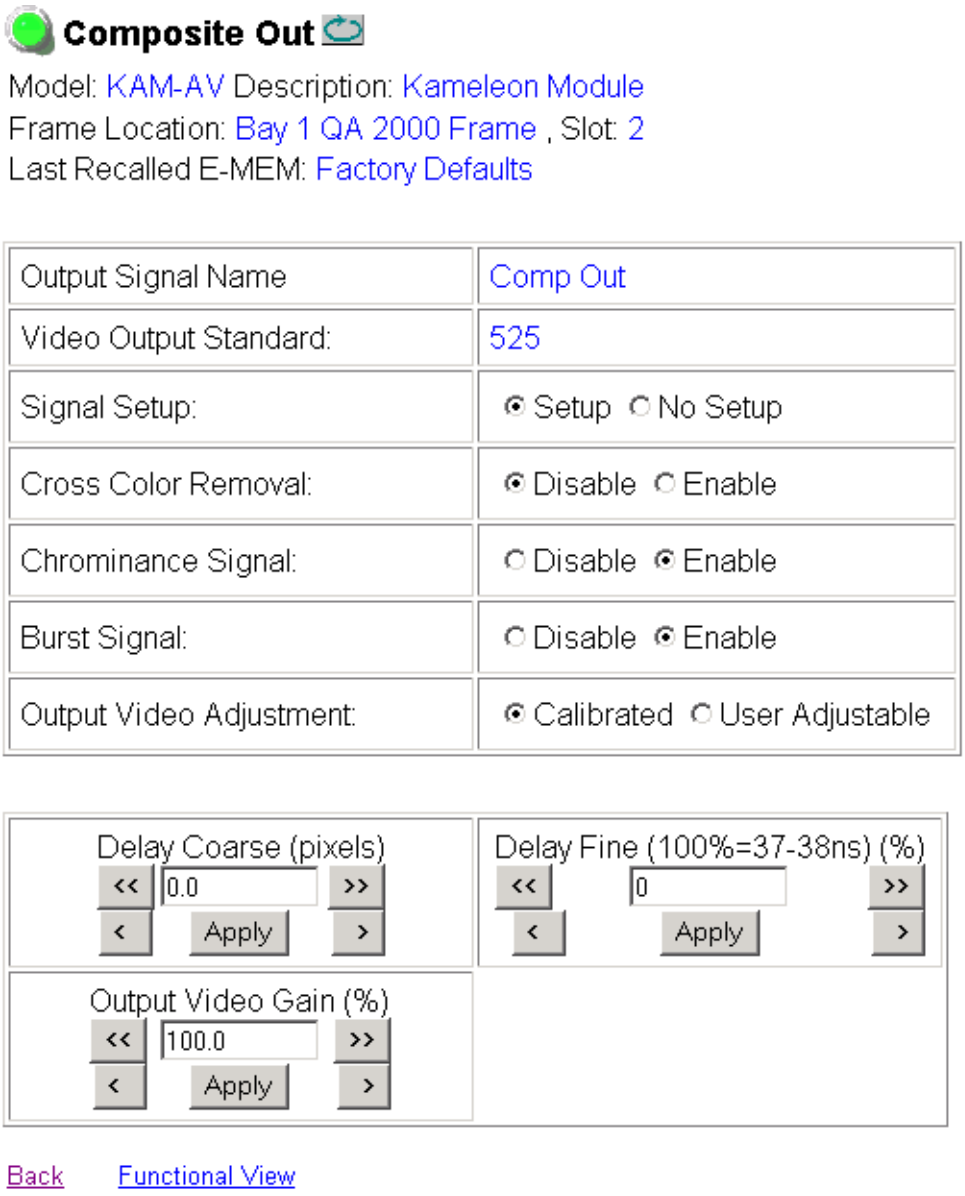
Video Composite Out Web Page



Use the Composite Out web page (Figure 55) to adjust the following components of the video composite output signal (KAM-AV module only):

- Signal setup,
- Cross Color removal,
- Chrominance signal,
- Burst signal, and
- Gain, and Fine and Coarse delay.

Figure 55. KAM-AV Video Composite Out Web Page



Signal Setup

For 525 standard composite, select **Setup** to add setup to the output or **No Setup** to not add it to the composite output.

Cross Color Removal

Enable Cross Color Removal filtering for a composite signal that displays unwanted luminance and chrominance artifacts produced during encoding of the signal.

Chrominance Removal

Enable Chrominance Removal to completely remove the chrominance portion of the composite output signal.

Burst Removal

Enable Burst Removal to completely remove the burst portion of the composite output signal.

Output Video Adjustments

Gain and coarse/fine delay of the composite output signal can be set to calibrated values by selecting the **Calibrated** button. The delay settings are independent of the Frame Sync and SDI Video output controls.

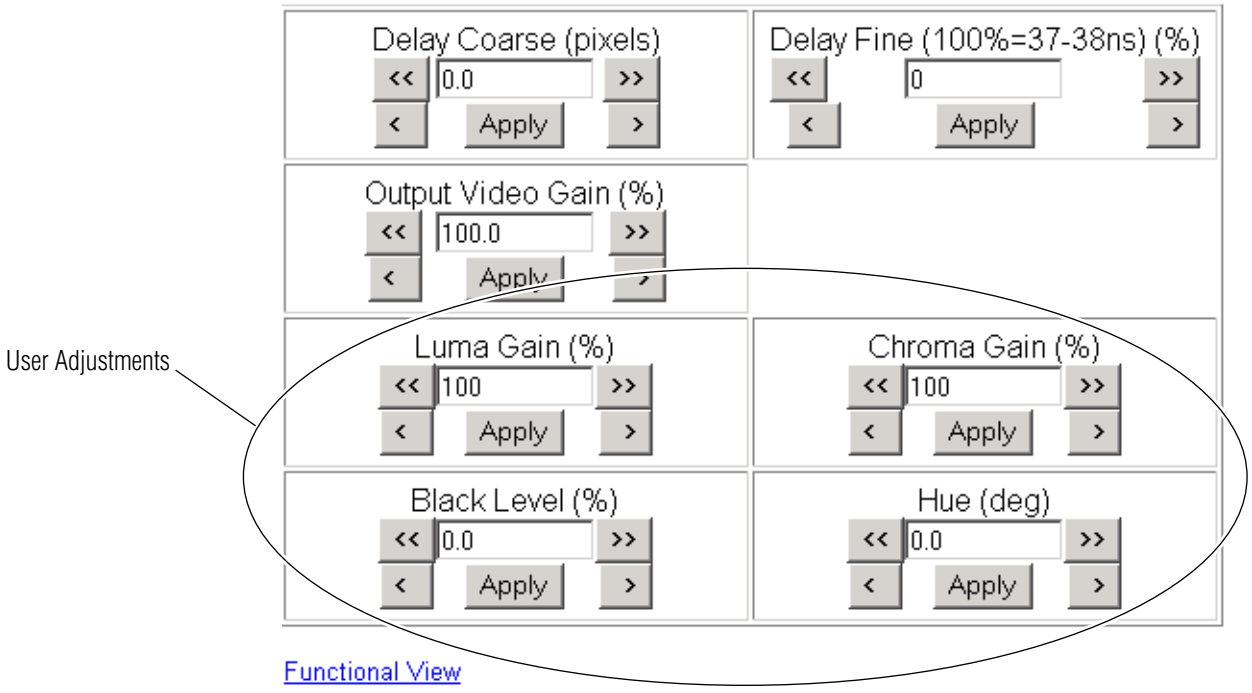
If **User Adjustable** is selected use the following controls to adjust the composite output:

- **Delay Coarse** – adjusts the output delay in coarse steps of 5 pixels (double arrows) or 0.5 pixels (single arrows). The coarse delay range is from 0–4095 pixels.
- **Delay Fine** – adjusts the percent of output delay in fine steps of 10 percent (double arrows) o r1.0 percent (single arrows). The fine delay range is from 0–100% (100% = 37-38 ns)
- **Output Video Gain** – adjusts the output video gain in steps of 5 percent (double arrows) or 0.5 percent (single arrows). The output gain range is approximately 61–138.5 percent.

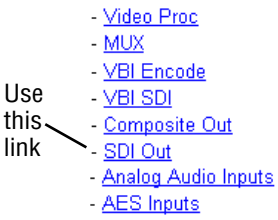
When the **User Adjustable** radio button is selected the following controls are also made available for adjustment of the composite output (Figure 56):

- Luma Gain – adjust percentage of luma (brightness) relative to 100%.
- Chroma Gain – adjust the percentage of color saturation relative to 100%.
- Black Level – adjust the percentage of black level relative to 0%.
- Hue – (control appears in 525 only) adjust the hue of the output signal in degrees.

Figure 56. KAM-AV Composite Out Web Page (User Adjustments)

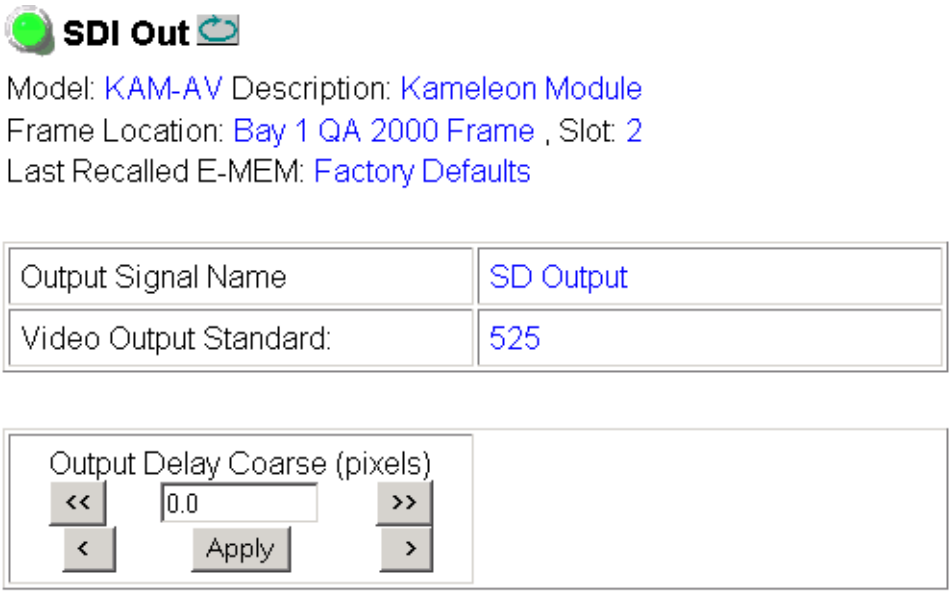


SDI Out Web Page



Use the SDI Out web page (Figure 57) to adjust the coarse delay of the SDI output signal independent of the Frame Sync and Composite Video controls. This page is present only for the KAM-AV module.

Figure 57. KAM-AV Video SDI Out Web Page

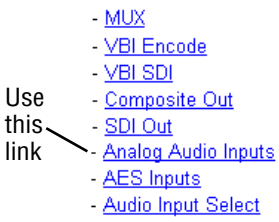


Output Delay Coarse

This web page provides an output delay coarse timing adjustment for the Video SDI Output signal only. This adjustment does not affect the Frame Sync timing or the Composite Video Output.

Adjust the output delay in coarse steps of 5 pixels (double arrows) or 0.5 pixels (single arrows). The coarse delay range is from 0–4095 pixels.

Analog Audio Inputs Web Page



The Analog Audio Inputs web page is present when a KAM-ADC sub-module is installed on the front media module in position 1 or position 2. Analog audio inputs are available from a KAM-AA-R, KAM-MIX-R, or KAM-AA-AES-UR rear module.

Use the Analog Audio Inputs web page (Figure 58 for KAM-AA-R and KAM-MIX-R) to view the signal present and clipping status of the analog audio inputs and set maximum input levels. The web page for an extended rear module (with dual analog audio inputs) such as a KAM-AA-AES-UR, is shown in Figure 59 on page 88.

These audio groups become inputs on the Audio Input Select web page (Figure 62 on page 93) and any pair can be routed to one of the four audio processing paths.

Figure 58. Analog Audio Inputs Web Page

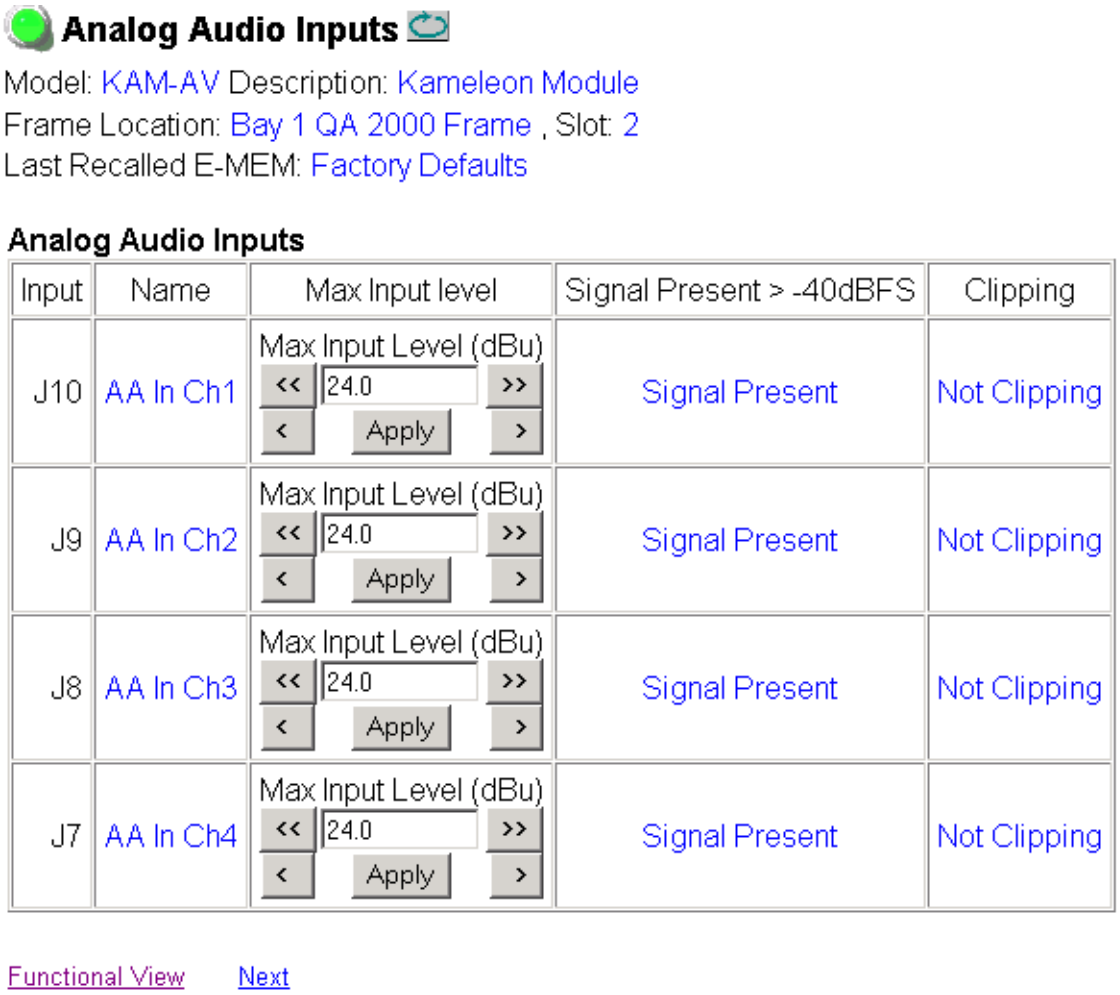
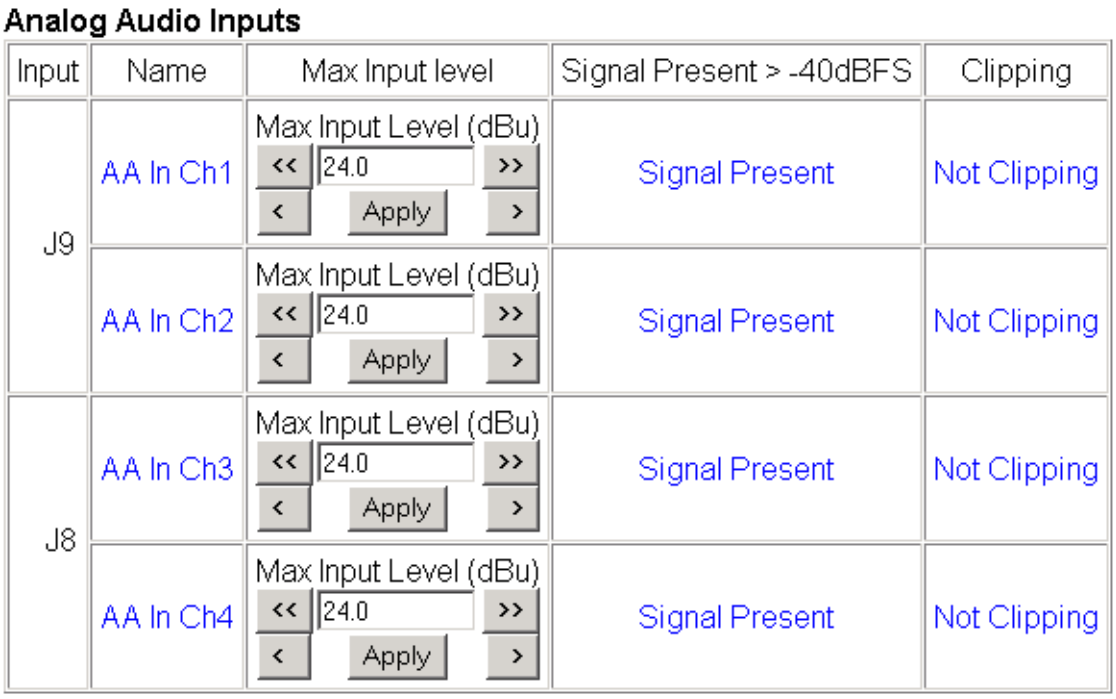


Figure 59. Analog Audio Inputs Web Page for Extended Rear Module



Input

The Input column will indicate which rear module connectors are being used to input the analog audio. Refer to the *Input/Output Configuration Web Page* on page 46 for how to configure the analog audio input connectors.

Name

The Name column will report the default input name for these audio connectors or the name given to the inputs by the user.

Maximum Input Level

The maximum input level is adjustable -2.0 to +28 dBu. Kameleon uses this value to adjust the signal level into the A-to-D converter for the best signal-to-noise and dynamic range.

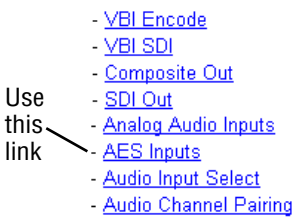
Signal Present

A Signal Present status will be reported if the incoming signal is greater than -40 dBFS.

Clipping

Clipping will be reported when incoming signals are in excess of approximately 0.5 dB of maximum level.

AES Inputs Web Page



Use the AES Inputs web page (Figure 60) to check AES/EBU input signal status decoded from the input signal status bits.

These audio groups become inputs on the Audio Input Select web page (Figure 62 on page 93) and any pair can be routed to one of the four audio processing paths.

Figure 60. AES/EBU Audio Inputs Web Page

AES Inputs

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

AES Input characteristics

Input	Name	Signal State	Sample Rate	Mode	Ch1 Emphasis	Ch2 Emphasis	Ch1 Data	Ch2 Data	AES Errors Detected	
J10	AES In 1 Unbal	Present	48 kHz	---	Off	Off	Audio	Audio	Errors Detected	Clear
J9	AES In 2 Unbal	Present	48 kHz	---	Off	Off	Audio	Audio	Errors Detected	Clear

Functional View Next

Input

The Input column will indicate which rear module connectors are being used to input AES audio depending on the type of rear module installed. Refer to the *Input/Output Configuration Web Page* on page 46 for how to configure the AES input connectors.

Name

The Name column will report the default input name for these audio connectors or the name given to the inputs by the user.

Signal State

The signal state of the AES audio will be reported as **Present** or **Not Present**.

Sample Rate

Kameleon accepts AES/EBU input signals at sample rates from 31 kHz to 96 kHz. The currently detected sample rate will be reported.

Mode

All Kameleon audio processing is done in 24-bit mode. 20-bit input signals are converted to 24-bits using dithering probability. 20- or 24-bit output mode is selectable on later pages for AES/EBU and multiplexed (SDI) outputs.

Emphasis

Ch1 and Ch2 Emphasis windows report whether high frequency emphasis is present (On/Off) on the audio input signal. Emphasis is high frequency gain adjustment that can conform to 50/15 µs or CCIT J.17 standards.

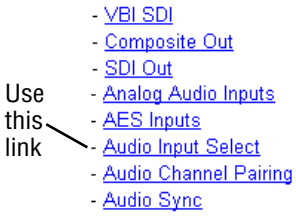
Data

The Ch1 and Ch2 Data windows report whether the input channels contain standard AES/EBU Audio or Data.

AES Errors Detected

Use the **Clear** button to refresh the AES Errors Detected in the AES Errors Detected column.

Audio Input Select Web Page



Use the Audio Input Select web page to select and format the four audio streams for downstream processing and output. The Audio Input Select web page is shown in Figure 62 on page 93.

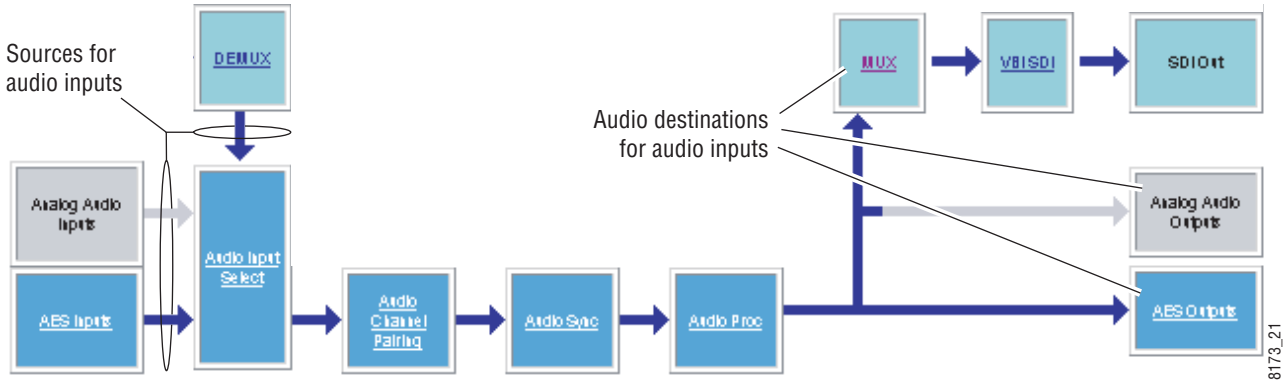
The Audio Input Select web page provides the following functions:

- Selects the source assignment for each audio stream with the radio button in each stream column.
- Enable or disables sample rate conversion for each stream,
- Enable or disables Loss of Signal reporting for each stream.
- Enable or disables AES error reporting for each AES stream.

All available audio inputs from the DEMUX, Analog Audio Inputs, and AES Inputs web pages are fed to the Audio Input Select page. From the available inputs, configure up to four audio streams for processing and output. **Silence** may also be selected for any stream.

Figure 61 illustrates the possible audio sources and destinations for the configured streams.

Figure 61. Audio Input Sources and Destinations



Refer to Figure 62 on page 93 for the following explanations.

Input Stream Select

All available audio inputs are listed on the Audio Input Select web page with the names defined on the I/O Config web page. For this example, module default names are used.

Select the desired Stream 1-4 by selecting the corresponding radio button for that input.

Status

The status of each of the selected inputs is reported as **Present** or **Not Present**.

Sample Rate Convert

On demultiplexed and AES audio inputs, select whether to disable sample rate conversion on each stream. This does not apply to analog audio inputs.

Loss of Signal Reporting

Enable or disable loss of signal reporting for each stream to higher levels such as SNMP reporting. This does not apply to analog audio inputs.

Reporting

The Reporting row will display what status is being reported to the higher levels. When Reporting is unchecked, the display will report **Not Monitored**.

AES Errors

Enable or disable AES error reporting to higher levels. This is not applicable for analog or demultiplexed digital audio signals.

Figure 62. Audio Input Select Web Page

Audio Input Select

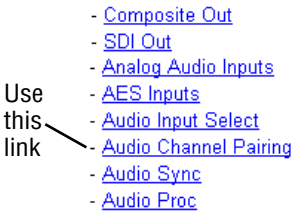
Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

Input Stream Select

	Stream 1	Stream 2	Stream 3	Stream 4
Silence	○	○	○	○
Video In.G1.S1	○	○	○	○
Video In.G1.S2	◉	○	○	○
Video In.G2.S1	○	○	○	○
Video In.G2.S2	○	○	○	○
AES In 1 Unbal	○	◉	○	○
AES In 2 Unbal	○	○	◉	○
AA In Ch1 &AA In Ch2	○	○	○	◉
AA In Ch3 &AA In Ch4	○	○	○	○
Status	Not Present	Not Present	Not Present	Not Present
Sample Rate Convert	☐ Disable	☐ Disable	☐ Disable	☐ Disable
Loss of Signal	☐ Report	☑ Report	☑ Report	☑ Report
Reporting	Not Monitored	Not Present	Not Present	Not Present
AES Errors	N/A	☑ Warn	N/A	☑ Warn

Back (AES Inputs) Functional View Next
Back (DEMUX)

Audio Channel Pairing Web Page



The Audio Channel Pairing web page (Figure 63) allows the input audio channels to be arbitrarily recombined into new pairs, streams, and groups. The rows represent the audio input channels and the columns represent the audio output channels. The columns are grouped together into four different pairs.

The recombined audio pairs can be routed as follows:

- Any output pair can be routed to any of the AES/EBU output streams of the module (see *AES Outputs Web Page* on page 100).
- Any output pair can be routed to an analog output pair (see *Analog Audio Outputs Web Page* on page 98).
- Either or both Multiplexing Groups can be inserted into the SDI output video (see *MUX Web Page* on page 74).

Note Audio input names are assigned using the **I/O Config** page. Factory default names are used here.

Figure 63. Audio Channel Pairing Web Page

Audio Sync Web Page

- SDI Out
- Analog Audio Inputs
- AES Inputs
- Audio Input Select
- Audio Channel Pairing
- Audio Sync
- Audio Proc
- Analog Audio Outputs

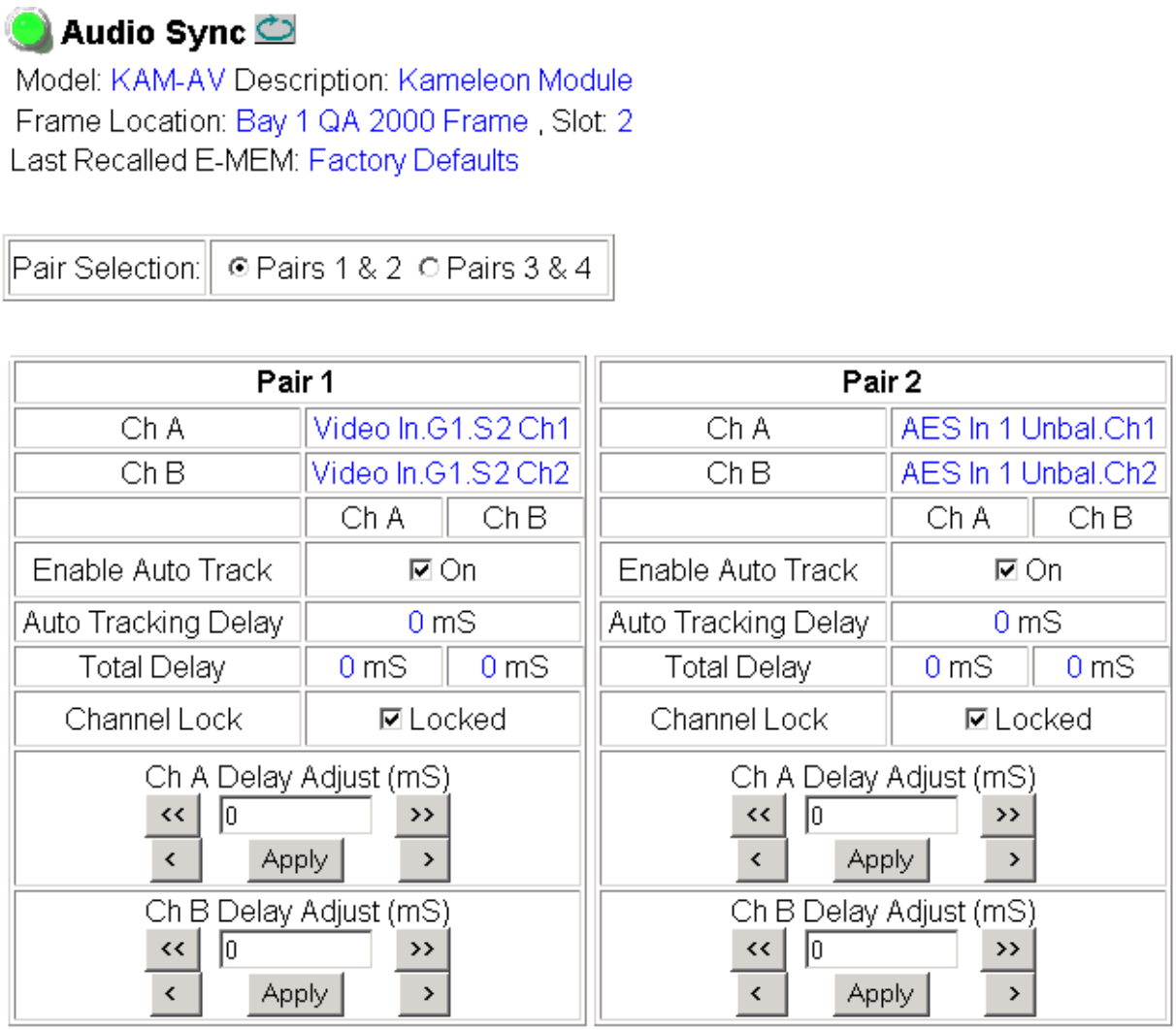
Use this link

Use the Audio Sync web page (Figure 64) to:

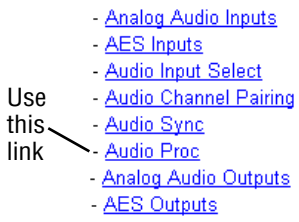
- Synchronize the four audio channel pairs to Video Frame Sync, and/or
- Add audio delay using the delay adjust controls.

Use the Pair Selection radio buttons to select either Pairs 1 & 2 or Pairs 3 & 4 for adjustment.

Figure 64. Audio Synchronizer Web Page



Audio Processing Web Page



Use the Audio Proc web page (Figure 65 on page 97) to adjust the following for Audio Pair 1 & 2 and Audio Pair 3 & 4:

- Adjust audio signal gain for each channel or the two audio pairs,
- Lock gain settings for simultaneous channel A/channel B adjustment,
- Select a processing option for each channel.

Use the Pair Selection radio buttons to select either Pairs 1 & 2 or Pairs 3 & 4 for adjustment.

Audio Gain

Each audio channel can be adjusted for gain separately or in pairs. Use the following adjustments for audio gain:

- To lock the two channels in a pair together, select the Gain Settings **Locked** checkbox for Pair 1 and/or Pair 2.
- Adjust the gain (-40 to +6 dB) for each channel with the Ch A Gain Adjust and Ch B Gain adjust controls for each pair. If the pair is locked, adjusting either control will set the gain to the same value for each channel in the pair.

Note After gain has been adjusted, a straight quote mark (') will be added to Ch A' and Ch B' to indicate the status of the channels after gain.

Output Processing

Set the output processing for each channel with the Processing pulldown to one of the following:

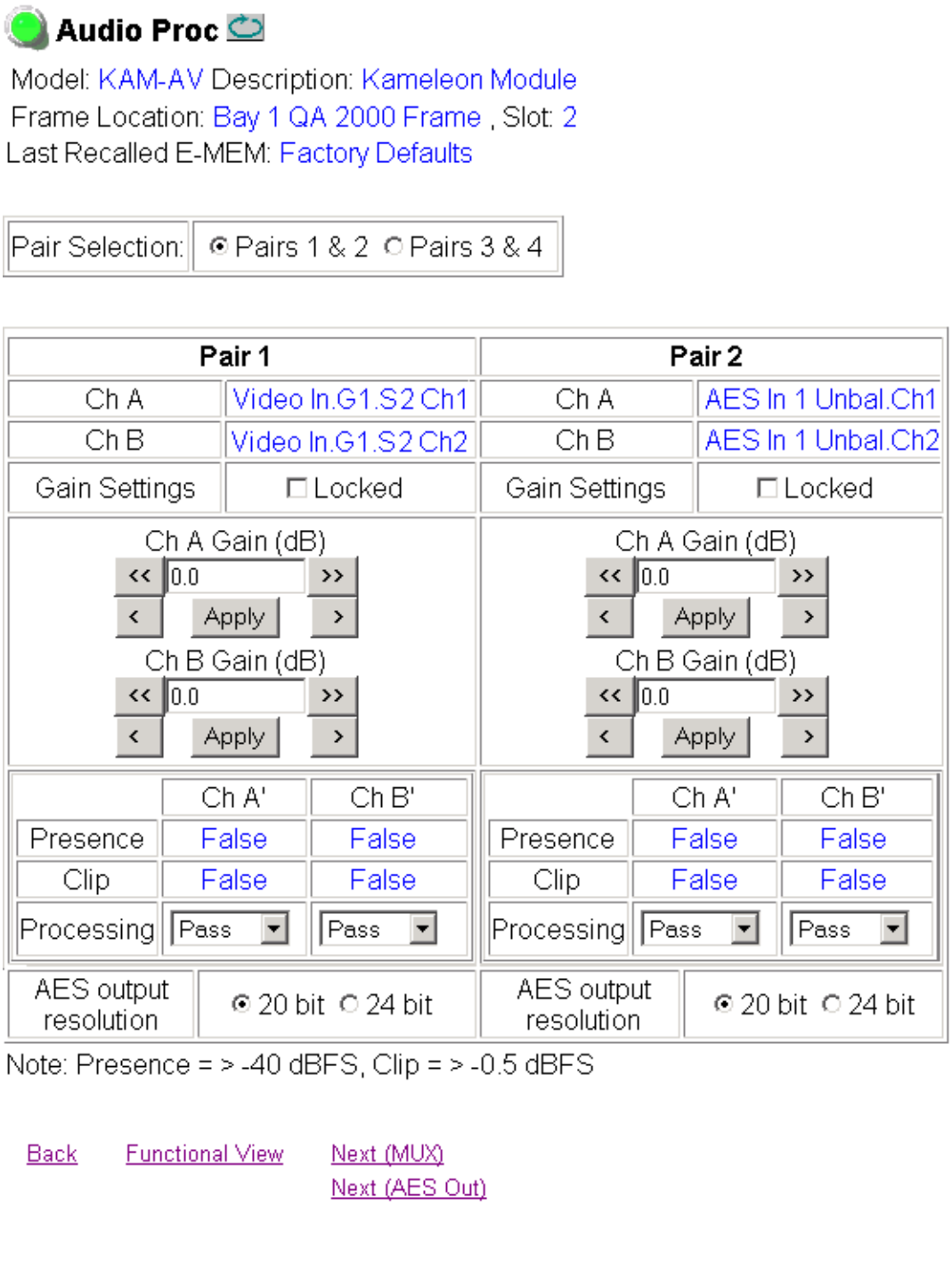
- Pass
- Invert
- A+B
- A-B
- -(A+B)
- 1 kHz (test tone)
- 400 Hz (test tone)
- Silence
- A + B (Pair 1, Pair 2, Pair 3 or Pair 4)

The Presence and Clipping status of each audio channel is reported as **True** or **False** in the read-only displays. If the audio is > -40 dBFS, it will be reported as **True**. If clipping is < 0.5 dBFS, it will be reported as **False** as shown in Figure 65 on page 97.

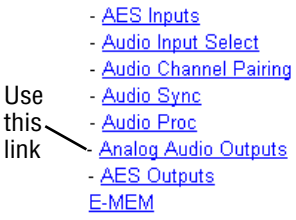
Selecting Output Resolution

Select the AES output resolution for Pair 1, Pair 2, Pair 3, and Pair 4 with the **20 bit** or **24 bit** radio button.

Figure 65. Audio Processing Configuration Web Page



Analog Audio Outputs Web Page



Use the Analog Audio Outputs web page (Figure 66 for KAM-AA-R and KAM-MIX-R Rear modules and Figure 67 on page 99 for the KAM-AA-AES-UR Rear module) to do the following:

- Select audio pairs for output to the assigned analog audio connectors (refer to *Input/Output Configuration Web Page* on page 46 for connector information and audio signal name assignment).
- Adjust the maximum output level for each analog audio channel (adjustable -6.0 to +24 dBu).

Note Analog audio outputs require the DAC submodule on the front media module.

Figure 66. Analog Audio Outputs Web Page

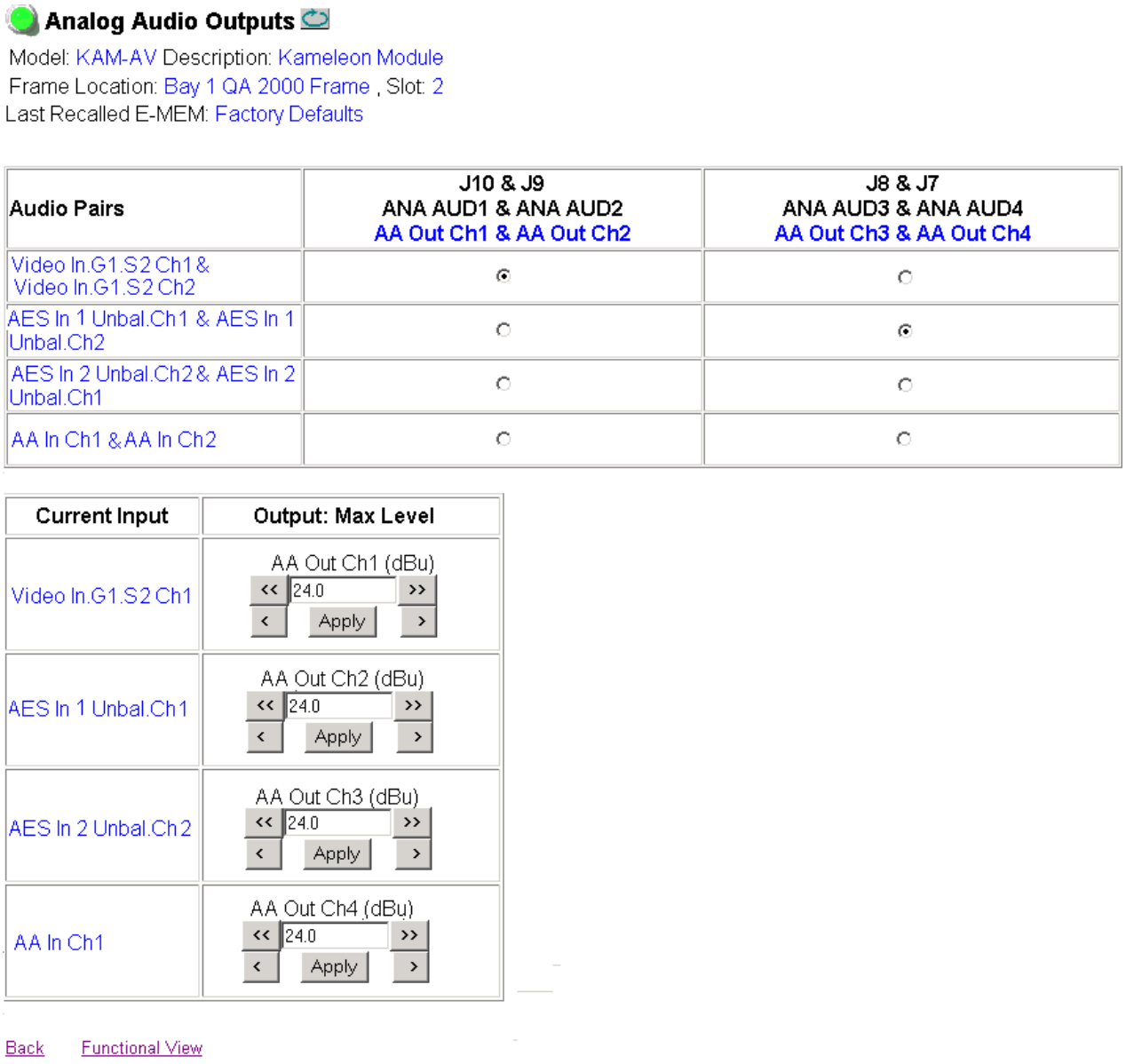
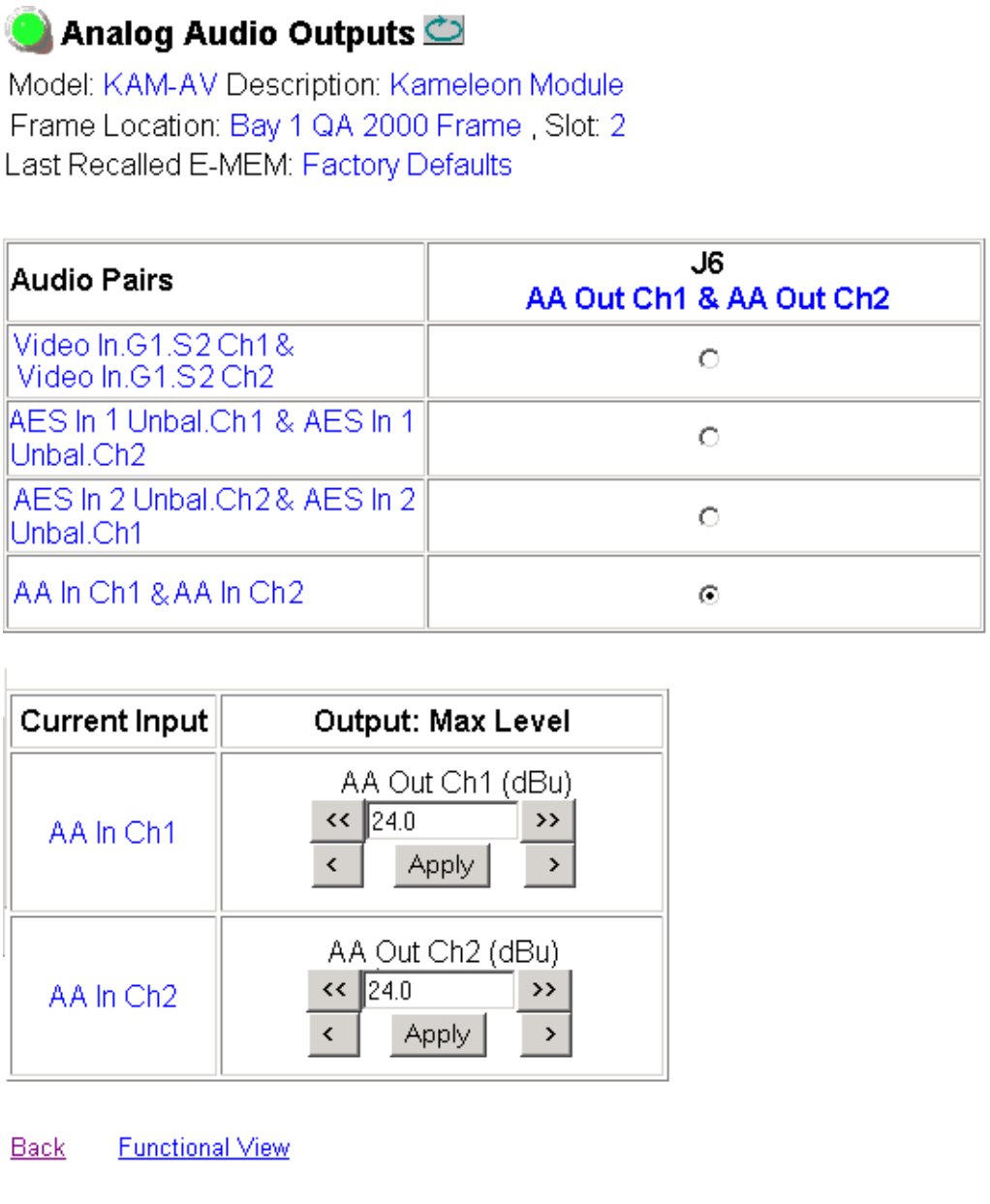
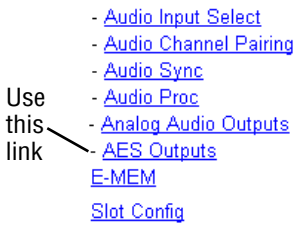


Figure 67. Analog Audio Outputs Web Page – KAM-AA-AES-UR Rear Module



AES Outputs Web Page



Use the AES Outputs web page (Figure 68) to:

- Select audio pairs for output to the assigned AES/EBU connectors

Kameleon AES/EBU signals are output at 48 kHz sample rate as reported in the display.

Figure 68. AES Outputs Web Page

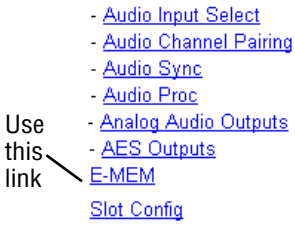
AES Outputs

Model: KAM-AV Description: Kameleon Module
Frame Location: Bay 1 QA 2000 Frame , Slot: 2
Last Recalled E-MEM: Factory Defaults

Audio Pairs	J5 AES 3 AES Out 1 Unbal	J4 AES 4 AES Out 2 Unbal	Output Resolution
Video In.G1.S2.Ch1& Video In.G1.S2.Ch2	○	◉	20 bit
AES In 1 Unbal.Ch1 & AES In 1 Unbal.Ch1	◉	○	20 bit
AES In 2 Unbal.Ch2 & AES In 2 Unbal.Ch1	○	○	20 bit
AA In Ch1 & AA In Ch2	○	○	20 bit
Balanced / Unbalanced	Unbalanced	Unbalanced	
Output Sample Rate	48 kHz	48 kHz	

Back Functional View

E-MEM Configuration Web Page



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

Factory default settings for all channels can be recalled by selecting the **Recall factory settings** button. To return the module to the factory signal names (such as the signal inputs), select the **Recall factory names** button.

There are two E-MEM view selections: **Standard** and **Advanced**.

In Standard view (Figure 69), 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 for the entire module into that E-MEM into the KAM-SD-2AES-DMX. This change will occur immediately upon recall. The name of the last recalled E-MEM will appear in the top header of each web page for the module.

To learn an E-MEM select the **Advanced** button in the View Selection section. This will open the Advanced view (Figure 70 on page 102).

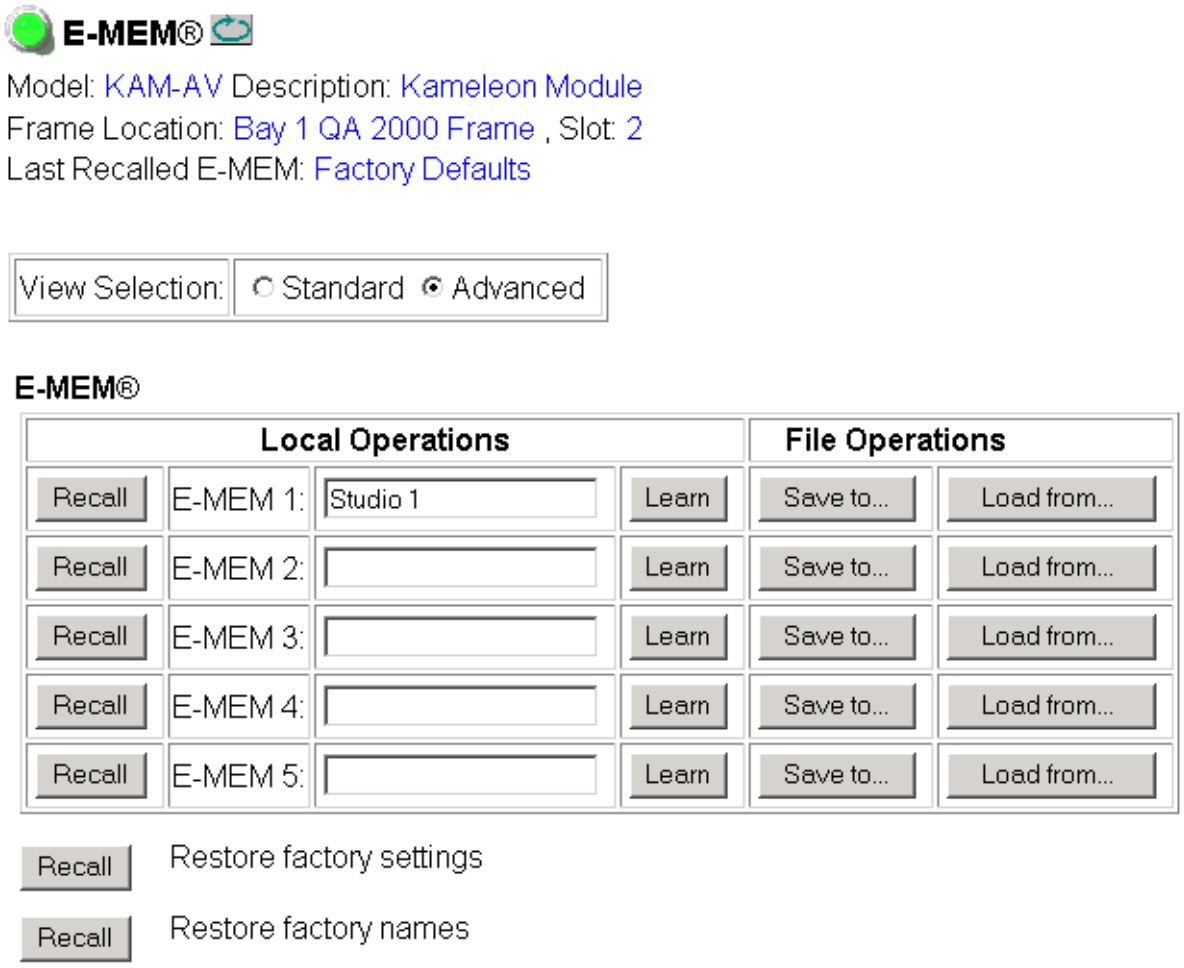
Figure 69. E-MEM Web Page (Standard View)

The Advanced View (Figure 70) includes a File Operations section to Learn a configuration into E-MEM (**Learn**), save a file to a disk location (**Save to…**) or load a file from a disk location (**Load from…**).

To learn an E-MEM:

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

Figure 70. E-MEM Web Page (Advanced View)



File Operations

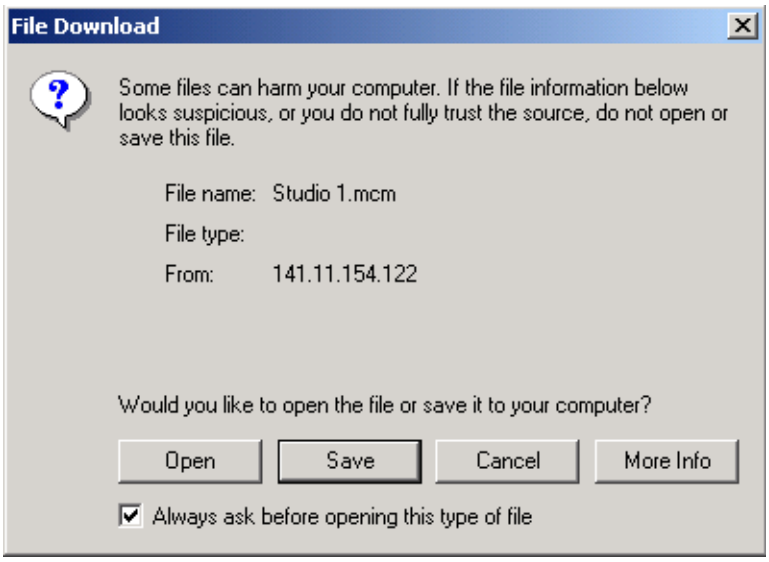
Save File

File operations allow you to save learned configurations to a computer hard drive or other accessible media for later recall to the onboard E-MEM registers of any Kameleon module in your system.

To save to a file, first make sure you have learned the configuration, then press the **Save To…** button.

This will bring up a File Download screen similar to Figure 71. Select **Save**.

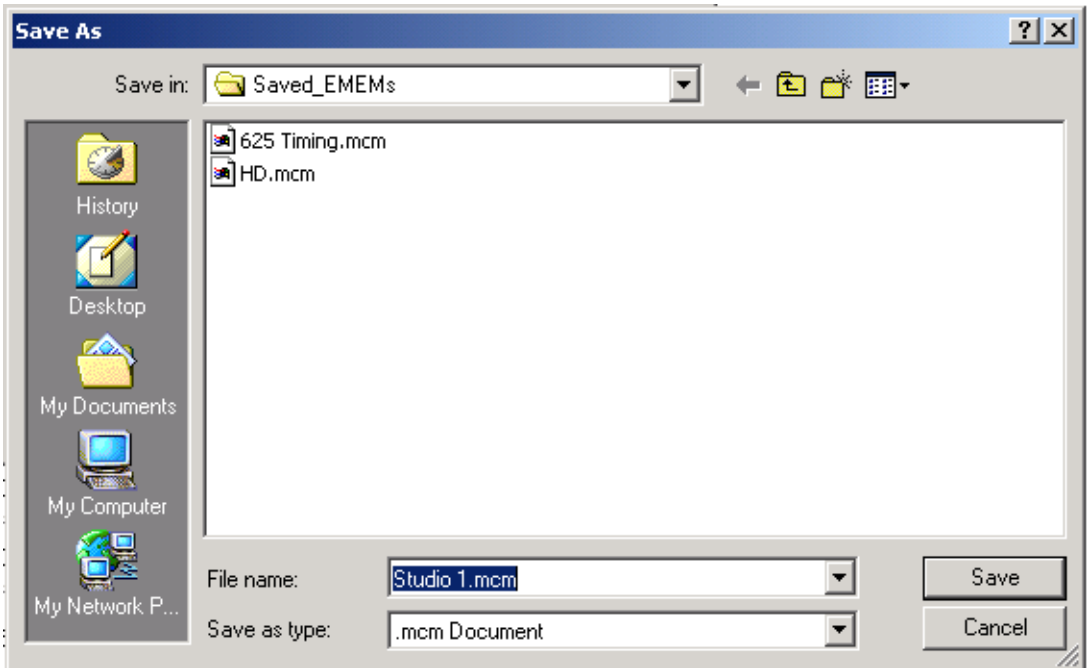
Figure 71. File Download Screen



This will bring up the Save As screen as shown in Figure 72. Locate or create a directory for storing the E-MEMs and select **Save**. This E-MEM register is now saved to the selected location and may be recalled as described below.

Note For frames running 2000NET software version v3.2.2 and earlier, files will be saved with a .mcm extension. For later version 2000NET software, files will be saved as .bin. Either file type can be used with the later version software.

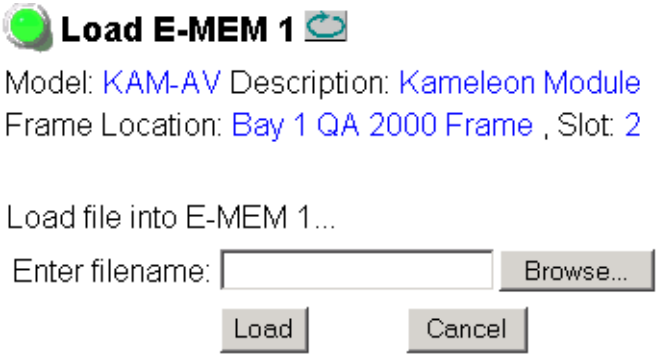
Figure 72. Save As Screen



Load File

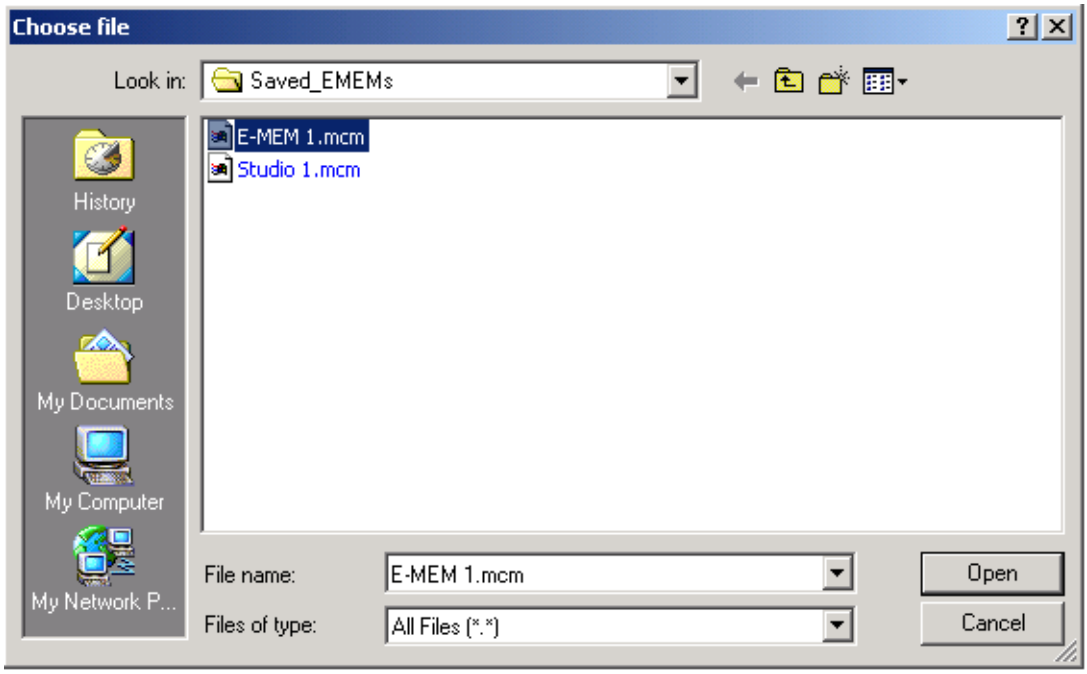
A file may be loaded from a saved directory to a register on the E-MEM web page by selecting the **Load From…** button in the associated E-MEM register in the Advanced view. This will bring up the Load E-MEM web page (Figure 73).

Figure 73. Load E-MEM Web Page



Enter a path and filename or use the **Browse** button to locate your saved E-MEM files. Browse to the Choose File screen (Figure 74), select the E-MEM file to download and select **Open**.

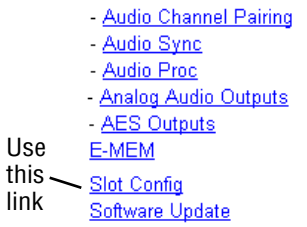
Figure 74. Choose File Screen



This will place the path and filename in the Load E-MEM screen (Figure 73 on page 104). If this is the correct file, select **Load**. Continue to load files or select **Cancel** to return to the main E-MEM web page. Loaded files will now be entered in the associated E-MEM registers.

Select the associated **Recall** button for each E-MEM register to load the configuration to the module.

Slot Configuration Web Page



Use the Slot Config web page (Figure 75 on page 107) to:

- Assign an appropriate name to the module slot,
- Assign an Asset Tag identification,
- Enable/disable the **Locate Module** function,
- Save module configuration and enable slot memory,
- Check SNMP related 2000NET module switch settings, and
- Enable/disable SNMP reporting for the specific Kameleon slot.

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.

Locate Module

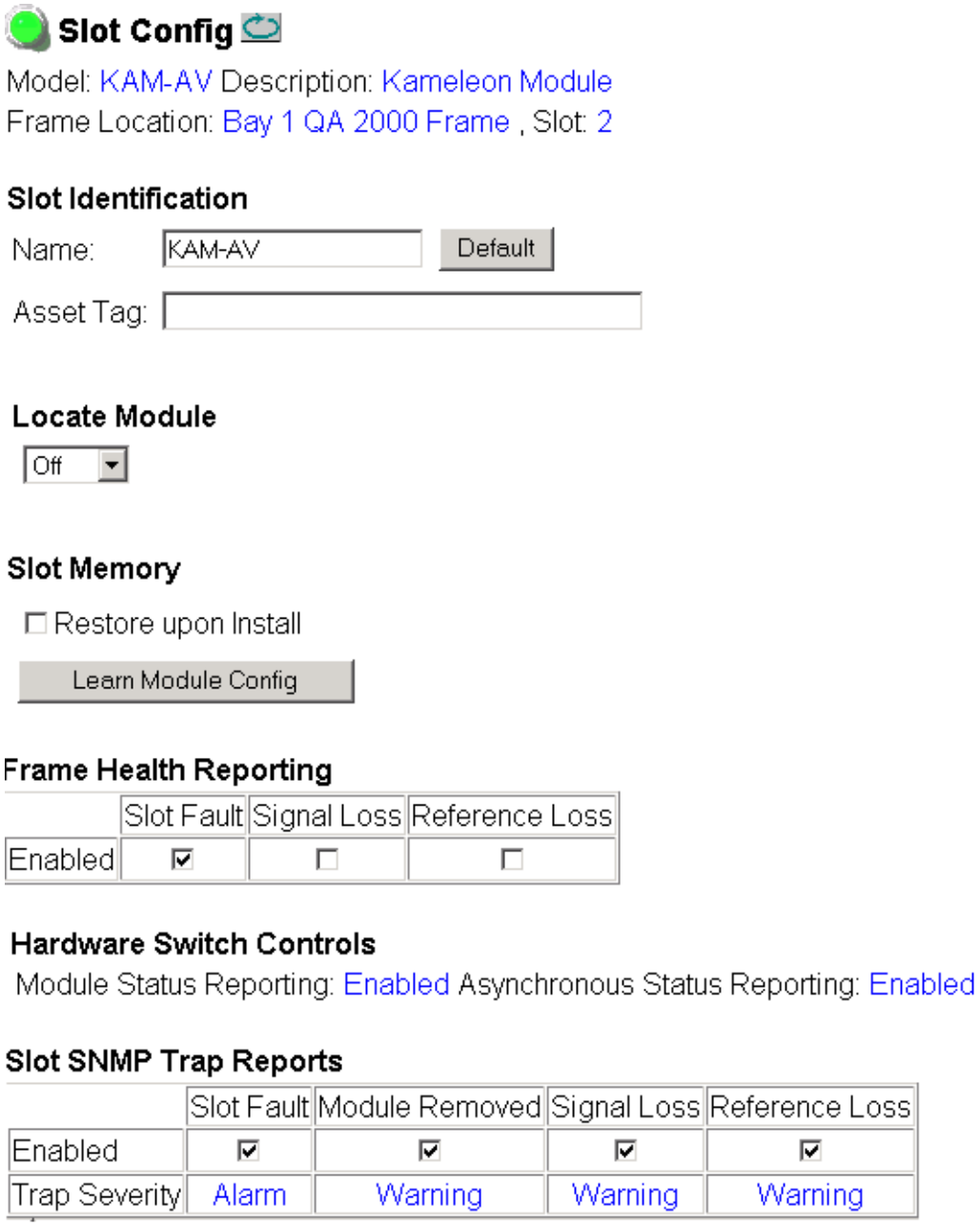
When enabled by selecting the **Flash** pulldown, the **Locate Module** function flashes the yellow COMM and CONF LEDs on the front of the module to make it easy to locate in the frame (see *Operation Indicator LEDs* on page 28).

Slot Memory

The slot configuration for each media module is automatically saved periodically 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 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.

Figure 75. Slot Configuration Web Page



Frame Heath Reporting

The reporting of Slot Fault, Signal Loss, and Reference Loss can be enabled or disabled to the Frame Health connector on the rear of the Kameleon frame (2000T3NG only) by selecting or deselecting the corresponding checkbox.

Hardware Switch Controls

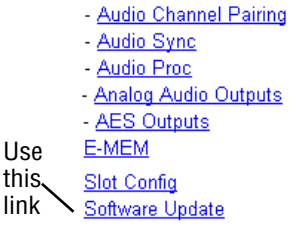
This section is a read-only status report of 2000NET module switch settings for Module Status Reporting and Asynchronous Status Reporting. These functions must be enabled for the following Slot SNMP Trap Reports to function.

Slot SNMP Trap Reports

This section is displayed only when the SNMP Agent software has been installed on the 2000NET module (refer to the *2000NET Instruction Manua*l for installation instructions). Slot SNMP traps can be enabled only when the hardware switches for Module Fault reporting and Asynchronous Status reporting are enabled on the 2000NET module (dipswitch S1 segment 7 and dipswitch S2 segment 1).

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.

Software Update Web Page

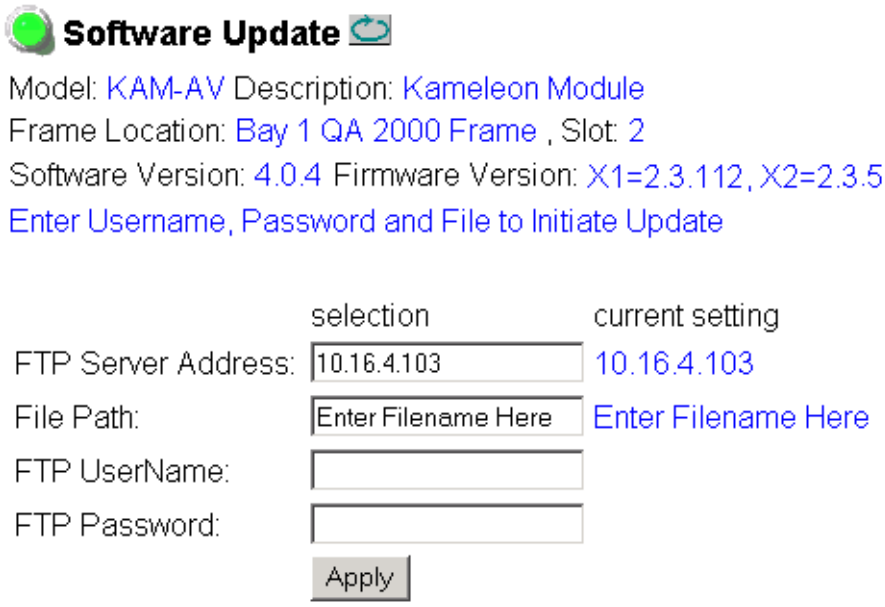


The Software Update web page (Figure 76) allows you to download new software versions for the module using the FTP server method described in the 2000NET Instruction Manual available on-line.

Software may also be updated using the NetConfig Networking Application PC option available with Modular and other Grass Valley products as described in the documentation that accompanies the option.

Refer to the latest module Release Notes for complete details on how to obtain and install the latest software for this module.

Figure 76. Software Update Web Page



Specifications

Note Specifications are subject to change without notice.

Table 11. SDI Input/Output Specifications

Parameter	Value
SDI Input	
Signal type	Serial digital video conforming to SMPTE259M 10-bit 4:2:2component digital signal
Input impedance	75 Ω
Connector type	75 Ω BNC on rear module
Input return loss	> 15 dB to 270 MHz
Common mode rejection ratio	2 V p-p to 60 Hz
Equalization	Up to 250 meters of Belden 1694A
SDI Output	
Number of outputs	1
Signal type	Serial digital video conforming to SMPTE259M 10-bit 4:2:2 component digital signal
Signal level	800 mV ±10%
Output impedance	75 Ω
Connector type	75 Ω BNC on rear module
DC offset	< 0.5 V when terminated into 75 Ω
Output return loss	>15 dB up to 270 MHz
Jitter	Conforms to SMPTE17.12/002 < 400 ps above 1 KHz
Rise/fall time	700 – 900 ps (20 – 80% amplitude)
EDH error detection and reporting	EDH automatically inserted into SD output, conforms to SMPTE recommended Practice RP-165
SDI I/O Control Parameters	
Vertical blanking processing	Line by line blank

Table 12. Composite Input Specifications

Parameter	Value
Composite Input	
Signal types	Composite analog video conforming to: NTSC (525/59.9) SMPTE170M PAL-B/PAL-I (625/50) CCIR 624-4
Level	0.5 V p-p to 2 V p-p, 1 V p-p nominal
Impedance	75 Ω terminating
Signal source	75 Ω BNC on rear module or internal signal
Return loss	> 40 dB to 5.75 MHz
Common mode rejection ratio	> 60 dB to 60 Hz
HUM peak	< 4.5 V p-p
Clamping hum rejection	0 dB

Table 12. Composite Input Specifications

Parameter	Value
Composite In Performance	
Sampling	27 MHz (2x oversampling)
Input quantization	12 bits
Overall processing accuracy	10 bits
Luma frequency response	± 0.1 dB to 5.5 MHz
Chroma (R-Y,B-Y) response	-1.5 dB @ 1.3 MHz
Group delay error	< 5 ns to 5.5 MHz
Chroma/luma delay	< 10 ns
Luma non-linearity	< 0.15%
K factor (2T)	< 0.5%
Line tilt	< 0.5%
Field tilt	< 0.5%
Differential phase	< 1 degree
Differential gain	< 1%
Signal/noise ratio (CCIR410 or EIA RS-250B)	> 60 dB to 5.5 MHz
Phasing	None
Picture centering error	0.0 ±20 ns non-adjustable
Decoding modes	Three-line adaptive with two pre-programmed adaption threshold levels high/low
Blanking start/end	SMPTE170M or CCIR624, non-adjustable
Composite In Control	
Overall video gain range	44% to 219% in 0.5% steps, 100% default
Black range	-21.5% to +22% of luma full-scale in 0.1% steps, 0 default
Hue range	-180 to + 179 degrees in 0.1 degree steps, 0 degree default (525 only)
Setup processing in vertical	Line by line on/off (525 only)
Vertical blanking processing	Line by line blank/notch decode/pass

Table 13. Composite Output Specifications

Parameter	Value
Composite output	
Number of outputs	1
Signal type	Composite analog video conforming to SMPTE170M for NTSC and CCIR624 for PAL-B
Signal level	600 mV to 1.4 V p-p adjustable, 1 V p-p default
Output clamping level	0 VDC ±20 mV
Output impedance	75 Ohm
Connector type	75 Ohm BNC on rear module
Output return loss	> 40 dB to 5.5 MHz
Output isolation	> 46 dB to 5.5 MHz
Composite Output Performance	
Response	± 0.1 dB to 5.0 MHz

Table 13. Composite Output Specifications - (continued)

Parameter	Value
Differential phase	< 0.5 degrees
Differential gain	< 0.9%
Group delay	< 10 ns to 5.5 MHz
RMS signal-to-noise	> 59 dB to 5.5 MHz
Resolution	10 bits
Accuracy	9.2 bits
Subcarrier jitter	< 1 degree when input clock jitter spec is met
Blanking start/end	SMPTE170M or CCIR624, non-adjustable
Composite Output Control Parameters	
Overall video gain	61% to 138% in 0.5% steps, 100% default
Black range	-7.5% to +15% of luma full-scale in 0.1% steps, 0 default
Luma gain	50 – 150% in 1% steps, 100% default
Chroma gain	50 – 150% in 1% steps, 100% default
Hue range	± 22.5 degree 0.5 degree steps, 0 degree default (525 only)
Setup processing in vertical	Line by line on/off (525 only)
Vertical blanking processing	Line by line blank/unblank
Prefiltering	Cross-color & luma reduction 2D filtering on/off

Table 14. AES/EBU Input Specifications

Parameter	Value	
AES/EBU Input	**Balanced (AES3-1992)**	**Unbalanced (AES3id 2001)**
Common mode range	+ 10/-10 V, 50 Hz to 20 kHz	NA
Differential voltage range	200 mV p-p to 12 V p-p	200 mV p-p to 2 V p-p
Input return loss	> 25 dB (100 kHz to 6 MHz)	>15 dB (100 kHz to 6 MHz)
Sample rate	32 – 96 kHz	32 – 96 kHz
Performance		
Static withstand	5 kV (330 Ω, 150 pF)	

Table 15. AES/EBU Output Specifications

Parameter	Value	
AES/EBU Output	**Balanced (AES3-1992)**	**Unbalanced (AES3id 2001)**
Signal type	AES3 1992, 110 Ω	AES3id 2001, 75 Ω
Signal level	3 V p-p ±0.2 V @ 110 Ω	1 V p-p ±0.2 V @ 75 Ω
Rise/fall time	5 ns to 30 ns, 110 Ω load	37 ns ± 7 ns, 75 Ω load
Output return loss	> 25 dB (100 kHz to 6 MHz)	>15 dB (100 kHz to 6 MHz)

Table 15. AES/EBU Output Specifications

Parameter	Value	
DC offset	< 50 mV	<50 mV
Sample rate	48 kHz	48 kHz
Bits/sample	20/24 bits/sample, selectable	20/24 bits/sample, selectable
AES/EBU Performance		
Static withstand	5 kV (330 Ω, 150 pF)	

Table 16. Audio ADC Specifications

Parameter	Value
Analog Input (ADC)	
Number of inputs	4 per submodule
Level for full-scale output	-2 dB to +28 dBu, adjustable in 0.1 dBu steps
Input impedance	> 22 kΩ
Common mode input voltage	20 V maximum
Differential DC	0.25 V maximum
Common mode rejection ratio	> 72 dB, 20 Hz to 20 kHz
Connector type	Multi-pin (receptacle)
Analog Audio Input Conversion Performance	
Signal-to-noise ratio	> 102 dB, 20 Hz to 20 kHz > 105 dB, "A" weighted
THD+noise, swept 20 Hz-20 kHz	< -75 dB, 20 to 20 kHz, @ +28 dBu
Interchannel crosstalk	< -95 dB, 20 Hz to 20 kHz
Intermodulation distortion	< -100 dB CCIF two-tone test, 19 & 20 kHz tones
Interchannel gain mismatch	0.1 dB
Frequency response	± 0.1 dB, relative to 1 kHz, 20 Hz to 20 kHz
DC offset	± 1 mV
Emphasis	Not selectable
Output resolution	24 bits
Effective number of bits	18
Static withstand	5 kV (330 Ω, 150 pF) any input or output

Table 17. Audio DAC Specifications

Parameter	Value
Analog Audio Output (DAC)	
Number of outputs	4 per submodule
Signal type	-2 dB to +24 dBu, adjustable in 0.1 dBu steps
Output impedance	100 Ω balanced
Drive capability maximum	+24 dBu balanced @ 10 KΩ load
Differential DC	0.25 V maximum
Connector type	Multi-pin (receptacle)

Table 17. Audio DAC Specifications - (continued)

Parameter	Value
Analog Audio Output Performance (48 kHz sampling rate)	
Signal/noise ratio	> 102 dB, 20 Hz to 20 kHz > 105 dB, "A" weighted
THD+noise, swept 20 Hz-20 kHz	< -75 dB, 20 Hz to 20 kHz, @ +24 dBu
Interchannel crosstalk	< -80 dB, 20 Hz to 20 kHz
Intermodulation distortion	< -80 dB CCIF two-tone test, 19 & 20 kHz tones
Interchannel gain mismatch	0.1 dB
Frequency response	± 0.2 dB, relative to 1 kHz, 20 Hz to 20 kHz @ +24 dBu
DC offset	± 50 mV
Output resolution	24 bits
Effective number of bits	18
Static withstand	5 kV (330 Ω, 150 pF) any input or output

Table 18. Frame Sync/Timing Specifications

Parameter	Value
Video Frame Sync Timing Control Parameters	
Delay adjustment (main)	0 to 1 frame in 37 ns steps
Additional delay, composite out	0 to 151µs in 37 ns steps
Fine phase delay, composite out	0 to 37 ns in 100 steps
Additional delay, SDI out	0 to 151 µs in 37 ns steps

Table 19. Main Video Processing Specifications

Parameter	Value
Main Video Frame Processing Control Parameters	
Y gain	± 50% in 0.4% steps, 100% default
Y offset	± 3.5% of 100% white in 0.11% steps, 0% default
B-Y gain	± 50% in 0.4% steps, 100% default
B-Y offset	± 3.5% of 100% white in 0.11% steps, 0% default
R-Y gain	± 50% in 0.4% steps, 100% default
R-Y offset	± 3.5% of 100% white in 0.11% steps, 0% default
Color bars	on/off

Table 20. Multiplexing/Demultiplexing Specifications

Parameter	Value
MUX/DEMUX Performance	
Standard	SMPTE 272M A, C: Synchronous audio, 48K, 20/24 bits/sample Compatible with buffer sizes down to 48 samples
Pass through	Up to 4 groups (frame sync must be in delay mode)
Extract, retime, insert	Up to 2 groups
Delete	Up to 4 groups
Insert	Up to 2 groups
Bits/sample on inserted audio	20/24 bits, selectable
Buffer size	170 samples
DEMUX delay	1.77 ms
MUX delay	1.77 ms
Distribution	Evenly distributed, minimum of 3 samples per line, maximum of 4 samples per line except near switching lines Switch line and nearby lines (lines 4, 5, 6, 317, 318, 319 for 625; 8, 9, 10, 270, 271, 272 for 525) have 0 samples

Table 21. Audio Processing Specifications

Parameter	Value
Audio Processing	
Number of channels supported	8
Sample Rate Conversion	All audio inputs (analog, AES or DEMUX) retimed to output timing reference (either input video or frame reference)
Fixed Delay	0 – 5.2 sec in 20 ms steps, individual setting for each channel
Delay Tracking	Delay can be set to automatically track delay through video frame sync with fixed offset
Gain	+ 6 to -40dB in 0.1dB steps, individual setting for each channel.
Other processing	Selectable: Invert; L + R; L-R; -(L-R); 1 kHz; 400 Hz; Silence Individual setting for each channel.
Re-pairing	Complete flexibility to swap or recombine any input channel with any other

Table 22. Electrical Length Specifications

Parameter	Value
Electrical Length	
Composite In to Composite Out	2 lines + 10 µs
Composite In to SDI Out	1 line + 10 µs
SDI In to Composite Out	1 line + 16 µs
SDI In to SDI Out	14 µs
SDI In to AES/EBU Out (DMUX)	3.8 ms
SDI In to Analog Audio Out (DMUX)	4.5 ms

Table 22. Electrical Length Specifications - (continued)

Parameter	Value
Analog Audio to Analog Audio	1.9 ms
Analog Audio to AES/EBU	1.2 ms
Analog Audio to SDI Out (MUX)	3.0 ms
AES/EBU to Analog Audio	2.5 ms @ 48 kHz
AES/EBU to AES/EBU	2.0 ms @ 48 kHz
AES/EBU to SDI Out (MUX)	3.8 ms @ 48 kHz
SDI In to SDI Out Audio Delay (DMUX, retime, MUX)	5.6 ms

Table 23. Environmental/Power Specifications

Parameter	Value
Environmental	
Frame temperature range	See Kameleon Frame Manual
Operating humidity range	0 to 90% non-condensing
Non-operating temperature	-10 to +70 degrees C
Mechanical	
Frame type	2000T1DNG Kameleon Frame or 2000T3NG Kameleon Frame
Power	
Consumption	KAM-AV – 14 Watts typical KAM-SD – 11 Watts typical KAM-ADC-S – 2 Watts typical KAM-DAC-S – 2 Watts typical

Service

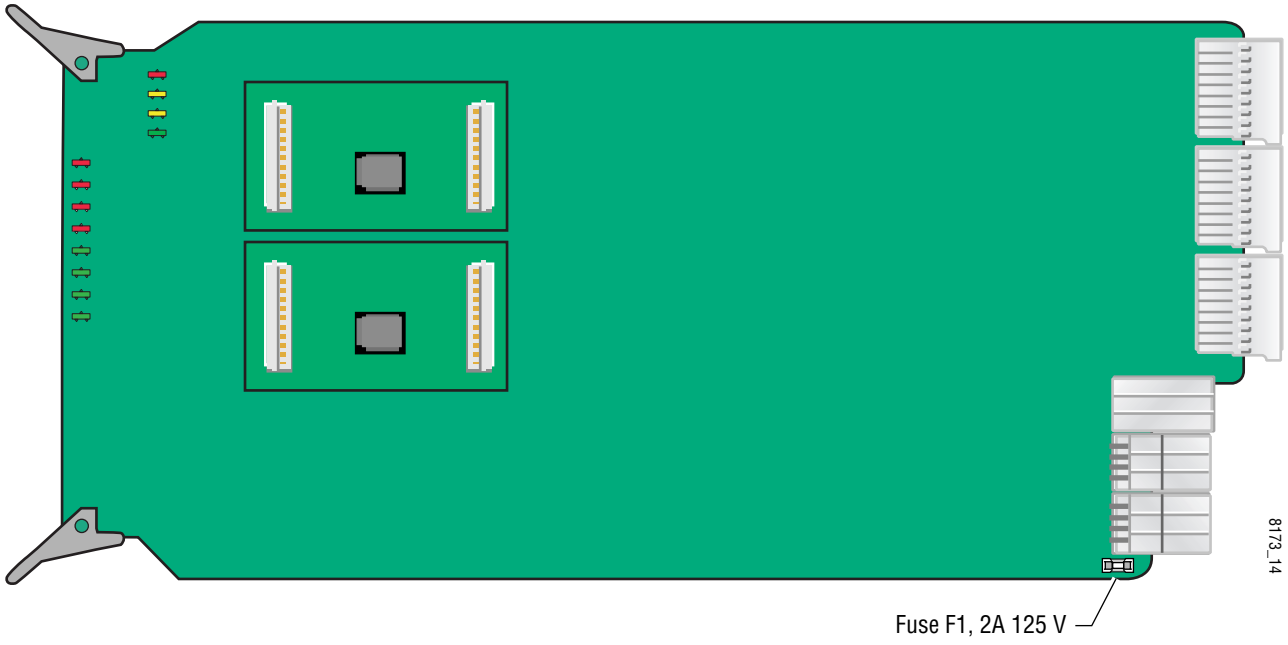
The Kameleon modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field except to check and replace fuses.

Troubleshooting

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

- Check frame and module power. If power is not present, check the fuse on the +24 V input to the module as illustrated in Figure 77.
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.

Figure 77. Location of Module Fuse



Refer to Figure 14 on page 27 for the location of PWR LED and Table 7 on page 28 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 Thomson Grass Valley repair depot. Call your Thomson Grass Valley representative for depot location. Refer to *Contacting Grass Valley* at the front of this document for the Grass Valley Customer Support Information number.

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