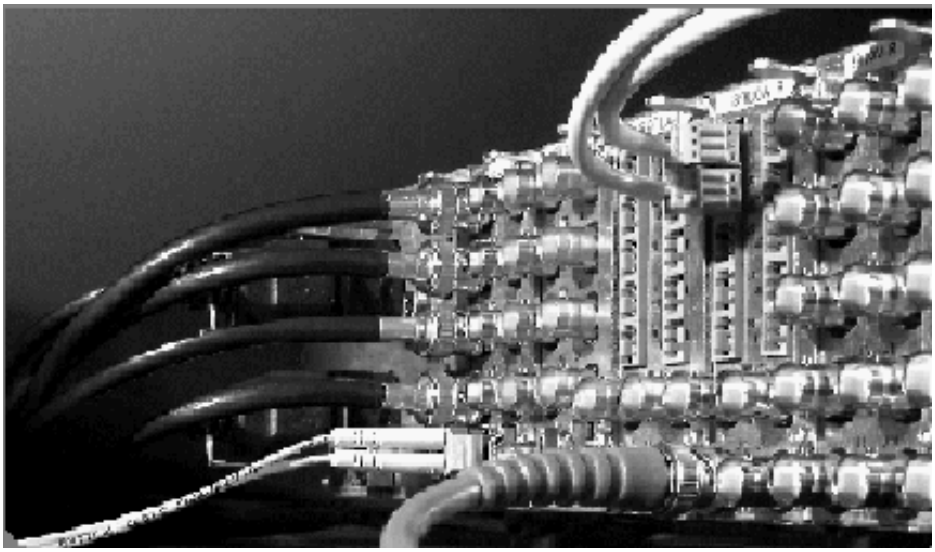
grass valley

8995UPC/DNC/UDX

SD/HD UP/DOWN/CROSS CONVERTER



Instruction Manual

Software Version 1.3.0

www.grassvalley.com

071848005
MARCH 2011

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The www.grassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Download software updates, drivers, and patches.

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For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the U.S. and Canada please call 800-547-8949, and ask to be connected to the EH&S Department. Additional information concerning the program can be found at: www.grassvalley.com/about/environmental-policy

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Contents

Preface

About This Manual

This manual describes the features of a specific 8900 module in the GeckoFlex Signal Processing System family. As part of this module family, it is subject to Safety and Regulatory Compliance described in the GeckoFlex 8900 Series frame documentation (see the *GeckoFlex Frames 8900FX/FF/FFN Signal Processing System Instruction Manual).*

All Modular product documentation can be found on-line in PDF format at this link:

www.grassvalley.com/docs/modular

8995UPC/DNC/UDX Up/Down/Cross Converter Modules

Introduction

This manual covers installation, configuration, and operation for the 8995UPC Up Converter, 8995DNC Down Converter, and 8995UDX Up/Down/Cross Converter modules for the GeckoFlex frame.

The 8995 modules provide up/down/cross conversion between broadcast quality SD and HD video. An optional Genlock submodule can be installed for external reference timing for environments requiring video signals to be synchronized with other video sources and processed for video quality.

The following features are available with this module series.

- Two module set including a hot-swappable front and rear module. The rear module requires two rear slots.
- Up to five 8995 modules in the same 2 RU GeckoFlex frame.
- An optional Genlock submodule mounted on the 8995 circuit board accepts an external reference (NTSC/PAL color black or Tri-Level Sync) and manages local and frame bus reference timing to the module.
- Fiber-ready front module accepts a fiber optic submodule option for optical input/output interfaces for all models. Refer to Table 1 on page 19 for the submodules available.
- Frame Sync (with Genlock submodule from two independent frame buses or for local reference) and Delay mode.
- Full featured video proc amp functions including RGB and component color controls, video gain, Y/C clip controls, chroma gain, phase (Hue) and black level control, color space conversion (ITU 601, ITU 709), and Cadence control for setting 3:2 pulldown for video from film.
- Aspect ratio control including mode selection, alignment, top crop and matte color along with Active Format Description (AFD) input and output status reporting and enabling and disabling controls.

- Edge enhancement and pixel-level motion adaptive conversion for superb picture quality.
- Color correction controls for RGB gain and offset and gamma settings.
- Powerful handling of embedded audio for channel level and Dolby E stream routing.
- PCM audio processing including audio status reporting, delay, gain, channel pairing, and audio processing controls. Processed audio is then re-embedded into output video stream.
- One auto-tracking output to allow synchronization of audio modules to the Genlock reference.
- VITC time code SD to HD and HD to SD translation supported for same-frame rate (59.94 Hz) or Closed Caption SD to HD or HD to SD translation at same frame rate (59.94 Hz), or output line select for VITC and Closed Caption.
- Minimum delay (1 frame) for low latency live applications all critical format conversions.
- SNMP and product health monitoring is supported through the 8900NET module with applications such as NetCentral.
- Software updating using the NetConfig Networking application and/or microSD card.

8995UDX Module

The 8995UDX provides the full spectrum of up, down, and cross conversion with all of the functionality listed above. Refer to Table 3 on page 28 for a video conversion summary diagram.

8995UPC Module

The 8995UPC is fully featured with 8995 series functionality described above. This module up converts SD video to high quality HD video. Refer to Table 4 on page 28 for a video conversion summary diagram.

8995DNC Module

The 8995DNC is fully featured with 8995 series functionality described above. This module down converts HD video to high quality SD video. Refer to Table 5 on page 29 for a video conversion summary diagram.

System Requirements

The following system requirements are necessary for proper operation of the 8995 Series modules:

- 8995 module operation requires the presence of an 8900NET Network Interface module in an 8900FFN GeckoFlex frame for configuration. There are no local front edge configuration controls for this module. When using the web browser interface, the latest version of Internet Explorer is the recommended application. Other web browsers may cause unexpected results.

  The latest version of 8900NET (Net Card) software must be at 4.3.0 for proper operation. Check the software version of your 8900NET module by navigating to the Frame Status web page (Figure 16 on page 37) and noting the software version given below the frame graphic. Check the Grass Valley ftp server at this link for the latest 8900NET release:

  ftp://ftp.grassvalley.com/modular/8900/8900net/v4.3.0/

- Fans in the front cover must be set at maximum speed. Refer to *Set Fan Speed to Maximum* on page 23.

- 8995 Series release 1.2.0 or later requires version 8 Firmware and version 1 Hardware be installed on the 8900GEN-SM Genlock Sub-module if present on any modules. Firmware can be updated with the software update for version 1.2.0 as described in the Release Notes that accompany the version 1.2.0 software release.

  To check the version of the 8900GEN-SM submodule, link to the Genlock web page and note the **Firmware Version** and **Hardware Revision** reported in the web page header as shown in Figure 54 on page 89.

For software updating information, refer to *Software Updating* on page 98.

Installation

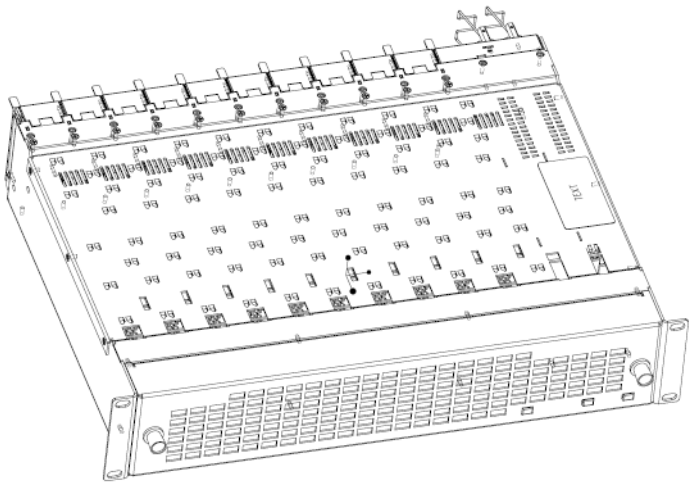
The 8995 models consists of a front and rear module set that can only be installed in a GeckoFlex frame. An optional fiber optic submodule is also available for providing fiber inputs or outputs depending on the type of submodule installed. Installation of the 8995 module set is a process of:

1. Determining the placement of the 8995 module based on genlock timing configuration if required,
2. Placing the 8900UDX-R rear module in a rear frame slot (this rear module requires two adjacent rear slot spaces),
3. Installing the Genlock submodule option on the front module if used,
4. Placing the front module in the corresponding front slot,
5. Installing the optional SFP Fiber Optic submodule in the rear module,
6. Cabling the signal ports, and
7. Setting front cover fan speed on 8900NET module to maximum.

Module Placement in the GeckoFlex Frame

There are ten front and rear cell locations in the 2 RU GeckoFlex frame (Figure 1) to accommodate either audio, analog and digital video modules. The 8995 module set uses the 8900UDX-R rear module that requires two adjacent slots, allowing five 8995 modules per frame.

Figure 1. GeckoFlex Frame



Module Installation Precautions

Please read and follow the precautions listed below before installing the front and rear modules and any fiber optic option submodules:

- Use standard anti-static procedures during installation. As modules can be installed or removed when the GeckoFlex frame is powered up, before removing the cover, please use an anti-static bracelet tied to a metal part of the frame.
- Install the rear module first, the 8900GEN-SM submodule on the front module (if used), the front module, then the optical submodule option (if used).
- When installing or removing a rear module, loosen or tighten the screws holding the retainer clips to the frame manually with the retainer clip tool provided inside the front cover of the frame or use a 2 mm (5/64") hex screwdriver. Please do not use an electric screwdriver.

Note On newer 751- version GeckoFlex frames, a Rear Retainer Clip removal tool and 2 extra retainer clips and screws for installing them are provided on the inside of the frame cover.

- Make every effort to leave the screws holding the retainer clips in place (do not remove them completely). They are very small and can easily drop into other equipment causing a shorting hazard. (Two turns of the screw should be enough to loosen the screws, 3 turns or more will remove it.)
- When installing a rear module, tighten the screws on the retainer clips just until snug. Do not apply more force than is necessary to seat the rear module. The retainer clip screw torque specification is given in the **Mechanical** specifications in Table 9 on page 99.
- If using a fiber optic submodule, handle it carefully, use anti-static precautions, and read the *Fiber Optic Cleaning Requirement* on page 19 before cabling.

8995 Module Placement For Genlock Timing

Before installing the 8995 module, you will first need to determine if and how you want to use a genlock reference or the available frame reference buses. The genlock timing from an 8900GEN-SM submodule can be utilized in several ways. Refer to the *8900GEN-SM GeckoFlex Genlock Instruction Manual* available online for a complete overview of using the genlock reference.

This as well as all other modular product manuals are available online at the following URL on the Grass Valley web site:

http://www.grassvalley.com/docs/modular

In addition to the capability of providing a local external reference to this specific 8995 module with an 8900GEN-SM submodule installed, slots 1 and 3 of the Gecko Flex frame have been specifically designed to distribute an independent frame bus reference transmitted from the 8900GEN-SM submodule mounted on an 8995 module (or other GeckoFlex module with this capability) configured for this purpose. The external reference connected to the corresponding Genlock Loop BNCs can be distributed to other modules in the frame that accept a genlock reference.

If another 8995 module has already been configured and installed for frame bus distribution, you may configure this module's output timing to lock to the Frame Bus 1 or Frame Bus 2 reference from the other 8995 module. In this case, the 8995 does not require the use of an additional 8900GEN-SM submodule.

The use of the genlock reference is determined by the setting of the Output Timing on the System Config web page of the module and module placement in the frame and jumper configuration as summarized below.

- Local Reference – the 8995 with an 8900GEN-SM submodule can have a local external reference connected to one of the corresponding Genlock Loop BNCs. This external timing reference will be fed to this specific 8995 module only.
- Frame Reference 1 or 2 – when an 8995 with an 8900GEN-SM submodule is installed in slot 1 and/or slot 3, a frame timing bus can be enabled to distribute the external reference connected to the corresponding Genlock Loop BNCs on the rear module to all modules in the frame that can accept a genlock reference. slot 1 provides Frame Bus 1 and slot 3 provides Frame Bus 2.
- Input Video – when no 8900GEN-SM submodule is installed on the 8995, the Output Timing can be set to Input so the output timing will follow the input to the module.

Rear Module Installation

To install the rear module, refer to Figure 2 and the instructions below:

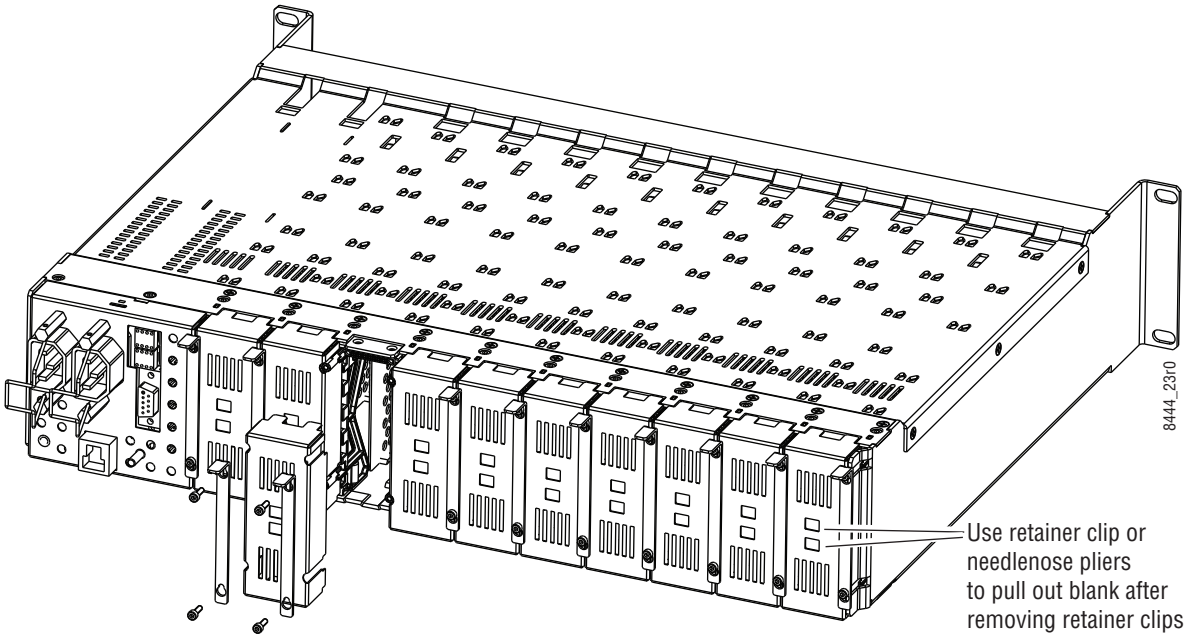
1. To remove a blank rear adapter cover (or a rear module already present), manually loosen the two screws holding each retainer clip on the rear adapter cover or rear module to the frame with the retainer clip tool provided inside the front cover of the frame (newer model frames only) or a 2 mm (5/64″) hex screwdriver. Do not remove the screws.

Note To remove a rear module already installed, follow the same steps. It is helpful to first remove the front module so the rear can be pulled out more easily.

1. After loosening the retainer clip screws, pull up on each retainer and completely remove it, leaving the screws in place.
2. Remove the blank rear adapter cover by inserting needlenose pliers into the slots in the blank cover and pulling it off.
3. Insert the rear module into the empty slot, guiding it carefully.
4. Replace each retainer clip over the two screws on both sides of the module and push down to seat the retainer clip.
5. Tighten the two screws on each retainer clip just until they come into contract with the retainer clip then tighten about a 1/4 turn more. The retainer clips should not bend or be bowed. The rear retainer clip screw torque specification is 4-5 inch-lb/0.45-0.6Nm).

Note All unused rear slots in a GeckoFlex frame should have a blank rear adapter cover installed.

Figure 2. Installing Rear Module (751- Version Frame)



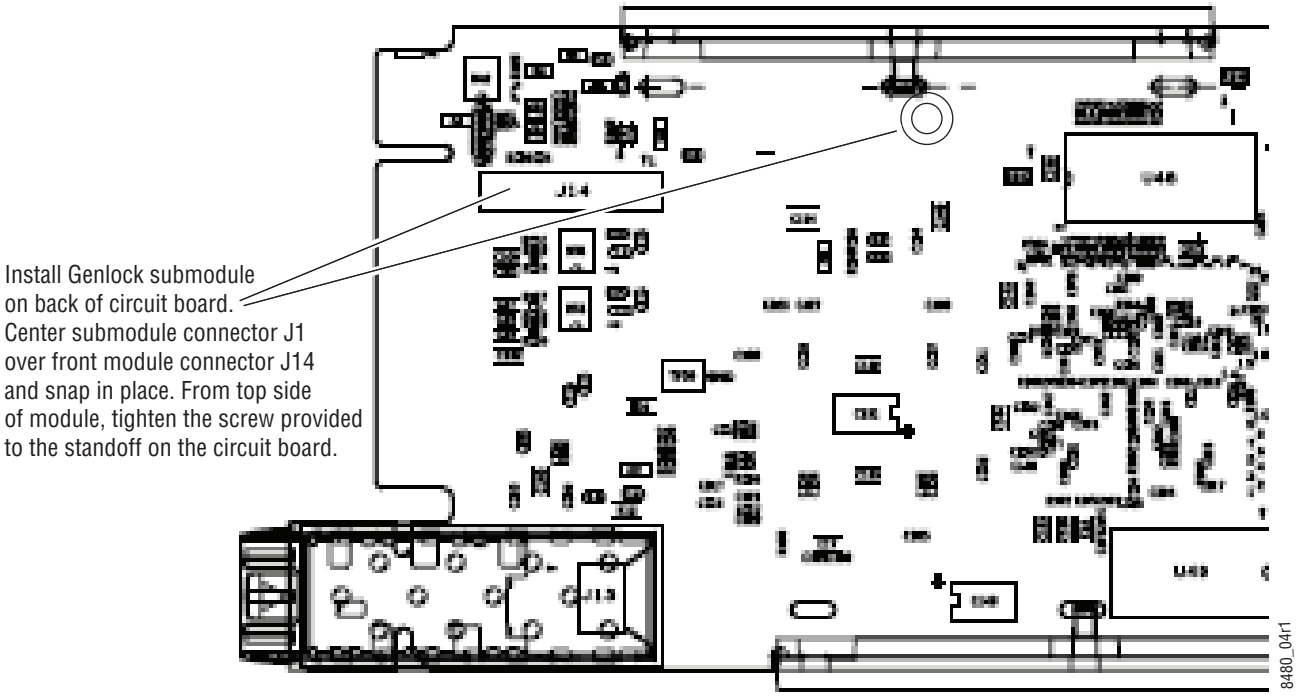
Genlock Submodule Installation

The Genlock submodule will ship in a separate package, not installed on the front module.

To install a Genlock submodule, follow these steps:

1. Locate the Genlock connector J14, on the back side of the 8995 circuit board (Figure 3).
2. Line up the connector on the submodule, J1, with J14 on the front module and snap the submodule into place making sure the holes in each circuit board line up.
3. To hold the submodule in place, attach the screw provided from the bottom of the front module to the standoff on the submodule circuit board.

Figure 3. Installing Genlock Submodule



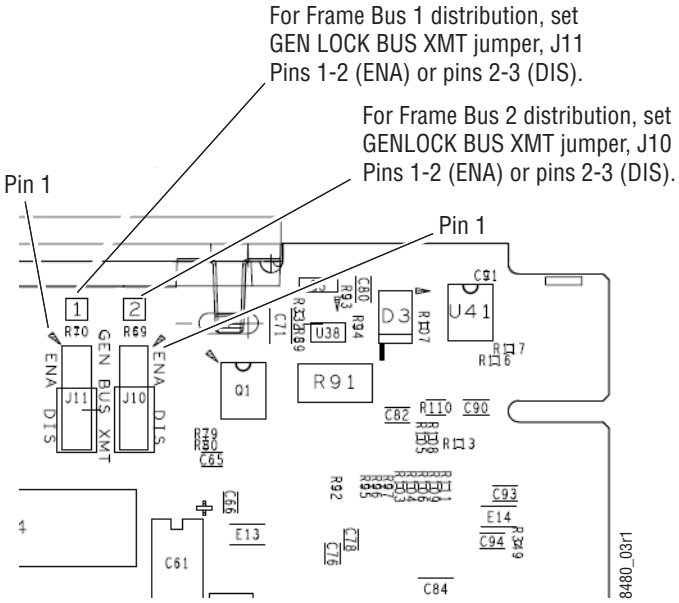
Frame Bus Jumpering

If you will be using this 8995 module to distribute reference Frame Bus 1 (slot 1) or Frame Bus 2 (slot 3), you must set a jumper on the front module circuit board for this purpose before installing the module (Figure 4).

- Frame Bus 1 – to transmit the reference connected to one of the Genlock Loop BNCs on the corresponding rear module on Frame Bus 1, set jumper J11 to **ENA** (pins 1-2). This module must be installed in slot 1 of the frame and configured on the Genlock web page (see *Genlock Web Page* on page 88) for **Auto** in the Drive Frame Reference Bus pulldown.
- Frame Bus 2 – to transmit the reference connected to one of the Genlock Loop BNCs on the corresponding rear module on Frame Bus 2, set jumper J10 to **ENA** (pins 1-2). This module must be installed in slot 3 of the frame and configured on the Genlock web page (see *Genlock Web Page* on page 88) for **Auto** in the Drive Frame Reference Bus pulldown.

Note Both jumpers may be enabled. The module in slot 1 will only read the status of jumper, J11. The module in slot 3 will only read the status of jumper, J10.

Figure 4. Setting Frame Bus Jumpers



Front Module Installation

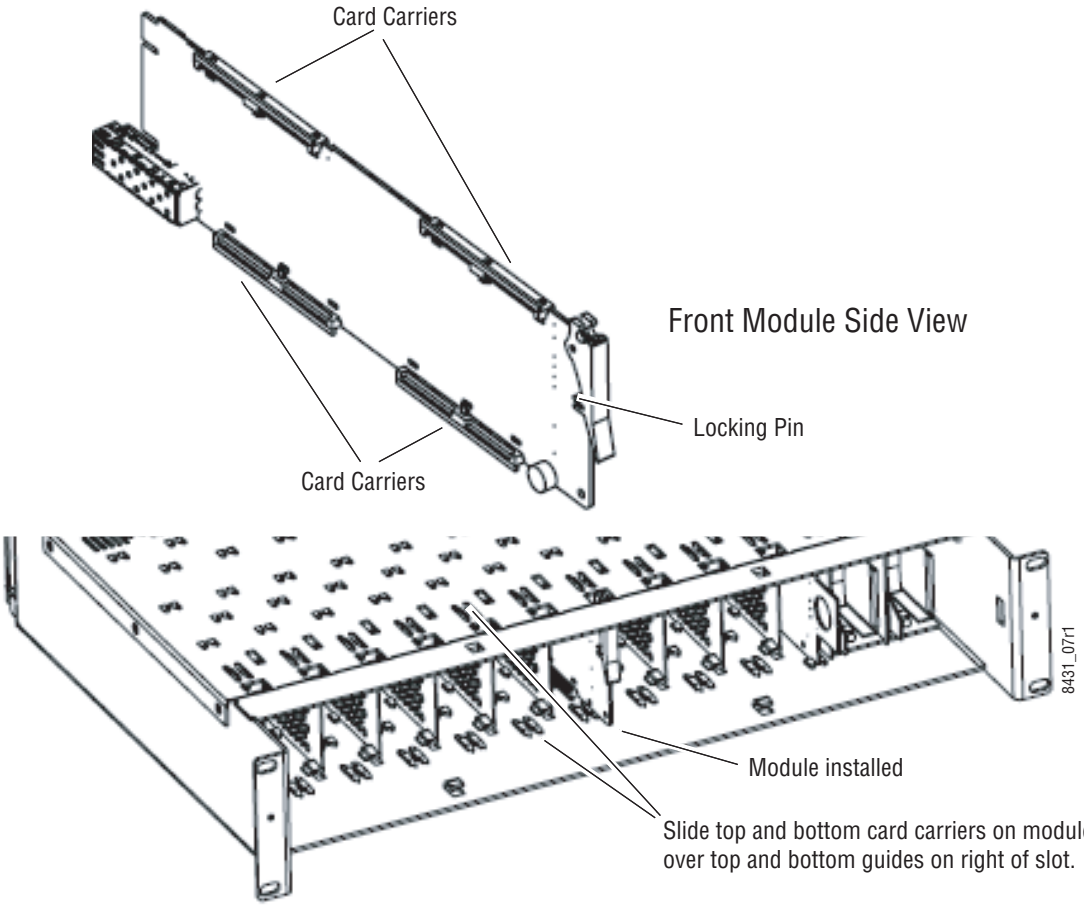
After installing the rear module (and Genlock submodule on the front module if required), install the front module as follows:

Note If using a fiber optic submodule, install it through the rear module according to *Optional Fiber Optics Submodule Installation* on page 19.

1. Remove the front cover of the frame if required.
2. Locate the corresponding front slot.
3. Insert the front module so that the plastic card guides on the module top and bottom edges go over the upper and lower raised rail guides on the right of the top and bottom of the slot(Figure 5).
4. Carefully slide the module into the rear connector.
5. Lock the front module ejector tab into the locking pin.

Note Before removing the front module, first remove the Fiber Optic submodule if present, from the rear module.

Figure 5. Front Module Installation



Optional Fiber Optics Submodule Installation

After the front and rear modules have been installed, install the SFP Fiber Optic submodule option if being used into the rear module metal cage labeled FIBER (Figure 6 on page 20). The SFP submodule is hot-pluggable and may be installed or removed with power applied to the module.

CAUTION The Fiber Optic submodule is static sensitive. Use static handling precautions when installing or removing the submodule. Fiber connections must be cleaned before installing or cabling as described in *Fiber Optic Cleaning Requirement* below.

Refer to Table 1 for the correct model of submodule to use with different software versions.

Table 1. Fiber Optic Submodule Summary

Submodule	Type	SW1.2.4 and later	SW 1.2.1 and earlier
SFP-13103G-M1DRX	Dual Receiver	X	–
SFP-13103G-M1DTX	Dual Transmitter	X	–
SFP-13103G-M1TRX	Transceiver	X	–
1310nm-DRL	Dual Receiver	X	X
1310nm-DTL	Dual Transmitter	X	X
1310nm-TRL	Transceiver	X	X

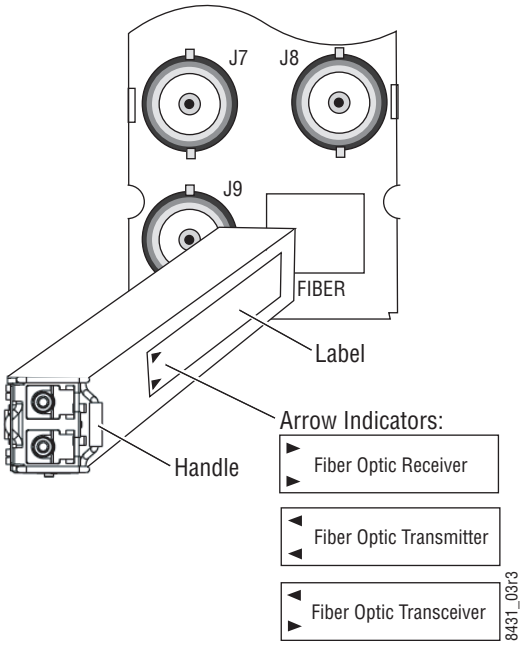
Fiber Optic Cleaning Requirement

Before making any fiber optic cable mating connections, including installation, and after every de-mating cycle, use an industry standard fiber optic cleaning kit, including oil-free compressed air, to clean the fiber connectors and the connectorized fiber end faces. This helps ensure optimum performance of the fiber optic interface. Industry standard fiber optic cleaning kits can be purchased on the web and in electronics stores.

To install the fiber optic submodule:

1. Slide the fiber optic device into the metal fiber cage with the label and handle to the right.
2. Push the device in as far as it will go without forcing it. It will not go completely into the cage.
3. Cable the fiber optic connectors according to the instructions given in *Fiber Optic Video Inputs* on page 22 or *Fiber Optic Video Outputs* on page 22 depending on the type of submodule used.

Figure 6. Installing Fiber Optics Submodule



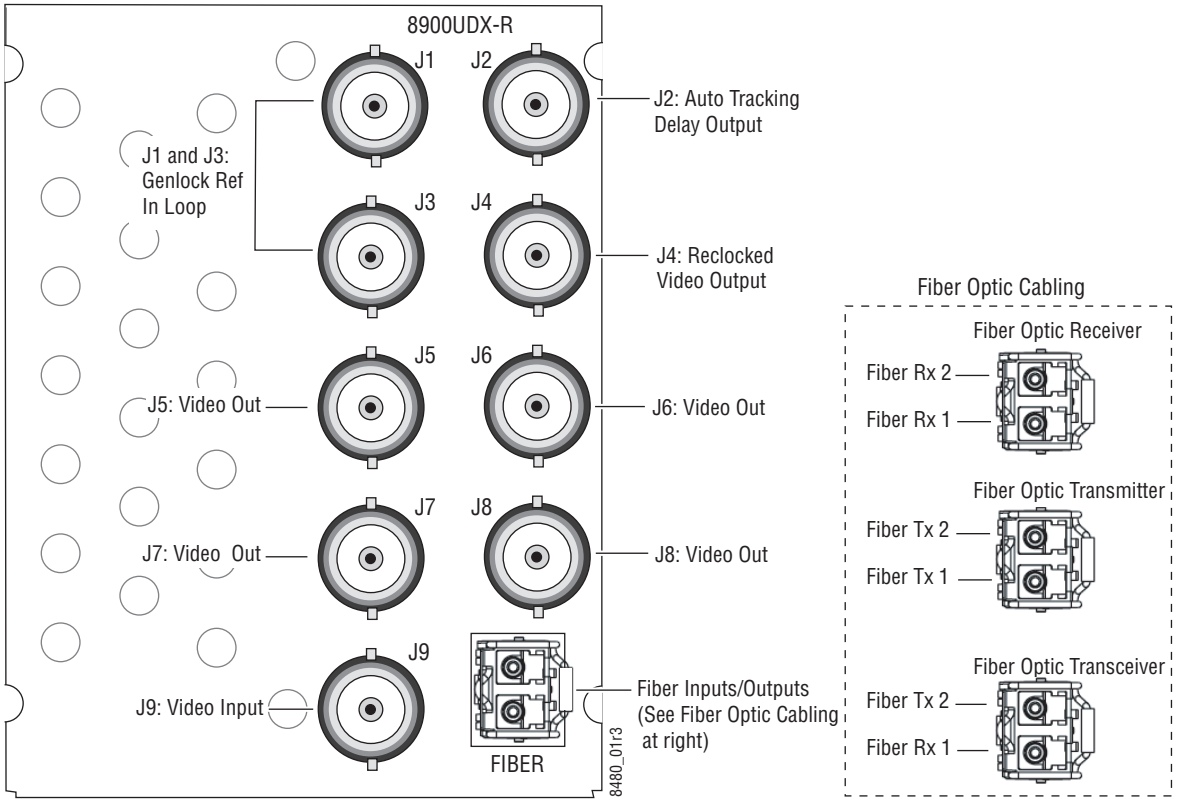
Removing an SFP Submodule

If you need to remove an SFP submodule, snap the handle out and pull the submodule slowly out of the metal cage.

Cabling

Cabling is done on the rear of the 8900UDX-R module illustrated in Figure 7. Inputs and outputs are also illustrated on the I/0 Config web page (*I/O Config Web Page* on page 46).

Figure 7. 8995UDX Rear Module



Genlock Loop

BNCs J1 and J3 are looping inputs to the optional Genlock submodule on the 8995 module with an external genlock reference (NTSC/PAL color black or Tri-level sync).

Connect an external reference to J1 or J3 and loop the other input to another device or terminate the unused input.

Video Input

The input to the module can be connected to an electrical coax BNC and up to two fiber optic connectors depending on the fiber optic submodule installed. Only one video input can be active at a time and must be selected on the Video Input web page (page 54).

Electrical Video Input

To use an electrical input, connect an HD or SD digital video signal to the Coax input at BNC J9.

Fiber Optic Video Inputs

For fiber optic inputs, a dual receiver or transceiver SFP optical submodule must be installed. Refer to the SFP Fiber Optic Submodule summary table (Table 1 on page 19) for the correct submodule to use. Connect the inputs as illustrated in Figure 7 on page 21. Fiber connections must be cleaned when cabling or after any de-mating cycle. Refer to *Fiber Optic Cleaning Requirement* on page 19.

Video Outputs

There can be up to six video outputs from the module available at one time, four electrical coax and up to two fiber optic outputs depending on the fiber optic submodule used.

Electrical Outputs

There are four electrical coax video outputs at BNCs J5, J6, J7, and J8 always enabled and available.

Fiber Optic Video Outputs

If an optical transceiver submodule is installed, one fiber optic output (TX2) is available. If an optical dual transmitter submodule is installed, two fiber optic outputs are available TX1 and TX2. Refer to the SFP Fiber Optic Submodule summary table (Table 1 on page 19) for the correct submodule to use. Fiber optic outputs must be enabled on the Fiber Out web page (page 78). Refer to *Fiber Optic Cleaning Requirement* on page 19 for cleaning fiber optic connections before use.

Reclocked Video Output

One reclocked video output of non-processed input video is provided for looping to other equipment. If a fiber input is being used, the reclocked video from this input will also pass to this output.

Auto Tracking Output

BNC J2 output is an auto tracking delay signal that can be fed to audio modules to synchronize the audio delay to match the delay of the 8995 module.

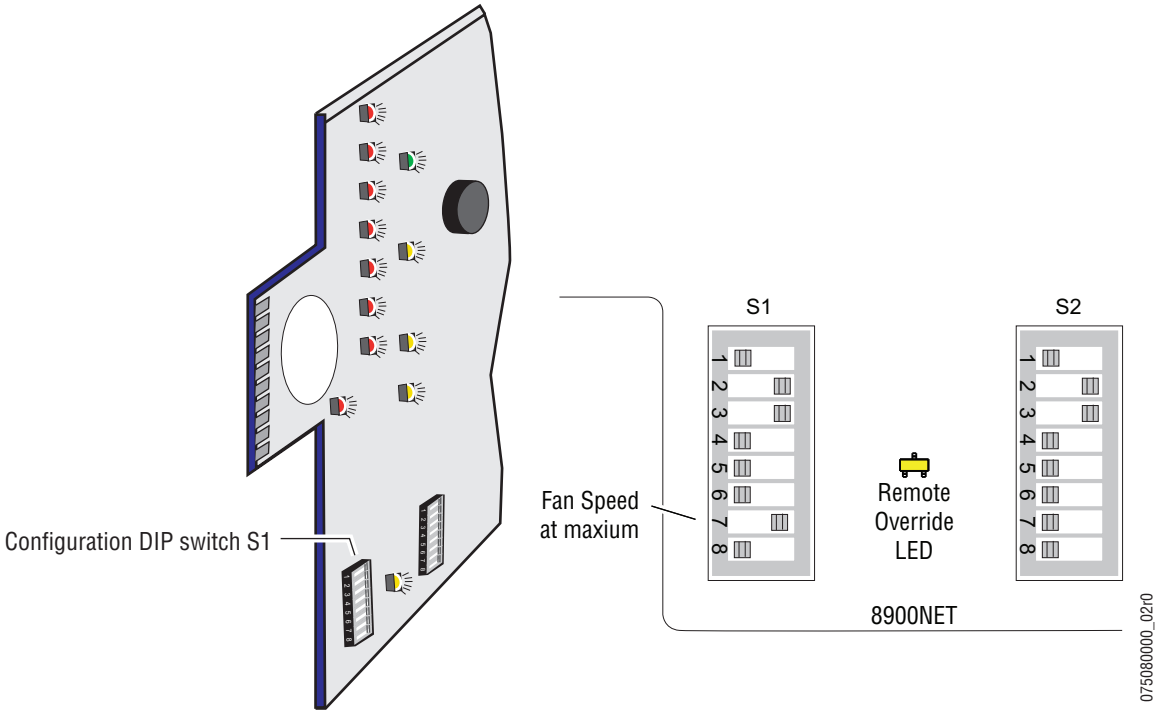
Set Fan Speed to Maximum

Set the front cover fans to maximum speed to maximize the cooling in the frame.

To increase fan cover speed:

1. Remove the front cover of the frame.
2. Remove the 8900NET module (next to the power supplies).
3. Locate Configuration DIP switch S1 (Figure 8).
4. Set position 7 to the right as shown in Figure 8.
5. Return the 8900NET module to the frame and replace the front cover.

Figure 8. Set 8900NET S1 for Maximum Front Cover Fan Speed



Power Up

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

Note When a media module is first plugged into a GeckoFlex frame, the 8900NET module (if present) may report a momentary fault. This will clear once the media module has booted up.

Operation Indicator LEDs

With factory default configuration and a valid input signal connected, the green PWR and (Figure 9) on the top side of the module front edge should illuminate (refer to Table 2 on page 25 to see the possible operating indicator combinations).

Figure 9. Front Panel LED Indicators

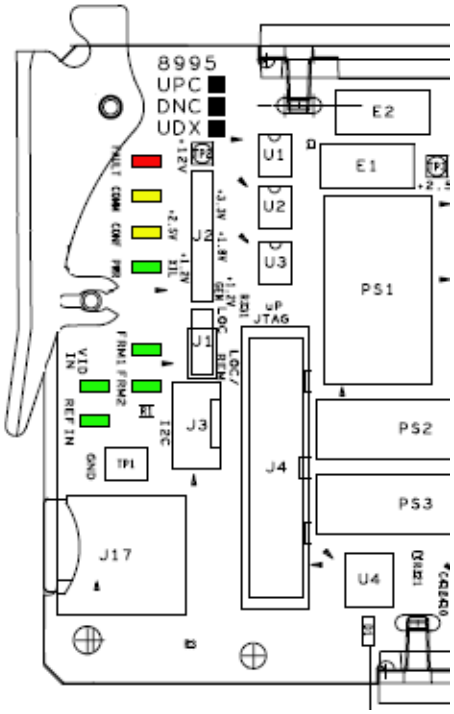


Table 2. Board Edge LED Names and Meaning

LED	Indication	Condition
FAULT (red)	Off	Normal operation.
	On continuously	Module has detected an internal fault.
	Flashing	Configuration problems. Check inputs and settings. Missing video.
COMM (yellow)	Off	No activity on frame communication bus.
	3 Quick Pulses	Locate Module command received by the module from a remote control system.
	Short flash	Activity present on the frame communication bus.
CONF (yellow)	Off	Module is in normal operating mode.
	On continuously	Module is initializing, changing operating modes or programming hardware.
PWR (green)	Off	No power to module or module's DC/DC converter failed.
	On continuously	Normal operation, module is powered.
FRM1 (green)	Off	Reference frame bus is disabled to frame on Genlock web page or no Genlock submodule is installed in slot 1.
	On	Reference frame bus is enabled on Genlock web page and Genlock submodule is installed in slot 1.
FRM2 (green)	Off	Reference frame bus is disabled to frame on Genlock web page or no Genlock submodule is installed in slot 3.
	On	Reference frame bus is enabled on Genlock web page and Genlock submodule is installed in slot 3.
VID IN (green)	Off	Indicates no valid input signal is being detected.
	On	Indicates a valid input signal is being detected.
REF IN (green)	Off	Indicates no valid reference signal is being detected or signal is not locked.
	On	Indicates a valid reference signal is present and locked.

Configuration

The 8995 modules can only be configured remotely using the 8900NET network interface GUI or a networked Newton Control Panel.

Refer to the following sections for configuration instructions:

- Configuration Overview (page 26)
- Remote Control and Monitoring (page 34)
- Configuration Parameter Summary (page 111)

Operation of these control types is explained in detail in their respective sections of this manual.

Configuration Summary

This section provides a brief summary of all parameters that can be configured on the 8995 module. Use this section in conjunction with the specific configuration method instructions for each configuration type. Table 13 on page 111 provides a summary in table format of all parameters and their ranges, default values, and remote, local, and control panel function names and locations for setting each value.

Video Input Selection

The video input source (Coax, RX 1, or RX 2) must be selected on the Video Input web page. Fiber optic inputs available depend on the type of fiber optic submodule installed. All inputs can have connections cabled, but only one input can be used at a time.

Video Timing and Loss of Signal Controls

On a 8995 module with an external Frame Sync genlock timing source selected, the following timing adjustments are available:

- Horizontal Timing – adjusts the horizontal delay of the channel output in pixels
- Vertical Timing – adjusts vertical delay in line increments

Also available on the 8995 module are the following controls for setting the output condition when there is a loss of input signal:

- Auto Blue – when Auto Blue is enabled on a channel, the output will automatically freeze to a blue screen when the input signal is lost on the input.

- Auto Freeze – when Auto Freeze is enabled on a channel, the output will automatically freeze on the last valid field when the input signal is lost on the input.
- A Manual freeze can be performed at any time with the following two choices:
  - Frame
  - Field

Note 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 the two fields can cause motion artifacts.

Signal Conversion

The 8995UDX module performs three main video conversion functions:

- Up Conversion – allows an SD signal input to be converted to an HD output signal in the same time domain (480i/59.94 to 1080i/59.94 or 576i/50 to 1080i/50 for example).
- Down Conversion – allows an HD signal input to be converted to an SD output signal in the same time domain (1080i/59.94 to 480i/59.94 or 1080i/50 to 576i/50 for example).
- Cross Conversion – allows an HD signal input to be cross converted between progressive signal types and interlaced signal types in the same time domain (720p/59.94 to 1080i/59.94 or 1080i/50 to 720p/50 for example).

The various up, down, and cross conversion possibilities for all input signal to output signal selections are shown in Table 3 for the 8995UDX.

Note Note that all conversions must occur in the same time domain or they will be invalid. Invalid conditions are grayed out.

Table 3. 8995UDX Up, Down, and Cross Conversion

		Output Signal							
		480i (SD/59.94)	**720p (59.94)**	**1080i (59.94)**	**1080p (23.98**	**1080sf (23.98**	**576i (SD/50)**	**720p (50)**	**1080i (50)**
Input Signal	**480i (SD/59.94)**		Up Convert	Up Convert	Up Convert	Up Convert			
	720p (59.94)	Down Convert		Cross Convert	Cross Convert	Cross Convert			
	1080i (59.94)	Down Convert	Cross Convert		Cross Convert	Cross Convert			
	1080p (23.98	Down Convert	Cross Convert	Cross Convert		Cross Convert			
	1080sf (23.98	Down Convert	Cross Convert	Cross Convert	Cross Convert				
	576i (SD/50)							Up Convert	Up Convert
	720p (50)						Down Convert		Cross Convert
	1080i (50)						Down Convert	Cross Convert	

Table 4 shows the possible input and output conditions for the 8995UPC Up Converter module or up conversion on the 8995UDX.

Table 4. 8995UPC/8995UDX Up Conversion

		Output Signal							
		480i (SD/59.94)	**720p (59.94)**	**1080i (59.94)**	**1080p (23.98)**	**1080sf (23.98)**	**576i (SD/50)**	**720p (50)**	**1080i (50)**
Input Signal	**480i (SD/59.94)**		Up Convert	Up Convert	Up Convert	Up Convert			
	720p (59.94)								
	1080i (59.94)								
	1080p (23.98)								
	1080sf (23.98)								
	576i (SD/50)							Up Convert	Up Convert
	720p (50)								
	1080i (50)								

Table 5 shows the possible input and output conditions for the 8995DNC Down Converter module or down conversion on the 8995UDX.

Table 5. 8995DNC/8995UDX Down Conversion

		Output Signal							
		480i (SD/59.94)	**720p (59.94)**	**1080i (59.94)**	**1080p (23.98)**	**1080sf (23.98)**	**576i (SD/50)**	**720p (50)**	**1080i (50)**
Input Signal	**480i (SD/59.94)**								
	720p (59.94)	Down Convert							
	1080i (59.94)	Down Convert							
	1080p (23.98)	Down Convert							
	1080sf (23.98)	Down Convert							
	576i (SD/50)								
	720p (50)						Down Convert		
	1080i (50)						Down Convert		

Color Correction

Color correction controls are provided for making RGB gain, offset and gamma correction adjustments. Each color channel can be adjusted separately or a total gain or total gamma can be applied to all channels.

Gamma controls brighten and darken the gray intensity of the signal. Raising the gamma above 1.0, brightens the gray intensity. Lowering the gamma below 1.0, darkens the gray intensity.

Video Processing Adjustments

Component level (Y, Cr, Cb) adjustments are provided in the Video processor for video gain and offset, chroma gain, phase control (hue), and color saturation. Each color component can be adjusted separately or the total gain can be adjusted.

Y/C clipping controls are available in the Video Proc for adjusting the top (white) and bottom (black) luminance levels and the white clipping on chrominance channel of the output signal (C White Clip)

Image enhancement controls include a noise reduction control, edge expansion, extended color space, vertical edge filtering, and a matte edge border.

Cadence controls are present for selecting between two modes to handle automatic cadence detection in video created from film. The first (and default) choice is **Auto Film/Video (3:2 or 2:2 pull down).** Video created from film that has a 1/23.98 Hz capture interval must use a process called 3:2 pull down to produce video fields at 1/59.94 Hz intervals.

If artifacts occur in **Auto Film/Video (3:2 or 2:2 pull down** mode, automatic cadence detection may be disabled by selecting the second choice, **Fixed Video (2:2 pull down)** mode. In this mode, the de-interlacer to performs motion-adaptive de-interlacing assuming only a 2:2 cadence in the video, reducing the chance of distortion related to cadence detection.

Aspect Ratio Controls

Aspect ratio controls are provided on this module for changing various characteristics of the output image after an up or down conversion using the mode, alignment, position, and crop controls (when applicable).

The module also detects and reports whether Active Format Description (AFD) information is present on the input/output signal. The AFD Input and Output Status sections report the presence of AFD, the AFD Input and Output Line, the Input and Output Aspect Ratio (4:3 or 16:9), and the AFD Input and Output AFD code.

The AFD Input and Output codes are defined as 4-bit binary numbers. Each 4-bit code describes a video picture in terms of aspect ratio and other characteristics of the active image based on the SMPTE 2016-1:2009 and 2016-3:2009 standards.

When present, AFD processing can be disabled in the AFD Control section if desired. When disabled, AFD reporting information will remain on the web page but will be bypassed when the aspect ratio controls are used. The aspect ratio controls will act on the video output in the same manner as when no AFD is detected or AFD is disabled as described in *Aspect Ratio (No AFD or AFD Disabled)* on page 31.

The following sections describe using the aspect ratio controls on signals with and without AFD:

Aspect Ratio (AFD Present)

When AFD is present on the input and AFD is enabled, the aspect ratio controls will change the output as defined by specific software programming designed to meet the requirements of the SMPTE 2016-1:2009 and 2016-3:2009 AFD code standards.

AFD input and output codes are defined in the Appendix section: *Active Format Description* on page 117. This Appendix provides detailed definitions of the binary codes and how the AFD codes respond to the aspect ratio settings made on the web page when AFD is present.

Aspect Ratio (No AFD or AFD Disabled)

When the input signal has no AFD coded information on it (reported on the Aspect Ratio web page as **Not Present)** or if the AFD processing has been disabled in the AFD Control section, the aspect ratio mode selections are available as described in the section below.

Note The default Aspect Ratio web page will also include an **Auto** mode if the input signal has no AFD. **Auto** mode is used only when AFD is present. Disabling AFD when present will remove the **Auto** mode button on the web page.

- Full Width – this mode will stretch a down converted image to fit the screen with top and bottom margins. An image set to this mode will appear centered horizontally in a 16:9 display with black bars on the top and bottom of the screen (letterbox) as illustrated in Figure 10. The image can be aligned with the aspect ratio controls and the matte color of the background can be changed.

Figure 10. Full Width Aspect Ratio

Full Width

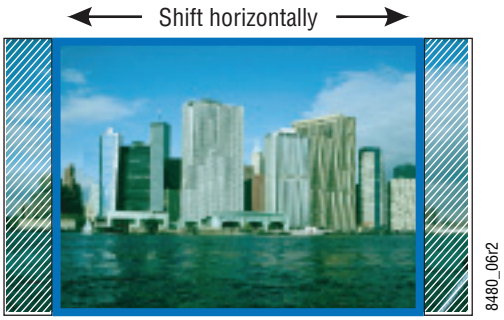
Complete picture appears in Full Width format with top and bottom margins.
Position picture vertically with alignment controls and crop vertical lines.
Set matte color of top and bottom margins.

- Full Height – this mode, also known as Center Cut, presents the entire picture with horizontal cropping. An image set to this mode will appear centered vertically in a 16:9 display with some cropping on either side as shown in Figure 11. The image can be adjusted with the horizontal aspect ratio controls.

Figure 11. Full Height Aspect Ratio

Full Height (Center Cut)

Complete picture appears in Full Height format with horizontal cropping.
Also known as Center Cut mode.
Position picture with horizontal alignment and cropping controls.



- Anamorphic – this mode is designed to be used with material originally captured with an anamorphic lens. It ensures that the top and bottom edges of the input aspect ratio match the top and bottom edges of the output aspect ratio. When used with standard 4:3 material, it will have the effect of stretching the material horizontally as illustrated in Figure 12. This results in a distortion of the geometry of the image, particularly causing circles to appear as ovals when present in the image if the input image was not recorded with an anamorphic lens.

Figure 12. 16:9 Anamorphic Mode

Anamorphic Aspect Ratio

Displays all pixels, no loss of picture, but stretches image height. Circles will appear as ovals. No positioning controls are used.

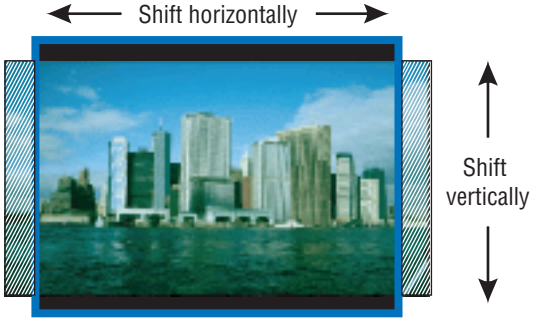
- 14 x 9 SP – this mode minimizes the left and right cropping of the image and stretches it leaving the result for both down and up conversion as shown in Figure 13. The image can be aligned with the aspect ratio controls and the matte color of the background can be changed.

Figure 13. 14 x 9 SP Aspect Ratio

14x9 SP: Down Conversion

Minimized left and right cropping of picture with top and bottom margins. Position picture vertically and horizontally with alignment controls and crop vertical lines. Set matte color of top and bottom margins.

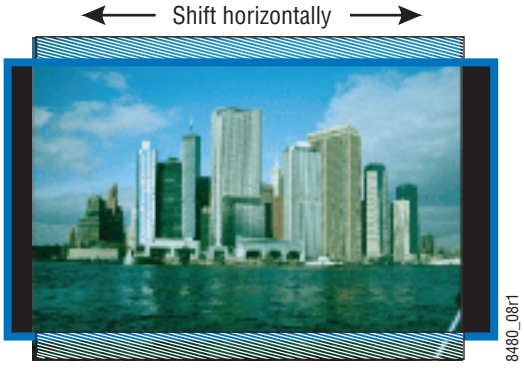
= lost picture



14x9 SP: Up Conversion

Top and bottom cropping; Position left, center, or right

= lost picture



Transcoding

The module is capable of transcoding same-rate (59.94 Hz) closed caption and VITC data. Refer to the detailed explanation in *Transcoding Web Page* on page 66.

Note VITC and CC transcoding is not supported in 1080p/sf 23.98.

Audio Processing and Configuration

Audio status for up to eight audio streams in four embedded audio groups present in the input video is monitored and reported. Controls are provided for adjusting gain on individual audio channels in each of the streams (2 streams per group, each stream having a Channel A and Channel B) and re-pairing audio channels into the four output groups as desired (or forcing to Silence) and reinserting the processed audio into the video output. Refer to the *Functional View Web Page* on page 53.

Genlock Controls

On modules with an 8900GEN-SM Genlock submodule installed (8995UDX+GEN, 8995DNC+GEN, or 8995UPC+GEN) the Genlock web page and control panel controls will be available. Use these controls to enable the external genlock reference and set control and timing parameters for the module. Refer to *Genlock Submodule Installation* on page 16 for installation instructions.

User Settings

Module default parameters and default signal names can be recalled at any time for the entire module or subsets of parameters such as the color corrector or video processor.

On the web pages, a **Defaults** button at the bottom of each applicable web page is available to return the parameters on that page to the factory defaults.

Save and load module configuration to/from a file are also provided on this web page.

Fiber Optic Outputs

When there is a Dual Transmitter (TX1 and TX2) or a Transceiver (TX2) fiber optic submodule installed, one or both fiber outputs can be enabled for operation. Refer to Table 1 on page 19 for the correct submodules to use for your software version. Be sure to follow the instructions for preparing the fiber cables given in *Fiber Optic Cleaning Requirement* on page 19.

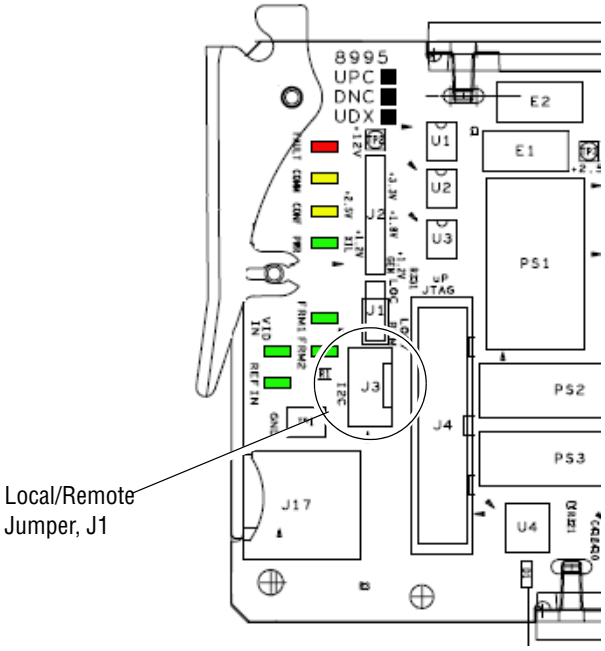
Remote Configuration and Monitoring

8995 module configuration and monitoring can only be performed using a web browser GUI interface or a networked Newton Control Panel when the 8900NET Network Interface module is present in the GeckoFlex frame. Each of these interfaces is described below.

Local/Remote Jumper

The on-board jumper Local/Remote jumper, J1, (Figure 14) must be set for local and remote (LOC/REM position, pins 2-3) for remote control or set to (LOC position, pins 1-2) to lock out remote control.

Figure 14. Module Configuration Switches and LEDs



8900NET Module Information

Refer to the *8900NET Network Interface Module Instruction Manual* for information on the 8900NET Network Interface module and setting up and operating the GeckoFlex frame network.

Note The 8900NET module in the GeckoFlex frame should be running software version 4.3.0 or higher for optimum remote and control panel operation and is required for software updating. Upgrade software and instructions for the 8900NET can be downloaded from the Grass Valley web site. See *System Requirements* on page 11 for 8900NET software updating.

Newton Control Panel Configuration

A Newton Control Panel (hard or soft version) can be interfaced to the GeckoFlex frame over the local network. Refer to the documentation that accompanies the Newton Modular Control System for installation, configuration, and operation information.

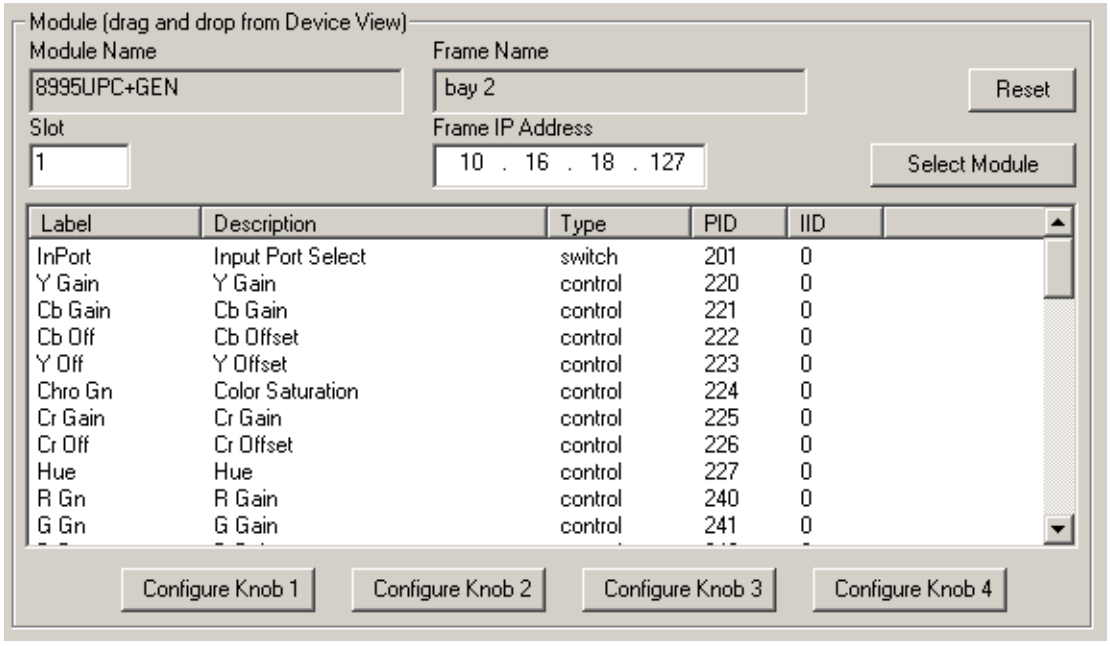
Control panel access offers the following considerations for module configuration and monitoring:

- 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 8995 modules are listed in Table 13 on page 111.

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

Figure 15. Newton Configurator Example



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:

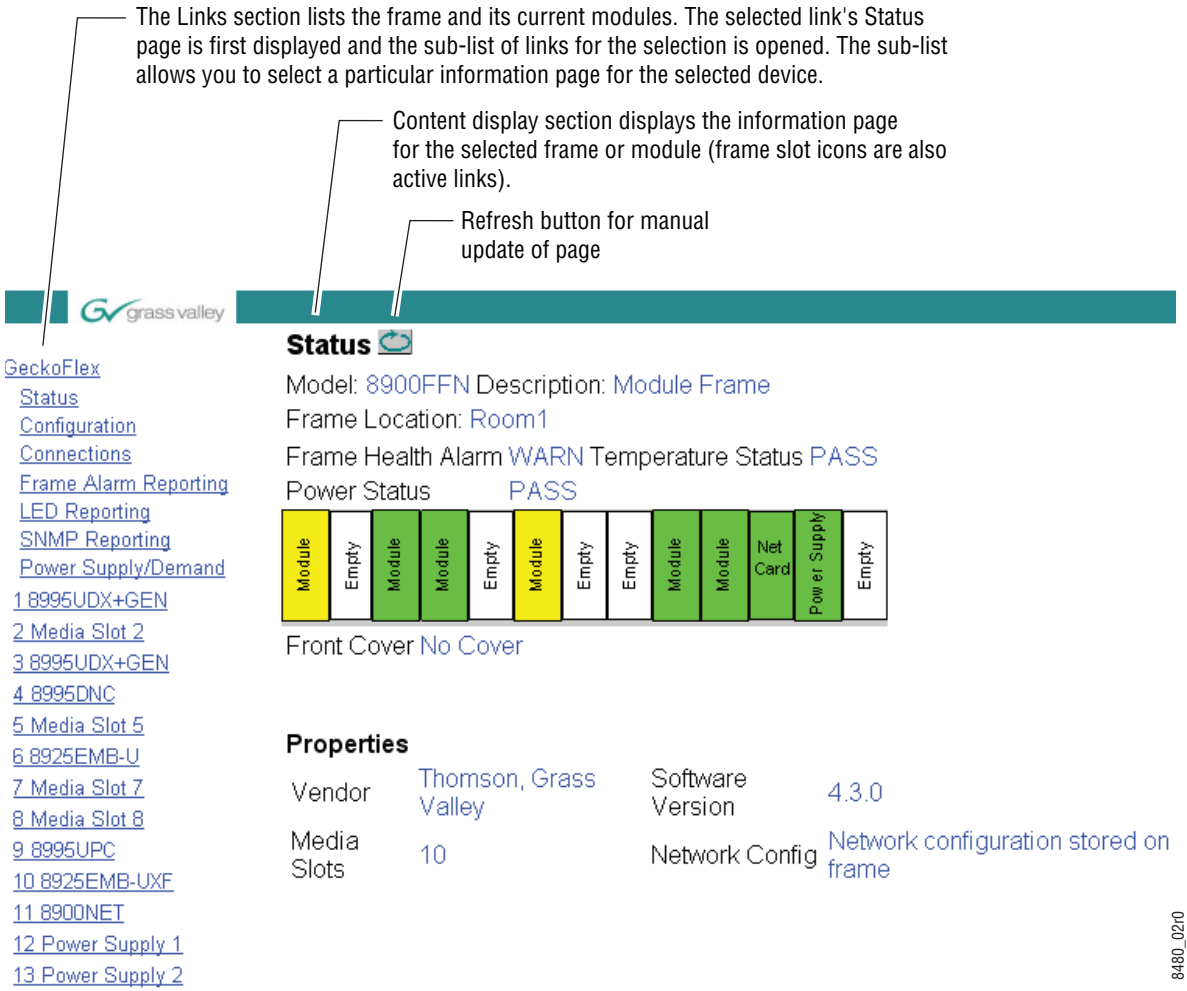
- Provides complete access to all module status and configuration functions, including naming of inputs and outputs, factory parameter and name default recalls, E-MEM functions, slot configuration, and SNMP monitoring controls.
- Web access will require some normal network time delays for processing of information.
- Configuration parameter changes may require pressing **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 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 8900NET 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 8900NET software installed in your system. This manual reflects an 8900NET module with software version 4.3.0, using Internet Explorer, the recommended web browser, and Windows XP operating system.

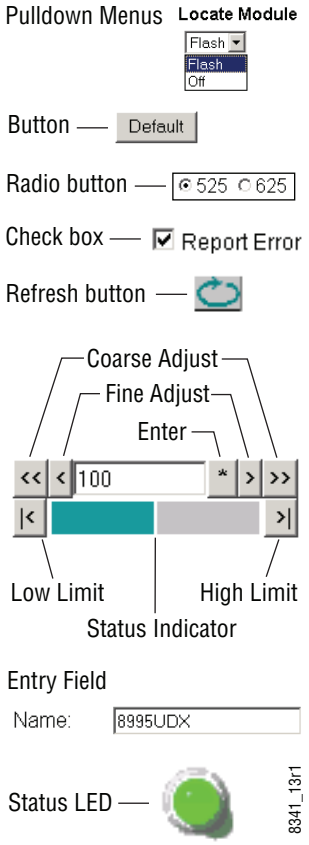
For information on status and fault monitoring and reporting shown on the Status page, refer to *Status Monitoring* on page 106.

Figure 16. GeckoFlex Frame Status Page



Web Page Operations and Functional Elements

The following conventions and functional elements (shown at left) are used in GeckoFlex web page operations. (The examples shown throughout this manual represent 8900NET software version 4.3.0 or later):



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

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

  Use the **Low** and **High Limit** buttons to go directly to the lowest and highest limits for the parameter.
- An entry field allows naming of various module functions such as input or output signals, asset tag, and slot identification.
- The **Status** LED icon reports communication status for the frame slot and is a link to the module Status web page where Warnings and Faults are displayed.

  LED colors indicate:

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

Web Page Headers

Each configuration web page has a Status and Identification Header as shown in Figure 17 for the 8995UPC, Figure 18 for the 8995DNC, and Figure 19 for the 8995UDX.

Figure 17. 8985UPC Status /ID Header

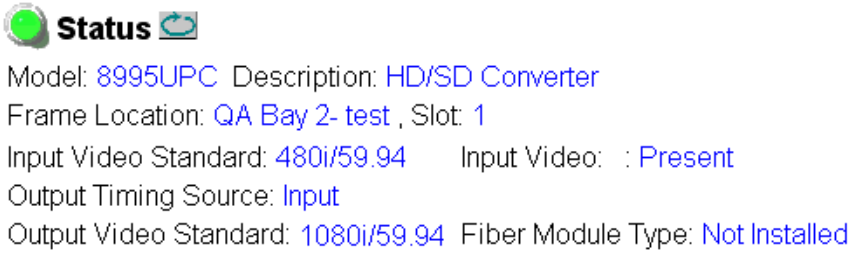


Figure 18. 8985DNC Status /ID Header

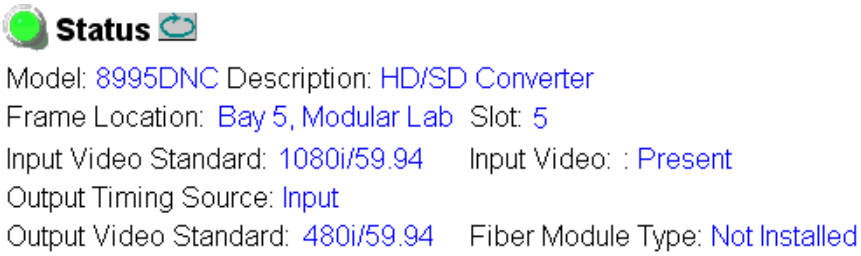
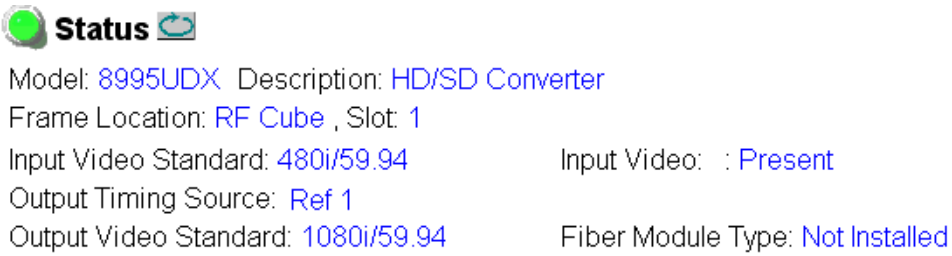
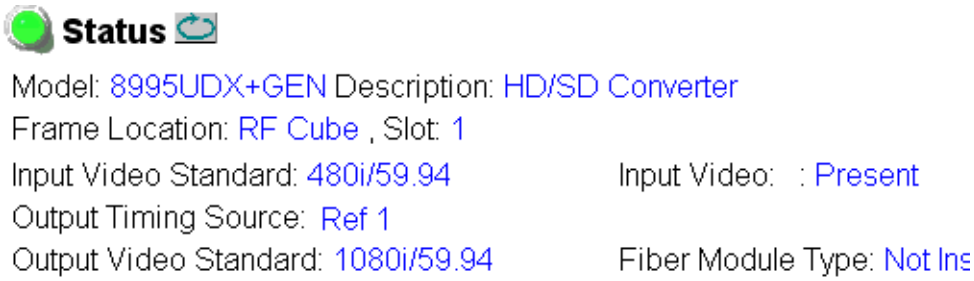


Figure 19. 8995UDX Status/ID Header



When any of the 8995 modules have an 8900GEN submodule installed, the header shows the addition of the Genlock with + GEN (Figure 20).

Figure 20. 8995UDX + GEN Status Web Page



The header information on each web page includes the following:

- **Model** and **Description** are read-only generated by the module.
- **Frame Location** is defined on the 8900 Series GeckoFlex Frame Configuration web page.
- **Slot** number reports the module's location in the frame.
- **Input Video Standard** reports the input video type and rate selected on the System Config web page.
- **Input Video** reports the status of the video input to the module.
- **Output Timing Source** reports the output timing source (Local, Ref 1, Ref 2 or Input) chosen on the System Config web page.
- **Output Video Standard** reports the current output video format selected.
- **Fiber Module Type** reports the type of SFP fiber module installed or **Not Installed.**

Web pages with configuration parameters each have a **Defaults** button at the bottom of the page to allow resetting of default parameters for only that page.

Web Page Links

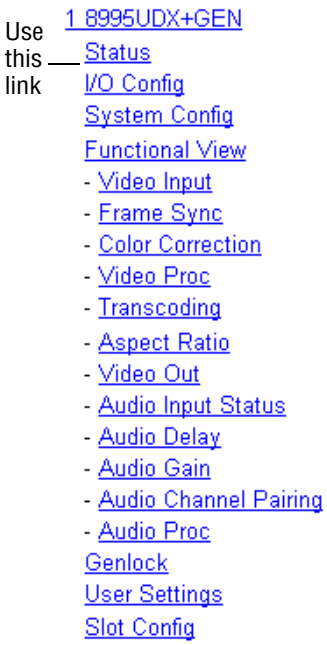
The web interface GUI provides the following links and web pages for the 8995 modules (Figure 21 on page 42):

- Status – reports input video and reference signal status, presence of Fiber Optic and Genlock option submodules, and module hardware and software version information (page 43),
- I/O Config – shows a graphic representation of inputs and outputs to the module and allows naming of each input and enabling and disabling of signal reporting (page 46),
- System Config – set the I/O standard for the input and output of the module, the output timing source, colorbars test output, and Reference Restore parameters (page 48),
- Functional View – provides a graphical block diagram of the video and embedded audio configuration pages for the module with links to each web page (page 53),
- Video Input – allows selection of the video input source (Coax or fiber) and provides the status of all sources, including fiber optic submodule option inputs (page 54),
- Frame Sync – provides horizontal and vertical timing and loss of signal controls for the 8995 module, multi-frame delay selection, minimum delay mode, manual freeze mode, and timing status tables (page 55),
- Color Correction – provides RGB gain, offset and gamma correction adjustments (page 62),

- Video Proc – provides overall video processing for the HD or SD signal along with Y/C White and Y/Black clip controls, and image enhancement controls for noise reduction, and enabling of edge expansion, extended color space, vertical edge filter, matte edge border, and Cadence controls (page 63),
- Transcoding – enable the Closed Captioning and VITC transcoding functions and set parameters for line positioning in the vertical interval (page 66),
- Aspect Ratio – set the desired aspect ratio, cropping, and matte color for the output video, reports AFD (Active Format Description) input and output status and disabling/enabling AFD (page 73),
- Video Out – enable or disable the fiber optic outputs when a dual transmitter or transceiver fiber optic submodule is installed and enable audio re-embedding (page 78),
- Audio Input Status – reports the input status of embedded audio on the video input signal (page 79),
- Audio Delay – allows setting delay on Channel A and B of each audio stream (page 80),
- Audio Gain – allows setting gain on Channel A and B of each audio stream (page 82),
- Audio Channel Pairing – allows recombining of audio channels within the four audio output groups (page 84),
- Audio Proc – allows selection of the type of audio processing for Stream 1 and 2, Channel A and B, of the four final audio groups 1-4 (page 86),
- Genlock – appears only on module links when the optional 8900GEN-SM submodule is installed on the module. This web page provides status reporting for the external genlock reference and controls for enabling the Genlock, matching the reference input to a selection standard, and setting reference signal delay (page 88),
- User Settings – allows recalling of factory defaults for all module parameters or factory signal names, and provides a save/load configuration file function (page 92), and
- Slot Config – provides Locate Module and Slot Memory functions along with links to the SNMP, LED Reporting, and Frame Alarm configuration web pages (page 95).

Figure 21. 8995UDX/UPC/DNC Web Page Links

Status Web Page



The Status web page (Figure 22 on page 44 shows an example of the 8995UDX + GEN) reports the input signal status of each of the video and the reference inputs and outputs in both graphical and textual formats. It also provides status reporting for the optional Genlock and Fiber Optic submodules. Color coding of the display and the Status LED indicates the signal status. Refer to *Status Monitoring* on page 106 for a complete explanation of the color coding.

Module Physical Structure

Status is reported for each of the following video or reference signals:

- Video In – indicates the status of the video input to the module from the coax BNC, or one of two possible fiber optic inputs (depending on the type of fiber optic connector installed).
- Video Out – not monitored in this application.
- Genlock Ref In – indicates the status of the external genlock reference signal at BNCs J1 and J3 (Genlock Loop).
- Local Ref – indicates the status of the internally generated genlock reference signal from the 8900GEN submodule to the front module.
- Frame Bus – indicates the status of the communication bus to the 8900NET module.
- Ref 1 and Ref 2 In (From Frame) – the Ref 1 arrow will be present when Frame Bus 1 has been enabled on the module in slot 1. The Ref 2 arrow will be present when Frame Bus 2 has been enabled on the module in slot 3 of the frame.

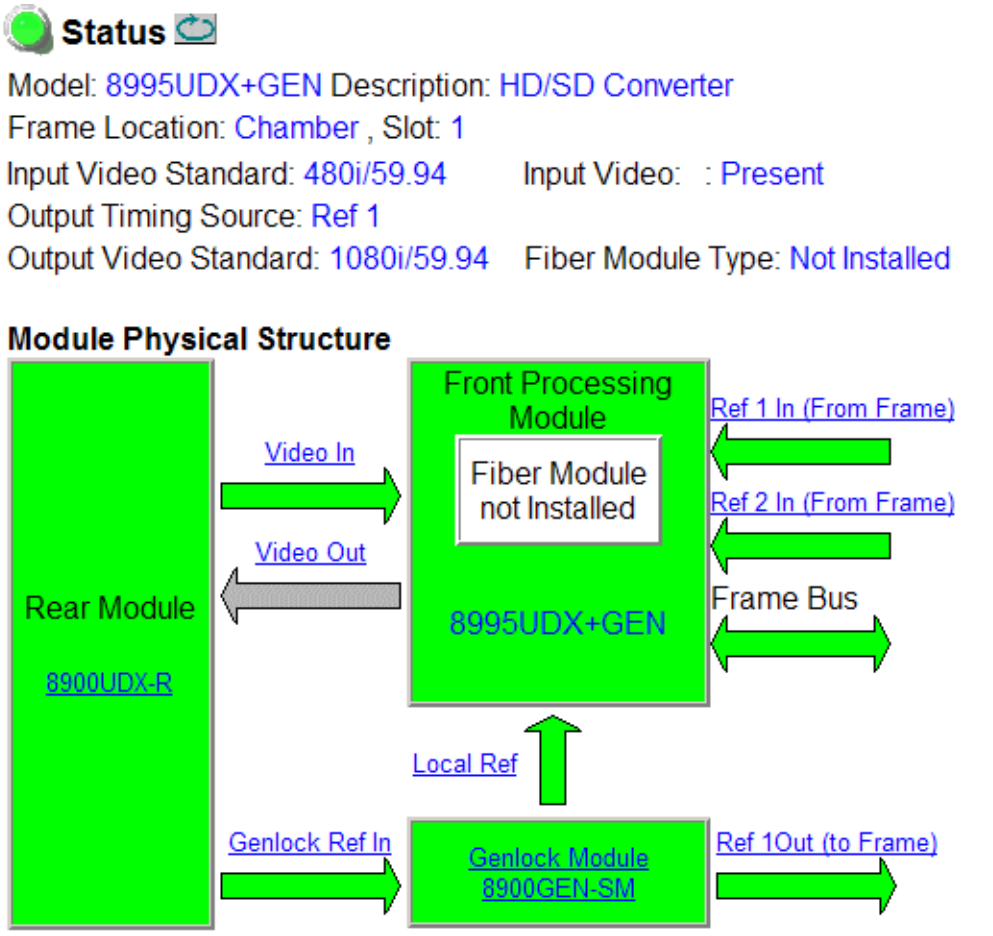
When the module detects an error, a warning messages, such as signal or reference not present, will appear between the lines below the status graphic as illustrated in Figure 22 on page 44. Refer to the *I/O Config Web Page* on page 46 for information on disabling the status reporting.

Note Many of these warnings are informational only and concern frame rate compatiblilty. Pay close attention to the frame rate compatibility explanations and tables in this manual.

The installation status of the Genlock Module or Fiber Optic submodule will also be reported here as well as being shown in the graphic.

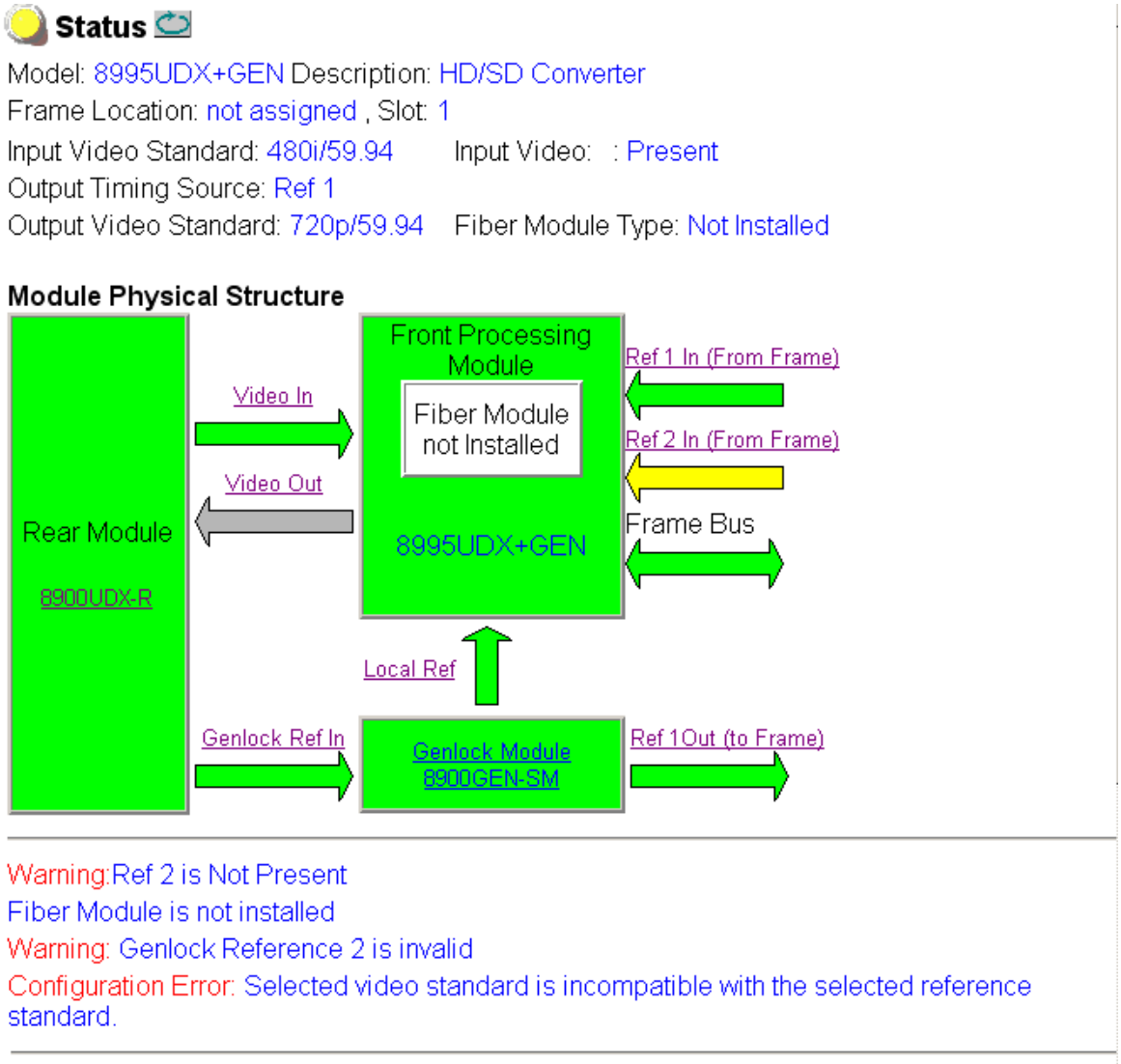
Information about the module, such as part number, serial number, hardware revision and software and firmware versions, and asset tag number (assigned on the Slot config web page) are given in a read-only section at the bottom of the display.

Figure 22. 8985UDX Status Web Page

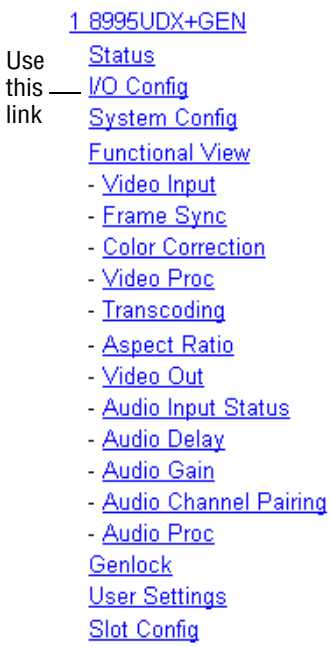


Warnings and configuration errors are also reported on the Status web page between the double lines as shown in Figure 23.

Figure 23. Warnings and Configuration Error Reporting



I/O Config Web Page



Use the I/O Config web page (Figure 24 on page 47) for the following:

Rear Connectors

All of the input and output connectors on the corresponding 8995UDX-R rear module are illustrated on the I/O Config web page. The inputs can be configured with the following controls:

- **Signal Naming** – use the factory default signal names or type the desired input name (up to 11 characters) into the corresponding boxes for each input. The status of each input is indicated by the color of the display.
- **Reporting Enabling** – status reporting of each input type can be enabled or disabled by selecting or deselecting the corresponding checkbox in the **Reporting Enabled** column for each input type. You may disable reporting for inputs not being used if desired to avoid error messages. Status color of the signal will not change. The **Reporting Enabled** column used with an SNMP monitoring application such as NetCentral.

  Refer to *Status Monitoring* on page 106 for an explanation of the color coding and using an SNMP monitoring application.

Note Outputs are not monitored in this application.

Figure 24. I/O Config Web Page with Factory Default Signal Names

I/O Config

Model: 8995UDX+GEN Description: HD/SD Converter
Frame Location: RF Cube , Slot: 1
Input Video Standard: 480i/59.94 Input Video: : Present
Output Timing Source: Ref 1
Output Video Standard: 1080i/59.94 Fiber Module Type: Not Installed

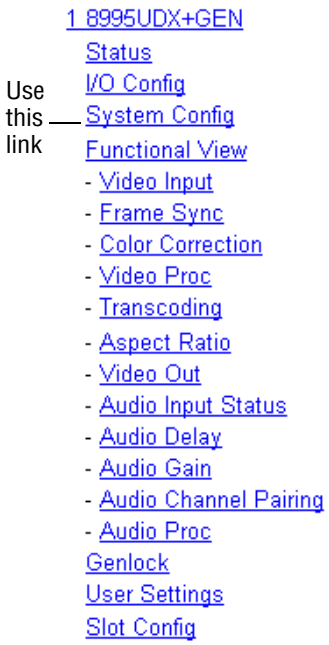
8900UDX-R Rear Connections

Signal Names	Reporting Enabled							Reporting Enabled	Signal Names
	☑	Genlock Ref In Loop	J1			J2	Audio Tracking Delay	.	.
			J3			J4	Reclocked Video Output	.	.
.	.	Video Output	J5			J6	Video Output	.	.
.	.	Video Output	J7			J8	Video Output	.	.
	☑	COAX Video Input	J9			Fiber	Fiber Video In/Out 2	☑	
							Fiber Video In/Out 1	☑	

Legend:

Present | Not Present | Not Monitored

System Config Web Page



Use the System Config web page (Figure 26 on page 49) to set the system configuration parameters for the module. For a complete list of module parameters, refer to the summary table in the *Summary of 8995UDX/UPC/DNC Configuration Functions* on page 111.

Test Output

Enable the colorbars test signal on the module output with the **Enabled** button.

Video I/O Configuration

The following controls are available in this section:

- **Ref Input** – displays the reference input standard connected to the Genlock Loop through BNCs on the rear module. Refer to Table 6 on page 51 for a listing of output standards and compatible frame references.
- **Input Standard** – choose the desired input standard from the pulldown choices or use the **Auto** selection. The signal input type selected will be reported in the web page header as the Input Video Standard. When **Auto** is selected, the input signal type detected on BNC J9 will be reported.
- **Output Standard** – choose the desired input standard from the pulldown choices. This will determine what action the module will perform, up conversion, down conversion, or cross conversion.

Refer to *Signal Conversion* on page 27 for an explanation of the conversion types and valid and invalid conditions.

When a new configuration has been selected with the Input and Output Standard pulldowns, such as a up conversion operation shown in Figure 25, a message will appear indicating **Changes Pending: Click Apply Settings button to commit changes**.

Figure 25. Changes Pending Message

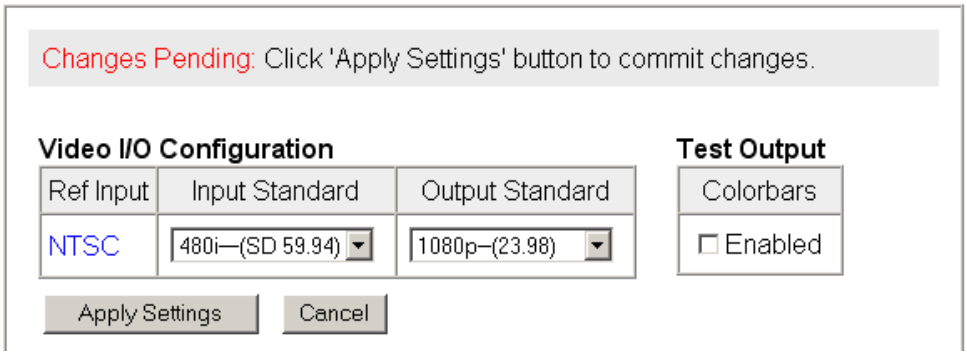
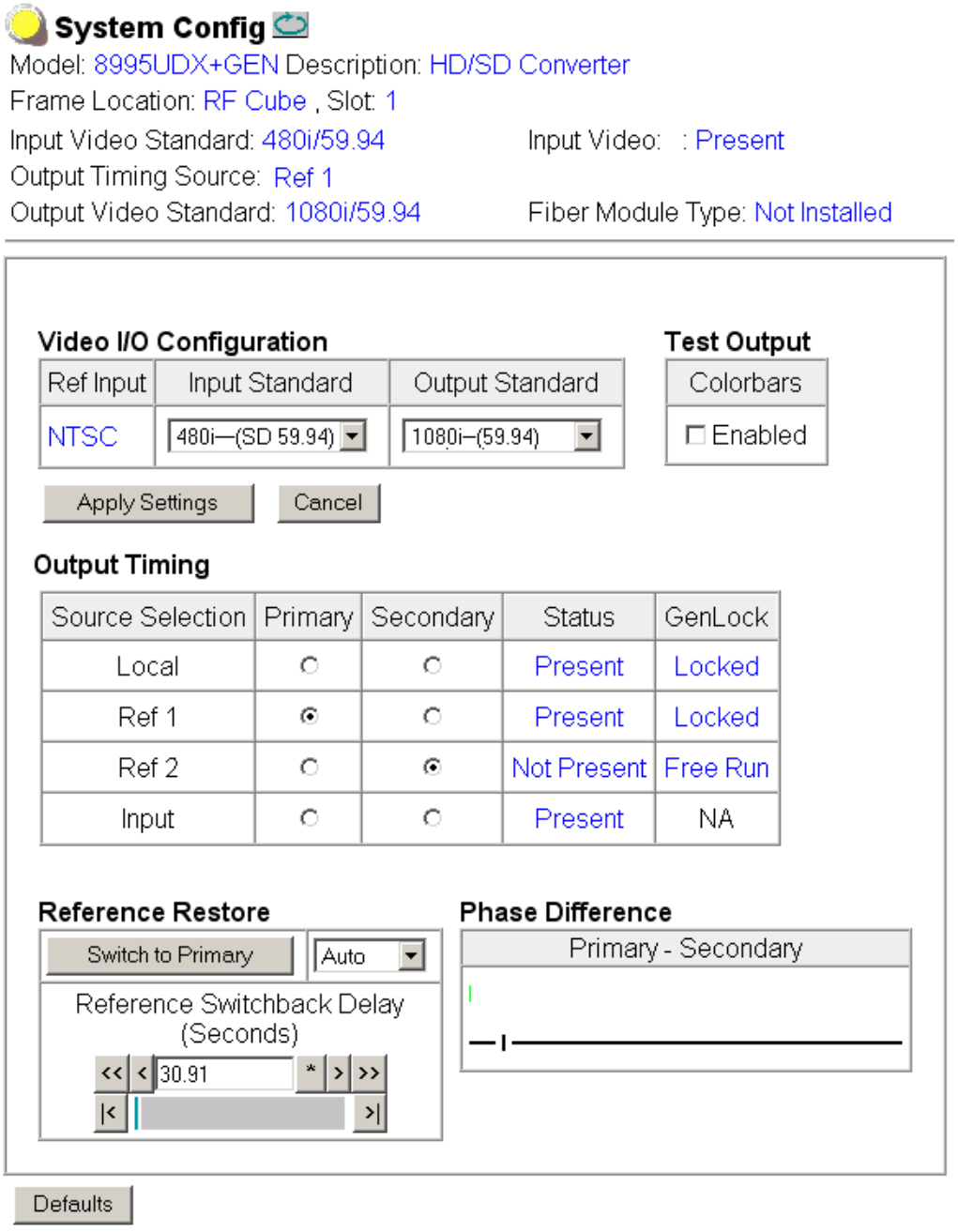


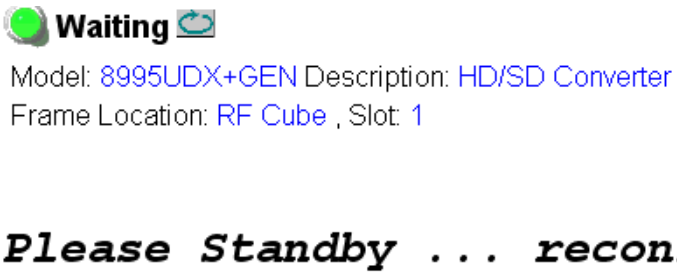
Figure 26. System Config Web Page



Select the **Apply Settings** button to perform the action. Some conversions (typically up and down conversion) require a reconfiguring of parameters on the module and a **Please standby … reconfiguring** message (Figure 27) will appear while the operation is performed.

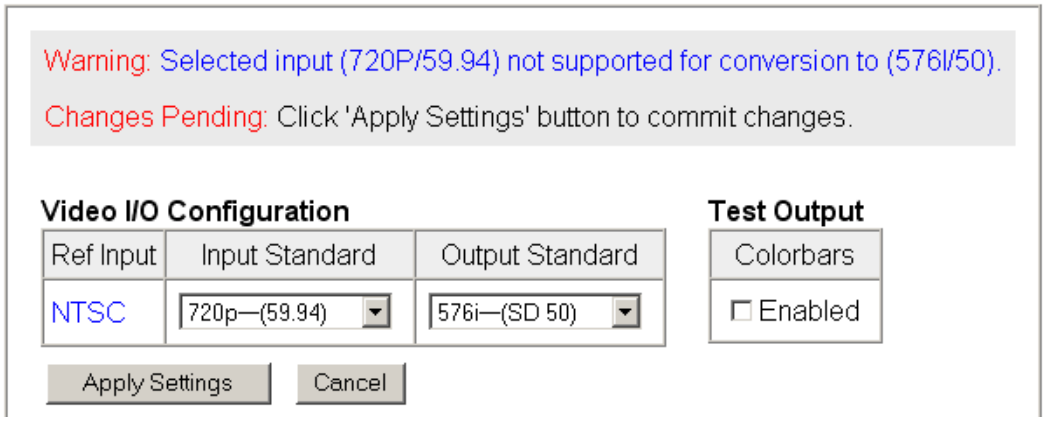
Note Once the web page reappears, it may be necessary to use the **Refresh** button to update the page to show the correct values now configured.

Figure 27. Please Stand By Message



When the module detects an invalid condition relating to input/output conversion (such as down converting between different line rates 59.94 and 50 for example), a warning message will appear similar to the one shown in Figure 28. The warning message will indicate why this operation is not supported.

Figure 28. Invalid Signal Conversion Warning Message



Configuration errors on the System Config web page will also be reported on the Status web page as shown in Figure 23 on page 45.

Table 6 give the various output video standards and the frame references that are compatible with each type.

Table 6. Output Video and Frame Reference Compatibility

Video Output Standard	Reference Detected	Mismatch Warning
480i	NTSC	None
	1080i 59.94 TLS	None
	720p 59.94	Yes[1]
576i	PAL	None
	1080i 50 TLS	None
	720p 50 TLS	Yes[1]
1080i 59.94	1080i 59.94 TLS	None
	NTSC	None
	720p 59.94 TLS	Yes[1]
720p 59.94	720p 59.94 TLS	None
	NTSC	None
	1080i 59.94 TLS	None
1080i 50	1080i 50 TLS	None
	PAL	None
	720p 50 TLS	Yes[1]
720p 50	720p 50 TLS	None
	PAL	None
	1080i 50 TLS	None
1080p 23.98	720P 59.94 TLS	Yes[1]
	1080i 59.94 TLS	Yes[1]
	NTSC	Yes or No[2]
	1080p 23.98 TLS	Yes[1]
1080sf 23.98	720P 59.94 TLS	Yes[1]
	1080i 59.94 TLS	Yes[1]
	NTSC	Yes or No[2]
	1080sf 23.98 TLS	Yes[1]

[1] No multi-frame indexing is present on these reference signals to handle the 5:4 ratio between the 59.94 and 23.98 Hz frame rates.

[2] Only an NTSC reference with SMPTE 318-M-1999 10-field marker will ensure frame synchronization of the 1080p/23/98 video.

Note The 3:2 pulldown cadence of 29.97Hz output video may be synchronized to a SMPTE 318M-B reference (NTSC with 10-field marker) as long as every 4th frame of the 23.98Hz input video is synchronous to the start of the 10-field sequence in this reference.

The 2:3 inverse pulldown cadence of 23.98Hz output video may be synchronized by the 8995UDX module to a SMPTE 318M-B reference.

Output Timing

Select the Primary and Secondary output timing source for the module as either **Local** (external reference from the 8900GEN-SM submodule mounted on this module), **Ref Bus 1** (8900GEN-SM submodule is mounted on module in slot 1 and jumpered for outputting a Ref 1 frame bus), **Ref Bus 2** (8900GEN-SM submodule is mounted on module in slot 3 and jumpered for outputting a Ref 2 frame bus), or **Input**, the reference is taken from the input video. The signal and genlock status of each reference source will be reported in the Status and Genlock columns.

When a Secondary reference source is selected and different than the Primary, the module can be configured to switch automatically to the Secondary selected if the Primary is lost or becomes unlocked or invalid. If you do not want this action of switching to a secondary, set the Primary and Secondary sources to the same source.

Note An 8995 module can switch between the REF1 and REF2 sources from different genlock submodules that are locked to the same reference signal, and maintain stable output video genlock.

Reference Restore

If the Primary source has failed and a Secondary source is selected and valid, the following controls allow you to set the module to switch back to the Primary automatically or manually and determine the amount of time before the Primary is restored.

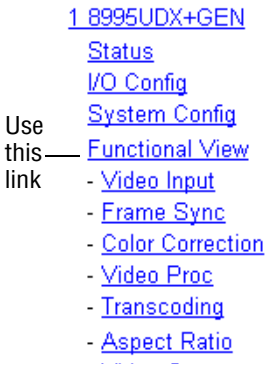
- **Switch to Primary** – set this control to **Manual** if you wish to manually return to the Primary reference when it becomes valid or locked again or **Auto** to allow the module to switch back to the Primary reference.
- **Reference Switchback Delay** – when the control above is set for **Auto**, set the amount of time to allow between switching from the Secondary reference back to the restored Primary. The switchback time has a minimum recovery time of 30 seconds to assure that the Primary is locked and valid before the module switches back to this source.

Primary – Secondary Phase Difference

This graphic is provided to show the total phase difference between the Primary and Secondary references. When the bar is green and remains in the area before the horizontal indicator, the two references are in a range where switching between the two will show no measurable disturbance in the output video (approximately 72 ns).

When the phase difference is larger than the recommended amount, the bar will indicate a second red bar. This indicates that the phase difference is now such that switching between the two references will show a disturbance in the output video. This can be caused by a loss of one of the references or a mis-adjustment in the reference output delay of either reference. The total phase error shown in this graphic represents approximately 1 us.

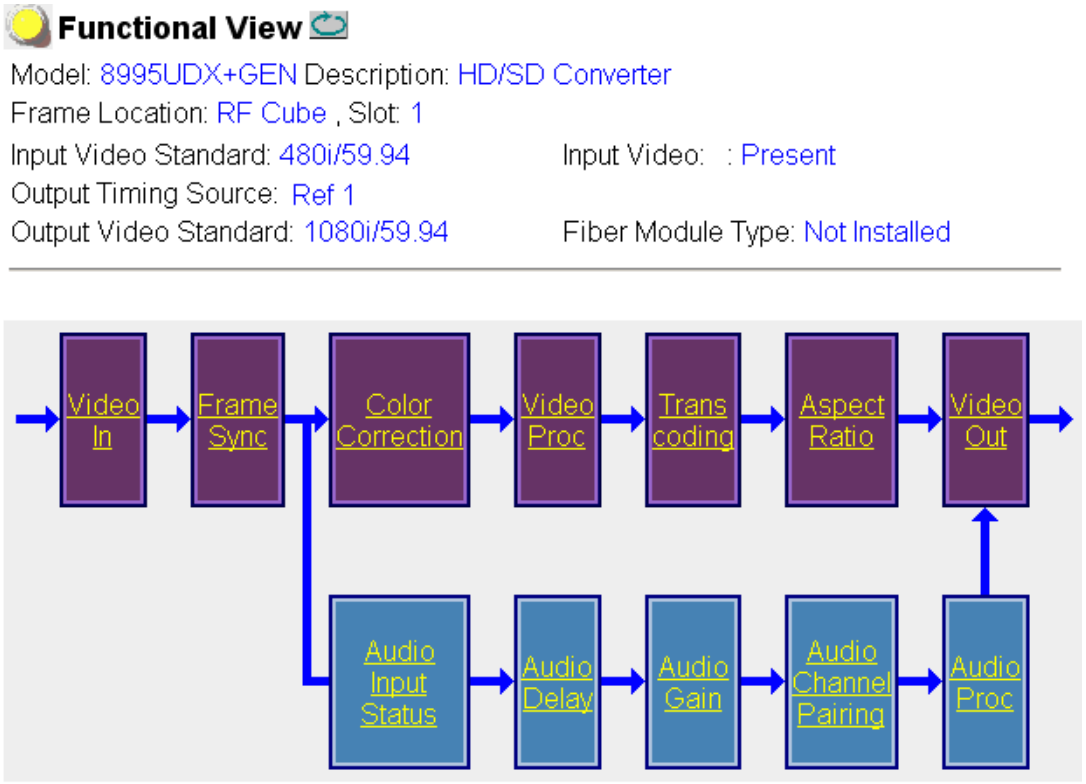
Functional View Web Page



The Functional View web (Figure 29) page illustrates a block diagram of the 8995 front media modules showing module functions and active signal paths in the current configuration. It can be used as a link map for configuring module functions. Each block has a link to the configuration page for that function.

- Color coding indicates active functions and signal flow. Grayed components are inactive due to hardware and/or software constraints.
- Use the Functional View to configure the 8995 configuration web pages in the order of the signal flow. Underlined module functions in each box are links to the web page for that function.

Figure 29. Functional View Web Page



- Each configuration web page shown in the Functional View will have links to the **<< Previous** web page, the **Functional View** web page, and the **Next >>** web page similar to Figure 30.

Figure 30. Configuration Web Page Links

Video Input Web Page

Use the Video Input web page (Figure 31) to select and monitor the video input source to the module with the following:

Video Input Selection

This section provides the following for the video input signal:

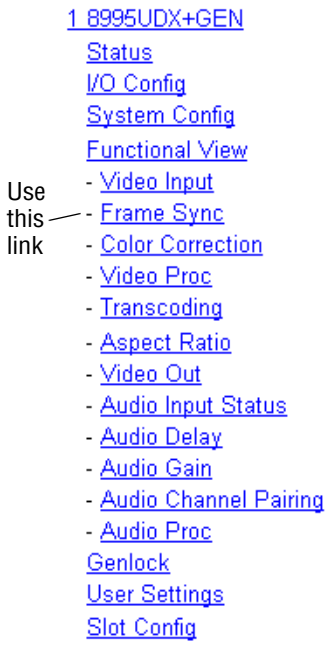
- **Select Input Video** – select the input source from the rear module as either **Coax**, **Fiber RX 1**, or **Fiber RX 2**.

Note Fiber optic inputs require the presence of a fiber optic submodule. See *Fiber Optic Video Inputs* on page 22.

- **Signal Name** – the signal name defined on the I/O Config web page by the user or the default names will appear in each field.
- **Signal State** – this field reports the status of the input video signal as **Present**, **Not Present**, or **Not Supported** (no fiber submodule installed).

Figure 31. Video In Web Page

Frame Sync Web Page



The Frame Sync web page provides timing adjustments for horizontal and vertical timing, multi-frame delay selection, enabling of minimum delay mode, loss of signal choices, manual freeze mode choices, and a timing status table for the 8995 module.

Note The controls available on the Frame Sync page depend on the Output Timing Source selected on the System Config web page.

Timing Adjustment

When no Frame Sync option is present or selected as the reference source, the module is in line sync mode. The module reference source can be set to **Input** on the System Config web page. Controls available in this mode will appear as shown in Figure 32 on page 56.

When the Frame Sync option is present and the **Local**, **Ref 1**, or **Ref 2** output timing sources are selected, horizontal and vertical timing adjustments can be made on the output video as required relative to the external reference with the controls described below. Refer to Table 7 on page 60 for the list of frame sync pixel and line timing adjustment ranges for input to output video combinations.

- **H Timing (Pixels)** – the horizontal timing can be adjusted in pixels relative to the external reference.
- **V Timing (Lines)** – the vertical timing can be adjusted in lines relative to the external reference.
- **Multi-Frame Delay** – this control allows you to add up to 6 frames of delay. When the H and V Timing controls are set to maximum, the total delay of the module will be 8 frames (when **Minimum Delay Mode** is not selected).

Minimum Delay Mode

A Minimum Delay Mode can be enabled to bypass portions of the frame sync memory to allow an absolute minimum amount of delay through the module. It is a special mode allowing the user to select a throughput delay of about one frame when the input is synchronous and its position with respect to the reference is well known. To enable this mode, check the **Enabled** checkbox. Refer to Figure 34 on page 58 for an example of this setting.

Note Delay can be added when in Minimum Delay Mode without causing video distortion up to one line short of a whole frame period of user delay. For normal delay operations, Minimum Delay mode should be disabled.

Refer to Table 9 on page 99 for the delay values for each format.

Figure 32. Frame Sync Web Page – Input Reference Source

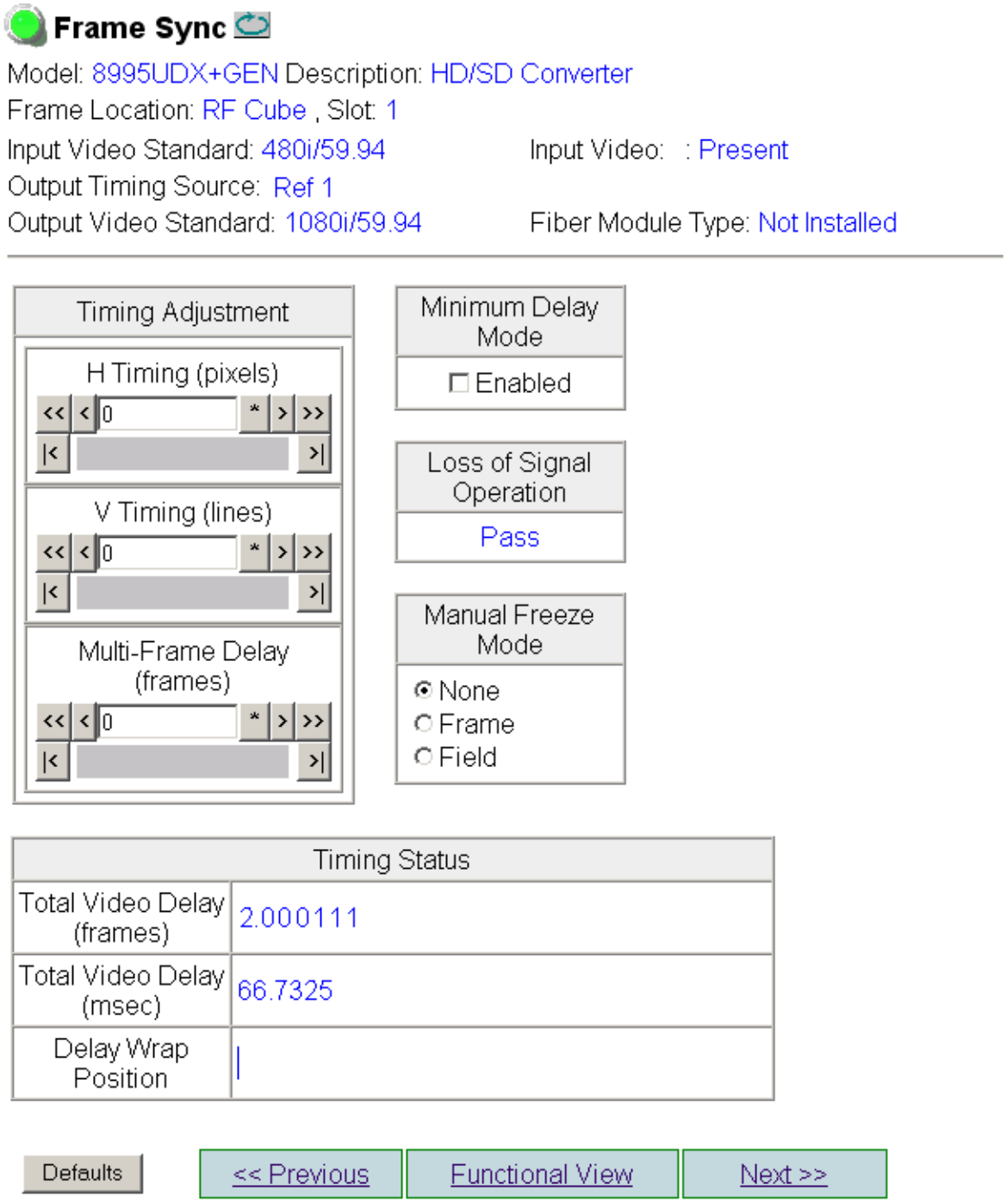


Figure 33. Frame Sync Web Page – External Reference Source

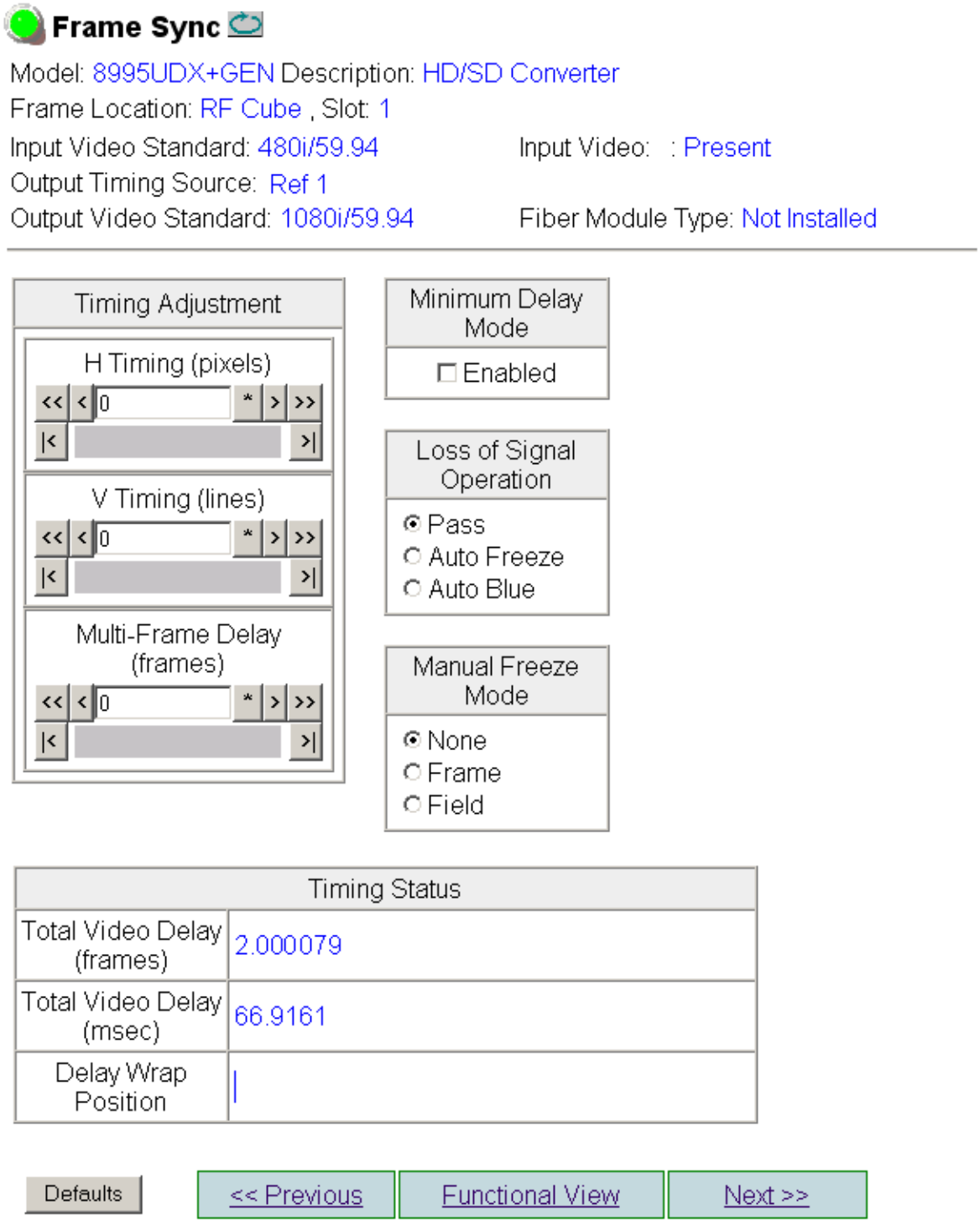
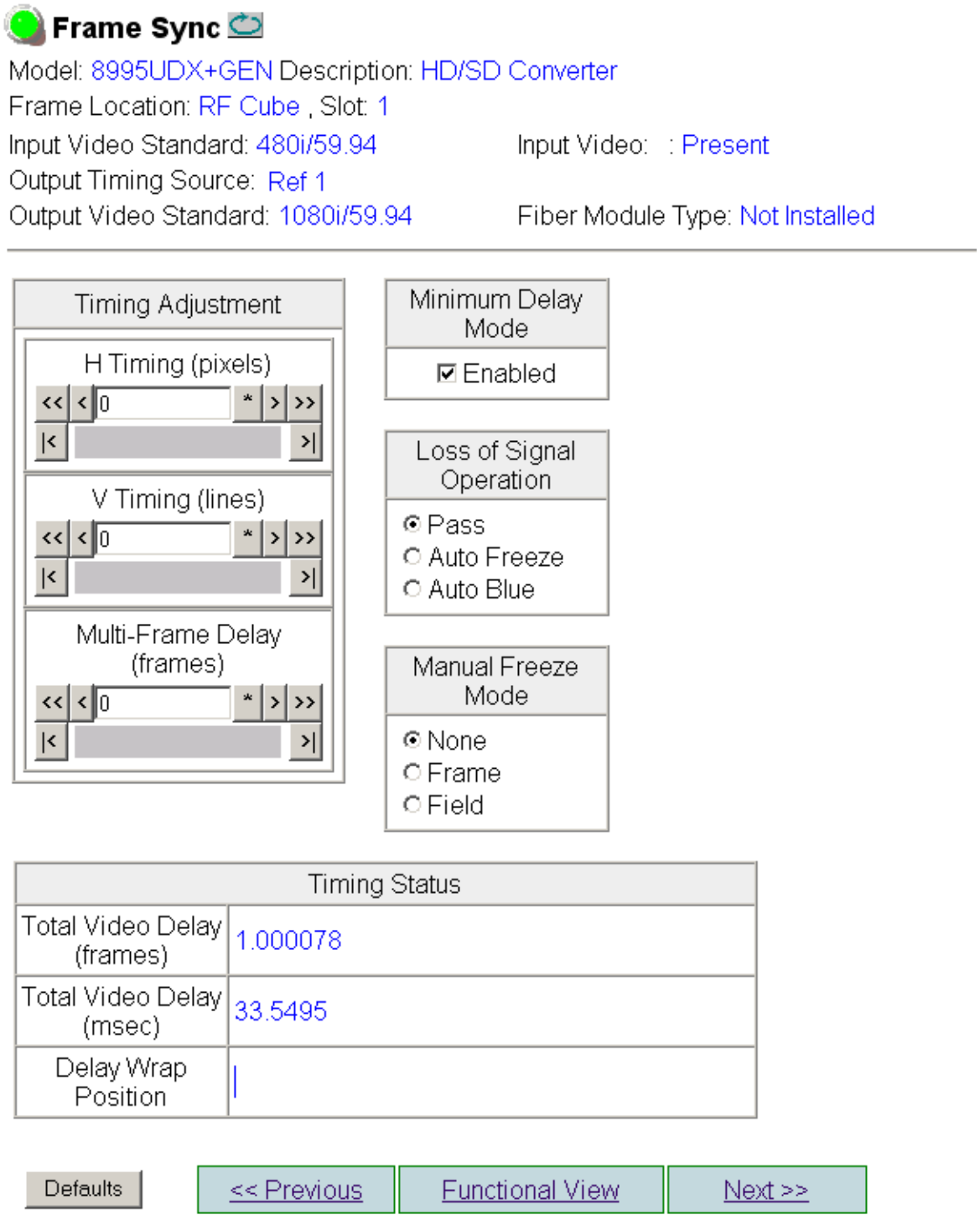


Figure 34 illustrates the Frame Sync timing status when Minimum Delay Mode is enabled.

Figure 34. Frame Sync with External Reference – Minimum Delay Enabled



Loss of Signal Operation

Set the operation to be performed by the module upon loss of input signal when an external reference is present (**Auto Blue**, **Auto Freeze**, or **Pass**).

When there is no external reference (output timing set to Input), the module will default to pass the signal to the output.

Manual Freeze Mode

Select one of the radio buttons (**Frame** or **Field**) to perform a manual freeze on the output.

Delay Wrap Position

This indicator will display with a blue bar, the fraction of the final frame of actual video delay through the frame sync.

Note It will not indicate if multiple frames have been selected with the Multi-Frame Delay control.

For example, with 1080i video and Minimum Delay Mode not selected, if 600 lines plus 5 frames of delay is entered by the user, that actual delay through the module will be anywhere from about 6 to 7 frames depending on the following conditions:

a. If the module is in Delay (Input-Timed) Mode, the delay through the module will be about 6.5 frames, and the Delay Wrap Position will be at about 50% of full scale.

b. If the module is in Frame Sync (Genlock) Mode, the delay through the module will be about 6.5 frames if the input video has zero delay with respect to the genlock reference frame position, and the Delay Wrap Position will be at about 50% of full scale. As this input video delay with respect to the genlock reference frame position is changed from -0.5 to +0.5 frame periods, the delay through the module will change from about 6 to 7 frame periods, with the Delay Wrap Position changing from about 0 to 100% of full scale.

In summary, the Electrical Length of the module can be estimated as the following:

- 1 frame minus 5 lines (Minimum Delay Mode not selected), or
- 150 pixels (Minimum Delay Mode selected) + Multi-Frame Delay + Delay Wrap Position (% of full scale) X (1 frame period).

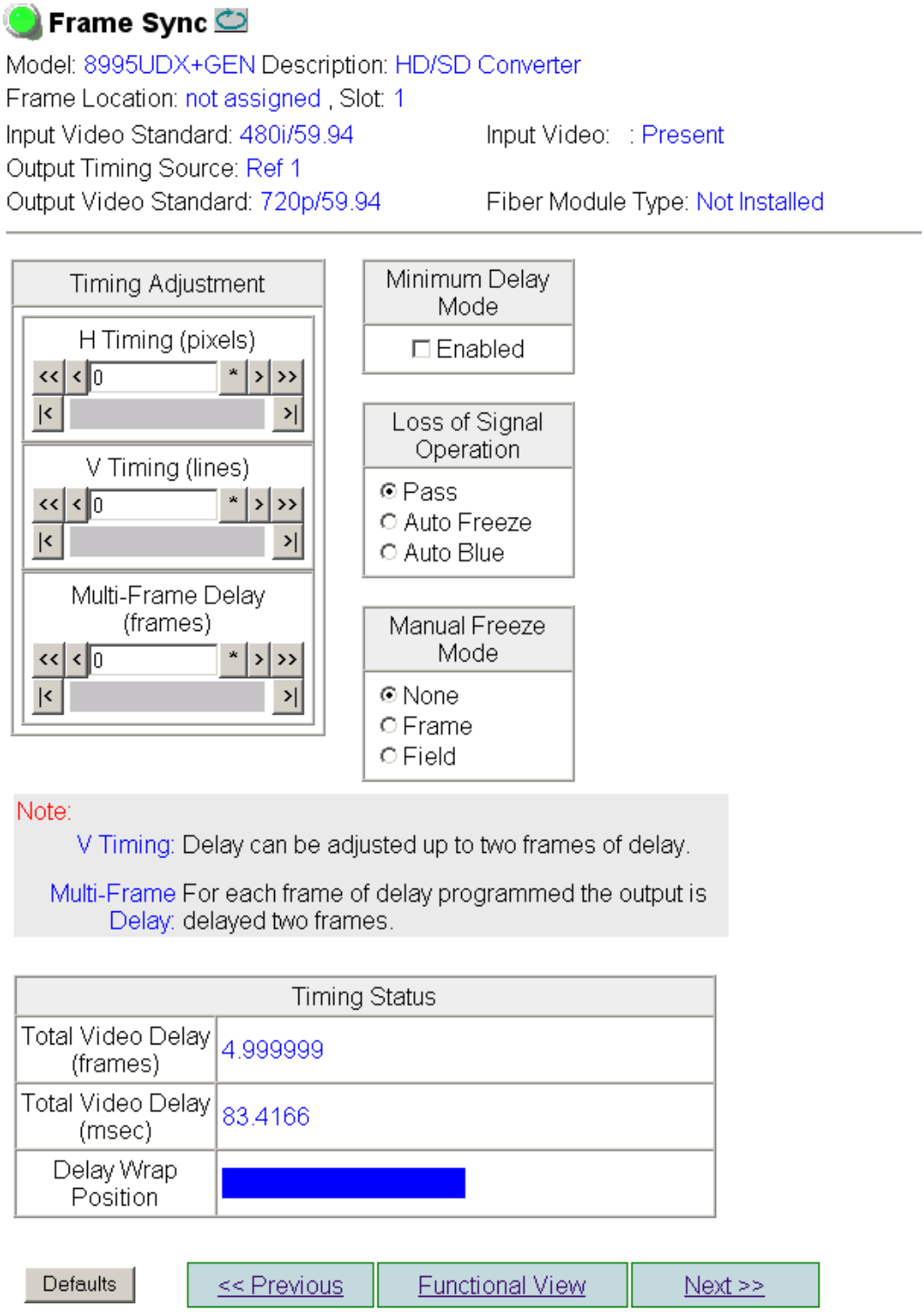
When converting from an interlaced to a progressive signal, the timing status will be noted as shown in Figure 35 on page 61.

Table 7. Frame Sync Timing Adjustment Ranges

Input Video	Output Video	Pixels	Lines	Notes
480i/59.94	480i/59.94	0 to 857	0 to 524	
	1080i/59.94	0 to 2199	0 to 1124	
	720p/59.94	0 to 1649	0 to 1499	Two frames of 720p span one frame of 480i
	1080p/23.98	0 to 2749	0 to 1124	Spans 1.25 frames of input video
1080i/59.94	480i/59.94	0 to 857	0 to 524	
	1080i/59.94	0 to 2199	0 to 1124	
	720p/59.94	0 to 1649	0 to 1499	Two frames of 720p span one frame of 1080i
	1080p/23.98	0 to 2749	0 to 1124	Spans 1.25 frames of input video
720p/59.94	480i/59.94	0 to 857	0 to 524	Must span two frames of input video as genlock reference does
	1080i/59.94	0 to 2199	0 to 1124	Must span two frames of input video as genlock reference does
	720p/59.94	0 to 1649	0 to 749	
	1080p/23.98	0 to 2749	0 to 1124	Spans 2.50 frames of input video
576i/50	576i/50	0 to 863	0 to 624	
	1080i/50	0 to 2639	0 to 1124	
	720p/50	0 to 1979	0 to 1499	Two frames of 720p span one frame of 480i
1080i/50	576i/50	0 to 863	0 to 624	
	1080i/50	0 to 2639	0 to 1124	
	720p/50	0 to 1979	0 to 1499	Two frames of 720p span one frame of 480i
720p/50	576i/50	0 to 863	0 to 624	Must span two frames of input video as genlock reference does
	1080i/50	0 to 2639	0 to 1124	Must span two frames of input video as genlock reference does
	720p/50	0 to 1979	0 to 749	
1080p/23.98	480i/59.94	0 to 857	0 to 656	Must span input video frame period
	1080i/59.94	0 to 2199	0 to 1406	Must span input video frame period
	720p/59.94	0 to 1649	0 to 1874	Must span input video frame period

Figure 35 illustrates the Frame Sync timing status when upconverting between an interlaced and a progressive signal.

Figure 35. Frame Sync with External Reference – Minimum Delay Enabled



Color Correction Web Page

Use the Color Correction web page (Figure 36) to make RGB gain, offset and gamma correction adjustments.

1 8995UDX+GEN
Status
I/O Config
System Config
Functional View
- Video Input
- Frame Sync
- Color Correction
- Video Proc
- Transcoding
- Aspect Ratio
- Video Out
- Audio Input Status
- Audio Delay
- Audio Gain
- Audio Channel Pairing
- Audio Proc
Genlock
User Settings
Slot Config

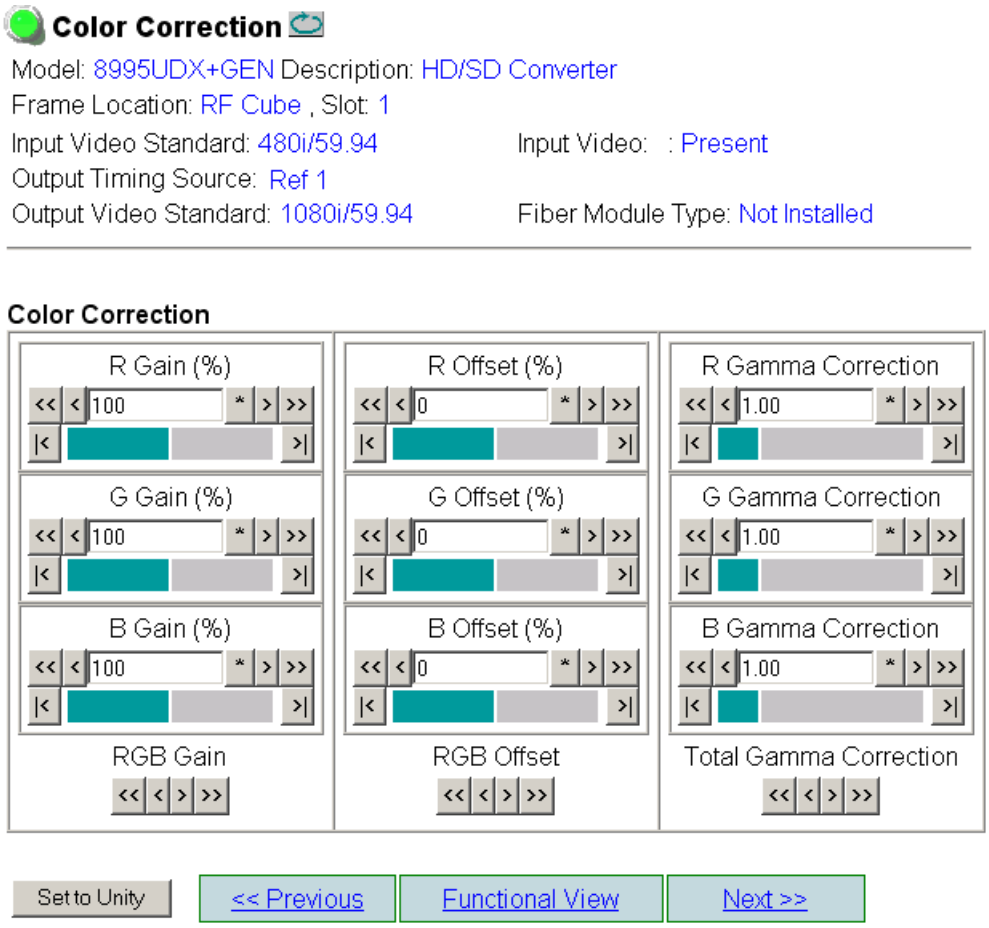
Use this link

Color Correction

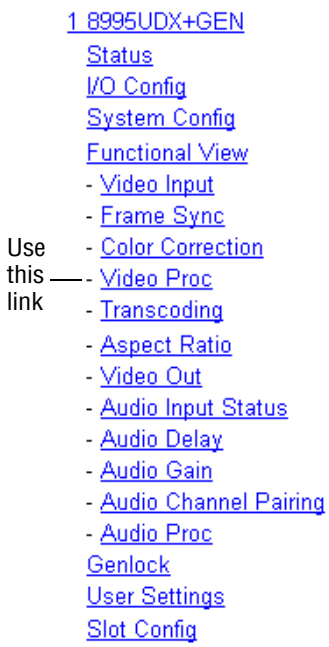
The Color Correction section provides the following RGB controls:

- **Gain Adjustments** – set the gain from 0 to 200% for the R, G, and/or B channel with the corresponding control or adjust all of the gains together by adjusting the **RGB Gain** control.
- **Offset Adjustments** – set the offset from ± 100% for the R, G, or B channel with the corresponding control or adjust all of the offsets together by adjusting the **RGB Offset** control.
- **Gamma Correction** – set gamma correction with the **R Gamma Correction**, **G Gamma Correction**, and/or **B Gamma Correction** or adjust all channels together using the **Total Gamma Correction** control. Raising the gamma above 1.0, brightens the gray intensity. Lowering the gamma below 1.0, darkens the gray intensity.

Figure 36. Color Correction Web Page



Video Proc Web Page



The Video Proc web page (Figure 37 on page 65) provides overall video processing and Y/C clipping controls for the HD or SD signal in addition to image enhancement controls.

Note The video scaler on this module does not handle Super Black signals.

Video Processing Controls

The following controls are provided for video processing:

- **Y/Cb/Cr Gain** – set the gain for the Y, Cb, or Cr channel from 0 to 200% with the corresponding control or adjust all gains together by using the **Total Gain** control.
- **Y/Cb/Cr Offset** – set the offset ± 100% for the Y, Cb, and Cr channels with the corresponding control.
- **Color Saturation** – adjust the percentage of color saturation relative to 100%.
- **Hue** – adjust the hue ± 180 degrees.

Y/C Clip Controls

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

- **Clip Enable** checkbox – check to enable the clip controls.
- Use the **Y White Clip (%)** control to set the clipping level for the top end (white) of the luminance signal (positive excursions) from 109% down to 50%.
- Use the **Y Black Clip (%)** control to set the clipping level for the bottom end (black) of the luminance signal (negative spikes) from -7% to +50%.
- Use the **C White Clip (%)** control to set the clipping level for the top end of the chroma components (Cb and Cr) of the video signal (clips large excursions and reduces overall saturation level to fit within clip) from 109% down to 50%.

Image Enhancement Controls

The following controls are provided for image enhancement:

- **Noise Reduction** – select the **Enable** control to enable the Noise Reduction function. This allows reduction of low level noise in the output signal which may occur during the conversion process.
- **Level** – when Noise Reduction is enabled, control the level of noise reduction with the Level control from a very low level (0) to a high level (63).

- **Edge Expansion** – select the **Enable** control to turn on the Edge Expansion function. This can be used to enhance the visual appearance of the edges of the image.

Note Edge expansion is not functional with 1080p/sf 23.98.

- **Extended Color Space** – enabling this control doubles the dynamic range for chroma samples while halving chroma resolution. This change removes the least significant bit of each chroma sample and adds one more most significant bit.
- **Vertical Edge Filter** – enabling this control applies horizontal low-pass filtering to the luma and chroma samples at the video image vertical edges to lessen the black-to-video matte-to-video distortion that occurs in the scaler function.
- **Matte Edge Border** – enabling this control applies a 3 pixel wide mask to vertical image edges matching the brightness and hue of the vertical bars. These masks are applied to lessen the transition distortion between matte and video that occurs in the scaler function.

Cadence Controls

The 8995 module has automatic cadence detection on the input signal. A **Cadence** control is provided to set one of two modes for signals: **Auto Film/Video (3:2 or 2:2 pull down)**, the default, or **Fixed-Video (2:2 pull down)**

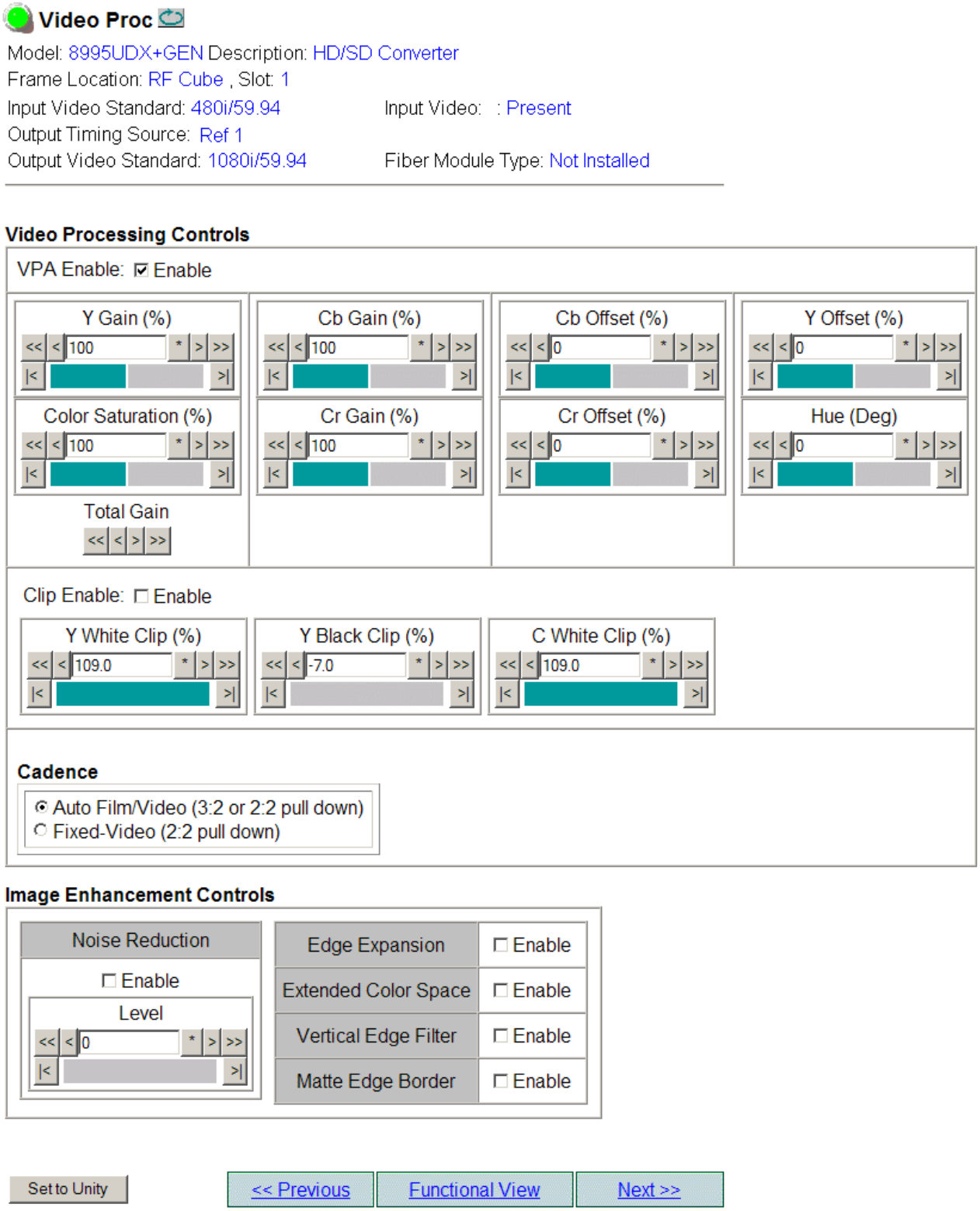
In **Auto Film/Video (3:2 or 2:2 pull down)** mode, the scaler in the 8995 module detects the pattern of video field updating in the input video and performs motion-adaptive de-interlacing based upon that pattern. Normal video has a video field updating pattern of 2:2, meaning one frame of video consists always of two fields captured at 1/59.94 Hz intervals.

Video created from film that has a 1/23.98 Hz capture interval must use a process called 3:2 pull down to produce video fields at 1/59.94 Hz intervals. The first frame of film may be repeated twice, and the second frame may be repeated three times to give a repeating sequence of 5 video fields for every 2 frames of film.

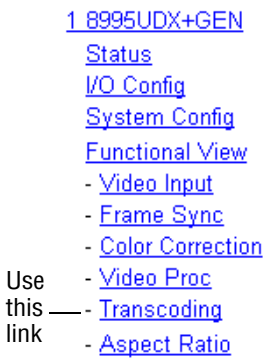
Typically, the sequence is defined as 2:3:2:3 over a span of 5 video frames, or four film frames. Sometimes a portion of a video program with 2:2 cadence is mixed with other video data having a 3:2 cadence. The 8995 module scaler may detect one cadence type and de-interlace assuming that cadence type for the whole image, or it may oscillate between the two cadence types. This may produce disturbing artifacts in the video.

If artifacts occur in **Auto Film/Video (3:2 or 2:2 pull down** mode, the user may disable automatic cadence detection by selecting the **Fixed Video (2:2 pull down)** mode, forces the de-interlacer to perform motion-adaptive de-interlacing assuming only a 2:2 cadence in the video, reducing the chance of distortion related to cadence detection. The result may slightly reduce de-interlacing quality for 3:2 cadence video.

Figure 37. Video Proc Web Pager



Transcoding Web Page



Use the Transcoding web page to transcode closed caption and VITC data between formats. Both are supported for same-rate conversion at 59.94 Hz. The Transcoding web page is shown in Figure 39 on page 68.

Note Closed caption and VITC transcoding of input rates of 1080p/sf 23.98 is not supported.

The web page has two main sections, **CC Transcoding** and **VITC Transcoding**. Each section is described below.

CC Transcoding

The 8995 module can simultaneously detect analog (Line21), EIA608 packet, and EIA708 digital packet type closed captioning encoded on the input video. It can also detect the presence of EIA608 CC inside of an EIA708 digital packet.

In the Transcoding web page, the controls for CC Transcoding are divided into three sections:

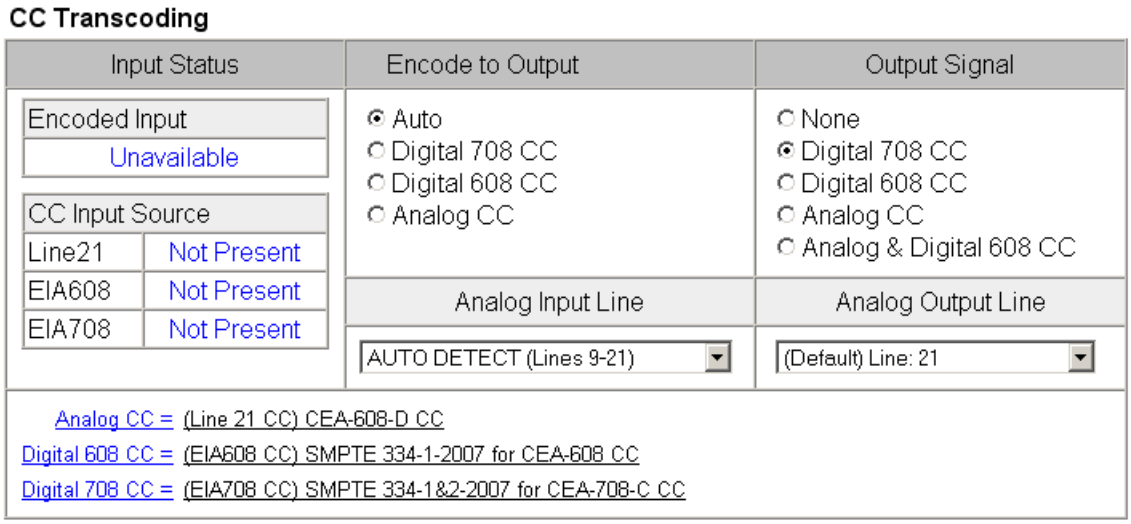
- Input Status,
- Encode to Output, and
- Output Signal.

CC Transcoding Input Status

When the module is set to auto-detect the presence of closed caption data (**Encode to Output** control set for **Auto**) as shown in Figure 38 below, if no closed captioning data is present on the video input, the module will report **Unavailable** and show the Line 21, EIA608, and EIA708 fields in the **CC Input Source** reporting fields as **Not Present**.

The specifications for each type of closed captioning are listed below the **CC Input Source** section. You may refer to the CEA and SMPTE documentation for further information on these standards.

Figure 38. CC Transcoding – No Encoded CC Detected

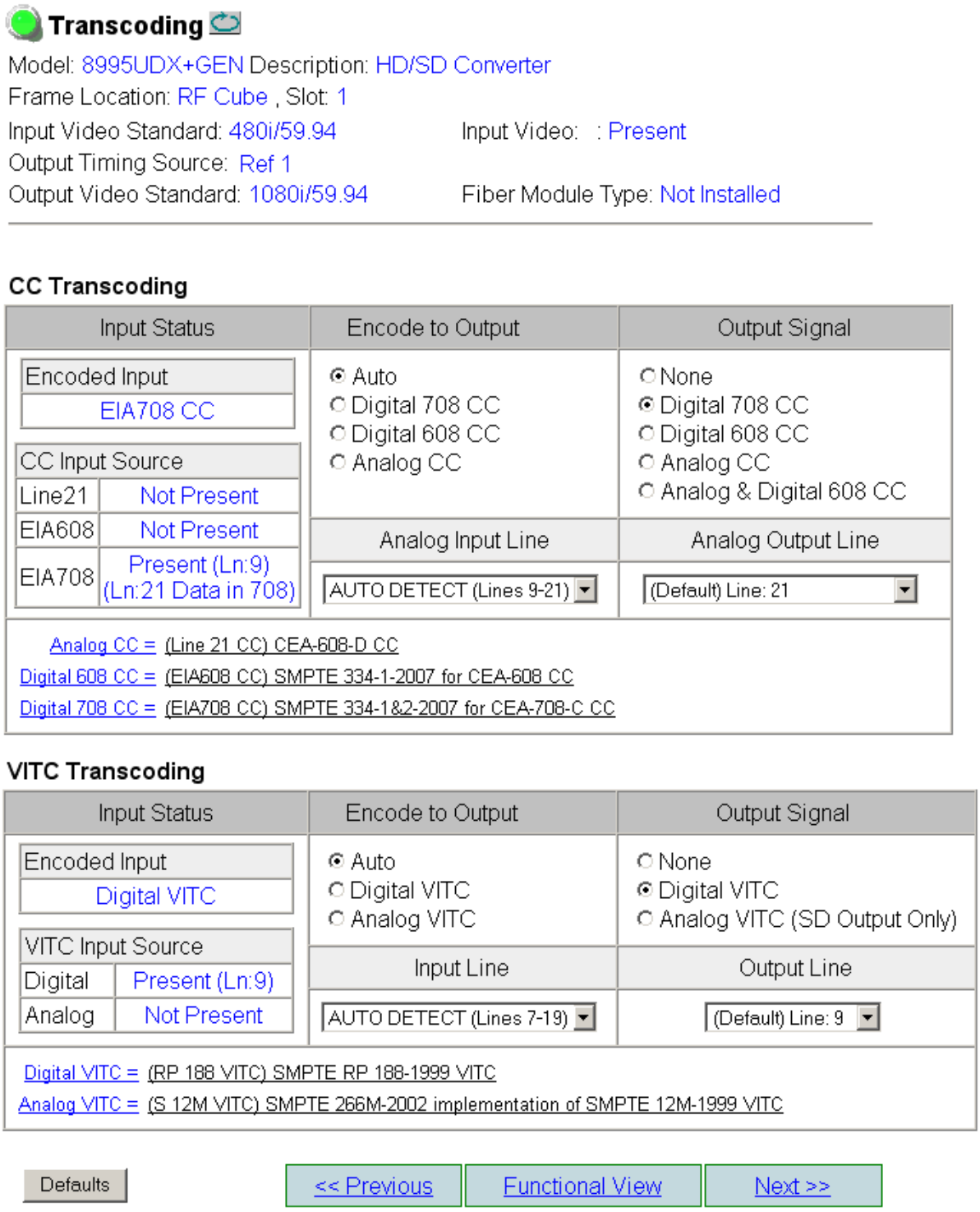


CC Encoding Encode to Output

In the example in Figure 39 on page 68, the module **Encode to Output** control is set for **Auto** and the module has detected only EIA708 CC on the input and has reported this in the **Input Status** field. In the **CC Input Source** reporting fields below the presence of Line21 CC (analog) and EIA608 CC are reported as **Not Present**.

If Line21 CC, EIA608 and/or EIA708 closed captioning are all detected on the input video, only one will be used as the source of the output closed captioning and only that closed captioning form will appear on the video output. In this case, the user may select with the **Encode to Output** control, which packet type (**Digital 708 CC**, **Digital 608 CC**, or **Analog CC) to** take the closed captioning from.

Figure 39. Transcoding Web Page



Otherwise, the default priority is as follows:

For SD Input video (all line rates at 59.94):

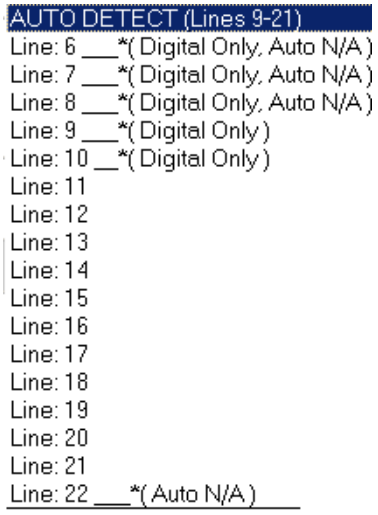
- For SD input video, Line21 CC takes precedence.
- If Line 21 CC is not present, EIA708 carrying Line21 CC takes precedence over EIA608 CC
- If neither Line21 CC or EIA708 CC with Line21 CC is present, EIA608 CC is used.

For HD input video (all line rates at 59.94):

- The same priority applies as above without the possibility of receiving Line21 CC.

The **Analog Input Line** pulldown menu in this section allows selection of what video line the Analog CC appears on when encoded to the output (Figure 40). This pulldown allows you to **Auto Detect (Lines 9-21)** the location of the Analog CC or place the Analog CC (normally on Line 21) on any line between lines 11 and 21. Lines 6-10 and Line 22 are reserved for digital only.

Figure 40. Encode to Output Pulldown



CC Transcoding Output Signal

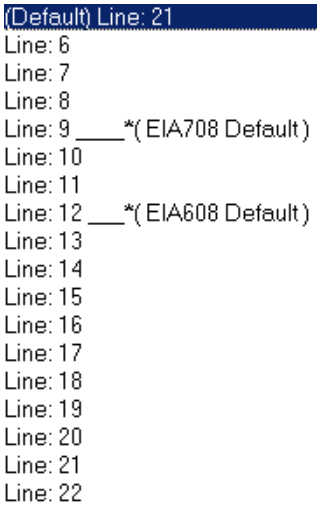
The **Output Signal** control allows you select what packet type the closed captioning will be transmitted on in the output video (**Digital 708 CC**, **Digital 608 CC**, **Analog CC**, and **Analog & Digital 608 CC**). You may disable closed captioning transmission completely on the output by selecting the **None** button.

The other choices in the **Output Signal** control offer a number of different output packet conversions. Conversion is allowed between most packet types with some general rules. Results may vary depending on your end use application. The **Output Signal** closed caption type chosen will depend on the type of signal conversion (up, down, or cross) you have performed on the module.

The **Analog Output Line** pulldown menu in this section allows selection of what line the Analog CC will be on in the output signal (Figure 41). This pulldown allows you to select the default **(Default) Line 21** or on Lines 6-22.

Note Lines 9 is reserved for the EIA708 Default and Line 12 is reserved the EIA608 Default.

Figure 41. Analog Output Line Choices



VITC Transcoding

The VITC (Vertical Interval Time Code) transcoding controls allow you to convert between Analog VITC and Digital VITC with same-rate signals of 59.94. The input/output choices will depend on what type of video conversion the module is performing (up, down, or cross).

Note VITC transcoding of input rates of 1080p/sf 23.98 are not supported.

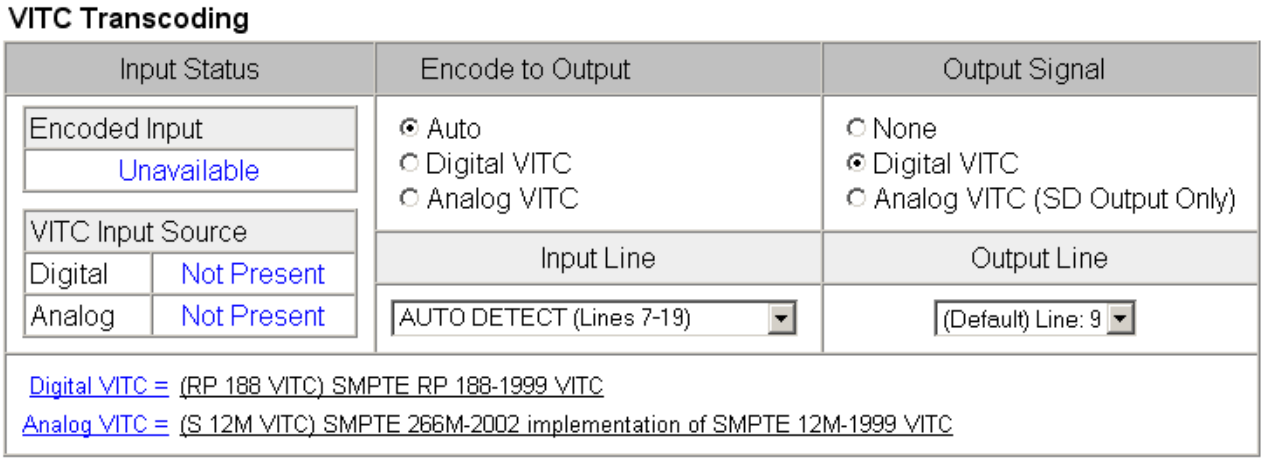
The VITC Transcoding has three sections, **Input Status**, **Encode to Output**, and **Output Signal**, similar to the CC transcoding. Each section is described below.

Input Status

The **Input Status** section will report in the **Encoded Input** field any detected Analog or Digital VITC encoded on the input when the **Encode to Output** control is set for **Auto**. Figure 42 below shows an input status of **Unavailable**. An example of VITC present on the input is shown in the Transcoding web page example in Figure 39 on page 68. In this case, the input is encoded with Digital VITC on line 9.

The specifications for the VITC handled by this module is given at the bottom of the VITC Transcoding section. If no VITC information is encoded on the input signal, the module will report **Unavailable** as shown in Figure 42.

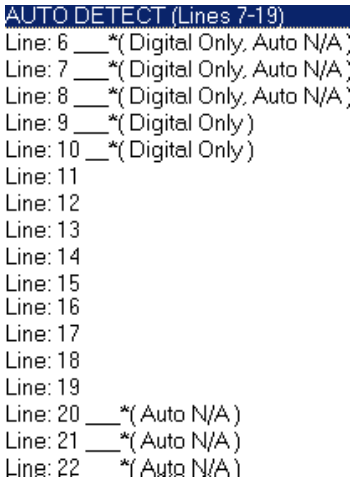
Figure 42. VITC Section of Transcoding Web Page



Encode to Output

This VITC information can be encoded to the output by selecting **Auto**, **Digital VITC**, or **Analog VITC**. An **Input Line** pulldown menu provides the choice of the input line for VITC detection on a specific line or the default position of **AUTO DETECT Lines 7-19**. The Input Line pulldown choices are shown in Figure 43 on page 72.

Figure 43. Encode to Output Input Line Selections



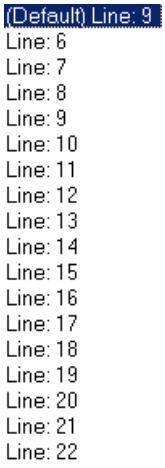
Output Signal

The VITC on the video output signal can be completely disabled by selecting the **None** button in the Output Signal section or **Digital VITC**, or **Analog VITC (SD output only)** can be selected. The selection of Digital or Analog VITC for embedding on the output will depend on what type of conversion is being performed by the module. Some general rules are listed below:

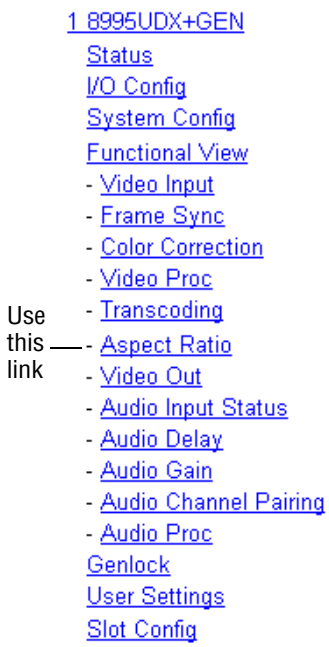
- The transcoder will only detect analog VITC from SD sources and can transmit analog VITC into any SD output source.
- When transcoding from 23.98 Hz to 59.94 Hz video VITC data words at the slow input rate will be repeated in an over-sampling fashion. When converting in the other direction, some VITC words may be lost, as expected when sampling them with a slower output frame rate.

An **Output Line** pulldown provides the choice of the line VITC will be on in the output video signal. Select a specific line or default position of **AUTO DETECT Lines 7-19**. The Input Line pulldown choices are shown in Figure 44.

Figure 44. VITC Output Line Choices



Aspect Ratio Web Page



Use the Aspect Ratio web page to set the desired aspect ratio mode for the output video signal. Controls are also provided for alignment, cropping, and matte color. AFD (Active Format Description) processing control and reporting status are also provided for the SDI input and SDI output.

Note It is important to understand the difference in aspect ratio control behavior between an input signal without AFD or with AFD disabled and a signal with AFD information present. Refer to *Aspect Ratio Controls* on page 30 for an overview.

The web page example in Figure 45 on page 75 shows an input signal without AFD information. **Auto** mode is included on this web page but is only applicable for signals reporting AFD. Refer to Figure 46 on page 76 for an example of an input signal with AFD present and disabled (note **Auto** mode will be removed).

When AFD coded information is present on the input, the aspect ratio controls will operate based on a different set of programmed software tables to produce an output coded frame that meets the SMPTE AFD standards. Refer to the Appendix, *Active Format Description* on page 117, for a detailed overview of AFD and how to use the aspect ratio controls for signals with AFD present.

Aspect Ratio Controls

This section provides the following controls to change the aspect ratio of the video output signal:

- **Mode** – set the desired aspect ratio for the output video. Refer to the *Aspect Ratio Controls* on page 30 for an overview.
- **Alignment** – align the output video image depending on the mode selected using one of the radio buttons.
- **Top Crop** – crop the top of the image if desired when applicable depending on the mode selected.
- **Matte Color** – select the color of the matte blanking margins when present in the video image. Matte colors are at 75% of color bar colors. Gray Mattes are Gray 1– darkest to Gray 6 – lightest.
- Click the **Apply Aspect Ratio Selections** button to apply the settings or use the **Cancel** button to return to the previous selections.

AFD Control

The AFD processing on the input signal can be disabled using the **Disable** radio button in the AFD Control section. When disabled, the AFD Input/Output reporting on the web page will be bypassed. The Aspect Ratio mode selection, **Auto**, will also be removed and revert to **Full Width** mode as shown in Figure 46 on page 76.

AFD (Active Format Description) Reporting

When AFD is present, status reporting for the presence of AFD information is provided for the SDI input and SDI output as shown in Figure 47 on page 77.

For the AFD Input Status, the following read-only information is provided:

- **AFD Input Status** – reports if AFD data is **Present** or **Not Present**.
- **AFD Input Line** – reports the line number where input AFD data has been detected.
- **Input Aspect Ratio** – reports the aspect ratio of the input signal coded frame (**4:3** or **16:9**).
- **AFD Input Code** – reports the 4-bit AFD code of the input signal. The definition of each 4-bit AFD code is defined in the SMPTE 2016-1:2009, 2016-3:2009 standard.

For the AFD Output Status, the following read-only information is provided:

- **AFD Output Status** – reports if AFD data is **Present** or **Not Present** in the output signal.
- **AFD Output Line** – the AFD input line offset from the current input standard switching line is computed and added to the current output standard switching line to get the AFD Output Line number. If this line number exceeds the VBI, the the AFD Output line is set to the default value with is the switching line plus four lines according to the AFD SMPTE standard.
- **Output Aspect Ratio** – reports the aspect ratio of the input signal coded frame (**4:3** or **16:9**).
- **AFD Output Code** – reports the 4-bit AFD code of the output signal. The resulting AFD Output Code is determined by the module software according to specific software programming to meet the SMPTE AFD requirements.

Refer to the Appendix, *Active Format Description* on page 117, for detailed information on SMPTE AFD code definitions and requirements and how to use the aspect ratio controls with signals containing AFD information.

Figure 45. Aspect Ratio Web Page without AFD

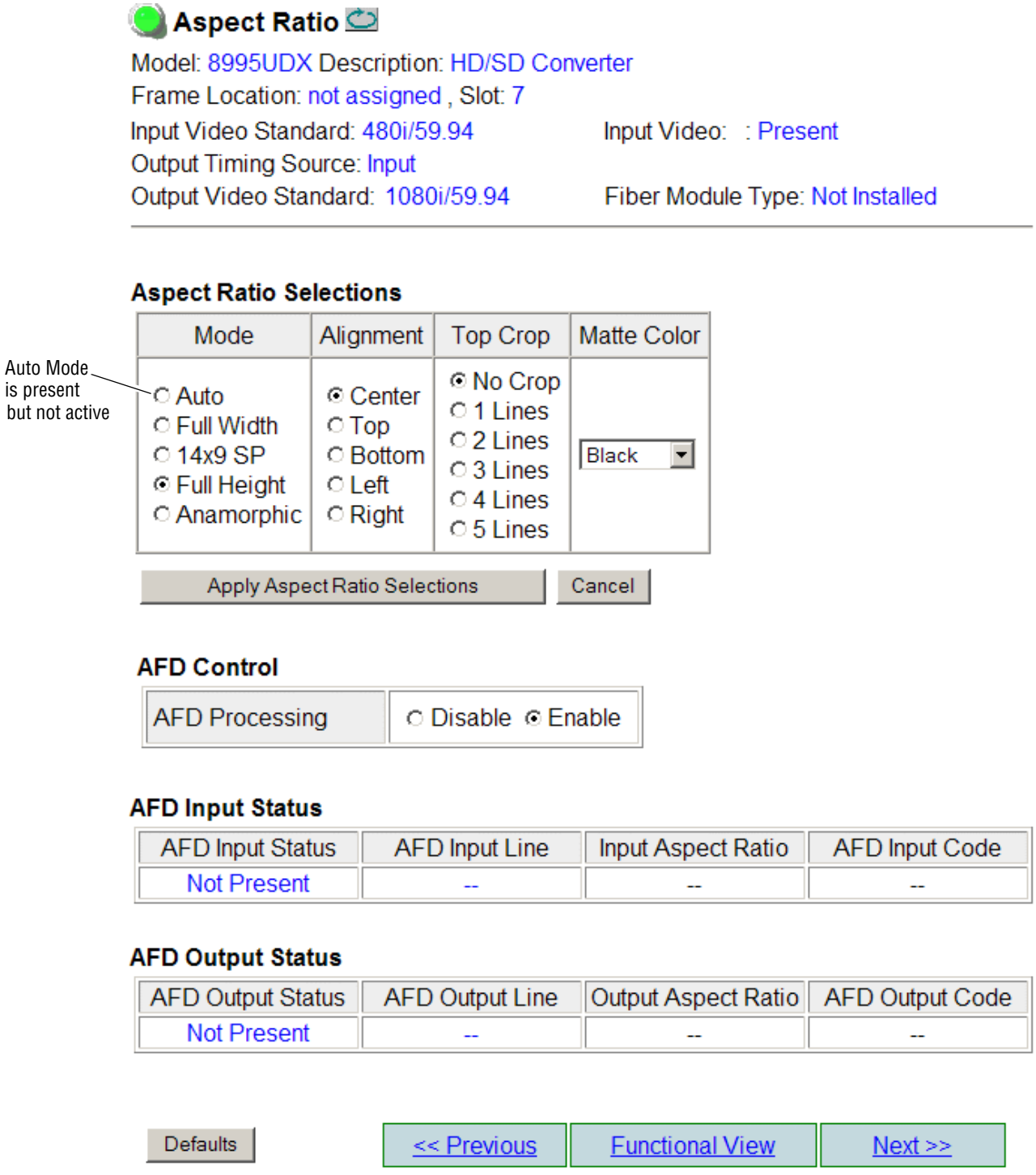


Figure 46. Aspect Ratio Web Page with AFD Disabled

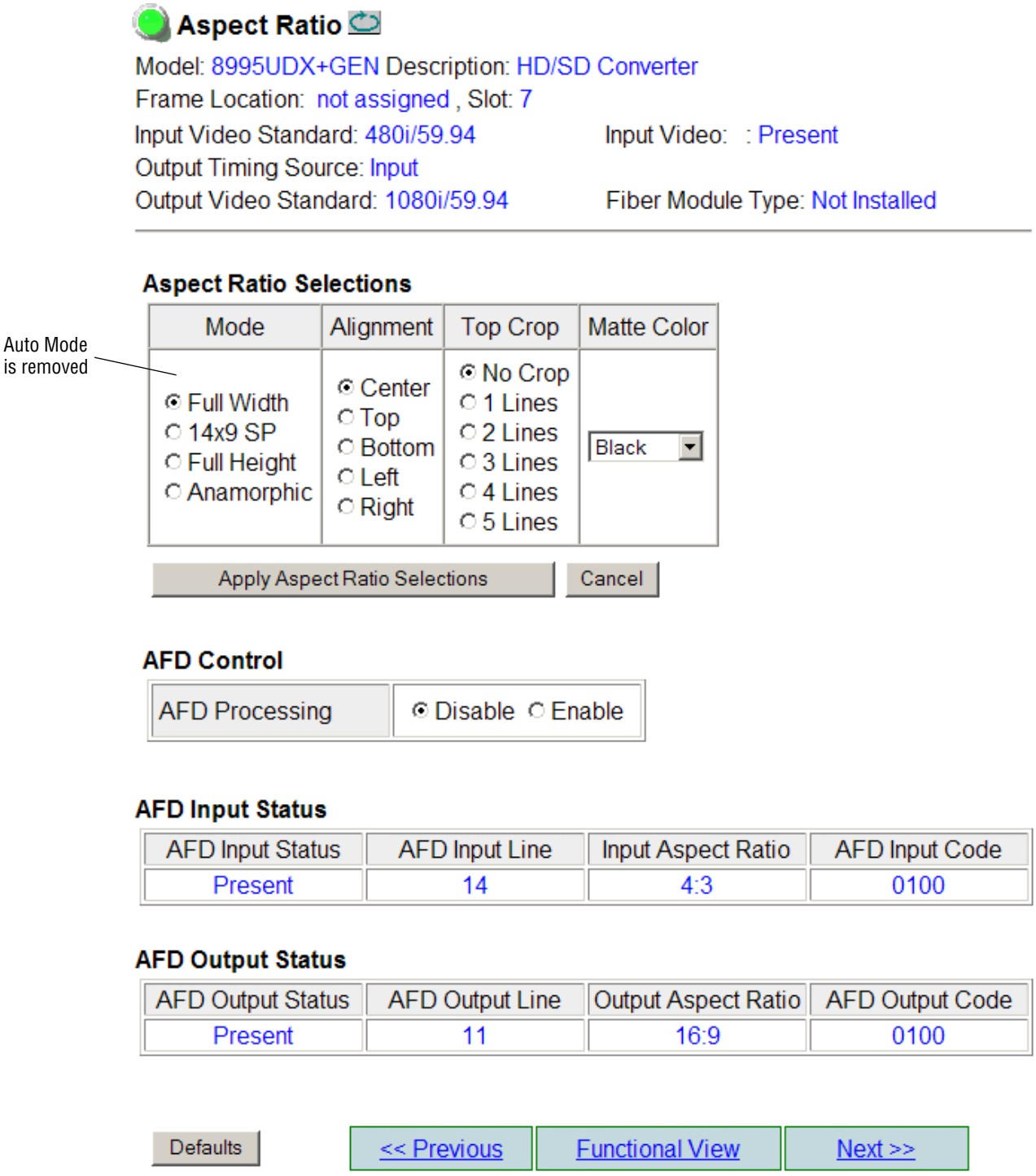
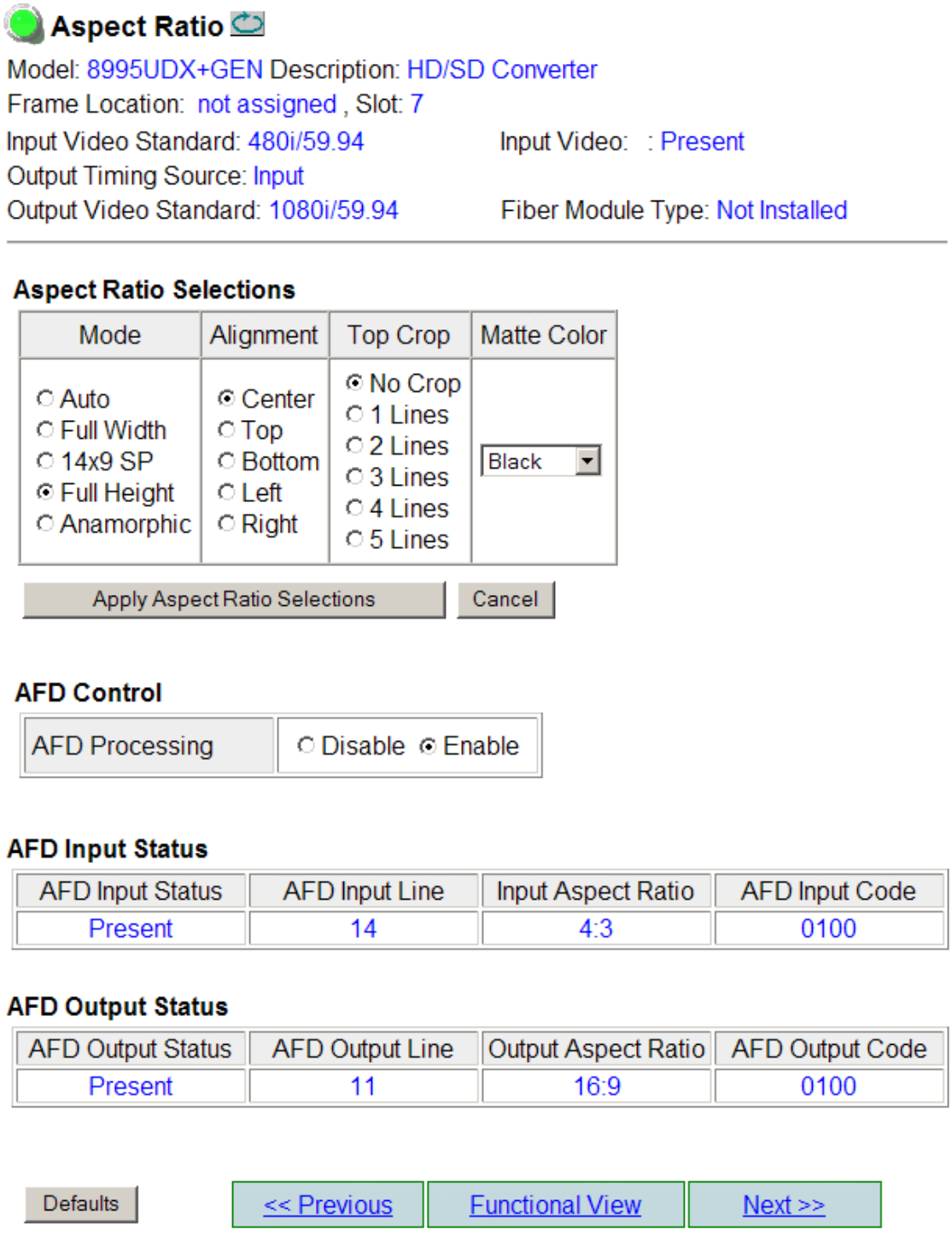


Figure 47. Aspect Ratio Web Page with AFD Present and Enabled



Video Out Web Page

Use the Video Out web page (Figure 48) to enable or disable the SFP Fiber Optic submodule outputs when present and enable or disable audio re-embedding.

Note Fiber optic outputs will be present when either a Dual Transmitter option is installed (TX1 and TX2) or a transceiver (TX2) is installed. Refer to Table 1 on page 19 for the correct submodule to use with your software version.

Output Enables

This section allows enabling of the following for the video output signal:

- **Fiber TX1** – check the **Enabled** checkbox to enable the output of the Dual Transmitter submodule installed.
- **Fiber TX2** – check the **Enabled** checkbox to enable the output from the Dual Transmitter or a Transceiver submodule.
- **Audio Re-Embedding** – checking this checkbox enables re-embedding of the audio on the output signal. For no embedded audio on the output, leave this unchecked.

Figure 48. Fiber Out Web Page

Audio Input Status Web Page

The Audio Input Status web page (Figure 49) reports the following for embedded audio in the video input signal:

- **Input Stream Name** – identifies the Group and Stream number of the embedded audio in the input video
- **Signal Present** – reports whether the stream within the audio group contains an audio signal.
- **Capability** – reports whether the detected audio has 20 or 24 bit capability.
- **Audio Mode** – identifies the detected audio as Audio or Non-audio.

Use this link

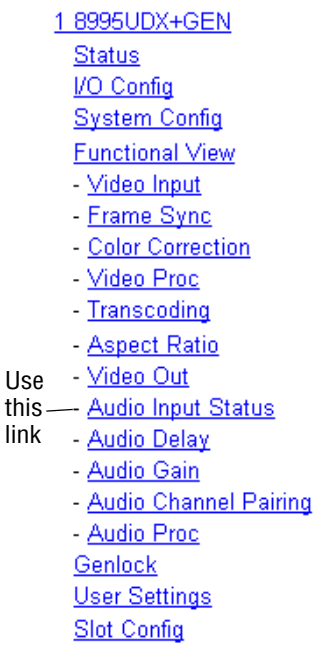


Figure 49. Audio Input Status Web Page

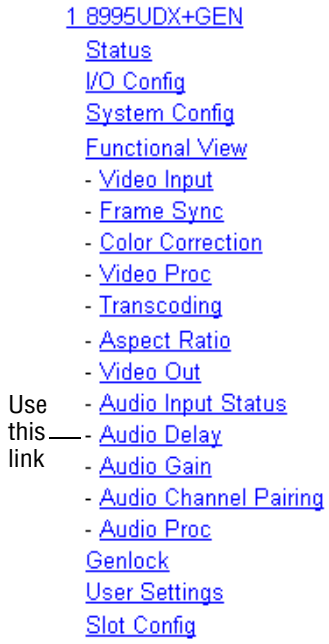
Audio Input Status

Model: 8995UDX+GEN Description: HD/SD Converter
Frame Location: RF Cube , Slot: 1
Input Video Standard: 480i/59.94 Input Video: : Present
Output Timing Source: Ref 1
Output Video Standard: 1080i/59.94 Fiber Module Type: Not Installed

Input Stream Name	Signal Present	Capability	Audio Mode
SDI Input.G1.S1	Present	20 Bit	Audio
SDI Input.G1.S2	Present	20 Bit	Audio
SDI Input.G2.S1	Present	20 Bit	Audio
SDI Input.G2.S2	Present	20 Bit	Audio
SDI Input.G3.S1	Present	20 Bit	Audio
SDI Input.G3.S2	Present	20 Bit	Audio
SDI Input.G4.S1	Present	20 Bit	Audio
SDI Input.G4.S2	Present	20 Bit	Audio

<< Previous | Functional View | Next >>

Audio Delay Web Page



The Audio Delay web page (Figure 50 on page 81) allows selection of the eight audio streams in the four audio groups for audio delay adjustment with respect to video delay for Channel A and Channel B.

Audio Disruption Processing

This control can be enabled to disable V-fade and X-fade operations so audio clicks and pops are not passed to the output.

View Select

Select the audio streams to view and adjust for delay by selecting one of the following buttons:

- Streams (1-2)
- Streams (3-4)
- Streams (5-6)
- Streams (7-8)

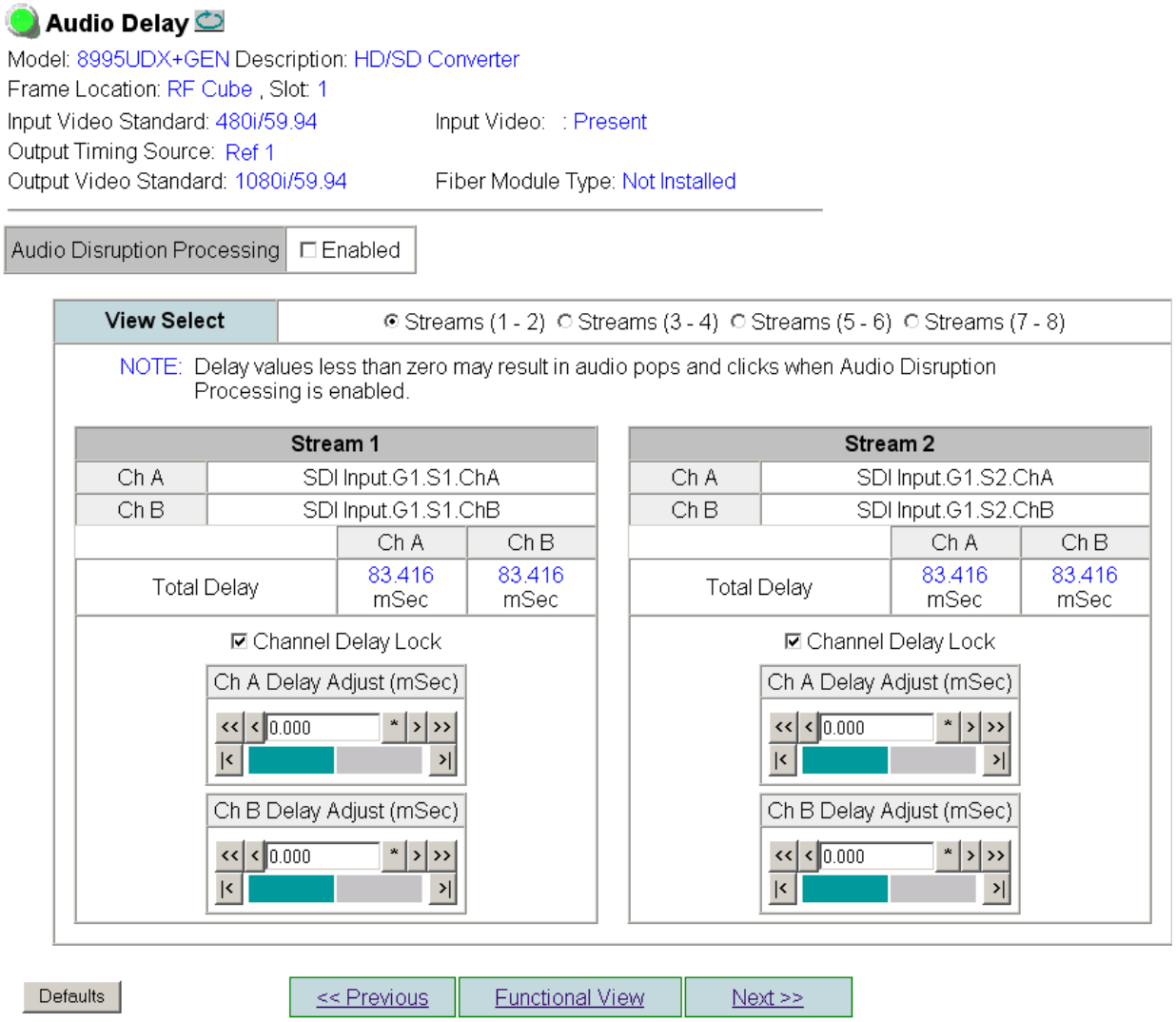
Stream (1-2) is illustrated in Figure 50 on page 81. Under each stream, the Channel A and Channel B group and stream numbers will be reported.

Delay

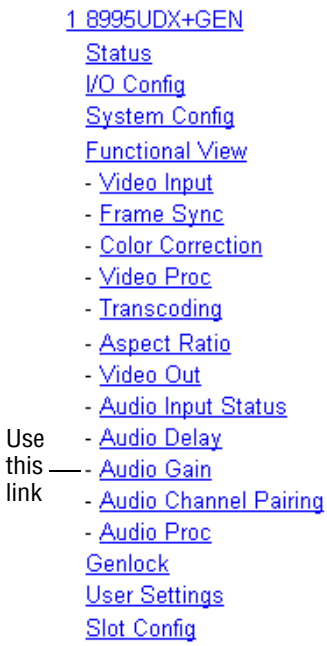
Use the Delay controls for Channel A and Channel B to adjust the individual channel delay from ±33.786ms (29.97Hz), ±40ms (25Hz), and ±41.708ms (24Hz) with respect to video delay.

To lock the channel delay setting together, select the **Channel Delay Lock** checkbox.

Figure 50. Audio Delay Web Page



Audio Gain Web Page



The Audio Gain web page (Figure 51 on page 83) allows selection of the eight audio streams in the four audio groups for gain adjustment in Channel A and Channel B.

View Select

Select the audio streams to view and adjust for gain by selecting one of the following buttons:

- Streams (1-2)
- Streams (3-4)
- Streams (5-6)
- Streams (7-8)

Stream (1-2) is illustrated in Figure 51 on page 83. Under each stream, the Channel A and Channel B group and stream numbers will be reported.

Gain

Use the Gain controls for Channel A and Channel B to adjust the individual channel gain from -40 to + 6 dB.

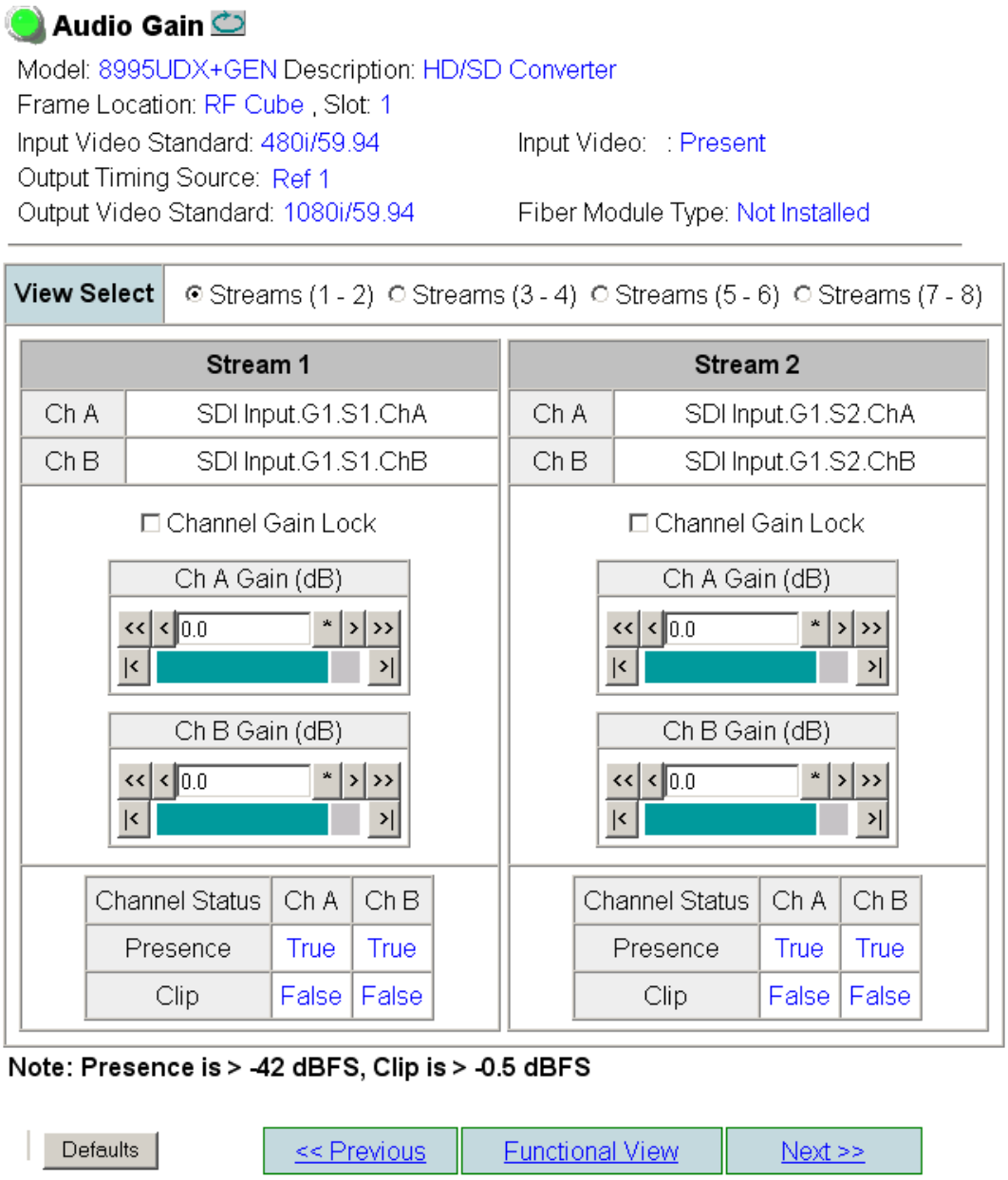
To lock the channel gains together, select the **Channel Gain Lock** checkbox.

Channel Status

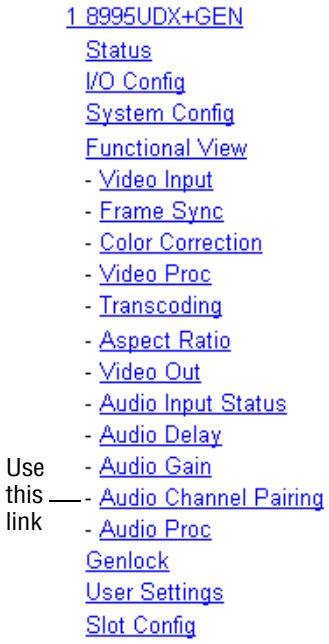
The following status items are reported for Channel A and Channel B for each stream in a table under the Gain controls:

- Under **Presence**, A report of **True** indicates that an audio signal of > -42 dBfs is present. **False** indicates the signal exceeds this level or is not present.
- Under **Clip**, a report of **True** indicates that the signal is clipping above -0.5dBfs. **False** indicates the signal is > -0.5 dBfs.

Figure 51. Audio Gain Web Page



Audio Channel Pairing Web Page



The Audio Channel Pairing web page (Figure 52 on page 85) allows Channel A and Channel B in each audio stream in each audio channel (1-8) of each audio group (1-4) to be passed through with no re-pairing or recombined into new pairs, streams, and groups.

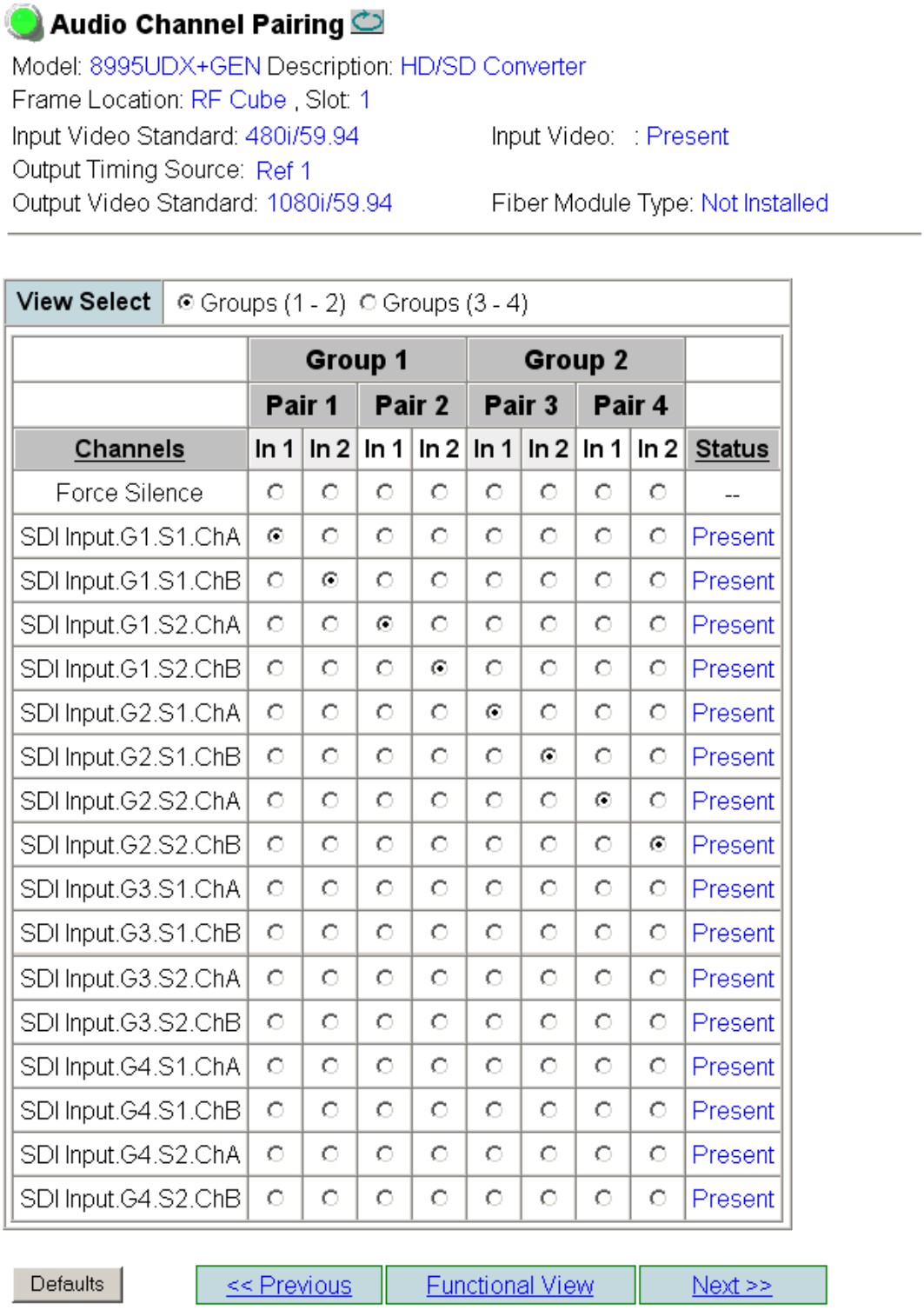
The rows represent the audio input channels and the columns represent the audio output pairs. The columns are grouped together into four different pairs.

Status of each audio stream is given a **Present** or **Not Present**.

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

The resulting choices will be the embedded audio configuration in the video output signal.

Figure 52. Audio Channel Pairing Web Page



Audio Channel Pairing

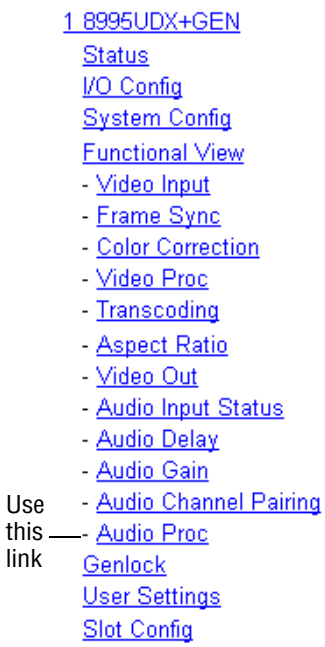
Model: 8995UDX+GEN Description: HD/SD Converter
Frame Location: RF Cube , Slot: 1
Input Video Standard: 480i/59.94 Input Video: : Present
Output Timing Source: Ref 1
Output Video Standard: 1080i/59.94 Fiber Module Type: Not Installed

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

	Group 1				Group 2				
	Pair 1		Pair 2		Pair 3		Pair 4		
Channels	In 1	In 2	In 1	In 2	In 1	In 2	In 1	In 2	Status
Force Silence	○	○	○	○	○	○	○	○	--
SDI Input.G1.S1.ChA	◉	○	○	○	○	○	○	○	Present
SDI Input.G1.S1.ChB	○	◉	○	○	○	○	○	○	Present
SDI Input.G1.S2.ChA	○	○	◉	○	○	○	○	○	Present
SDI Input.G1.S2.ChB	○	○	○	◉	○	○	○	○	Present
SDI Input.G2.S1.ChA	○	○	○	○	◉	○	○	○	Present
SDI Input.G2.S1.ChB	○	○	○	○	○	◉	○	○	Present
SDI Input.G2.S2.ChA	○	○	○	○	○	○	◉	○	Present
SDI Input.G2.S2.ChB	○	○	○	○	○	○	○	◉	Present
SDI Input.G3.S1.ChA	○	○	○	○	○	○	○	○	Present
SDI Input.G3.S1.ChB	○	○	○	○	○	○	○	○	Present
SDI Input.G3.S2.ChA	○	○	○	○	○	○	○	○	Present
SDI Input.G3.S2.ChB	○	○	○	○	○	○	○	○	Present
SDI Input.G4.S1.ChA	○	○	○	○	○	○	○	○	Present
SDI Input.G4.S1.ChB	○	○	○	○	○	○	○	○	Present
SDI Input.G4.S2.ChA	○	○	○	○	○	○	○	○	Present
SDI Input.G4.S2.ChB	○	○	○	○	○	○	○	○	Present

Defaults << Previous Functional View Next >>

Audio Proc Web Page



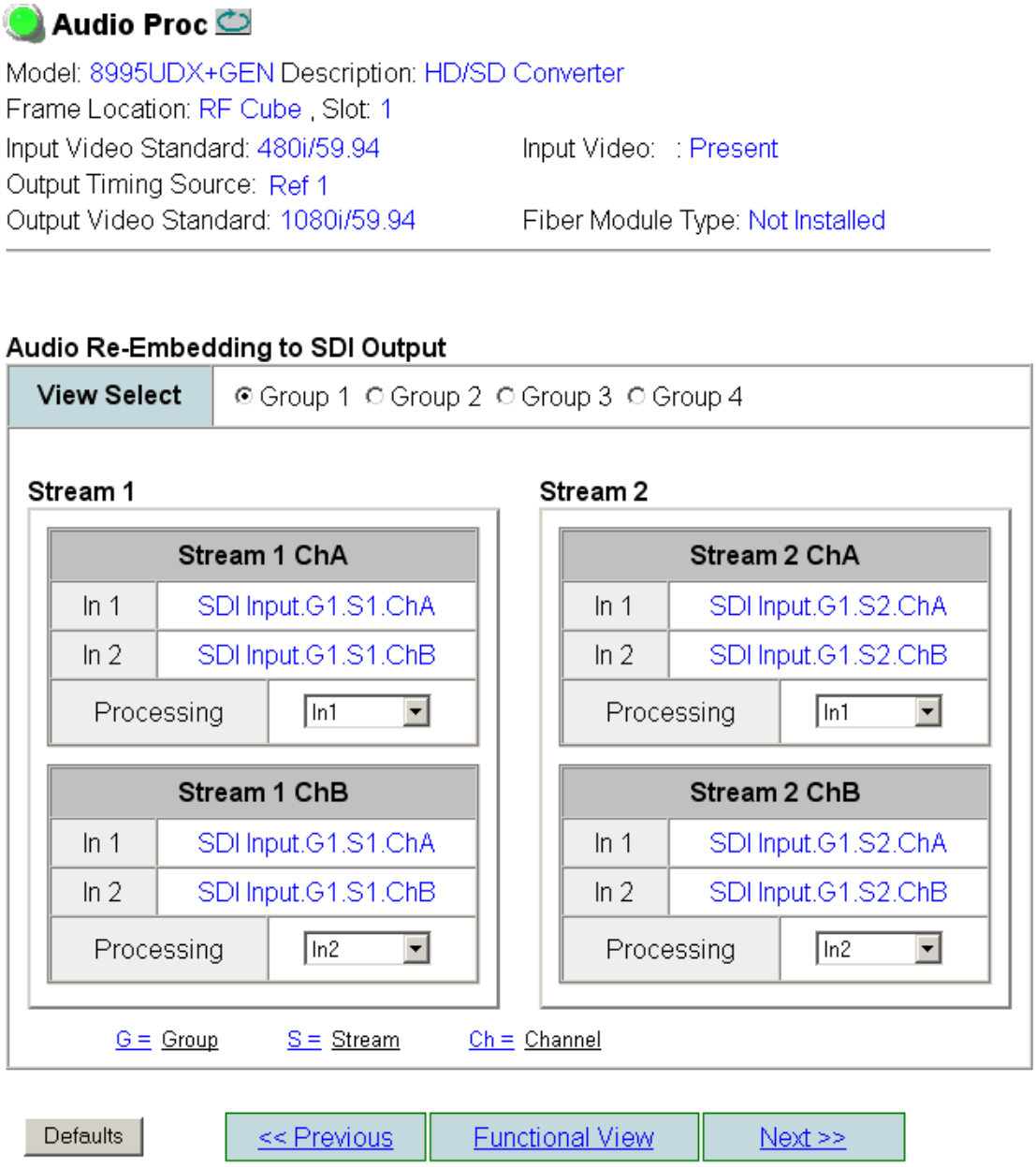
The Audio Proc web page (Figure 53 on page 87) allows selection of the audio processing output for Channel A and Channel B in each Stream of audio in the four audio groups, Groups 1-4. Each audio group had two streams, each with two channels A and B.

One of the following audio processing choices can be made for Stream 1 and Stream 2, Channel A and Channel B for all four audio groups:

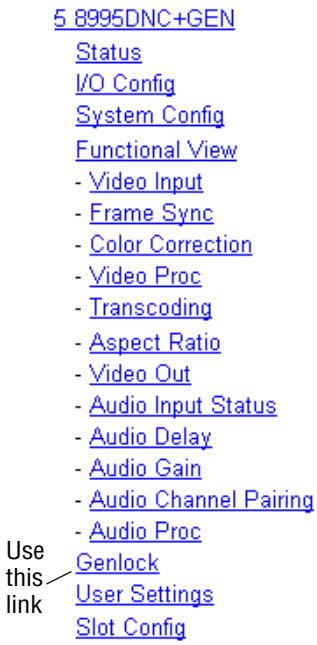
- In1
- -In1
- In2
- -In2
- In1 + In2
- -(In1+ In2)
- In1-In2
- -(In1-In2)
- 1 KHz
- 400 Hz
- Silence

Note To re-embed the processed audio into the video output stream, make sure the **Audio Re-Embedding Enable** checkbox on *Video Out Web Page* on page 78 is selected.

Figure 53. Audio Proc Web Page



Genlock Web Page



The Genlock web page (Figure 54 on page 89) is present on 8995 links when an 8900GEN-SM submodule is installed on the module.

Refer to the *8900GEN-SM Installation Manual* available online for complete details for configuring the 8900GEN-SM submodule. Also refer to *Genlock Submodule Installation* on page 16 for installation information.

This web page provides reporting status for the following genlock status items:

- Genlock – reports status of Genlock function as **Enabled** or **Freerun**.
- Status – reports whether the reference input is **Locked** or **Not Locked**.
- Firmware Version – reports the firmware version of the 8900GEN-SM submodule installed on this 8995 module.
- Hardware Revision – reports the hardware version of the 8900GEN-SM submodule installed on this 8995 module.
- Ref Input Standard – reports the reference input standard as detected by the 8900GEN-SM submodule that is connected to the Genlock Loop on the 8900GFR-R rear module.
- Ref Input Frame Rate – reports the frame rate of the reference input as detected by the submodule.
- Output Bus Frame Rate – reports the frame rate being output on the frame bus.
- Output Bus – reports the reference bus (Ref Bus 1 or Ref Bus 2) being output from the submodule.

Genlock Control

The following controls are available for configuring the Genlock submodule:

- **Enable** or **Freerun** – select one of the radio buttons to enable the Genlock submodule or allow the reference to freerun.
- **Input Standard Selection** – use this control to set the input standard needed for the reference input. Refer to
- **Loop Bandwidth** – set this control for either fast locking (**Fast Lock**) to the reference or for the lowest jitter performance (**Low Jitter**) depending on the stability of the reference signal being used.

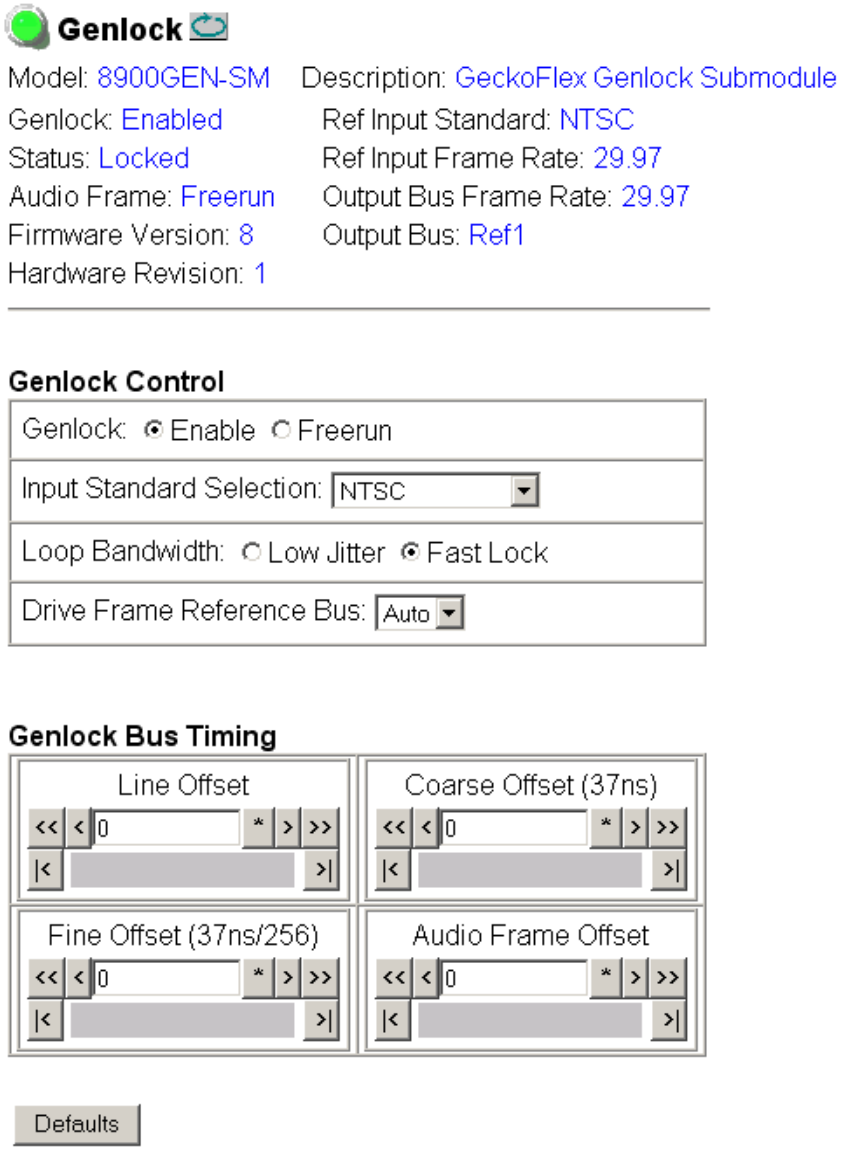
  For example, if Low Jitter is selected and the Status is still **Invalid** after one minute has passed, the input reference has excessive wander that cannot be tracked in Low Jitter mode. Switch to **Fast Lock** and verify Status is **Locked** after about 10 seconds.

Genlock Timing

Use the following controls to adjust the output timing of the genlock reference signal from this submodule:

- **Line Offset** – adjust the reference timing stream by standard definition line steps up to one full frame.
- **Coarse Offset** – provides coarse adjustment of the reference timing stream by 37 ns steps up to one line.
- **Fine Offset** – provides fine adjustment of the reference timing stream by steps up to 37 ns.

Figure 54. Genlock Web Page



The external reference fed to the Genlock submodule must be configured to one of the frame rates in the reference Input Standard Selection pulldown on the Genlock web page. Table 8 lists the available frame rates in the pulldown and the compatible reference inputs that will report a locked condition on the Genlock web page.

Note If the Input Selection Standard selected on the Genlock web page does not match the reference input exactly, a warning will be generated.

Table 8. Reference Frame Rate Compatibility

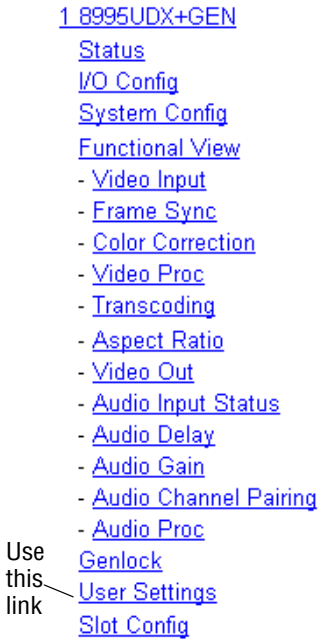
Input Standard Selection (Genlock web page)	Reference Detected	Mismatch Warning
NTSC	NTSC	None
	1080i 59.94 TLS	Yes[1]
	720p 59.94	Yes[1]
PAL	PAL	None
	1080i 50 TLS	Yes[1]
	720p 50 TLS	Yes[1]
1080i 59.94 TLS	1080i 59.94 TLS	None
	NTSC	Yes[1]
	720p 59.94 TLS	Yes[1]
720p 59.94 TLS	720p 59.94 TLS	None
	NTSC	Yes[1]
	1080i 59.94 TLS	Yes[1]
1080i 50 TLS	1080i 50 TLS	None
	PAL	Yes[1]
	720p 50 TLS	Yes[1]
720p 50 TLS	720p 50 TLS	None
	PAL	Yes[1]
	1080i 50 TLS	Yes[1]
1080p 24 TLS	1080p 24 TLS	Not used in this release
	1080sf 24 TLS	
	PAL	
	1080i 50 TLS	
	720p 50 TLS	
1080 sf 24 TLS	1080p 24 TLS	Not used in this release
	1080sf 24 TLS	
	PAL	
	1080i 50 TLS	
	720p 50 TLS	
1080p 23.98 TLS	1080p 23.98 TLS	None
	NTSC	Yes[1]
	1080i 59.94 TLS	Yes[1]
	720p 59.94	Yes[1]

Table 8. Reference Frame Rate Compatibility

Input Standard Selection (Genlock web page)	Reference Detected	Mismatch Warning
AES 48K	AES 48K	None
	AES 96K	Yes[1]
	Word Clock 48K	Yes[1]
	Work Clock 96K	Yes[1]
AES 96K	AES 96K	None
	AES 48K	Yes[1]
	Word Clock 48K	Yes[1]
	Work Clock 96K	Yes[1]
Word Clock 48K	Word Clock 48K	None
	AES 48K	Yes[1]
	AES 96K	Yes[1]
	Work Clock 96	Yes[1]
Word Clock 96K	Word Clock 96K	None
	AES 48K	Yes[1]
	AES 96K	Yes[1]
	Work Clock 48K	Yes[1]

[1] This input standard will lock but will generate a Warning on both the Genlock and Status web pages but will not affect the locked condition.

User Settings Web Page



The User Settings web page (Figure 55) provides the following File Operations for saving and recalling user settings and factory defaults:

- Save to... and Load from... functions are provided for saving the current module configuration to a file or loading a previously saved file, and
- Factory recall for default settings and default signal names.

Figure 55. User Settings Web Page

File Operations

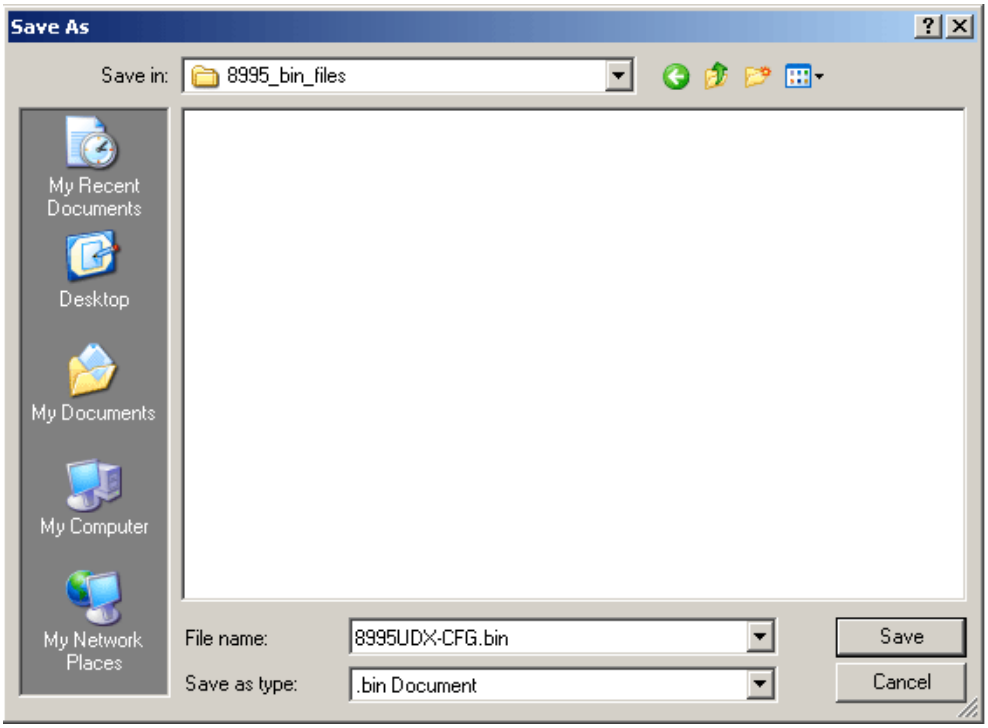
Configuration files from the 8995 module may be saved to a file and stored offline for later recall.

Note Always do this before a software update to preserve your configuration. After any software update, your must recall factory default settings and names.

To save a file, do the following:

1. Save the current configuration on the module to a file by selecting the **Save to…** button which will bring up the File Download screen (not shown).
2. In the File Download screen select **Save**.
3. This will bring up the Save As screen shown in Figure 56 on page 93.
4. Enter a name in the File name field. This file is saved as a .bin type.

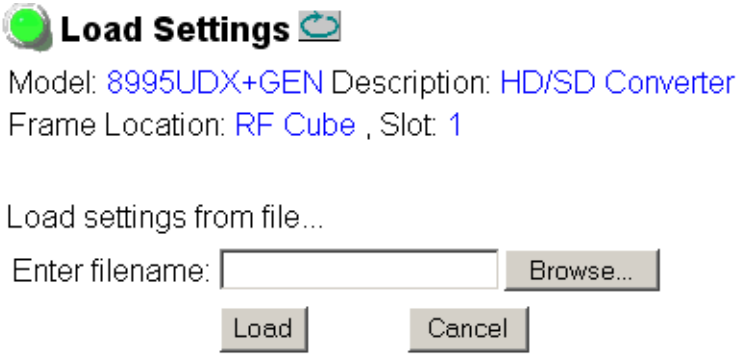
Figure 56. Save Module Configuration.



To load and recall a file, do the following:

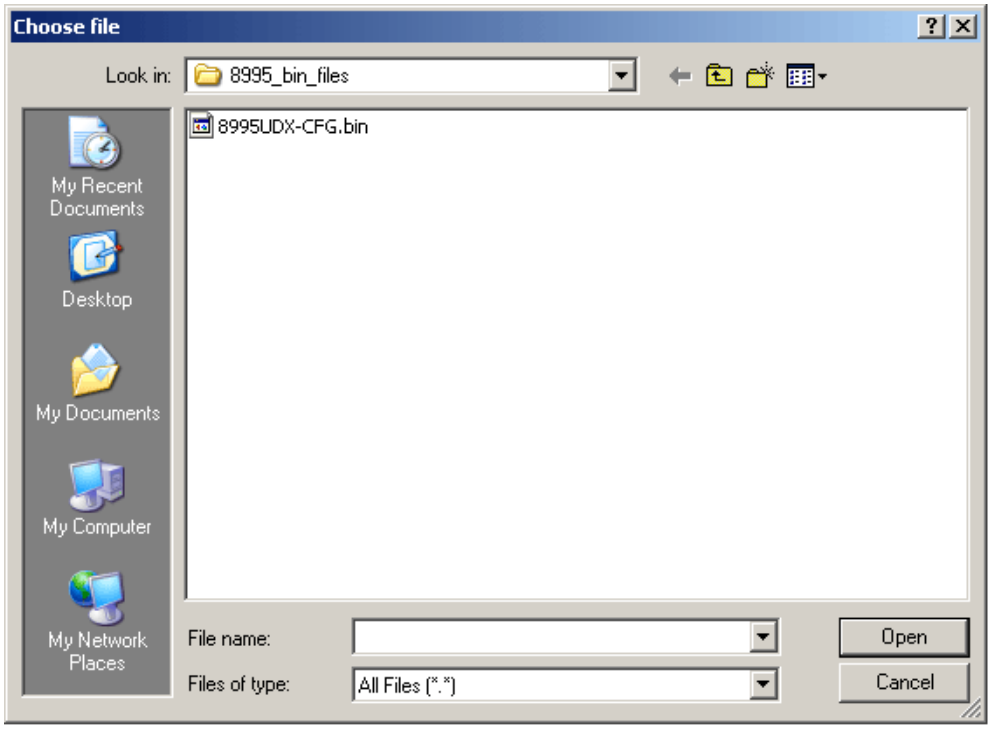
1. Selecting the **Load From...** button on the User Settings web page (Figure 55 on page 92) which will bring up the Load Settings web page shown in Figure 57.
2. Enter a path and file name or select **Browse...** to locate the directory where the files have been saved.

Figure 57. Load Settings Configuration.



3. This will bring up the Choose File screen shown in Figure 58 on page 94.

Figure 58. Choose File Screen



4. Select a file to load and then press **Open** to bring the file into the filename field.

5. Press the **Load** button in the Load From... web page (Figure 57 on page 93) to load the file to the module.

Use the two recall buttons at the bottom of the web page to do the following:

- **Set Factory Defaults** – select the **Set Factory Defaults** button to recall factory settings to the module. Defaults for all module parameters are listed in Table 13 on page 111.
- **Set Factory Names** – select the **Set Factory Names** button to recall factory signal names to the module. Defaults for all signal names are displayed on the I/O Config web page shown in Figure 24 on page 47.

Note As mentioned in a previous note, recalling default factory settings and names must be done after any software update. This writes over your current configuration so follow the instructions for saving your configuration before updating software.

Slot Config Web Page

Use the Slot Config web page (Figure 59) to perform the following functions on the module:

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

Each of these functions is described in detail below.

Figure 59. Slot Config Web Page

Locate Module

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

Slot Identification

You may identify the module by typing a specific name in the **Name** field. The assigned name is stored on the 8900NET module and travels with the 8900NET module if it is moved to another frame. Select **Default** to enter the factory default module name.

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

Slot Memory

The slot configuration for each media module is automatically polled and refreshed periodically (about every 50 minutes) by the 8900NET module when the **Always Slot Refresh** checkbox on the 8900NET Configuration web page (with 4.3.0 software) and/or the **Restore upon Install** checkbox on any media module Slot Config web page is selected.

When the **Restore upon Install** checkbox on any media module Slot Config web page has been selected, the current configuration from that module is saved in slot memory on the 8900NET module. This allows the current module to be removed and when another module of the same part number, and software version is installed, the configuration saved to the 8900NET module will be downloaded to the installed module. The **Restore upon Install** checkbox must be selected before the current module with the saved configuration is removed.

Note Make sure all modules of the same model type are running the same software version and have the same part number silk-screened on the printed circuit board. Downloading a configuration to a module with a different software version or part number can produce unexpected results.

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

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 8900NET module. If the 8900NET module is removed or powered down, the stored configurations are not saved.

When no **Restore upon Install** checkboxes on any of the media module Slot Config web pages are selected and the **Always Slot Refresh** checkbox on the 8900NET Configuration web page is unchecked, the slot refresh polling function on the 8900NET module will be disabled. See the **Always Slot Refresh** checkbox description in the *8900NET (Net Card) Network Interface Module Instruction Manual* for more details.

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

Frame Health Reporting

This web page allows configuration of the alarms and warnings that are reported to the external Frame Health Alarm connector on the rear of the GeckoFlex frame. Refer to *8900NET Instruction Manual* for more details.

LED Reports Link

Select the LED Reports link to open the 8900NET LED Reporting web page. Normally, every module in the frame will report to the 8900NET module any Fault, Signal Loss, Reference Loss, or Config Error conditions. These conditions will be reflected by the status LEDs on the 8900NET module. Using this web page, any of these conditions can be disabled from being reported to the 8900NET module for each individual module and other components (power supplies, fans) in the frame

SNMP Trap Reports Link

Select the SNMP Trap Reports link to open the 8900NET SNMP Reporting web page. This link will only be present when SNMP Agent software has been installed on the 8900NET module. This web page allows configuration of which alarms and warnings that are reported to the SNMP management software.

Refer to the *8900NET Instruction Manual* for complete details on using the 8900NET web pages.

Software Updating

Software updating of the 8995 modules is done using the NetConfig Networking Application PC option available free of charge from Grass Valley or the microSD method using a memory card and adapter (if required) provided by the customer. Refer to the latest module release notes for complete software updating details.

All modular Modular product documentation, including the latest release notes, can be found in PDF format on the Grass Valley web site at this link:

www.grassvalley.com/docs/modular

Specifications

Table 9. 8995 Module Specifications

Parameter	Value
Serial Digital Input	
Number and type of input	1 non-isolated terminating BNC
Input impedance	75 ohm
Input return loss	> 15 dB from 5 MHz to 1.5 GHz
Input DC tolerance	± 0.25 V maximum
Serial mode hum voltage	1 V p-p to 60 Hz maximum
Auto equalization	• 325 meters of Belden 1694A or 270 Mb/s • 125 meters of Belden 1694A for 1.5 Gb/s
Reclocking	Yes
Input signal type	• 480i-(SD 59.94) • 720p-(59.94 • 1080i-(59.94) • 576I-(SD 50) • 720p-(50) • 1080i-(50) • 1080p-(23.98)
Input auto sensing	Yes
AFD (Active Format Description) reporting	SMPTE 2016-1:2009, 2016-3:2009
Reference Signal Input (8900GEN-SM Genlock Submodule Installed)	
Signal Type	
Analog color black	525i/59.9(NTSC); 625i/50(PAL-B); SMPTE318M (NTSC with 10 field AES ID)
Tri-level sync	720p59.94; 1080i59.94, 720p50, 1080i50, 1080p23.98
4 V composite sync	Not supported
Active video	Not supported due to effects on timing
Reference signal level	300 mV p-p +/- 6 dB
Reference signal to noise ratio (S/N)	> 46 dB S/N
Serial Digital Outputs	
Connector type	Coax BNC, optional fiber optic SFP
Number of outputs	4
Output impedance	75 ohm
Return loss	> 15 dB 5 MHz-270 MHz > 15 dB typical 270 MHz -1.5 GHz
Output signal level	SDI 800 mV p-p, +/- 10%
Rise/fall time (20-80%)	140 ps for HD 500 ps for SD
Output jitter (FS mode, in low jitter mode)	< 0.2 UI > 100KHz for HD < 1.0 UI 10 Hz-100KHz for HD < 0.2 UI 10 Hz and up for SD

Table 9. 8995 Module Specifications

Parameter	Value		
Electrical Length			
Minimum Delay Mode Output Video Delays with respect to Input or Reference Timing Source			
Note the following about Minimum Delay Mode:			
In Minimum Delay Mode with zero user-input delay, the electrical length of the module is one frame period of the input video format. Use of Minimum Delay Mode with a genlock reference assumes that the user has control over the input video delay with respect to that reference, and that delay is less than approximately +/-100 pixel periods			
Input-timed delays are output video frame start with respect to input video frame start.			
Genlock delays are output video frame start with respect to reference signal frame start when the input video is exactly aligned to that reference signal.			
Delay range is shown in whole frames, from N to M, but in all cases the true range limits are N minus 5 lines and M minus 5 lines.			
Two delay values are shown for 720p to interlaced conversions when Input-timed because interlaced output field position is arbitrary in this case.			
Video Conversion	**Timing Mode**	**Output Video Delay**	**Delay Range**
480i/59.94 – 480i/59.94	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
480i/59.94 – 1080i/59.94	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
480i/59.94 – 720p/59.94	Genlock	2.0 frames	2.0 to 16.0
	Input	2.0 frames	2.0 to 16.0
480i/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	0.8 to 6.4
	Input		0.8 to 6.4
1080i/59.94 – 480i/59.94	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
1080i/59.94 – 1080i/59.94	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
1080i/59.94 – 720p/59.94	Genlock	2.0 frames	2.0 to 16.0
	Input	2.0 frames	2.0 to 16.0
1080i/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	0.8 to 6.4
	Input		0.8 to 6.4
720p/59.94 – 480i/59.94	Genlock	0.5 frames	0.5 to 4.0
	Input	0.5/1.0 frames	0.5 to 4.0
720p/59.94 – 1080i/59.94	Genlock	0.5 frames	0.5 to 4.0
	Input	0.5/1.0 frames	0.5 to 4.0
720p/59.94 – 720p/59.94	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
720p/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	0.4 to 3.2
	Input		0.4 to 3.2
1080p/sf/23.98 – 1080p/23.98	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
1080p/sf/23.98 – 480i/59.94	Genlock	Delay not deterministic	1.2 to 10.0
	Input		1.2 to 10.0

Table 9. 8995 Module Specifications

Parameter	Value		
1080p/sf/23.98 – 1080i/59.94	Genlock	Delay not deterministic	1.2 to 10.0
	Input		1.2 to 10.0
1080p/sf/23.98 – 720p/59.94	Genlock	Delay not deterministic	2.4 to 20.0
	Input		2.4 to 20.0
576i/50 – 576i/50	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
576i/50 – 1080i/50	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
576i/50 – 720p/50	Genlock	2.0 frames	2.0 to 16.0
	Input	2.0 frames	2.0 to 16.0
1080i/50 – 576i/50	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
1080i/50 – 1080i/50	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8
1080i/50 – 720p/50	Genlock	1 frame	1.0 to 16.0
	Input	1 frame	1.0 to 16.0
720p/50 – 576i/50	Genlock	0.5 frames	0.5 to 4.0
	Input	0.5/1.0 frames	0.5 to 4.0
720p/50 – 1080i/50	Genlock	0.5 frames	0.5 to 4.0
	Input	0.5/1.0 frames	0.5 to 4.0
720p/50 – 720p/50	Genlock	1 frame	1 to 8
	Input	1 frame	1 to 8

Table 9. 8995 Module Specifications

Parameter	Value
Full-Frame Mode Output Video Delays with respect to Input or Reference Timing Source	
Note the following about Full Frame Mode:	
In Normal Delay Mode with Input-Timed video and zero user-input delay, the electrical length of the module is two frame periods of the input video format. Genlock timing of the module produces an electrical length that varies between two and three frame periods of the input video format. For synchronous input video, the electrical length is a constant value between two and three frame periods minus 5 line periods. For asynchronous input video the electrical length slowly decreases to two frame periods minus 5 line periods or increases to three frame periods minus 5 line periods, beyond which it snaps back to the opposite extreme	
Input-timed delays are output video frame start with respect to input video frame start.	
Genlock delays are output video frame start with respect to reference signal frame start when the input video is exactly aligned to that reference signal.	
Delay range is shown in whole frames, from N to M, but in all cases the true range limits are N minus 5 lines and M minus 5 lines.	
Two delay values are shown for 720p to interlaced conversions when Input-timed because interlaced output field position is arbitrary in this case.	

Video Conversion	Timing Mode	Output Video Delay	Delay Range
480i/59.94 – 480i/59.94	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
480i/59.94 – 1080i/59.94	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
480i/59.94 – 720p/59.94	Genlock	4 frames	4.0 to 18.0
	Input	4 frames	4.0 to 18.0
480i/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	1.6 to 7.2
	Input		1.6 to 7.2
1080i/59.94 – 480i/59.94	Genlock	3 frames	2 to 9
	Input	3 frames	2 to 9
1080i/59.94 – 1080i/59.94	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
1080i/59.94 – 720p/59.94	Genlock	4 frames	4.0 to 18.0
	Input	4.0 frames	4.0 to 18.0
1080i/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	1.6 to 7.2
	Input		1.6 to 7.2
720p/59.94 – 480i/59.94	Genlock	1.5 frames	1.0 to 4.5
	Input	1.0/1.5 frames	1.0 to 4.5
720p/59.94 – 1080i/59.94	Genlock	1.0 frames	1.0 to 4.5
	Input	1.0/1.5 frames	1.0 to 4.5
720p/59.94 – 720p/59.94	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
720p/59.94 – 1080p/sf/23.98	Genlock	Delay not deterministic	3.2 to 14.4
	Input		3.2 to 14.4
1080p/sf/23.98 – 1080p/sf/23.98	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
1080p/sf/23.98 – 480i/59.94	Genlock	Delay not deterministic	2.4 to 11.25
	Input		2.4 to 11.25
1080p/sf/23.98 – 1080i/59.94	Genlock	Delay not deterministic	2.4 to 11.25
	Input		2.4 to 11.25

Table 9. 8995 Module Specifications

Parameter		Value		
1080p/sf/23.98 – 720p/59.94	Genlock	Delay not deterministic	4.8 to 22.5
	Input		4.8 to 22.5
576i/50 – 576i/50	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
576i/50 – 1080i/50	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
576i/50 – 720p/50	Genlock	4 frames	4.0 to 18.0
	Input	4 frames	4.0 to 18.0
1080i/50 – 576i/50	Genlock	3 frames	2 to 9
	Input	3 frames	2 to 9
1080i/50 – 1080i/50	Genlock	2 frames	2 to 9
	Input	2 frames	2 to 9
1080i/50 – 720p/50	Genlock	3 frames	3.0 to 18.0
	Input	3 frames	3.0 to 18.0
720p/50 – 576i/50	Genlock	1.0 frames	1.0 to 4.5
	Input	1.0/1.5 frames	1.0 to 4.5
720p/50 – 576i/50	Genlock	1 frames	1.0 to 4.5
	Input	1.0/1.5 frames	1.0 to 4.5
720p/50 – 576i/50	Genlock	2 frames	2 to 9
	input	2 frames	2 to 9
Power			
Power dissipation	18.5 W (with Genlock and fiber optic submodules)		
Mechanical			
Frame type	GeckoFlex		
Number of frame slots required	2 adjacent front and rear slots		
Rear module type	8900UDX-R		
Rear module retainer clip screw torque	4-5 inch-lb./0.45-0.6Nm		
Environmental			
Frame temperature range	Refer to GeckoFlex Frames 8900FX/FF/FFN Signal Processing Systems Instruction Manual at: www.grassvalley.com/docs/modular		
Operating humidity range			
Non-operating temperature			

The frame phase relationship between the SDI video stream and the analog reference signal is established according to SMPTE RP 168-2002. This defines the SDI video frame start occurring *N* pixel periods before the frame start of the analog video reference signal. *N* is defined for each video format in Table 10.

Table 10. Frame Phase Relationship

Format	Standard	N
408i59.94	SMPTE 125M-1995	16
576i50	Rec. ITU-R BT.656-4	12
1080i59.94	SMPTE 274M-1998	88
720p59.94	SMPTE 296M-2001	110
1080i50	SMPTE 274M-1998	528
720p50	SMPTE 296M-2001	440
1080sF24	Not used in this release	
1080p24	Not used in this release	
1080p23.98	SMPTE 274-1998	638

In Minimum Delay mode, the UDX module is calibrated to give one frame of delay through the frame sync portion when the User-Programmable Delay is zero. The remaining delay through the module is about one input-video frame. The delay numbers indicate the following:

For Genlock Mode: table entries indicate the delay in output video frame start from the genlock reference frame start when the input video is exactly aligned with that reference.

For Input-Timed Mode: table entries indicate the delay in output video frame start from the input video frame start position.

Table 11. SFP Receiver/Transceiver Fiber Optic Submodule Specifications

Model Number	**SFP-13103G-M1DRX**	**SFP-13103G-M1TRX**
Low wavelength	1260nm	1260nm
High wavelength	1620nm	1620nm
Receiver channels	2	1
Connector type	LC	
Fiber support	Single mode	
Data rate	50Mb/s to 3Gb/s	
Maximum distance @ 3Gb/s	10km	
Minimum distance	30km	

Table 12. SFP Transmitter/Transceiver Fiber Optic Submodule Specifications

Model Number	**SFP-13103G-M1DTX**	**SFP-13103G-M1TRX**
Wavelength 1	1310 nm	1310 nm
Wavelength 2	1310 nm	N/A
Transmit channels	2	1
Connector type	LC	
Fiber support	Single-mode	
Data rate	143 Mb/s to 2.97 Gb/s	
Power output	-5 to 0 dBm (-2dBm typical)	
Maximum distance	10 km[1]	
Maximum distance	20 km	

[1] The 1310 nm Dual Transmitter (SFP-13103G-M1DTX) and Transceiver (SFP-13103G-M1TRX) require no attenuation between fiber transmitter and receiver connections at any length.

Status Monitoring

There are a number of ways to monitor frame and module status. These methods are summarized here. For more detailed information, refer to the *8900NET (Net Card) Network Interface Module Instruction Manual* and the *8900 Gecko* or *8900 GeckoFlex Frame Instruction Manuals.*

All modular product documentation is available on-line in PDF format at this link*:*

http://www.grassvalley.com/docs/modular

The main status monitoring methods include the following:

- External frame alarm output on the rear of the 8900 frame with reporting from the Module Health Bus and other frame status alarm reports,
- LEDs on the Frame, 8900NET module, and individual frame media modules,
- Web browser status reporting for each frame component, and
- SNMP traps, captured by Grass Valley's NetCentral or another SNMP Manager Application.

Note SNMP trap information is only available when an SNMP Agent has been installed and configured.

External Frame Alarm

An external Frame Alarm output is available on pins 8 and 9 of the RS-232 connector on the rear of the frame. The Frame Alarm outputs a voltage level indicating there is an alarm condition on the Module Health Bus or one of the other frame components reported to the Frame Monitor module in a Gecko 8900TF or GeckoFlex 8900FF frame or the 8900NET module in an 8900TFN and GeckoFlex 8900FFN frame.

- The Module Health bus is a separate line on the frame motherboard that provides a means for older or less capable modules (such as DAs with no microprocessor) that cannot communicate over the Frame (serial) bus to report warning and alarm conditions to the external Frame Alarm. All media modules in the frame report a voltage level to this line when a warning condition occurs on the module. The specific warning or module location is not reported, only an indication that an warning condition has occurred.
- Frame alarm reporting from other frame components can be enabled and disabled using DIP switches on the Frame Monitor and 8900NET module. For frames with an 8900NET module, the Frame Alarm Reporting web page allows configuration of the alarms and warnings that are reported to this external Frame Health Alarm.

LED Reporting

LEDs on the front of media modules, the Frame Monitor or 8900NET modules, and the front covers of the 8900TF/TFN and GeckoFlex FF/FFN frames indicate status of the frame and the installed power supplies, fans in the front covers, and module status. (The 8900TX-V/A and GeckoFlex 8900FX frames have no LED indicators on the front cover.)

- LED reporting from the modules in the frame to the 8900NET module is configurable using the 8900NET LED Reporting web page.
- The Status LEDs for this module are described in *Operation Indicator LEDs* on page 24. LEDs for the 8900NET module are described in the *8900NET (Net Card) Network Interface Instruction Manual*.

Web Browser Interface

The 8900NET module controls a web browser GUI that indicates frame and module status on the following web pages:

- Frame Status web page – reports overall frame and module status in colored graphical and text formats. Refer to Figure 16 on page 37 for an example.
- Module Status web page (Figure 22 on page 44) – shows specific input and reference signal configuration error status to the module along with module status and information (part number, serial number, hardware version, software/firmware/boot versions, and Asset number (as assigned on the Slot Config web page).
- A Status LED icon on each web page reflects the module status on the module Status web page where warnings and faults are displayed and is a link to the module Status web page.

SNMP Reporting

The Gecko 8900 Series system uses the Simple Network Monitoring Protocol (SNMP) internet standard for reporting status information to remote monitoring stations. When SNMP Agent software is installed on the 8900NET module, enabled status reports are sent to an SNMP Manager such as the Grass Valley's NetCentral application.

Status reporting for the frame is enabled or disabled with the configuration DIP switches on the 8900NET module. Most module status reporting items can be enabled or disabled on individual configuration web pages.

Service

The 8995 modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit boards should not be serviced in the field unless directed otherwise by Customer Service.

Power-Up Diagnostic Failure

If the module has not passed self-diagnostics, do not attempt to trouble-shoot. Return the unit to Grass Valley (see *Module Repair*).

Troubleshooting

Electronic Circuit Breaker

An electronic circuit breaker on the module works during a fault condition or an overcurrent to cut off power to the module in place of a fuse.

If power has been cut off to module, remove the module and replace it in the frame to reset. If the problem persists contact Grass Valley Customer Service.

Module Repair

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

Refer to *Contacting Grass Valley* *on page 4* at the front of this document for the Grass Valley Customer Service contact information.

Functional Description

Figure 60 illustrates a block diagram of the 8995UDX modules.

Figure 60. 8995UDX Block Diagram

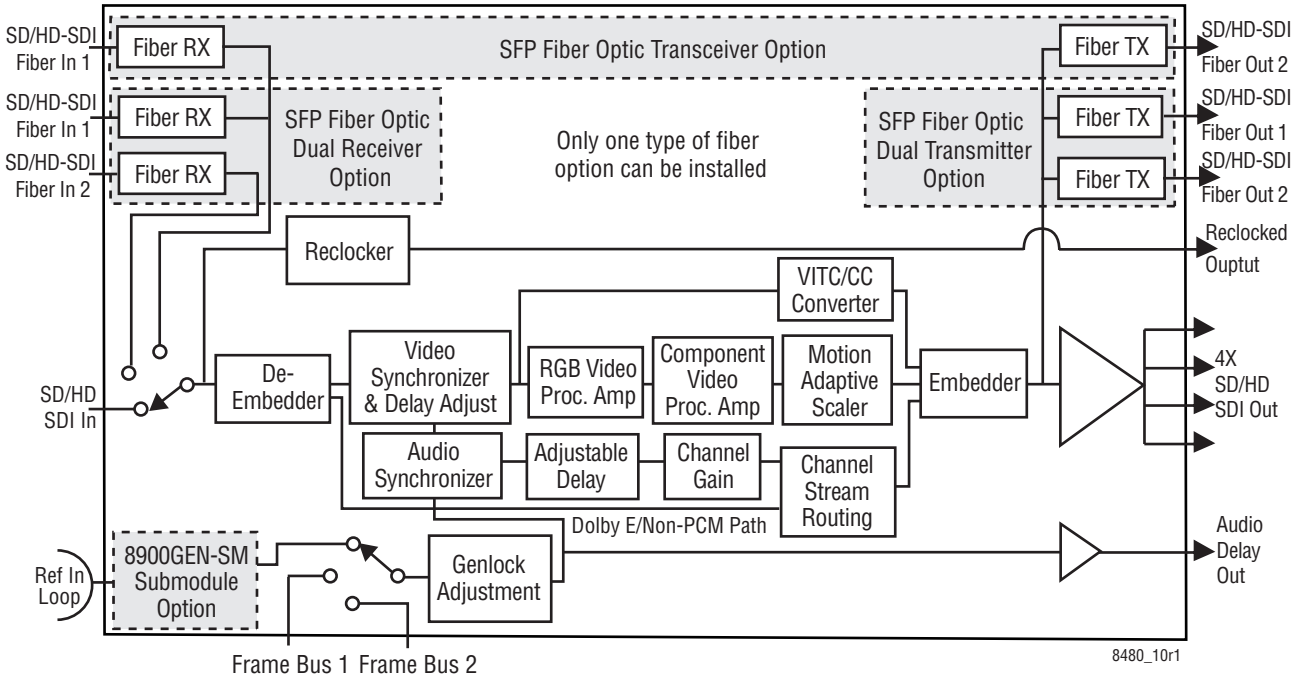


Figure 61 illustrates a block diagram of the 8995UPC modules.

Figure 61. 8995UPC Block Diagram

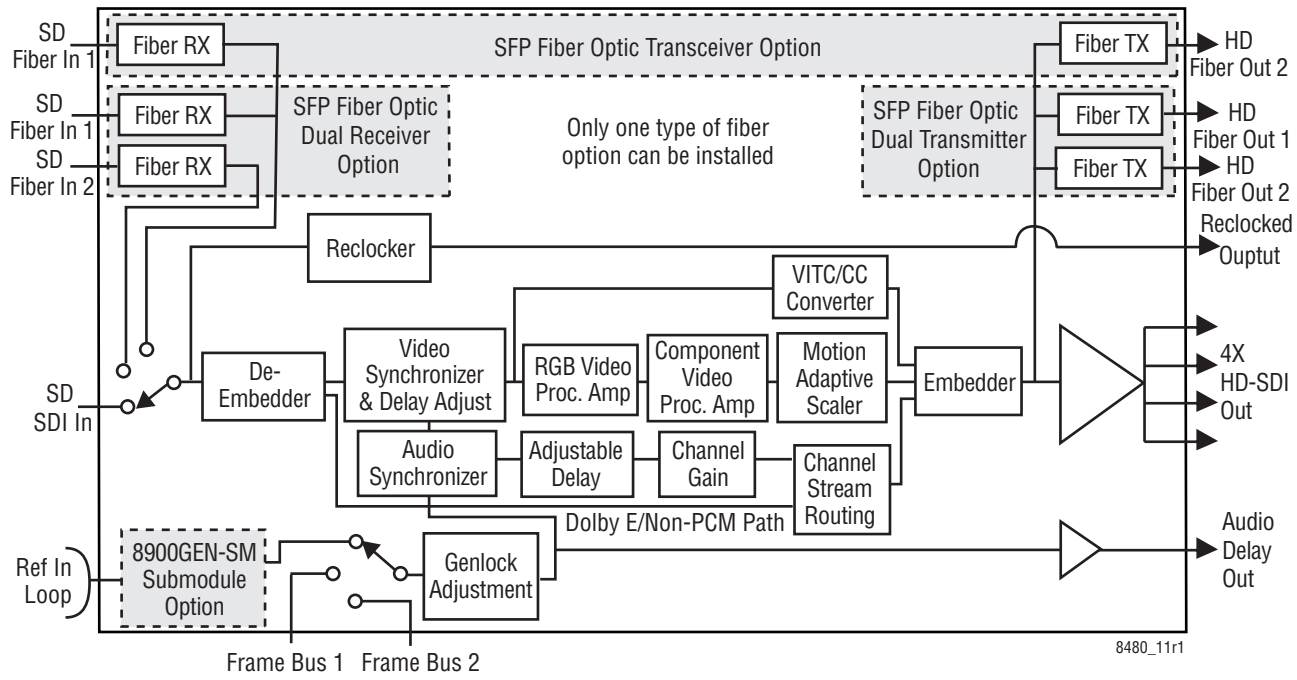
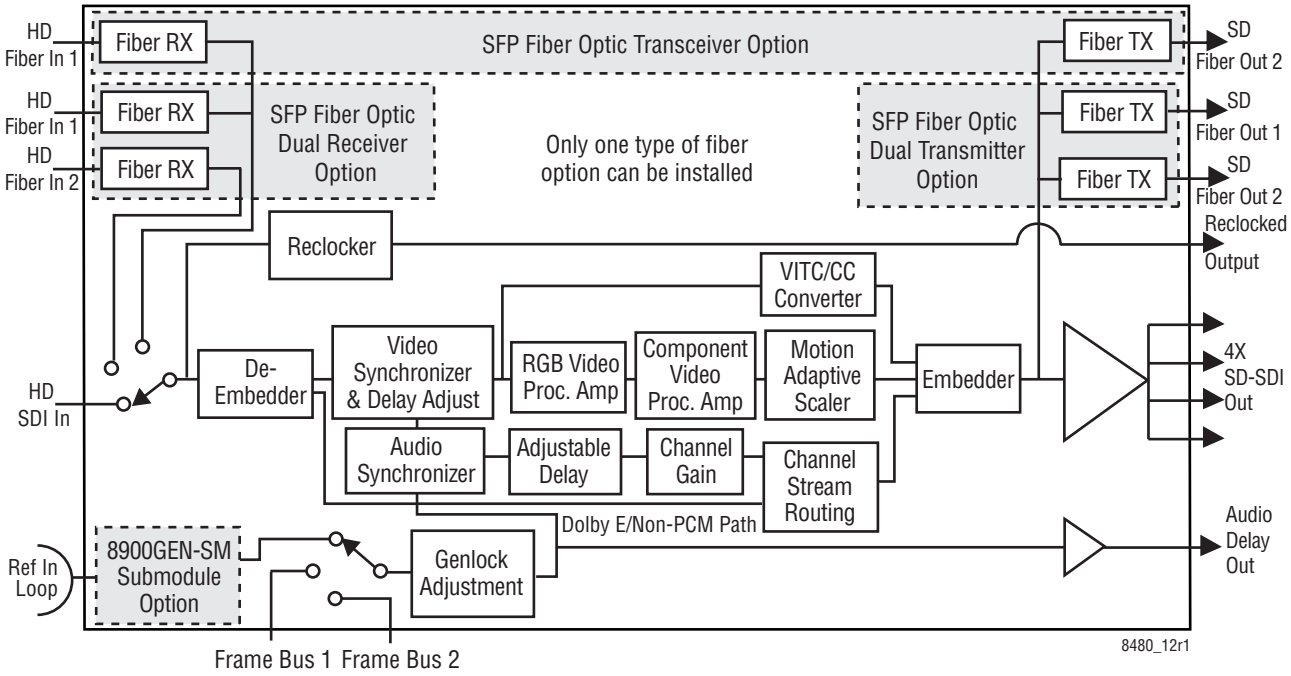


Figure 62 illustrates a block diagram of the 8995UPC modules.

Figure 62. 8995DNC Block Diagram



Configuration Summary Table

Table 13 provides a complete summary of the 8995 module functions and a comparison of the functionality available with each control type along with the ranges and default values for each parameter and notes on each control.

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
Reference Signal Loss Reporting	On	On or Off	I/O Config/ Genlock Ref In Loop Reporting Enabled checkbox	N/A
Coax Input Signal Loss Reporting	On	On or Off	I/O Config/ COAX In Reporting Enabled checkbox	N/A
Fiber Input 1 and 2 Signal Loss Reporting	On	On or Off	I/O Config/ Fiber 1 and Fiber 2 Reporting Enabled checkbox	N/A
Reference input (read-only)	Reports reference input standard selected on Genlock web page			N/A
Input standard	Auto	Auto, 480i-(59.94), 720p-(59.94), 1080i-(59.94), 1080p-(23.98), 1080sf-(23.98) 576i-(50), 720p-(50), or 1080i-(50).	System Config/ Video I/O Configuration/ Input Standard pulldown	InVidStd
Output standard		480i-(59.94), 720p-(59.94), 1080i-(59.94), 1080p-(23.98), 1080sf-(23.98) 576i-(50), 720p-(50), or 1080i-(50).	System Config/ Video I/O Configuration/ Output Standard pulldown	OutVidStd
Test Output Color Bars signal	Disabled	Enable or Disable	System Config/ Test Output/ Colorbars Enabled checkbox	ClrBars
Select primary output timing source	Local	Local, Ref 1, Ref 2, or Input	System Config/ Output Timing Primary Source Selection radio button	RefPri
Select secondary output timing source	Local	Local, Ref 1, Ref 2, or Input	System Config/ Output Timing Secondary Source Selection radio button	RefSec
Select switch to primary source method	Auto	Auto or Manual	System Config/ Reference Restore Switch to Primary pulldown	RefSwBk
Select amount of delay for switching back to primary	30 seconds	30 to 93.97 seconds	System Config/ Reference Restore Reference Switchback Delay (Seconds)	RefSwDly

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
Video Input Selection	COAX	COAX, Fiber RX 1, or Fiber RX 2	Video Input/ Video Input Select Video Input Selection radio button	N/A
Horizontal Timing control	0	See Table 7 on page 60	Frame Sync/ Timing Adjustment/ Horizontal Timing (pixels)	HTiming
Vertical Timing control	0	see Table 7 on page 60	Frame Sync/ Timing Adjustment Vertical Timing (lines)	VTiming
Multi-Frame Delay control	0	0 to 6 Frames	Frame Sync/ Timing Adjustment Multi-Frame Delay (Frames)	MultFrmDly
Minimum Delay Mode enable	Disabled	Enable or Disable	Frame Sync/ Minimum Delay Mode Enable checkbox	MinDly
Loss of signal operation (Output timing set to Local, Ref 1, or Ref 2)	AutoBlue	Pass Auto Freeze, or Auto Blue	Frame Sync/ Loss of Signal Operation radio button	LOS Oper
Manual freeze mode	None	None, Frame, or Field	Frame Sync/ Manual Freeze Mode radio button	ManFrzMode
Adjust R gain	100%	0 to 200% (1% steps)	Color Correction/ R Gain (%)	R Gn
Adjust G gain	100%	0 to 200% (1% steps)	Color Correction/ G Gain (%)	G Gn
Adjust B gain	100%	0 to 200% (1% steps)	Color Correction/ B Gain (%)	B Gn
Adjust total gain	100%	0 to 200% (1% steps)	Color Correction/ RGB Gain	RGB Gn
Adjust R offset	0	±100% (1% steps)	Color Correction/ R Offset (%)	R Off
Adjust G offset	0	±100% (1% steps)	Color Correction/ G Offset (%)	G Off
Adjust B offset	0	±100% (1% steps)	Color Correction/ B Offset (%)	B Off
Adjust total offset	0	0 to 200% (1% steps)	Color Correction/ RGB Offset	RGB Off
Adjust R gamma	1.0	0.25 to 4.00 (0.01 unit steps)	Color Correction/ R Gamma Correction	RGmC
Adjust G gamma	1.0	0.25 to 4.00 (0.01 unit steps)	Color Correction/ G Gamma Correction	GGmC
Adjust B gamma	1.0	0.25 to 4.00 (0.01 unit steps)	Color Correction/ B Gamma Correction	BGmC
Adjust total gamma	100	0.25 to 4.00 (0.01 unit steps)	Color Correction/ Total Gamma Correction	RGBGmC
Adjust Y gain (contrast)	100%	0 to 200% (1% steps)	Video Proc/ Video Processing Controls Y Gain (%)	Y Gain
Adjust color saturation (chroma gain)	100%	0 to 200% (1% steps)	Video Proc/ Video Processing Controls Color Saturation (%)	Chro Gn
Adjust total gain	100%	0 to 200% (1% steps)	Video Proc/ Video Processing Controls Total Gain	VPA Gain

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
Adjust Cb gain	100%	0 to 200% (1% steps)	Video Proc/ Video Processing controls Cb Gain (%)	Cb Gain
Adjust Cr gain	100%	0 to 200% (1% steps)	Video Proc/ Video Processing Controls Cr Gain (%)	Cr Gain
Adjust Cb offset	0	±100% (1% steps)	Video Proc/ Video Processing Controls Cb Offset (%)	Cb Off
Adjust Cr offset	0	±100% (1% steps)	Video Proc/ Video Processing Controls Cr Offset (%)	Cr Off
Adjust Y Offset (brightness)	0	±100% (1% steps)	Video Proc/ Video Processing Controls Y Offset (%)	Y Off
Adjust hue	0	-180 to +179 degrees (1 degree steps)	Video Proc/ Video Processing Controls Hue (Deg)	Hue
Clip enable (enable clip controls)	Disable	Enable or Disable	Video Proc Clip Enable checkbox	ClipEn
Y White Clip% control	109.0%	50 to 109.0%	Video Proc/ Y White Clip% control	YWhtClp
Y Black Clip% control	-7.0%	-7.0 to 50%	Video Proc/ Y Black Clip% control	YBlkClp
C White Clip% control	109.0	50 to 109.0%	Video Proc/ C White Clip% control	CWhtclp
Cadence control	Auto Film/Video (3:2 or 2:2 pulldown)	Auto Film/Video (3:2 or 2:2 pulldown) or Fixed-Video (2:2 pulldown)	Video Proc/ Cadence Cadence radio button	N/A
Enable noise reduction	Disable	Enable or Disable	Video Proc/ Image Enhancement Controls Noise Reduction Enable checkbox	NREnable
Noise level control	0	0 to 63	Video Proc/ Image Enhancement Controls/ Noise Reduction Level control	NRLevel
Edge Expansion enable	Disable	Enable or Disable	Video Proc/ Image Enhancement Controls/ Edge Expansion Enable checkbox	EdgeExp
Extended Color Space enable	Disable	Enable or Disable	Video Proc/ Image Enhancement Controls/ Extended Color Space Enable checkbox	ExtClrSpc
Vertical Edge Filter enable	Disable	Enable or Disable	Video Proc/ Image Enhancement Controls/ Vertical Edge Filter Enable checkbox	VertFltEn
Matte Edge Border enable	Disable	Enable or Disable	Video Proc/ Image Enhancement Controls/ Matte Edge Border Enable checkbox	MatBdrEn
CC (closed captioning) transcoding input signal	Auto	Auto, Digital 708 CC, Digital 608 CC, or Analog CC.	Transcoding/ CC Transcoding/ Input Signal radio buttons	AudTrscdEnab

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
CC (closed captioning) transcoding output signal	None	None, Digital 708 CC, Digital 608 CC Analog CC, or Analog & Digital 608 CC.	Transcoding/ CC Transcoding/ Output Signal radio buttons	CCEnab
VITC (Vertical Interval Time Code) transcoding input signal	Auto	Digital VITC, Analog VITC, or Auto.	Transcoding/ VITC Transcoding/ Input Signal radio buttons	AudTrscdEnab
VITC (Vertical Interval Time Code) transcoding output signal	None	Digital VITC, Analog VITC (SD Output Only), or None.	Transcoding/ VITC Transcoding/ Output Signal radio buttons	AudTrscdEnab
Analog VITC Input Line selection	Line 14	Line 6 to Line 22	Transcoding/ VITC Transcoding/ Input Signal/ Analog VITC Input Line Selection (Lines)	TCInLnSel
Analog VITC Output Line selection	Line 14	AUTO DETECT (Lines 7-19) Line 6 to Line 22	Transcoding/ VITC Transcoding/ Output Signal/ Analog VITC Output Line Selection (Lines)	TCOutLnSel
Enable or Disable Active Format Description (AFD) if present	Enable	Disable or Enable	Aspect Ratio/ AFD Control/ Disable or Enable radio button	N/A
Aspect ratio mode on video output	Full Height	Full Width, 14x9 SP, Full Height, or Anamorphic	Aspect Ratio/ Aspect Ratio Selections Mode radio buttons	ArMode
Aspect ratio alignment of video output image	Center	Center, Top, Bottom, Left, or Right	Aspect Ratio/ Aspect Ratio Selections Alignment radio buttons	PicAlgn
Select amount of cropping of top of output image	No Crop	No Crop, 1 Line, 2 Lines, 3 Lines, 4 Lines, or 5 Lines	Aspect Ratio/ Aspect Ratio Selections Top Crop radio buttons	TopCrop
Aspect ratio alignment of video output image	Black	Black, Gray 1, Gray 2, Gray 3, Gray 4, Gray 5, Gray 6 White, Yellow, Cyan, or Green	Aspect Ratio/ Aspect Ratio Selections Matte Color pulldown	MatteClr
Enable Fiber TX1 output	Disabled	Enabled or Disabled	Video Out/ Fiber TX1 Enabled Checkbox	N/A
Enable Fiber TX2 output	Disabled	Enabled or Disabled	Video Out/ Fiber TX2 Enabled Checkbox	N/A
Audio Re-embedding to re-embed processed audio into video output	Enabled	Enabled or Disabled	Video Out/ Audio Re-embedding Enabled Checkbox	AudXcode
Audio Disruption Processing (enabled turns off V-fade and X-fade to eliminate pops and clicks on outputs).	Disabled	Enabled or Disabled	Audio Delay/ Audio Disruption Processing checkbox	AudDunkEn

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
View Select (Choose audio streams to view for audio delay adjustments)	Streams (1-2)	Streams (1-2), Streams (3-4), Streams (5-6), or Streams (7-8)	Audio Delay/ Stream (1-2), Streams (3-4), Streams (5_6) or Streams (7-8) radio button	N/A
Lock Channels A and B together in each stream for delay adjustment (stereo)	Unlocked	Lock or Unlock	Audio Delay/ Streams (1-2), Streams (3-4), Streams (5-6), and Streams (7-8) Channel Lock checkbox	AudChLk-1-8
Set Channel A and Channel B delay for each audio stream 1-8	0mSec	59.94Hz: -33.786 to +33.786ms 50Hz: -40ms to +40ms 23.98Hz -41.708ms to +41.708ms	Audio Delay/ Stream (1-2), Streams (3-4), Streams (5-6), and Streams (7-8) ChA/ChB Delay Adjust controls (mSec)	AudChDly-1-16
Choose embedded audio streams to view and adjust	Streams (1-2)	Streams (1-2), Streams (3-4), Streams 5-6), or Streams (7-8)	Audio Gain/ View Select Streams (1-2), Streams (3-4), Streams 5-6), Streams (7-8) radio buttons	N/A
Lock Stream 1-8 Channels A and B together for gain adjustment (stereo)	Unlock	Lock or Unlock	Audio Gain/ Channel A and Channel B Gain Lock checkbox	AudChLk1-8
Set audio gain for Channel A and Channel B in Streams 1-8 in Groups 1-4	0 dB	-40 to +6 dB	Audio Gain/ Channel A Gain control Channel B Gain control	AudChGn1-16
Select Audio groups for channel pairing	Groups (1-2)	Groups (1-2) Groups (3-4)	Audio Channel Pairing/ View Select Groups (1-2) and Groups (3-4) radio buttons	N/A
Define audio In1 and In2 for Pairs 1-2 and 3-4 in Groups 1-2 and 3-4 from available channels.	See Range/Choices at right	Force Silence SDI Input G1.S1.ChA SDI Input G1.S1.ChB SDI Input G1.S2.ChA SDI Input G1.S2.ChB SDI Input G2.S1.ChA SDI Input G2.S1.ChB SDI Input G2.S2.ChA SDI Input G2.S2.ChB SDI Input G3.S1.ChA SDI Input G3.S1.ChB SDI Input G3.S2.ChA SDI Input G3.S2.ChB SDI Input G4.S1.ChA SDI Input G4.S1.ChB SDI Input G4.S2.ChA SDI Input G4.S2.ChB	Audio Channel Pairing/ Group (1-2) and (3-4) In1 and In2 for Pairs 1-4 in Groups 1-4 Channel A and Channel B for each stream radio buttons	AudOut1-16
View Select audio Group 1, Group 2, Group 3, or Group 4 for type of audio processing to be re-embedded to SD output. (Note: Audio Re-embedding checkbox on Video Out web page must be checked to re-embed audio to output.	Group 1	Group 1, Group 2, Group 3, or Group 4	Audio Proc/ Audio Re-Embedding to SDI Output View Select Group 1, Group 2, Group 3, or Group 4 radio button	N/A

Table 13. Summary of 8995UDX/UPC/DNC Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Newton Control Panel
Select type of output processing for In1 and In2 in Channel A and Channel B in each Stream in each Group (1-4).	Stream 1 ChA=In1 Stream 2 ChB=In2	In1, -In1, In2, -In2, In1+In2, - (In1+In2), In1-In2, - (In1-In2), 1kHz, 400 Hz, Silence, or ID.	Audio Proc/ Audio Re-Embedding to SDI Output Group 1 Stream 1: ChA and ChB (In1 and In2) Stream 2: ChA and ChB (In1 and In2) Group 2 Stream 3: ChA and ChB (In1 and In2) Stream 4: ChA and ChB (In1 and In2) Group 3 Stream 5: ChA and ChB (In1 and In2) Stream 6: ChA and ChB (In1 and In2) Group 3 Stream 7: ChA and ChB (In1 and In2) Stream 8: ChA and ChB (In1 and In2)	N/A
Genlock Enable	Enable	Enable or Freerun	Genlock/ Genlock Control Enable or Freerun radio button	GLEnable
Genlock Input Standard Selection	NTSC	NTSC, PAL, 1080i 59.95, 720p 59.94, 1080i 50, 720p 50, 1080p 24, 1080sF 24, 1080p 23.98, AES 48K, AES 96K, Word Clock 48K, or Work Clock 96K.	Genlock/ Genlock Control Input Standard Selection pulldown	GLInSel
Select loop bandwidth	Fast Lock	Low Jitter or Fast Lock	Genlock/ Genlock Control Loop Bandwidth radio button	GLLoopBW
Set Line offset for Genlock timing	0	525 rates: 0 to 524 625 rates: 0 to 624	Genlock/ Genlock bus Timing Line Offset control	GLLnOff
Set Coarse Offset for Genlock timing	0	525 rates: 0 to 1715 625 rates: 0 to 1727	Genlock/ Genlock bus Timing Coarse Offset (37ns) control	GLcors
Set Genlock fine offset timing	0	0 to 255	Genlock/ Genlock bus Timing Fine Offset (37ns/256) control	GLfine
Set Genlock audio frame offset timing	0	0 to 4	Genlock/ Genlock Bus Timing Audio Frame Offset control	GLAESFrm
Select Genlock drive frame reference bus	Auto	Off or Auto	Genlock/ Drive Frame Reference Bus pulldown	GLBusDr
Recall factory default parameters	N/A	See Defaults column	User Settings/ Recall Factory Defaults Set Factory Defaults button	N/A
Recall factory names	N/A	See I/O Config web page	User Settings/ Recall Factory Defaults Set Factory Names button	N/A

Active Format Description

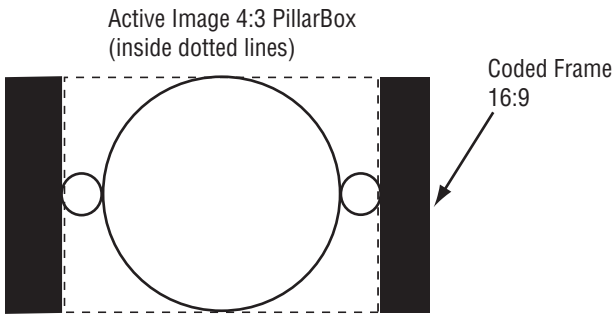
This appendix is provided for a detailed overview of using the Aspect Ratio controls when Active Format Description (AFD) is present on the input signal. When AFD is not present on the input signal or has been disabled on the Aspect Ratio web page, use the Aspect Ratio controls as described in the main body of the manual (*Aspect Ratio Web Page* on page 73).

Active Format Description (AFD) is a 4-bit binary code (a0, a1, a3, a4), which is part of a 10-bit AFD word describing the video picture in terms of the aspect ratio and other characteristics of the active image within a coded frame. AFD also includes an aspect ratio (AR) bit stored as b2 which indicates whether the picture is 16:9 (1) or 4:3 (0).

Note The additional information comprising the 10-bit AFD word, called Bar data, describing the unused areas of active video is currently not supported.

The active image is the portion of the video picture area that is being utilized for program content. The coded frame is the video frame as coded in a compressed bitstream for emission as shown in Figure 63. This manual uses the term coded frame to describe the area including the active video defined by the format standard being described by the AFD.

Figure 63. Active Image and Coded Frame



When the module reports the presence of an AFD coded input in the AFD Status reporting section on the Aspect Ratio web page, the AFD Input Line, the Input Aspect Ratio, and the binary AFD Input Code are reported (see Figure 66 on page 120).

The presence of the resulting output signal is also reported as well as the AFD Output line, Output Aspect Ratio, and binary AFD Output Code. The output translation of the Input to Output code is based on the up or down conversion and the aspect ratio settings. When a 4:3 or 16:9 input signal is passed through the module with no up, down, or cross conversion, the AFD Input Code will be the same as the AFD Output Code.

AFD Tables

The SMPTE 2016-1:2009 and 2016-3:2009 AFD code standards for 4:3 and 16:9 aspect ratio definitions corresponding to the binary codes are illustrated in the following tables:

- AFD Codes in 4:3 Coded Frames (Table 14 on page 123)
- AFD Codes in 16:9 Coded Frames (Table 15 on page 125)

The following tables in this section are provided to give the supported aspect ratio conversions based on the AFD coded input for all modes and alignment settings for both up and down conversion.

Up Conversion (4:3 to 16:9):

- Mode = Full Width (Table 16 on page 127)
- Mode = 14x9 SP (Table 17 on page 128)
- Mode = Full Height (Table 18 on page 129)
- Mode = Anamorphic (Table 19 on page 130)
- Mode = Auto (Table 20 on page 131

Down Conversion (16:9 to 4:3):

- Mode = Full Width (Table 21 on page 132)
- Mode = 14x9 SP (Table 22 on page 133)
- Mode = Full Height (Table 23 on page 134)
- Mode = Anamorphic (Table 24 on page 135)
- Mode = Auto (Table 25 on page 136

Notes on AFD

The 8995 module AFD software programming in **Auto** mode attempts to maximize and preserve the height of an output image while attempting to maintain as much vertical information as possible.

AFD processing can be disabled by selecting the **Disable** radio button in the AFD Control section on the Aspect Ratio web page (Figure 66 on page 120). When AFD is present but disabled, the module will act as if there is no AFD present. The status reporting of the current AFD will be bypassed.

If the output SDI standard is different than the input SDI, the output AFD is normally inserted at the same line offset from the switching line where it is located in the input SDI.

If the output offset turns out to be too large, AFD data is inserted 4 lines after the switching line. When there is a video freeze, AFD is not inserted.

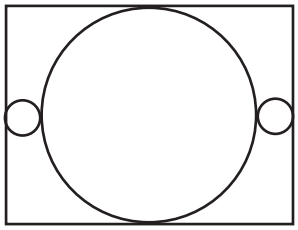
How to Use the AFD Conversion Tables

When an input signal contains an AFD Input Code, the resulting aspect ratio of the output will be based on the AFD Input Code in relation to the up or down conversion process, selections made in the aspect ratio controls, and the supported outputs in the software conversion tables.

Refer to the example Aspect Ratio web page in Figure 66 on page 120. Note that the module is doing an up conversion from 480i/59.94 to 1080i/59.94 as reported in the web page header.

The AFD Input Status is reporting an Input Aspect Ratio of **4:3** and an AFD Input Code of **1000**. To see what SMPTE format this represents, refer to *AFD Definitions For 4:3 Coded Frames* on page 123. In Table 14 on page 123, refer to the Active Formats column and find the illustration of the **1000** binary code aspect ratio. It will look like the illustration in Figure 64. The image is full frame with an aspect ratio that is the same as the 4:3 coded frame.

Figure 64. AFD Input Code = 1000



The current settings for the mode and alignment on the Aspect Ratio web page are **Full Height** and **Center** as shown in the example web page. Because of specific software programming to meet the SMPTE AFD standard, the resulting AFD Output Code is **1001** as reported on the Aspect Ratio web page in the AFD Output Code. This produces an up converted image output similar to the one shown in Figure 65. This image has a 4:3 aspect ratio with a horizontally centered pillarbox in a 16:9 coded frame.

When Mode = **Auto**, the module software is programmed to attempt to preserve full height while keeping as much vertical information as possible while following the SMPTE AFD standard.

Figure 65. AFD Output Code = 1001

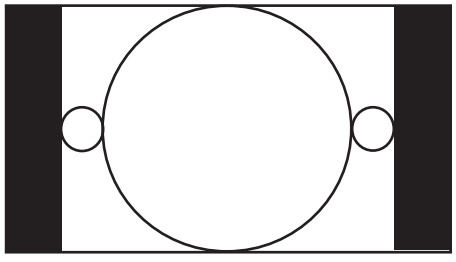
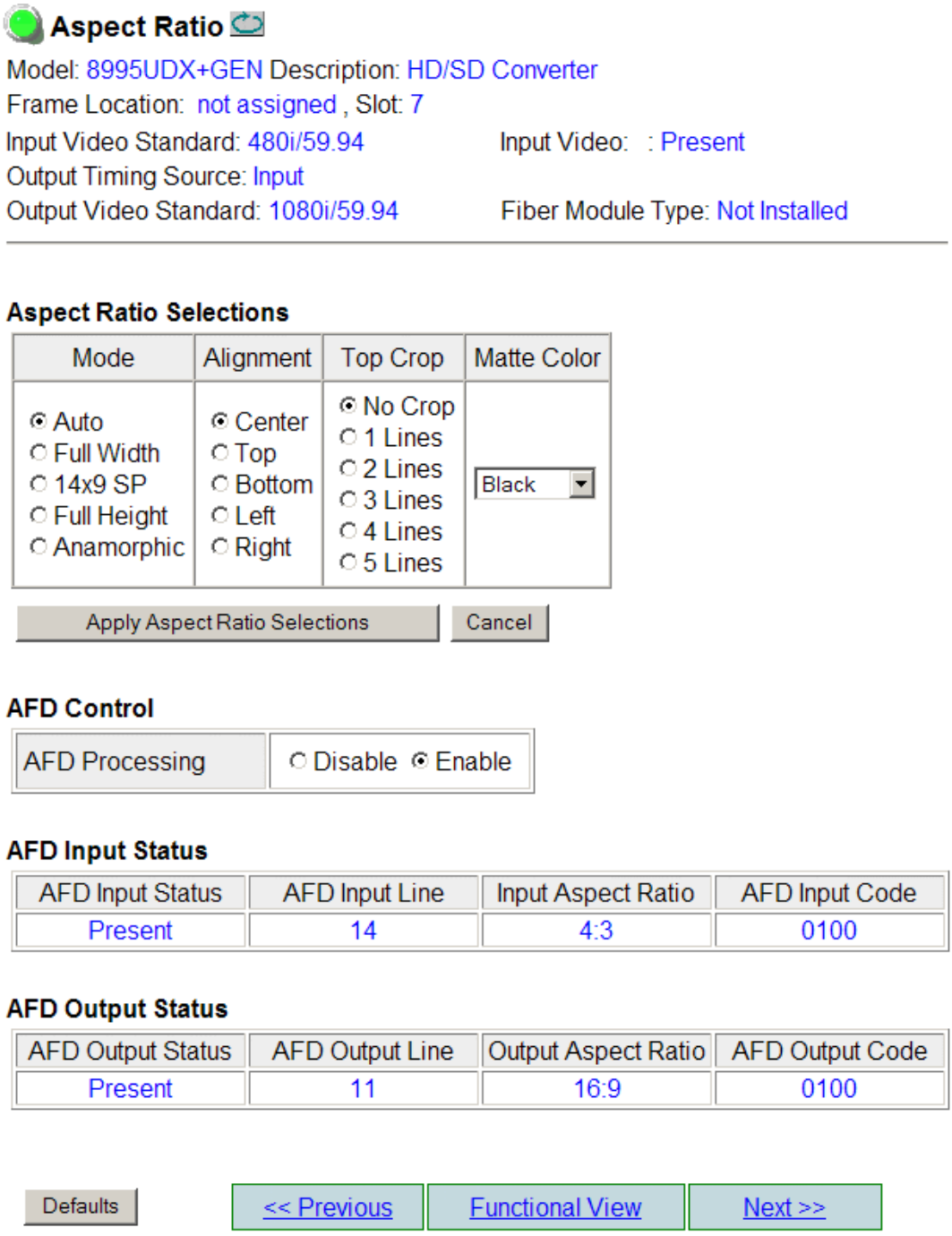


Figure 66. AFD Present in Input Signal



If the user would like to select a different output format, they can select any one of the five aspect ratio modes, **Auto**, **Full Width**, **14x9 SP**, **Full Height**, or **Anamorphic** with any one of the five alignment choices. Not all resulting outputs are supported by the SMPTE standard. Unsupported outputs will report an AFD Output Code of **0000** or undefined.

Use the Input Code in relation to the Up and Down conversion tables to determine what output codes are supported based on the Input Code and the aspect ratio Mode and Alignment settings.

To change this output code format to a different one, look at the 16:9 outputs available in the *AFD Codes For 16:9 Coded Frames* on page 125 as illustrated in Table 15 on page 125.

If the user needed a 14x9 output format for example, they would go to the Up Conversion table section and locate the Mode = 14x9 SP table, Table 22 on page 133.

Under each Alignment choice in the table, locate the Input Code **1000** and note if there are any supported SMPTE binary output codes available in the Output Code column. Unsupported codes are identified as **0000**.

In this case, choosing the **14x9 SP** mode and selecting **Center**, **Top**, **Left** or **Right** on the Aspect Ratio web page and selecting **Apply Aspect Ratio Selections** will change the AFD Output to AFD Output Code **1011** as shown in the Aspect Ratio web page shown in Figure 68 on page 122.

This AFD Output Code, **1011**, produces an image with a 14x9 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame similar to the image in Figure 67.

Figure 67. AFD Output Code = 1011

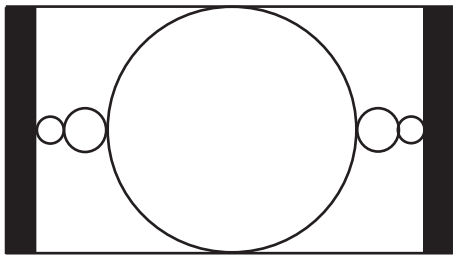
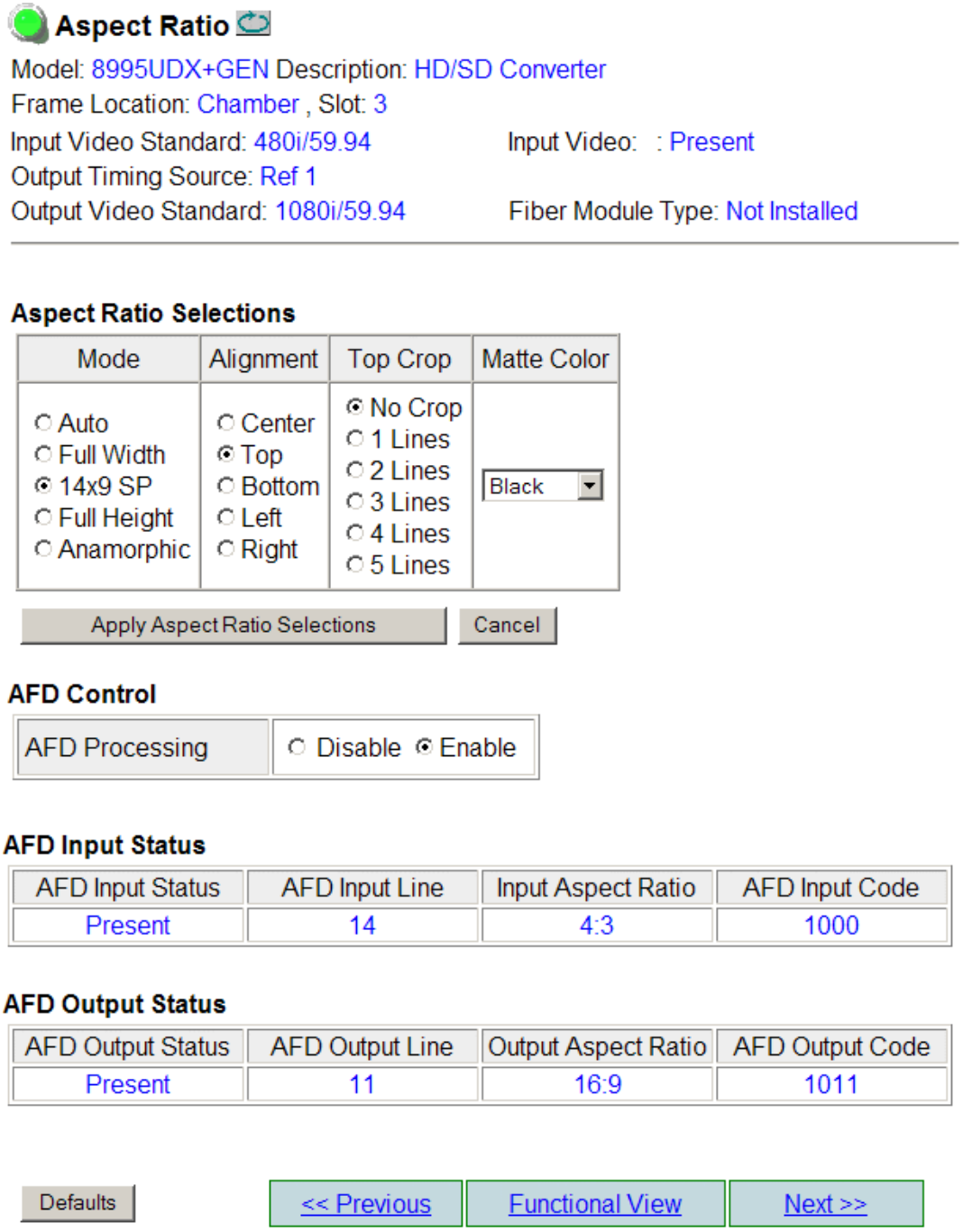


Figure 68. Change AFD Output Code



AFD Code Definitions

This section defines each of the aspect ratio AFD codes in SMPTE standard 2016-1 for 4:3 coded frames and 16:9 coded frames. Use these definitions with the Up and Down Conversion tables in the next section.

AFD Definitions For 4:3 Coded Frames

The AFD codes and aspect ratios illustrations from SMPTE standard 2016-1 are shown for a 4:3 coded frame in Table 14.

Table 14. AFD Codes in 4:3 Coded Frame

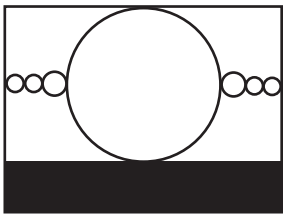
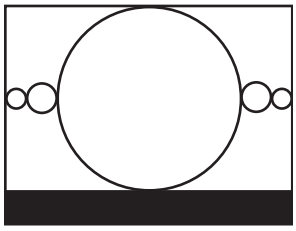
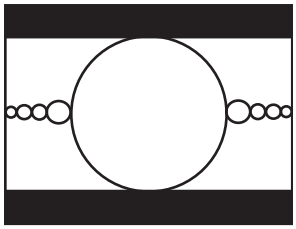
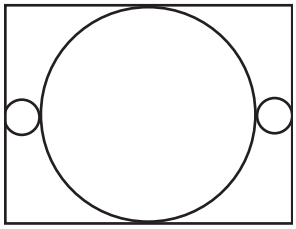
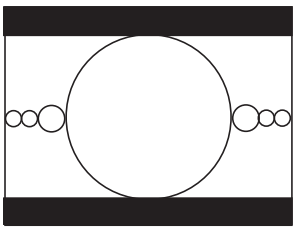
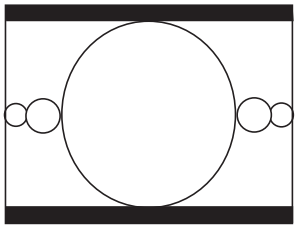
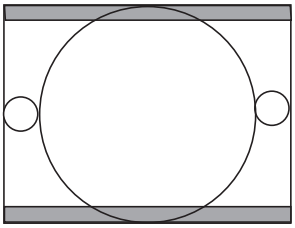
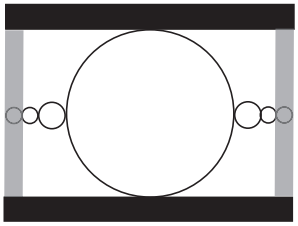
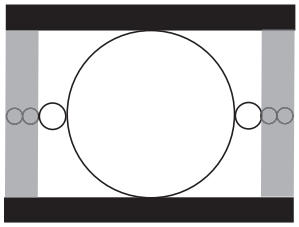
Active Format	Illustration in a 4:3 Coded Frame	Description
AFD = 0010 Box 16:9 (top)		Image with a 16:9 aspect ratio as letterbox at the top of a 4:3 coded frame.
AFD = 0011 Box 14:9 (top)		Image with a 14:9 aspect ratio as letterbox at the top of a 4:3 coded frame.
AFD = 0100 Box >16:9 (center)		Image with an aspect ratio greater than 16:9 as a vertically centered letterbox in a 4:3 coded frame.
AFD = 1000 Full Frame		Image is full frame with an aspect ratio that is the same as the 4:3 coded frame.
AFD = 1010 16:9 (center)		Image with a 16:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame.

Table 14. AFD Codes in 4:3 Coded Frame

Active Format	Illustration in a 4:3 Coded Frame	Description
AFD = 1011 14:9 (center)		Image with 14:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame.
AFD = 1101 4:3 (with alternate 14:9 center)		Image with a 4:3 aspect ratio and with an alternative 14:9 center in a 4:3 coded frame.
AFD = 1110 16:9 (with alternative 14:9 center)		Image with a 16:9 aspect ratio and with an alternative 14:9 center as a vertically centered letterbox in a 4:3 coded frame.
AFD = 1111 16:9 (with alternative 4:3 center)		Image with a 16:9 aspect ratio and with an alternative 4:3 center as a vertically centered letterbox in a 4:3 coded frame.

AFD Codes For 16:9 Coded Frames

The AFD codes and aspect ratios from SMPTE standard 2016-1 are shown for a 16:9 coded frame in Table 15..

Table 15. AFD Codes in 16:9 Coded Frames

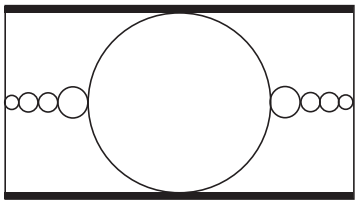
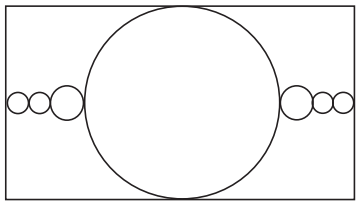
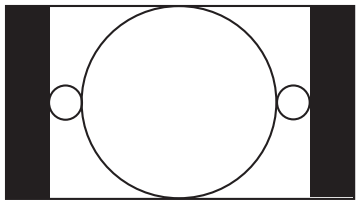
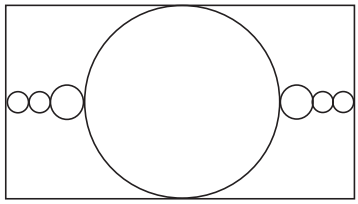
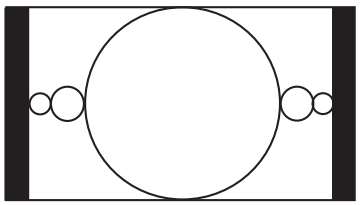
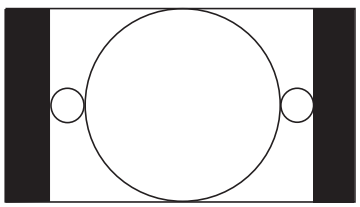
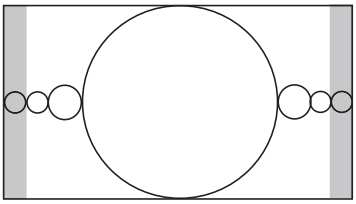
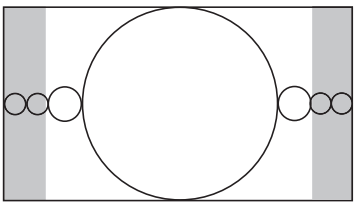
Active Format	Illustration in a 16:9 Coded Frame	Description
AFD = 0100 Box >16:9 (center)		Image with aspect ratio greater than 16:9 as a verticality centered letterbox in a 16:9 coded frame.
AFD = 1000 Full Frame		Image is full frame with an aspect ration as a horizontally centered pillarbox image in a 16:9 coded frame.
AFD = 1001 4:3 (center)		Image with a 4:3 aspect ratio greater than 16:9 as a vertically centered letterbox in a 4:3 coded frame.
AFD = 1010 16:9 (with complete 16:9 image protected)		Image is full frame with a 16:9 aspect ratio and with all image areas protected.
AFD = 1011 14:9 (center)		Image with a 14:9 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame.
AFD = 1101 4:3 (with alternate 14:9 center)		Image with 4:3 aspect ratio and with an alternative 14:9 center as a horizontally centered pillarbox image in a 16:9 coded frame.

Table 15. AFD Codes in 16:9 Coded Frames

Active Format	Illustration in a 16:9 Coded Frame	Description
AFD = 1110 16:9 (with alternative 14:9 center)		Image with a 4:3 aspect ratio and with an alternative 14:9 center in a 4:3 coded frame.
AFD = 1111 16:9 (with alternative 4:3 center)		Image with a 16:9 aspect ratio and with an alternative 4:3 center in a 16:9 coded frame.

AFD Tables – Up Conversion

The tables in this section give the input and output codes for AFD results after up conversion with all possible mode and alignment settings available in the aspect ratio controls.

Table 16 gives the aspect ratio mode input and output codes for Input Frame = 4:3/Output Frame = 16:9 when the aspect ratio mode is set to **Full Width** with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 16. Mode = Full Width, Input Frame = 4:3, Output Frame = 16:9

Input Frame = 4:3, Output Frame = 16:9
Mode = Full Width

Alignment Choices															
Center			Top			Bottom			Left			Right			
Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	
0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	
0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	
0010	0000	Full Width	0010	1000	Full Width	0010	0000	Full Width	0010	0000	Full Width	0010	0000	Full Width	
0011	1000	Full Width	0011	1000	Full Width	0011	1000	Full Width	0011	1000	Full Width	0011	1000	Full Width	
0100	0100	Full Width	0100	0000	Full Width	0100	0000	Full Width	0100	0100	Full Width	0100	0000	Full Width	
0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	
0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	
0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	
1000	1000	Full Width	1000	1000	Full Width	1000	1000	Full Width	1000	1000	Full Width	1000	1000	Full Width	
1001	1000	Full Width	1001	1000	Full Width	1001	1000	Full Width	1001	1000	Full Width	1001	1000	Full Width	
1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width	
1011	1000	Full Width	1011	0000	Full Width	1011	0000	Full Width	1011	1000	Full Width	1011	1000	Full Width	
1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	
1101	1000	Full Width	1101	0000	Full Width	1101	0000	Full Width	1101	1000	Full Width	1101	1000	Full Width	
1110	1110	Full Width	1110	0000	Full Width	1110	0000	Full Width	1110	1110	Full Width	1110	0000	Full Width	
1111	1111	Full Width	1111	0000	Full Width	1111	0000	Full Width	1111	1111	Full Width	1111	0000	Full Width	

Table 17 gives the **14x9 SP** aspect ratio mode input and output codes for Input Frame = 4:3/Output Frame = 16:9 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 17. Mode = 14x9 SP, Input Frame = 4:3, Output Frame = 16:9

Input Frame = 4:3, Output Frame = 16:9 Mode = 14x9 SP															
Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**			
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP
0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP
0010	0000	14x9 SP	0010	0000	14x9 SP	0010	0000	14x9 SP	0010	0000	14x9 SP	0010	0000	14x9 SP
0011	0000	14x9 SP	0011	1011	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP
0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP
0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP
0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP
0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP
1000	1011	14x9 SP	1000	1011	14x9 SP	1000	1011	14x9 SP	1000	0000	14x9 SP	1000	0000	14x9 SP
1001	1011	14x9 SP	1001	1011	14x9 SP	1001	1011	14x9 SP	1001	0000	14x9 SP	1001	0000	14x9 SP
1010	0000	14x9 SP	1010	0000	14x9 SP	1010	0000	14x9 SP	1010	0000	14x9 SP	1010	0000	14x9 SP
1011	1011	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP
1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP
1101	1011	14x9 SP	1101	1011	14x9 SP	1101	1011	14x9 SP	1101	0000	14x9 SP	1101	0000	14x9 SP
1110	0000	14x9 SP	1110	0000	14x9 SP	1110	0000	14x9 SP	1110	0000	14x9 SP	1110	0000	14x9 SP
1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP

Table 18 gives the **Full Height** aspect ratio mode input and output codes for Input Frame = 4:3/Output Frame = 16:9 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 18. Mode = Full Height, Input Frame = 4:3, Output Frame = 16:9

Input Frame = 4:3, Output Frame = 16:9
Mode = Full Height

Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**		
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height
0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height
0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height
0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height
0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height
0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height
0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height
0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height
1000	1001	Full Height	1000	1001	Full Height	1000	1001	Full Height	1000	0000	Full Height	1000	0000	Full Height
1001	1001	Full Height	1001	1001	Full Height	1001	1001	Full Height	1001	0000	Full Height	1001	0000	Full Height
1010	0000	Full Height	1010	0000	Full Height	1010	0000	Full Height	1010	0000	Full Height	1010	0000	Full Height
1011	0000	Full Height	1011	0000	Full Height	1011	0000	Full Height	1011	0000	Full Height	1011	0000	Full Height
1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height
1101	1011	Full Height	1101	1011	Full Height	1101	1011	Full Height	1101	0000	Full Height	1101	0000	Full Height
1110	0000	Full Height	1110	0000	Full Height	1110	0000	Full Height	1110	0000	Full Height	1110	0000	Full Height
1111	0000	Full Height	1111	0000	Full Height	1111	0000	Full Height	1111	0000	Full Height	1111	0000	Full Height

Table 19 gives the **Anamorphic** aspect ratio mode input and output codes for Input Frame = 4:3/Output Frame = 16:9 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 19. Mode = Anamorphic, Input Frame = 4:3, Output Frame = 16:9

Input Frame = 4;3, Output Frame = 16:9 Mode = Anamorphic															
Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**			
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	
0000	0000	Ana morphic	0000	0000	Ana morphic	0000	0000	Ana morphic	0000	0000	Ana morphic	0000	0000	Ana morphic	
0001	0000	Ana morphic	0001	0000	Ana morphic	0001	0000	Ana morphic	0001	0000	Ana morphic	0001	0000	Ana morphic	
0010	0000	Ana morphic	0010	0000	Ana morphic	0010	0000	Ana morphic	0010	0000	Ana morphic	0010	0000	Ana morphic	
0011	0000	Ana morphic	0011	0000	Ana morphic	0011	0000	Ana morphic	0011	0000	Ana morphic	0011	0000	Ana morphic	
0100	0000	Ana morphic	0100	0000	Ana morphic	0100	0000	Ana morphic	0100	0000	Ana morphic	0100	0000	Ana morphic	
0101	0000	Ana morphic	0101	0000	Ana morphic	0101	0000	Ana morphic	0101	0000	Ana morphic	0101	0000	Ana morphic	
0110	0000	Ana morphic	0110	0000	Ana morphic	0110	0000	Ana morphic	0110	0000	Ana morphic	0110	0000	Ana morphic	
0111	0000	Ana morphic	0111	0000	Ana morphic	0111	0000	Ana morphic	0111	0000	Ana morphic	0111	0000	Ana morphic	
1000	1000	Ana morphic	1000	1000	Ana morphic	1000	1000	Ana morphic	1000	1000	Ana morphic	1000	1000	Ana morphic	
1001	1000	Ana morphic	1001	1000	Ana morphic	1001	1000	Ana morphic	1001	1000	Ana morphic	1001	1000	Ana morphic	
1010	0100	Ana morphic	1010	0000	Ana morphic	1010	0000	Ana morphic	1010	0100	Ana morphic	1010	0100	Ana morphic	
1011	0100	Ana morphic	1011	0000	Ana morphic	1011	0000	Ana morphic	1011	0100	Ana morphic	1011	0100	Ana morphic	
1100	0000	Ana morphic	1100	0000	Ana morphic	1100	0000	Ana morphic	1100	0000	Ana morphic	1100	0000	Ana morphic	
1101	1000	Ana morphic	1101	0000	Ana morphic	1101	0000	Ana morphic	1101	1000	Ana morphic	1101	1000	Ana morphic	
1110	0100	Ana morphic	1110	0000	Ana morphic	1110	0000	Ana morphic	1110	0000	Ana morphic	1110	0000	Ana morphic	
1111	0100	Ana morphic	1111	0000	Ana morphic	1111	0000	Ana morphic	1111	0000	Ana morphic	1111	0000	Ana morphic	

Table 20 gives the **Auto** aspect ratio mode input and output codes for Input Frame = 4:3/Output Frame = 16:9 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 20. Mode = Auto, Input Frame = 4:3, Output Frame = 16:9

Input Frame = 4:3, Output Frame = 16:9
Mode = Auto

Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**		
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height
0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height
0010	0000	Full Width	0010	1000	Full Width	0010	1000	Full Width	0010	1000	Full Width	0010	1000	Full Width
0011	0000	14x9 SP	0011	1011	14x9 SP	0011	1011	14x9 SP	0011	1011	14x9 SP	0011	1011	14x9 SP
0100	0100	Full Width	0100	0000	Full Width	0100	0000	Full Width	0100	0100	Full Width	0100	0100	Full Width
0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height
0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height
0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height
1000	1001	Full Height	1000	1001	Full Height	1000	1001	Full Height	1000	0000	Full Height	1000	1001	Full Height
1001	1001	Full Height	1001	1001	Full Height	1001	1001	Full Height	1001	0000	Full Height	1001	1001	Full Height
1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width	1010	1000	Full Width
1011	1011	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	1011	14x9 SP
1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height
1101	1101	Full Height	1101	1101	Full Height	1101	1101	Full Height	1101	0000	Full Height	1101	1101	Full Height
1110	1110	Full Width	1110	0000	Full Width	1110	1110	Full Width	1110	1110	Full Width	1110	1110	Full Width
1111	1111	Full Width	1111	1111	Full Width	1111	1111	Full Width	1111	1111	Full Width	1111	1111	Full Width

AFD Tables – Down Conversion

The tables in this section give the input and output codes for AFD results after down conversion with all possible mode and alignment settings available in the aspect ratio controls.

Table 21 gives the **Full Width** aspect ratio mode input and output codes for Input Frame = 16:9/Output Frame = 4:3 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 21. Mode = Full Width, Input Frame = 16:9, Output Frame = 4:3

Input Frame = 16:9, Output Frame = 4:3
Mode = Full Width

Alignment Choices															
Center			Top			Bottom			Left			Right			
Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	
0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	0000	0000	Full Width	
0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	0001	0000	Full Width	
0010	0000	Full Width	0010	0000	Full Width	0010	0000	Full Width	0010	0000	Full Width	0010	0000	Full Width	
0011	0000	Full Width	0011	0000	Full Width	0011	0000	Full Width	0011	0000	Full Width	0011	0000	Full Width	
0100	0100	Full Width	0100	0000	Full Width	0100	0000	Full Width	0100	0100	Full Width	0100	0100	Full Width	
0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	0101	0000	Full Width	
0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	0110	0000	Full Width	
0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	0111	0000	Full Width	
1000	1010	Full Width	1000	0010	Full Width	1000	0000	Full Width	1000	1010	Full Width	1000	1010	Full Width	
1001	0000	Full Width	1001	0000	Full Width	1001	0000	Full Width	1001	0000	Full Width	1001	0000	Full Width	
1010	1010	Full Width	1010	0010	Full Width	1010	0000	Full Width	1010	1010	Full Width	1010	1010	Full Width	
1011	0000	Full Width	1011	0000	Full Width	1011	0000	Full Width	1011	0000	Full Width	1011	0000	Full Width	
1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	1100	0000	Full Width	
1101	0000	Full Width	1101	0000	Full Width	1101	0000	Full Width	1101	0000	Full Width	1101	0000	Full Width	
1110	1110	Full Width	1110	0000	Full Width	1110	0000	Full Width	1110	1110	Full Width	1110	0000	Full Width	
1111	1111	Full Width	1111	0000	Full Width	1111	0000	Full Width	1111	1111	Full Width	1111	0000	Full Width	

Table 22 gives the **14x9 SP** aspect ratio mode input and output codes for Input Frame = 16:9/Output Frame = 4:3 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 22. Mode = 14x9 SP, Input Frame = 16:9, Output Frame = 4:3

Input Frame = 16:9, Output Frame = 4:3
Mode = 14x9 SP

Alignment Choices															
Center			Top			Bottom			Left			Right			
Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode	Input Code	Output Code	Scalar Mode
0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP	0000	0000	14x9 SP
0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP	0001	0000	14x9 SP
0010	0000	14x9 SP	0010	0000	14x9 SP	0010	0000	14x9 SP	0010	1011	14x9 SP	0010	0000	14x9 SP
0011	0000	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP
0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP	0100	0000	14x9 SP
0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP	0101	0000	14x9 SP
0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP	0110	0000	14x9 SP
0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP	0111	0000	14x9 SP
1000	1011	14x9 SP	1000	0011	14x9 SP	1000	0000	14x9 SP	1000	1011	14x9 SP	1000	1011	14x9 SP
1001	0000	14x9 SP	1001	0000	14x9 SP	1001	0000	14x9 SP	1001	0000	14x9 SP	1001	0000	14x9 SP
1010	1011	14x9 SP	1010	0011	14x9 SP	1010	0000	14x9 SP	1010	1011	14x9 SP	1010	1011	14x9 SP
1011	1011	14x9 SP	1011	0011	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP
1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP	1100	0000	14x9 SP
1101	0000	14x9 SP	1101	0000	14x9 SP	1101	0000	14x9 SP	1101	0000	14x9 SP	1101	0000	14x9 SP
1110	1011	14x9 SP	1110	0011	14x9 SP	1110	0000	14x9 SP	1110	1011	14x9 SP	1110	1011	14x9 SP
1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP	1111	0000	14x9 SP

Table 23 gives the **Full Height** aspect ratio mode input and output codes for Input Frame = 16:9/Output Frame = 4:3 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 23. Mode = Full Height, Input Frame = 16:9, Output Frame = 4:3

Input Frame = 16:9, Output Frame = 4:3 Mode = Full Height															
Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**			
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height
0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height
0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height
0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height	0011	0000	Full Height
0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height
0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height
0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height
0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height
1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height
1001	1000	Full Height	1001	1000	Full Height	1001	1000	Full Height	1001	0000	Full Height	1001	0000	Full Height
1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height
1011	1000	Full Height	1011	1000	Full Height	1011	1000	Full Height	1011	0000	Full Height	1011	0000	Full Height
1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height
1101	1101	Full Height	1101	1101	Full Height	1101	1101	Full Height	1101	0000	Full Height	1101	0000	Full Height
1110	1000	Full Height	1110	1000	Full Height	1110	1000	Full Height	1110	1000	Full Height	1110	1000	Full Height
1111	1000	Full Height	1111	1000	Full Height	1111	1000	Full Height	1111	0000	Full Height	1111	0000	Full Height

Table 24 gives the **Anamorphic** aspect ratio mode input and output codes for Input Frame = 16:9/Output Frame = 4:3 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 24. Mode = Anamorphic, Input Frame = 16:9, Output Frame = 4:3

Input Frame = 16:9, Output Frame = 4:3
Mode = Anamorphic

Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**		
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	Anamorphic	0000	0000	Anamorphic	0000	0000	Anamorphic	0000	0000	Anamorphic	0000	0000	Anamorphic
0001	0000	Anamorphic	0001	0000	Anamorphic	0001	0000	Anamorphic	0001	0000	Anamorphic	0001	0000	Anamorphic
0010	0000	Anamorphic	0010	0000	Anamorphic	0010	0000	Anamorphic	0010	0000	Anamorphic	0010	1000	Anamorphic
0011	0000	Anamorphic	0011	0000	Anamorphic	0011	0000	Anamorphic	0011	0000	Anamorphic	0011	0000	Anamorphic
0100	0000	Anamorphic	0100	0000	Anamorphic	0100	0000	Anamorphic	0100	0000	Anamorphic	0100	0000	Anamorphic
0101	0000	Anamorphic	0101	0000	Anamorphic	0101	0000	Anamorphic	0101	0000	Anamorphic	0101	0000	Anamorphic
0110	0000	Anamorphic	0110	0000	Anamorphic	0110	0000	Anamorphic	0110	0000	Anamorphic	0110	0000	Anamorphic
0111	0000	Anamorphic	0111	0000	Anamorphic	0111	0000	Anamorphic	0111	0000	Anamorphic	0111	0000	Anamorphic
1000	1000	Anamorphic	1000	1000	Anamorphic	1000	1000	Anamorphic	1000	1000	Anamorphic	1000	1000	Anamorphic
1001	0000	Anamorphic	1001	0000	Anamorphic	1001	0000	Anamorphic	1001	0000	Anamorphic	1001	0000	Anamorphic
1010	1000	Anamorphic	1010	1000	Anamorphic	1010	1000	Anamorphic	1010	1000	Anamorphic	1010	1000	Anamorphic
1011	0000	Anamorphic	1011	0000	Anamorphic	1011	0000	Anamorphic	1011	0000	Anamorphic	1011	0000	Anamorphic
1100	0000	Anamorphic	1100	0000	Anamorphic	1100	0000	Anamorphic	1100	0000	Anamorphic	1100	0000	Anamorphic
1101	0000	Anamorphic	1101	0000	Anamorphic	1101	0000	Anamorphic	1101	0000	Anamorphic	1101	0000	Anamorphic
1110	1000	Anamorphic	1110	1000	Anamorphic	1110	1000	Anamorphic	1110	1000	Anamorphic	1110	1000	Anamorphic
1111	1000	Anamorphic	1111	1000	Anamorphic	1111	1000	Anamorphic	1111	0000	Anamorphic	1111	0000	Anamorphic

Table 25 gives the **Auto** aspect ratio mode input and output codes for Input Frame = 16:9/Output Frame = 4:3 with each of the alignment choices: **Center**, **Top**, **Bottom**, **Left**, and **Right**.

Table 25. Mode = Auto, Input Frame = 16:9, Output Frame = 4:3

Input Frame = 16:9, Output Frame = 4:3 Mode = Auto															
Alignment Choices															
Center			**Top**			**Bottom**			**Left**			**Right**			
Input Code	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**	**Input Code**	**Output Code**	**Scalar Mode**
0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height	0000	0000	Full Height
0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height	0001	0000	Full Height
0010	0000	Full Height	0010	1010	Full Height	0010	0000	Full Height	0010	0000	Full Height	0010	0000	Full Height
0011	0000	14x9 SP	0011	1011	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP	0011	0000	14x9 SP
0100	0100	Full Height	0100	0100	Full Height	0100	0000	Full Height	0100	0000	Full Height	0100	0000	Full Height
0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height	0101	0000	Full Height
0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height	0110	0000	Full Height
0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height	0111	0000	Full Height
1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height	1000	1000	Full Height
1001	1000	Full Height	1001	1000	Full Height	1001	1000	Full Height	1001	0000	Full Height	1001	0000	Full Height
1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height	1010	1000	Full Height
1011	1011	14x9 SP	1011	1011	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP	1011	0000	14x9 SP
1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height	1100	0000	Full Height
1101	1101	Full Height	1101	1101	Full Height	1101	1101	Full Height	1101	0000	Full Height	1101	0000	Full Height
1110	1110	Full Height	1110	1110	Full Height	1110	1000	Full Height	1110	0000	Full Height	1110	1000	Full Height
1111	1111	Full Height	1111	1111	Full Height	1111	1000	Full Height	1111	0000	Full Height	1111	0000	Full Height

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