

8920MUX

VIDEO/AUDIO MULTIPLEXER MODULE

Instruction Manual

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Preface

About This Manual

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

8920MUX Video/Audio Multiplexer

Introduction

The 8920MUX is a single format Serial Digital (SD) Video/AES3 multiplexer that inserts AES/EBU audio into the ancillary data space of SD 270 Mbit component 525 or 625 digital video. An audio group contains up to two AES/EBU audio streams. Each audio group in the SD input signal (up to four groups total) is packaged with a unique identification (ID). The 8920MUX uses this ID to insert, replace, or delete any one of the existing groups. The module can also delete all ancillary data contained in the SD input signal.

The 8920MUX:

- Is a hot-swappable module (can be removed and replaced in the frame with power on),
- Stores settings in non-volatile memory (if the power to the module is cycled, the module will maintain its settings),
- Multiplexes up to two AES/EBU audio digital streams,
- Requires 48 kHz AES/EBU streams synchronous or asynchronous (minimum grade 2 compliant AES audio within ± 50 ppm of the 48 kHz sample rate) with input SD video,
- Supports Grass Valley Modular Remote Configuration and Monitoring web browser and Newton Control Panel (with 8900NET module running software version 3.2.0 or later),
- Supports EDH (error detection and handling) error reporting system for the video and audio signal,
- Can delete incoming audio groups,
- Can select one of four audio groups to replace or delete, and
- Provides a status display of incoming and inserted/replaced audio groups.

Software Requirements

Operation of 8920MUX modules with version 4.2.0 software or later require an 8900NET module running version 3.2.0 or later software. To upgrade your 8900NET module, go to the Grass Valley web site or contact Customer Service. See *Contacting Grass Valley on page 2* for contact information.

Installation

Installation of the 8920MUX module is a process of:

1. Setting on-board jumpers to determine audio input type (110 Ω balanced or 75 Ω unbalanced) and remote control lockout,
2. Placing the module in the proper frame slot, and
3. Cabling and terminating signal ports.

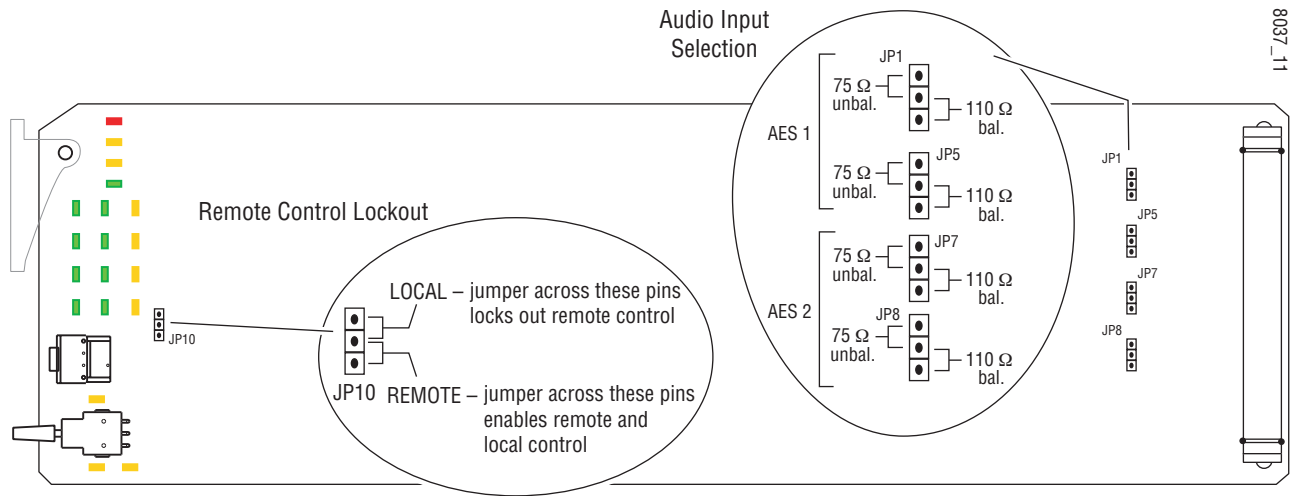
The 8920MUX module can be plugged in and removed from an 8900 Series frame with power on. When power is applied to the module, LED indicators reflect the initialization process (see *Power Up on page 12*).

Setting On-Board Jumpers

Jumpers on the 8920MUX module must be set for remote or local control and for the audio input type with the following on-board jumpers shown in *Figure 1 on page 9*:

- Jumper JP10 sets control mode for Local only or Remote and Local. When a jumper is placed across pins 2 and 3 of jumper block JP10, module output mode settings are adjustable from the Local on-board switches only. To have both Local and Remote access, set the jumper across pins 1 and 2.
- Jumpers JP1, JP5, JP7, and JP8 select either 75 Ω unbalanced or 110 Ω balanced AES/EBU inputs. All four jumpers must be set for the correct input type.

Figure 1. On-board Jumper Settings



Frame Capacity

The 8920MUX module can be installed in all 8900 Series frames but with varying maximum quantities determined by frame cooling capacity. [Table 1](#) provides the power capacity, cooling capacity, and maximum module count for each frame type.

Table 1. Power, Cooling, and Module Capacity of 8900 Frames

Capacity Calculated	8900T2 Frame	8900T2-F Frame	8900TX Frame	8900TF Frame	8900TFN Frame
Power (W)	60	60	100	100	100
Recommended Module Cooling (W)	30	60	30	90	90
8920MUX Modules	6	10	6	10	10

Note Module capacity figures assume no other modules are in the frame.

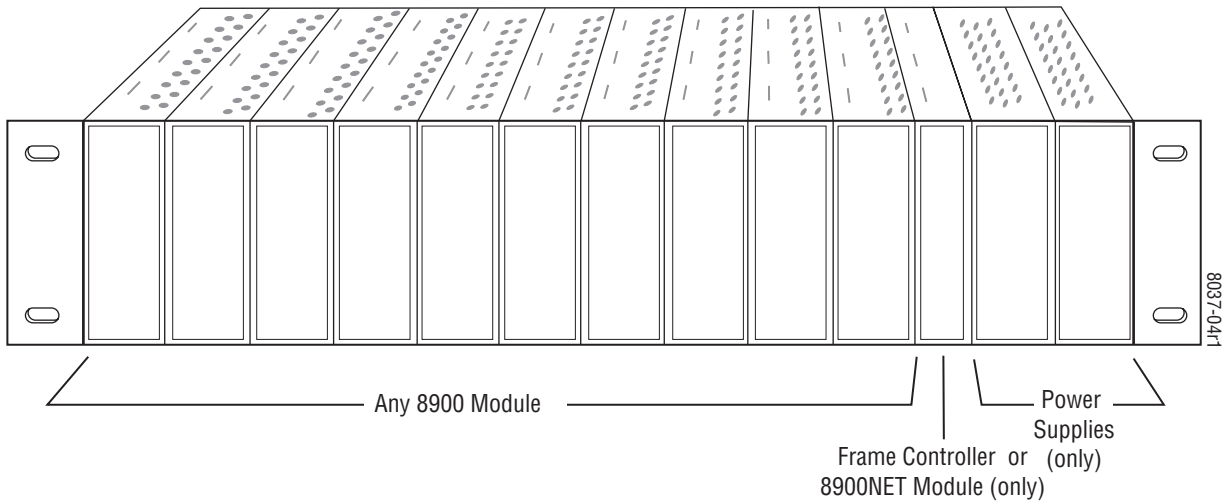
Module Placement in the 8900 Frame

There are ten slot locations in the frame to accommodate either analog or digital modules. These are the left ten locations. Refer to [Figure 2](#).

The two slots on the right are allocated for the power supplies. For additional information concerning the Power Supply module, refer to the 8900 Frame manual.

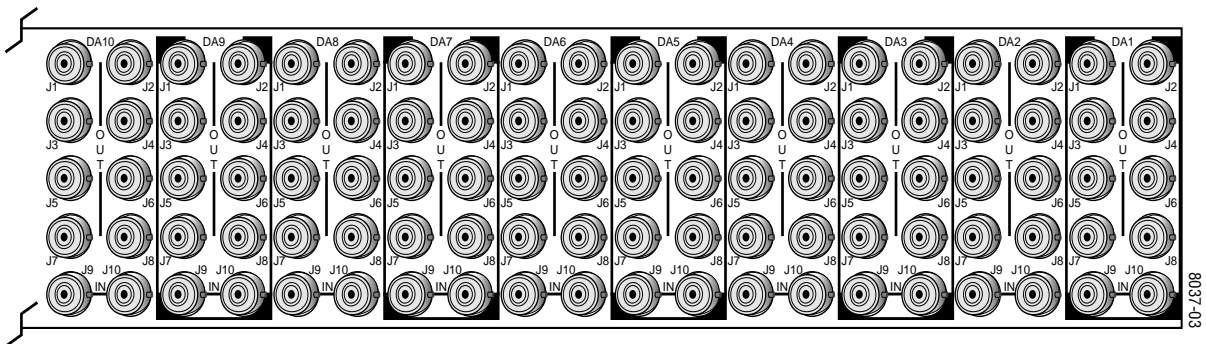
The third slot from the right is allocated for the Frame Monitor, or 8900NET Network Interface module. These modules provide health monitoring and control options.

Figure 2. 8900 Series Frame



8900 modules are interchangeable within the module slots. There are 10 BNC connectors in each slot's I/O group. The functional assignment of each connector in a group is determined by the module that is placed in that slot. The maximum number of modules an 8900 frame can accept is ten. Figure 3 illustrates the rear connector plate for an 8900 Series frame.

Figure 3. 8900 Series Frame Rear Connector



To install a module in the frame:

1. Insert the module, connector end first, with the component side of the module facing to the right and the ejector tab to the top.
2. Verify that the module connector seats properly against the backplane.
3. Press the ejector tab in to seat the module in place.

Cabling

Note At the back of every hard cover manual are overlay cards that can be placed over the rear connector BNCs to identify the specific 8920MUX connector functions.

Inputs

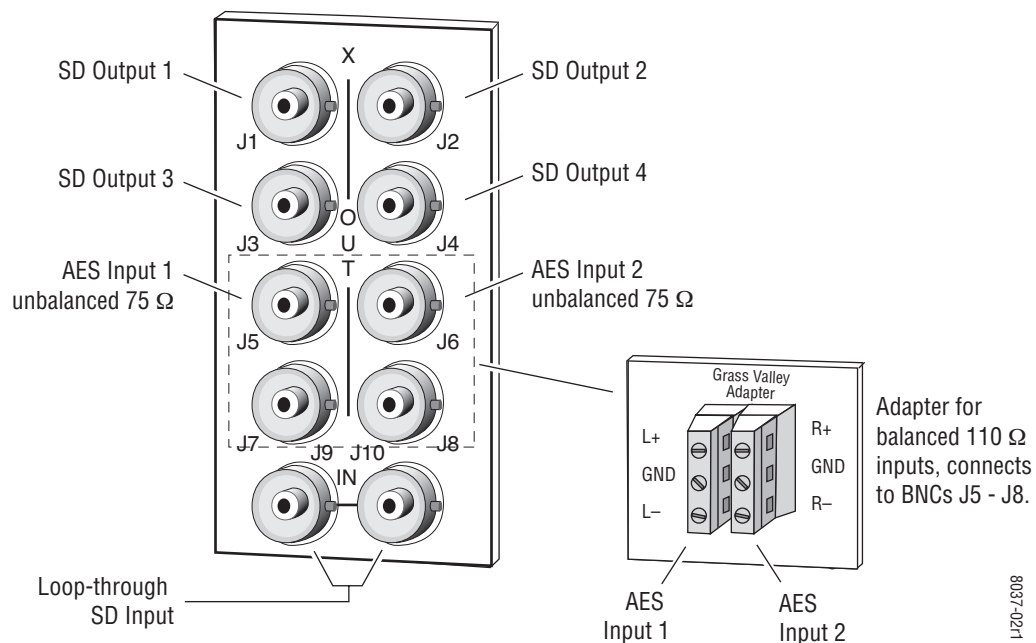
The SD video stream is connected to the looping input BNC at J9 or J10.

For balanced audio inputs, use the terminal post adapter shown in [Figure 4](#) to connect up to two AES/EBU input sources. The adapter connects to the plus and minus BNC pairs J5/J7 and J6/J8.

Connect unbalanced AES/EBU input BNCs to J5 and J6.

Note Jumper selections on the module must be made to select either 75 Ω unbalanced or 110 Ω balanced AES/EBU input (see [Figure 1](#) on page 9).

Figure 4. 8920MUX Input/Output Connectors



Outputs

The 8920MUX provides four SD output streams—J1 through J4. The destination equipment should have a 75 Ω input impedance or loop-through inputs that are terminated into 75 Ω .

Power Up

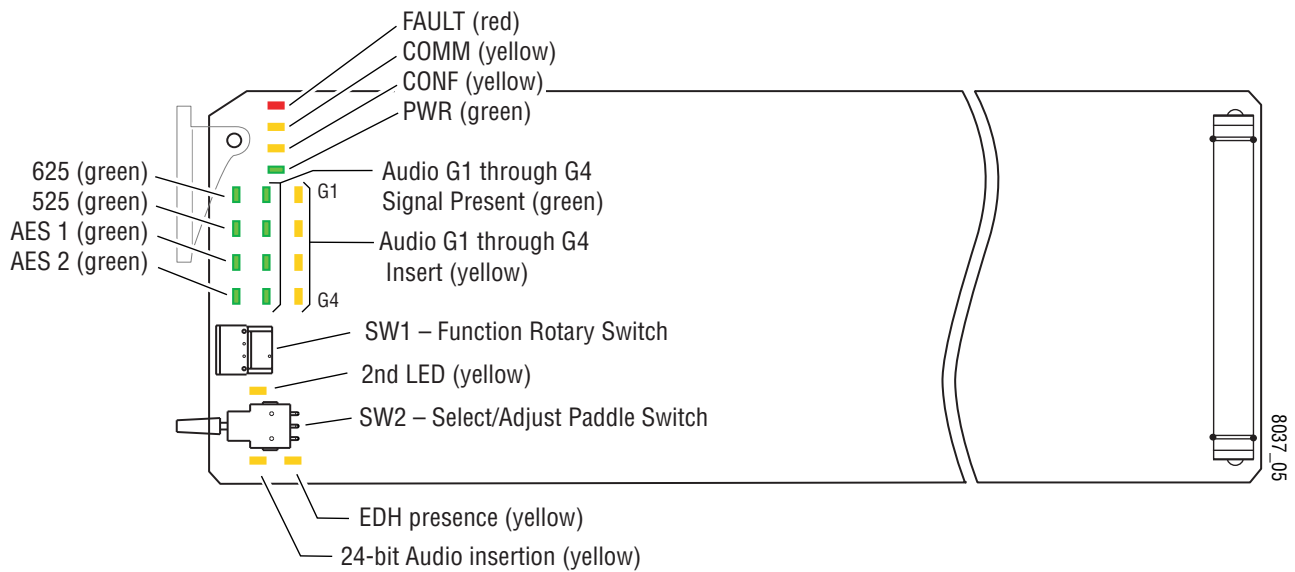
The front LED indicators and configuration switches are illustrated in [Figure 5](#). Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

With factory default configuration and a valid SD input with AES/EBU audio content, the green PWR LED, the SD format (either 525 or 625) LED, and the appropriate audio Signal Present LEDs should be on. The appropriate yellow Insert LED (G1 through G4) will indicate which audio group (if any) the module is configured to insert.

Note A flashing Insert LED indicates an invalid insertion configuration has been attempted and the existing audio group has not been deleted or replaced.

Figure 5. Operation Indicator LEDs



A red FAULT LED indicates an error situation and, with the other LEDs, can indicate the operational conditions presented in Table 2. The table describes signal output and LED indications for various input/reference combinations and user settings.

Table 2. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
FAULT (red)	Off	Normal operation.
	On continuously	Module has detected an internal fault.
	Long flash	Configuration problems. Check inputs and settings.
	Short flash	EDH error detected.
COMM (yellow)	Off	No activity on frame communication bus.
	Long flash	Location 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 updating firmware.
PWR (green)	Off	No power to module or module's DC/DC converter failed.
	On continuously	Normal operation, module is powered.
625 (green)	Off	No video or standard is other than 625.
	On continuously	Valid 625 video signal is present.
525 (green)	Off	No video or standard is other than 525.
	On continuously	Valid 525 video signal is present.
AES1 P (green)	Off	No valid AES stream is present at input 1.
	On continuously	Valid 48 kHz AES 3 stream at input 1.
AES2 P (green)	Off	No valid AES stream is present at input 2.
	On continuously	Valid 48 kHz AES 3 stream at input 2.
G1_PR (green)	Off	No audio present in group G1.
	On continuously	Audio present in group G1 and passing through.
	Flashing	Audio present in group G1 but has been replaced or deleted.
G2_PR (green)	Off	No audio present in group G2.
	On continuously	Audio present in group G2 and passing through.
	Flashing	Audio present in group G2 but has been replaced or deleted.
G3_PR (green)	Off	No audio present in group G3.
	On continuously	Audio present in group G3 and passing through.
	Flashing	Audio present in group G3 but has been replaced or deleted.
G4_PR (green)	Off	No audio present in group G4.
	On continuously	Audio present in group G4 and passing through.
	Flashing	Audio present in group G4 but has been replaced or deleted.
G1_INS (yellow)	Off	G1 audio will not be inserted.
	On continuously	G1 audio will be inserted.
	Flashing	G1 audio cannot be inserted because the existing G1 audio has not been deleted or replaced.

Table 2. Indicator LEDs and Conditions Indicated - (continued)

LED	Indication	Condition
G2 INS (yellow)	Off	G2 audio will not be inserted.
	On continuously	G2 audio will be inserted.
	Flashing	G2 audio cannot be inserted because the existing G2 audio has not been deleted or replaced.
G3 INS (yellow)	Off	G3 audio will not be inserted.
	On continuously	G3 audio will be inserted.
	Flashing	G3 audio cannot be inserted because the existing G3 audio has not been deleted or replaced.
G4 INS (yellow)	Off	G4 audio will not be inserted.
	On continuously	G4 audio will be inserted.
	Flashing	G4 audio cannot be inserted because the existing G4 audio has not been deleted or replaced.
2ND (green)	Off	First bank of configuration functions is being addressed by the Function Rotary Switch (SW1).
	On continuously	Second bank of functions is being addressed.
24b (yellow)	Off	Encoding is 20-bit.
	On continuously	Encoding is 24-bit.
EDH (yellow)	Off	Normal operation, EDH packet present in incoming SD stream.
	On	EDH packet not present in incoming SD stream. The module will report a signal or PLL (phase lock) loss condition.

Table 3 provides the possible input conditions and the output condition that results and front LED status.

Table 3. Possible Operating Conditions

SD Video Input	AES/EBU Input	Setting	Mode(s)	Output Condition
Video input present	Synchronous 48 kHz audio input present	Pass all	syn.AES asyn.AES syn.matrix	Input signal will be passed to the output with no new group embedded. Since no new group insertion is selected, AES1 P and AES2 P LEDs (signal present) will be on if any AES stream is present. G1-4_PR (signal present) LEDs will be on to indicate any embedded audio groups present.
Video input present	Synchronous 48 kHz audio input present	Auto insert	syn.AES asyn.AES syn.matrix	8920MUX will insert the input AES/EBU audio into the first available audio group (G1 through G4) and light the corresponding G1-4_INS (insert) LEDs. If all groups are occupied, no new group will be added and the G1-4_INS LEDs will flash.
Video input present	Synchronous 48 kHz audio input present	Insert G1, G2, G3, or G4	syn.AES asyn.AES syn.matrix	8920MUX will insert a new audio group with the appropriate group ID and light the corresponding G1-4_INS LED. If the group already exists, no new group will be inserted and the corresponding G1-4_INS LED will flash.
Video input present	Synchronous 48 kHz audio input present	Replace G1, G2, G3, or G4	syn.AES asyn.AES	8920MUX will insert a new audio group with the appropriate group ID and light the corresponding G1-4_INS LED. If the group already exists it will be replaced with the new group and the corresponding G1-4_PR LED will flash.
Video input present	Synchronous 48 kHz audio input present	Delete all	syn.AES asyn.AES	All existing incoming audio groups will be deleted and the G1-4_PR LEDs will flash. If an insert setting is selected, the module will insert one group and light the corresponding G1-4_INS LED.

Table 3. Possible Operating Conditions

SD Video Input	AES/EBU Input	Setting	Mode(s)	Output Condition
Video input present	Synchronous 48 kHz audio input present	Delete G1, G2, G3, or G4	syn.AES asyn.AES	The selected group, if present, will be deleted from the incoming stream and the corresponding G1-4_PR will flash. If insert is selected for the corresponding group, the module will insert the AES/EBU input as that group and light the G1-4_INS LED.
Video input present	Synchronous 48 kHz audio input present	20-bit	syn.AES asyn.AES syn.matrix	The newly inserted group will be inserted in the 20-bit format. The 24b LED will be off.
Video input present	Synchronous 48 kHz audio input present	24-bit	syn.AES asyn.AES syn.matrix	The newly inserted group will be inserted in the 24-bit format using the extended audio packet for the additional bits. The 24b LED will be on.
Video input present	No audio input	Any	syn.AES asyn.AES syn.matrix	Input signal will be passed to the output with no new group embedded. AES1 P and AES2 P LEDs will be off.
No video input	Any state	Any	syn.AES asyn.AES syn.matrix	Output is random noise (low level static). The 525 and 625 LEDs indicating valid input video will be off.
Video input present	Asynchronous 48 kHz audio input present	Any	syn.AES syn.matrix	AES1 P and AES2 P LEDs will be on if the AES audio is close to the correct frequency. If an insert or replace is selected, the module will try to embed the new group but a click or noise will be noticeable. If the frequency is not close, the group will not be embedded and the AES1 P and AES2 P LEDs will be off.
Video input present	Asynchronous 48 kHz audio input present	Any	asyn.AES	AES1 P and AES2 P LEDs will be on. The module will embed the new group and light the corresponding G1-4_INS LED. If the frequency is not close, the group will not be embedded and the AES1 P and AES2 P will be off. Small audio effects will be heard at slow rate due to dropping or repeating samples in asyn.AES mode.
Video Input present	Both audio inputs are not 48 kHz	Any	syn.AES asyn.AES syn.matrix	No audio groups will be added and AES1 P and AES2 P LEDs will be off and G1-4_INS LED will flash.
Video input present	One audio input is not 48 kHz and the other is 48 kHz	Any	syn.AES asyn.AES syn.matrix	Audio group will be added and AES1 P and AES2 P LEDs will be off for non-48 kHz audio and on for 48 kHz input and G1-4_INS LED will be on. The channels related to the non-48 kHz audio will be missing in the embedded group.

Configuration

The 8920MUX can be configured locally using on-board switches or remotely using the 8900NET network interface GUI or a networked Newton Control Panel. Operation of these control types is explained in detail in their respective sections of this manual.

Refer to the following sections for configuration instructions:

- Configuration Summary ([page 16](#))
- Local On-board Module Configuration ([page 21](#))
- Remote Control and Monitoring ([page 23](#))
- Newton Control Panel Configuration ([page 34](#))

Configuration Summary

A configuration summary is provided in this section for the following items on the 8920MUX:

- Multiplexing (audio insertion/deletion) to determine output composition ([page 17](#)),
- Synchronization modes ([page 18](#)), and
- AES Input Channel Status Bits ([page 19](#)).

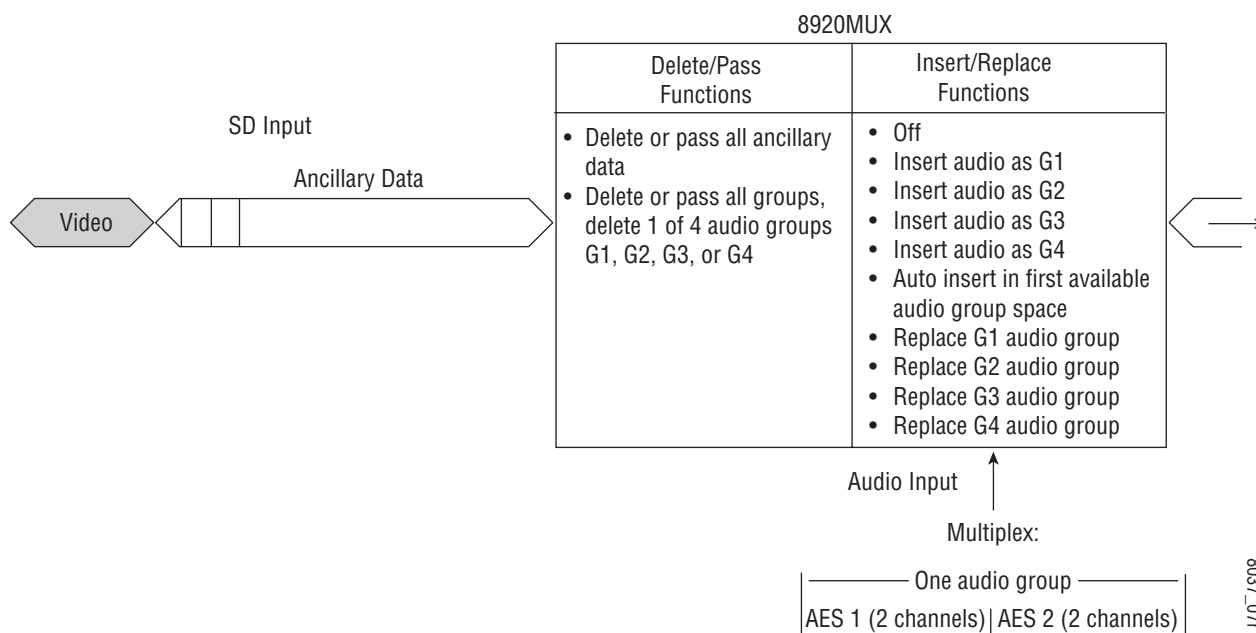
[Table 5 on page 20](#) provides a summary in table format of all parameters and their ranges, default values, and remote, local, and control panel function names and locations for setting each value.

Multiplexing

Figure 6 illustrates the various multiplexing functions available in the 8920MUX. The module can be used to delete or pass either:

- All of the ancillary data in the SD input stream, or
- One of the four audio groups (G1, G2, G3, or G4).

Figure 6. 8920MUX Multiplexing Options



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The Insert function allows you to insert the AES/EBU input into any one of the audio groups (G1 through G4). If the selected group is already occupied in the stream, the appropriate yellow Insert LED at the front of the module will flash to indicate an invalid operation and the insertion is not performed.

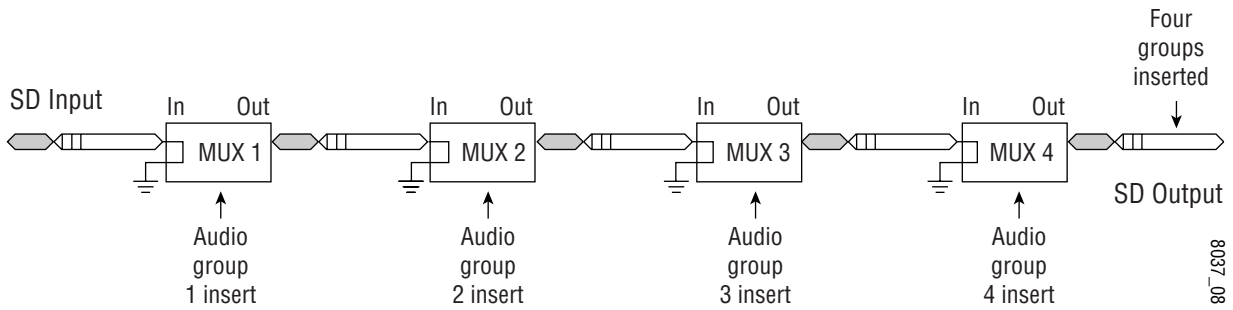
The Replace function removes any data in the designated group and inserts the module’s AES/EBU input signal in that group.

Note Ancillary data space can be limited when using 24-bit audio. Refer to Using Ancillary Space in the SMPTE standard.

Note The 8920MUX inserts or replaces only one audio group. To change more than one audio group in the SD stream, you can cable multiple modules in series and configure each module to manipulate one of the four groups (see Figure 7 on page 18).

Note The EDH Feed Forward bits from the incoming video for the Full Field and Active Picture are ignored and set to No Error by the multiplexer IC.

Figure 7. Multiple 8920MUXs in Series



Synchronization Modes

The 8920MUX can be configured to run in one of three sync modes:

- Synchronous – for AES input (48 kHz, 20/24 bits) that is synchronized to SD video,
- Asynchronous – for asynchronous AES input (48 kHz, 20/24 bits, grade 2 compliant AES audio within ± 50 ppm of the 48 kHz sample rate), or
- Sync Matrix – synchronous mode with control of audio channel switching.

Note In Sync Matrix mode, Delete and Replace functions are not available. The incoming signal must already have space available in the ancillary data for the AES audio group insertion.

Any one of the three modes can be selected either using on-board switches or the remote control interfaces (when remote control is enabled). The switching of audio channel content is done using the GUI or control panel only (see [Audio Matrix on page 29](#)).

Note In Asynchronous mode, the 8920MUX may add or drop audio samples in each audio channel to maintain correct timing with the SD video signal. This process can produce timing errors of up to ± 2 audio samples between channels in the AES stream. Applications requiring exact audio timing should use one of the synchronous modes.

AES Input Channel Status Bits

AES input channel status bits are handled differently in each of the three sync modes. The synchronous AES mode (syn.AES) passes the channel status bits from the AES inputs. The asynchronous AES (asyn.AES) and synchronous Matrix mode (syn.matrix) modify the input status bits to prevent random bits from occurring. Refer to [Table 4](#) for a detailed overview of what the channel status bits are set to for each mode.

Table 4. AES Channel Status Bits For Each Mode

Byte	Bit	Description	Sync Mode	Sync Matrix Mode	Async Mode
Byte 0	0	Professional/Consumer	Pass	Professional=1	Professional=1
	1	Audio/Non-audio	Pass	Audio=0	Audio=0
	2	Emphasis	Pass	No emphasis 100	No emphasis 100
	3				
	4				
	5	Fs locked/unlocked	Pass	Locked=0	Locked=0
	6	Sampling Rate	Pass	48 kHz 01	48 kHz 01
7					
Byte 1	0	Channel Mode	Pass	Not indicated 0000	Not indicated 0000
	1				
	2				
	3				
	4	User Bit Mode	Pass	No user information indicated 0000	No user information indicated 0000
	5				
	6				
7					
Byte 2	0	Aux Sample Bits	Pass (may be wrong if the Mux setting of 20/24 bits does not match input)	Follows web page: 20 bit=000 24 bit=001	Follows web page: 20 bit=000 24 bit=001
	1				
	2				
	3	Audio Sample Length	Pass (may be wrong if the Mux setting does not match input)	Not indicated=000	Not indicated=000
	4				
	5				
	6	Reserved=00	Pass	00	00
7					
Bytes 3-22		Various	Pass	All zeros	All zeros
Byte 23	0-7	CRC	CRC made correct by Mux IC if incorrect	20 bit=71h 24 bit=1Eh	20 bit=71h 24 bit=1Eh
	V	Validity Bit	Pass	Pass	Pass
	U	User Data Bit	Pass	Pass	Pass
	C	Channel Status Bit	See above	See above	See above
	P	Parity Bit	Pass	Set by firmware	Set by firmware

Table 5 provides a complete summary of the 8920MUX functions and a comparison of the functionality available with each control type along with the ranges and default values for each parameter.

Table 5. Summary of 8920MUX Configuration Functions

Function Type	Default	Range/Choices Resolution	Web Page/ Function Name	Jumper or Rotary Switch Bank/Setting	Newton Panel Mnemonic	Notes/ Conditions
Pass/Delete Audio Groups	Pass All	Pass All	Audio Group Management/ Pass/Delete Group pulldown	1:2	Pass/Del	In local mode, move paddle up to delete and down to pass all.
		Delete All		2:1		
		Delete G1		2:2		
		Delete G2		2:3		
		Delete G3		2:4		
		Delete G4		2:5		
Insert/Replace Group	Auto Insert	Auto Insert	Audio Group Management/ Insert/Replace Group pulldown	1:3 (paddle up)	Ins/Repl	In local mode, move paddle up to insert or replace. Moving paddle down has no function.
		Insert G1		1:4		
		Insert G2		1:5		
		Insert G3		1:6		
		Insert G4		1:7		
		Replace G1		1:8		
		Replace G2		1:9		
		Replace G3		1:A		
		Replace G4		1:B		
		Off		1:3 (paddle down)		
Bits per sample	20 bit	20 or 24 bit	Audio Group Management/ Bits per Sample pulldown	1:C (20 bits up) (24 bits down)	Bits/Smpl	
Synchronization mode	syn.AES	syn.AES, asyn.AES, or syn.matrix	Audio Group Management/ Synchronization pulldown	1:D up (syn.matrix) 1:E up (syn.AES) 1:E down (asyn.AES)	Synchron	See Synchronization Modes on page 18 .
Input to AES1A Out	AES1A	AES1A, AES1B, AES2A, AES2B	Audio Matrix/ AES1A Out, AES1B Out, AES2A Out, AES2B Out pulldowns	N/A	N/A	Remote control setting only. Active in syn.matrix mode.
Input to AES1B Out	AES1B					
Input to AES2A Out	AES2A					
Input to AES2B Out	AES2B					
Recall user settings	N/A	N/A	Recall/Save User Settings/ Recalls User Setup or Save User Setup button	2:F (up)	N/A	
Save user settings				2:F (down 3 sec.)		
Recall factory defaults	See above		Recall Fact Default button	1:F	N/A	

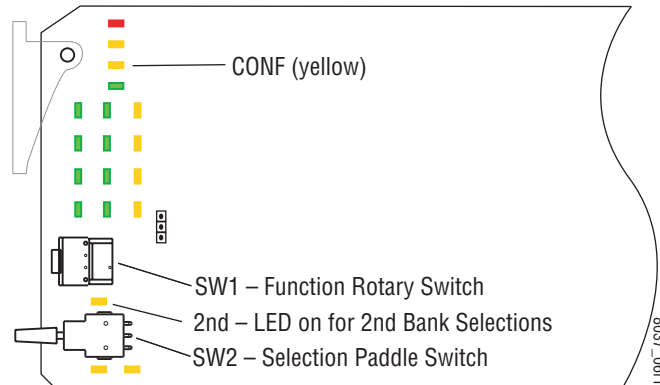
Local On-board Configuration

The module parameters can be configured locally using the on-board rotary switch, the paddle switch and LEDs as described in [Table 6 on page 22](#). The CONF LED indicates status of the configuration process.

Use the following controls illustrated in [Figure 8](#) to configure the module locally:

- Function (rotary) switch selects a desired configuration parameter from two banks of 16 positions each (0 through 9, A through F), although not all positions are used.
- SW1 paddle switch initiates a configuration parameter selection.
- CONF (configuring) LED when on, indicates the module is initializing or processing configuration information.

Figure 8. Module Configuration Switches and LEDs



The 8920MUX provides 18 configuration functions across two banks of the rotary switch positions (shown in Table 6). To make a configuration setting, rotate the switch to the desired configuration parameter. The 16-position rotary switch increments through 32 selection positions by addressing a first and second bank of 16. When the switch is in the second bank, the 2nd LED is illuminated. Move the paddle switch momentarily to either the up or down position to make the desired selection

Refer also to Table 5 on page 20 for an over view of each of the parameters and their default values.

Table 6. 8920MUX Configuration Functions

	Function Switch	Paddle Switch Up	Paddle Switch Down	Function Description
Bank 1	0	--	--	Inactive position.
	1	--	--	Not used.
	2	Pass all	--	Passes all audio channels to the outputs.
	3	Auto-insert on	Auto-insert off	Automatic insertion of input AES/EBU audio into first available group.
	4	Insert G1	Only one group can be inserted	Inserts the input audio group as G1 in the SD stream.
	5	Insert G2		Inserts the input audio group as G2 in the SD stream.
	6	Insert G3		Inserts the input audio group as G3 in the SD stream.
	7	Insert G4		Inserts the input audio group as G4 in the SD stream.
	8	Replace G1	Only one group can be replaced	Replaces the existing G1 audio group in the SD stream with the audio input to this module.
	9	Replace G2		Replaces the existing G2 audio group in the SD stream with the audio input to this module.
	A	Replace G3		Replaces the existing G3 audio group in the SD stream with the audio input to this module.
	B	Replace G4		Replaces the existing G4 audio group in the SD stream with the audio input to this module.
	C	20-bit	24-bit	Select AES/EBU audio format.
	D	Sync Matrix	--	Set to Sync Matrix when AES audio is in sync with SD video stream and status/control bits are required. This configuration also allows switching of channel content in the audio group using the GUI remote control interface.
	E	Sync AES	Async AES	Set to Sync AES when AES audio is in sync with SD video stream and status/control bits are required or set to Async AES when inputs not in sync and status/control bits are not required.
F	Recall factory defaults	--	Recalls the initial factory setups. as given in Table 5 on page 20.	
Bank 2	0	--	--	Inactive position.
	1	Delete all	Pass All	Removes all ancillary data from the SD stream.
	2	Delete G1		Removes G1 AES/EBU group from the SD stream.
	3	Delete G2		Removes G2 AES/EBU from the SD stream.
	4	Delete G3		Removes G3 AES/EBU from the SD stream.
	5	Delete G4		Removes G4 AES/EBU from the SD stream.
	6 thru 9	--	--	Not used.
	A thru E	--	--	Not used.
	F	Recall	Save (Down x 3 ¹)	Recall previously saved user default configuration, or Save current configuration settings as the user default.

¹ To Save current settings, the toggle switch must be held down for at least 3 seconds.

Remote Configuration and Monitoring

8920MUX configuration and monitoring can be performed using a web browser GUI interface or a Newton Control Panel when the 8900NET Network Interface module is present in the audio frame (Gecko 8900TFN-V frame).

Note 8900NET module software must be version 3.2.0 or later.

This section describes the GUI access to the module configuration functions. Refer to the Frame Status page shown in [Figure 9](#).

Figure 9. 8900NET GUI

The Links section lists the frame and its current modules. The selected link's Status page is first displayed and the sub-list of links for the selection is opened. The sub-list allows you to select a particular information page for the selected device.

Content display section displays the information page for the selected frame or module (frame slot icons are also active links).

Refresh button for manual update of page

Online Manual Link

Status

Model: 8900TFN Description: Module Frame

Frame Location: Back Room Top

Frame Health Status WARNING Temperature Status Pass

WARNING - Module Data or Config Errors

Module	Module	Module	Module	Module	Module	Module	Module	Empty	Empty	Empty	Net Card	Empty	Power Supply
--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	-------	----------	-------	--------------

Front Cover No Cover

Properties

Vendor	Thomson, Grass Valley	Software Version	3.2.0
Media Slots	10	Network Config	Network configuration stored on 8900NET module

8037_10

For Newton Control Panel control, refer to [Newton Control Panel Configuration](#) on page 34.

For remote access, make sure the jumper block on the module is set for both Local and Remote access ([Figure 8](#) on page 21). Audio inputs must also be specified as balanced or unbalanced with jumpers J1, J5, J7, and J8 as described in [Setting On-Board Jumpers](#) on page 8.

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

The 8900 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.

Use the **Refresh** button to update the display (available with 8900NET software version 3.0 and later).

The **Online Manual Link** button can be set up to link to the documentation in pdf format. Link configuration is done on the Frame Configuration page.

For information on status and fault monitoring and reporting shown on the Status page, refer to [Status Monitoring on page 38](#).

The 8920MUX will indicate a SMPTE Alarm fault on the Frame Status display for the following alarms:

- Lack of valid video input, or
- Board failure.

8920MUX Links and Web Pages

The 8900 GUI provides the following links and web pages for the 8920MUX module (Figure 10):

- Status – reports input and reference signal status and module information (page 26),
- Audio Group Management – provides controls for setting audio group functions (page 27),
- Audio Matrix – shows the input/output audio matrix assignments (page 29),
- Recall/Save User Settings– provides recall and save functions for local operations as well as recalling factory defaults (page 30),
- Slot Config – provides a Locate Module function and Slot Memory (page 31), and
- Software Update – gives information on software updating (page 33).

Figure 10. 8920MUX Web Page Links

10 8920MUX

Status

Audio Group
Management

Audio Matrix

Recall/Save User
Settings

Slot Config

Software Update

Refer also to Table 5 on page 20 for an over view of each of the parameters and their default values.



Use this link — [10 8920MUX](#)
[Status](#)
[Audio Group Management](#)
[Audio Matrix](#)
[Recall/Save User Settings](#)
[Slot Config](#)
[Software Update](#)

Status Page

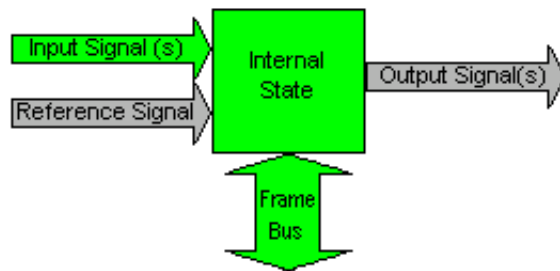
The Status page (Figure 11) shows the signal status of the audio input and frame bus communication. Color coding of the display indicates the signal status. Refer to *Status Monitoring* on page 38 for an explanation of the color coding.

Information about the module, such as part number, serial number, hardware revision and software and firmware versions are given in a read-only section at the bottom of the display.

Figure 11. 8920MUX Status Page

 **Status** 

Model: [8920MUX](#) Description: [SDI/AES Multiplexer](#)
Frame Location: [Bay 9 - QA Frame](#) , Slot: [10](#)
Input Signal Name: [not assigned](#)
8920MUX Status: [PASSED](#)



Properties

Hardware Revision [01P](#) Serial Number [TT03351338](#)
Software Version [4.2.0](#) Part Number [671-6290-01P](#)
Firmware Version [8](#)

Use
this
link

- [10 8920MUX](#)
- [Status](#)
- [Audio Group Management](#)
- [Audio Matrix](#)
- [Recall/Save User Settings](#)
- [Slot Config](#)
- [Software Update](#)

Audio Group Management

The Audio Group Management page (see [Figure 12 on page 28](#)) allows you to perform the following functions:

- **Pass/Delete Group** all audio groups or delete one audio group,
- Insert or replace audio content in one available audio group,
- Turn off the **Insert/Replace Group** function,
- Set audio sample rate (**Bits per Sample**), and
- Set AES audio-to-video input synchronization mode:
 - Synchronous – AES audio is in sync with SD video and will pass status/control bits
 - Asynchronous – AES audio is not in sync with input video and status/control bits will not be passed, or
 - Synchronous with matrix control – AES audio channel content is controlled through a switching matrix on the Audio Matrix page (see [Audio Matrix on page 29](#)).

Note Replace and Delete functions are not available in Synchronous Matrix mode. AES audio is inserted in available space only.

Click the **Apply** button to activate each selection.

Auto Insert places the AES/EBU input in the first available audio group. If no group is empty, the Status line will report a warning for all groups.

The status reporting section of the display provides monitoring of:

- Audio groups present in the SD input,
- Status of the group insert/replace function, and
- Audio groups present in the SD output.

CAUTION When monitoring the status of the signal configuration, be aware that this page is a static display and requires manual refresh. Changing SD input upstream can cause changes to the 8920MUX output that will not be reported until status refresh is activated. To refresh the status information, click on the Audio Group Management link, the **Refresh** button, or an **Apply** button.

Figure 12. Audio Group Management Display

Audio Group Management

Model: 8920MUX Description: SDI/AES Multiplexer
 Frame Location: Bay 9 - QA Frame , Slot: 10
 Video Input: 525 AES1 Input: Present AES2 Input: Present

Pass/Delete Group: selection current setting **Pass All**

Insert/Replace Group: selection current setting **Insert G4**

	Group 1 :	Group 2 :	Group 3 :	Group 4 :
Input:	Present	Present	Empty	Empty
Status:	Passed	Passed	Empty	Inserted
Output:	Present	Present	Empty	Present

Bits per Sample: selection current setting **24 Bit**

Synchronization: selection current setting **syn.AES**

- [10 8920MUX](#)
 - [Status](#)
 - [Audio Group Management](#)
 - [Audio Matrix](#)
 - [Recall/Save User Settings](#)
 - [Slot Config](#)
 - [Software Update](#)
- Use this link

Audio Matrix

When Synchronization is set to Synchronous with matrix control mode (syn.matrix) as described in *Audio Group Management* on page 27, the Audio Matrix page (see *Figure 13*) allows you to switch any one of the four input audio channels from the selected audio group (G1, G2, G3, or G4) into any or all of the output audio channels.

Pull-down menus allow you to select any of the four input channels (AES1A, AES1B, AES2A, or AES2B) for insertion in each of the output channels. The Input/Output map indicates the selected input channel by placing an **X** in the appropriate input row for each output column.

When Synchronization is set to Synchronous (syn.AES) or Asynchronous (asyn.AES) modes, the display will show only the default channel assignments.

Figure 13. Audio Matrix Display

Audio Matrix

Model: 8920MUX Description: SDI/AES Multiplexer
 Frame Location: Bay 9 - QA Frame , Slot: 10

	Output: AES1 A:	Output: AES1 B:	Output: AES2 A:	Output: AES2 B:
Input AES1 A:	---X---	---0---	---0---	---0---
Input AES1 B:	---0---	---X---	---0---	---0---
Input AES2 A:	---0---	---0---	---X---	---0---
Input AES2 B:	---0---	---0---	---0---	---X---

selection current setting

AES1A Out: AES1A

AES1B Out: AES1B

AES2A Out: AES2A

AES2B Out: AES2B

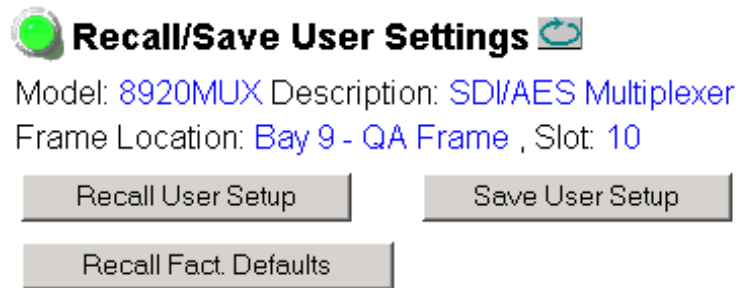
- [10 8920MUX](#)
- [Status](#)
- [Audio Group Management](#)
- [Audio Matrix](#)
- Use this link → [Recall/Save User Settings](#)
- [Slot Config](#)
- [Software Update](#)

Recall/Save User Settings

The Recall/Save User Settings page (see [Figure 14](#)) allows you to set the following parameters:

- Recall the saved User Setup,
- Save the currently selected settings for the entire module as User Setup, or
- Recall factory defaults.

Figure 14. User Settings Display



Use
this
link

- [10 8920MUX](#)
- [Status](#)
- [Audio Group Management](#)
- [Audio Matrix](#)
- [Recall/Save User Settings](#)
- [Slot Config](#)
- [Software Update](#)

Slot Config Page

Use the Slot Config page (Figure 15 on page 32) to perform the following functions on the 8920MUX module:

- **Locate Module** – selecting the **Flash** radio button 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.
- **Slot Memory** – the slot configuration for each media module is automatically saved periodically (once an hour) to the 8900NET module in that frame. You may also select the **Learn Module Config** button at any time to save the current configuration for this slot. The configuration is saved on the 8900NET module. If the 8900NET module is removed or powered down, the stored configurations are not saved.

When the **Restore upon Install** box has been checked, the current configuration saved to this slot is saved as slot memory. When the current module is removed and another module of the same type is installed, the configuration saved to the 8900NET module will be downloaded to the new module. The box must be checked before the current module with the saved configuration is removed.

- **Hardware Switch Controls** – a read-only status report of 8900NET module switch settings for Module Status Reporting and Asynchronous Status Reporting. These functions must be enabled for the following Slot SNMP Trap Reports to function.
- **Slot SNMP Trap Reports** – displayed only when the SNMP Agent software has been installed on the 8900NET module. Slot SNMP traps can be enabled only when the hardware switches for Module Fault reporting and Asynchronous Status reporting are in enabled on the 8900NET module (dipswitch S1 segment 7 and dipswitch S2 segment 1).

The enabled SNMP traps will be reported to any SNMP manager that is identified as an SNMP Report Destination in 8900NET configuration. Trap severity is read-only hard-coded information that is interpreted and responded to by the SNMP Manager software configuration.

Figure 15. 8920MUX Slot Config Page

 **Slot Config** 

Model: [8920MUX](#) Description: [SDI/AES Multiplexer](#)

Frame Location: [Bay 9 - QA Frame](#) , Slot: [10](#)

Locate Module

Flash Off

Slot Identification

Name:

Input Signal Name:

Slot Memory

Restore upon Install

Hardware Switch Controls

Module Status Reporting: [Enabled](#) Asynchronous Status Reporting: [Enabled](#)

Slot SNMP Trap Reports

	Slot Fault	Module Removed	Signal Loss	Reference Loss
Enabled	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Trap Severity	Alarm	Warning	Warning	Warning

Use
this
link

- [10 8920MUX](#)
- [Status](#)
- [Audio Group Management](#)
- [Audio Matrix](#)
- [Recall/Save User Settings](#)
- [Slot Config](#)
- [Software Update](#)


Software Update Page


The Software Update page (Figure 16) indicates that module software updates via the web or using the NetConfig networking application are not supported. For instructions on updating to the latest software, refer first to the 8920MUX Release Notes that accompany the software update for complete details.

Currently, the only recommended method of software updating is done with a software kit (8900-FLOAD-CBL) that includes a CD-ROM with the current software files and a serial cable assembly available from Grass Valley.

Refer to the *8900-FLOAD-CBL Software Upgrade Instruction Manual* in pdf format on the CD-ROM for complete updating instructions and the required software files for the 8920MUX.

Figure 16. 8920MUX Software Update Page



Software Update 

Model: [8920MUX](#) Description: [SDI/AES Multiplexer](#)
 Frame Location: [Bay 9 - QA Frame](#) , Slot: [10](#)
 Software Version: [4.1.0](#) Firmware Version: [7](#)
 Module Update: [Not Supported](#)

[Override Unsupported Update](#)

Newton Control Panel Configuration

A Newton Control Panel can be interfaced to the Gecko 8900 Series frame over the local network to control 8920MUX configuration and control parameters.

Note The 8900NET module in the Gecko 8900 frame must be running software version 3.2.0 or later for proper operation of the Newton Control Panel.

The available control panel controls are listed in [Table 5 on page 20](#). An example of the Newton Configurator for the 8920MUX is shown in [Figure 17](#).

Note Not all control parameters are available with the control panel.

Figure 17. Newton Configurator Example

Module (drag and drop from Device View)

Module Name: 8920MUX Frame IP Address: 10 . 16 . 18 . 60 Slot: 10

PID	IID	Label	Type	Description
51	0	State	switch	Slot Status
52	0	Input Sig	switch	Input Signal
59	0	Ref Sig	switch	Reference Signal
714	0	Ins/Repl	switch	Insert/Replace Group
715	0	Pass/Del	switch	Pass/Delete Group
729	0	Bit/Smpl	switch	Bits per Sample
752	0	Synchron	switch	Synchronization

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

Specifications

Table 7. 8920MUX Specifications

Parameter	Value
SDI Input	
Number of inputs	1 loop-through
Connector type	BNC
Input impedance	High impedance
Signal type	270 Mbit signal format, SMPTE 259M serial 10-bit 4:2:2 component video, 525 or 625
Signal level	SDI
Return loss	>15 dB, 5 to 270 MHz
Cable equalization	Automatic for <984 ft (300 m)
Digital Audio Input	
Number of inputs	2
Signal type	AES/EBU
Connector type	Unbalanced – One 75 Ω BNC per input Balanced – One 110 Ω terminal block per input (with adapter)
Input impedance	75 Ω or 110 Ω
Sampling rate	48 kHz sample rate 20 or 24-bit
Signal level	1 V peak to peak
SDI Output	
Number of outputs	4
Connector type	BNC
Signal type	SMPTE 259M
Return loss	>15 dB, 5 to 270 MHz
Output impedance	75 Ω
Error checking	EDH embedded
Clock jitter	<0.2 UI
Signal Processing Functions	
Electrical length	12 μ s
Audio delay	875 μ s
Audio format	48 kHz synchronous audio formatted per proposed SMPTE standard "Formatting AES/EBU audio and auxiliary data into digital video ancillary data space."
Interchannel crosstalk	<-100 dB, 20 Hz - 20 kHz
Signal	
Mode 1	AES/EBU 48 kHz sample rate, 20/24 bits, must be synchronous with SD video
Mode 2	AES/EBU 48 kHz sample rate, 20/24 bits, frequency minimum grade 2 compliant
Mode 3	AES/EBU 48 kHz sample rate, 20/24 bits, must be synchronous with SD video
Signal Level	1 V peak-to-peak nominal

Table 7. 8920MUX Specifications - (continued)

Parameter	Value
Environmental	
Frame temperature range	0 to 40 degrees C
Operating humidity range	0 to 90% non-condensing
Non-operating temperature	-10 to 70 degrees C
Mechanical	
Frame type	8900 Series
Power Requirements	
Supply voltage	+12 V/-12 V
Power consumption	4.5 Watts

Service

The 8920MUX modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field.

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

- Check frame and module power and signal present LEDs. If module power has failed, check Fuse F1 (see [Figure 18](#)).
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly and the AES/EBU input stream is 48 kHz and synchronized with the SD video input.
- Check cable connections.
- Check output connections for correct I/O mapping (correct input connector is used for the corresponding channel output).

Refer to [Figure 5](#) for the location of PWR LED and [Table 2 on page 13](#) for proper LED indications.

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

Refer to the [Contacting Grass Valley](#) at the front of this document for the Grass Valley Customer Support Information number.

Figure 18. 8920MUX Module Fuse Location



Status Monitoring

This section provides a summary of status monitoring and reporting for a Gecko 8900 Series system. It also summarizes what status items are reported and how to enable/disable reporting of each item. There are a number of ways to monitor status of modules, power supplies, fans and other status items depending on the method of monitoring being used.

8900 Frame status will report the following items:

- Power supply health,
- Status of fans in the frame front cover,
- Temperature,
- Module health, and
- Frame bus status.

Module health status will report the following items:

- Internal module state (and state of submodule or options enabled) including configuration errors (warning), internal faults, and normal operation (Pass).
- Signal input states including valid/present (pass), not present or invalid (warning), not monitored, and not available (no signal inputs).
- Reference input states including locked/valid (pass), not locked/invalid (warning), and not monitored.
- Signal output states with reporting functionality (reference output).

LEDs

LEDs on modules in the frame and on the front of the 8900TF/TFN frames indicate status of the frame and the installed power supplies, fans in the front covers, and modules. (The 8900TX-V/A frames have no LED indicators on the front cover.)

When a red FAULT LED is lit on a frame front cover, the fault will also be reported on the 8900NET or Frame Monitor module. The LEDs on the front of these modules can then be read to determine the following fault conditions:

- Power Supply 1 and 2 health,
- Fan rotation status,
- Frame over-temperature condition,
- Frame Bus fault (8900NET only), and
- Module health bus.

In general, LED colors used on the frame and modules indicate:

- Green – normal operation, (Pass) or signal present, module locked.
- Red – On continuously = fault condition, flashing = configuration error.
- Yellow – On continuously = active condition (configuration mode or communication), flashing in sequence = module locator function.

Status LEDs for this module are described in *Indicator LEDs and Conditions Indicated on page 13*. LEDs for the 8900NET module are described in the *8900NET Network Interface Instruction Manual*.

Frame Alarm

A Frame Alarm connection is available on pins 8 and 9 of the RS-232 connector on the rear of the 8900 frame (Frame Monitor or 8900NET Network Interface module required). This will report any of the status items enabled with the 8900NET or Frame Monitor module configuration DIP switch. Connection and use of the Frame Alarm is covered in detail in the *8900NET Network Interface Instruction Manual*.

Web Browser Interface

When the 8900NET module is installed in the frame, a web browser GUI can indicate frame and module status on the following web pages:

- Frame Status page – reports overall frame and module status in graphical and text formats.
- Module Status page – shows specific input and reference signal status to the module along with enabled options and module versions.
- A Status LED icon on each web page to report communication status for the frame slot and acts as a link to the Status page where warnings and faults are displayed (8900NET version 3.0 or later).

In general, graphics and text colors used indicate the following:

- Green = Pass – signal or reference present, no problems detected.
- Red = Fault – fault condition.
- Yellow = Warning – signal is absent, has errors, or is mis-configured.
- Gray = Not monitored (older 8900 module).
- White = Not present.

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.

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.

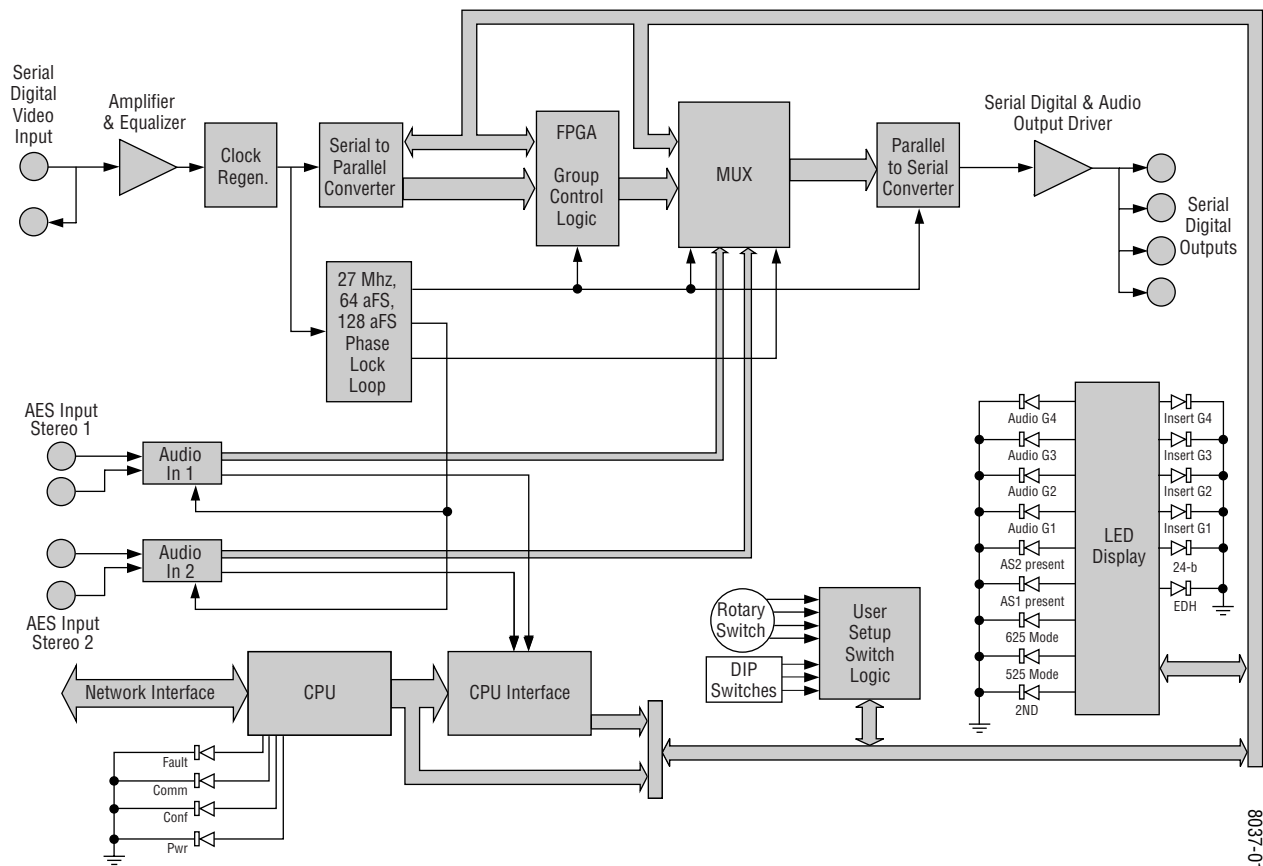
There are both hardware and software report enable switches for each report. Both must be enabled for the report to be sent. Software report switches are set on the 8900NET Configuration page for the Frame, the 8900NET module, and each module slot. Refer to the *8900NET Network Interface Instruction Manual* for installation instructions.

Functional Description

The 8920MUX inserts up to two 20- or 24-bit AES/EBU audio streams (2 channels per stream). The audio is collected into a group of up to 2 AES streams (four channels total). The audio group can be assigned one of four group IDs (G1, G2, G3, or G4) and can be inserted into the Ancillary Data of the SD stream. In Auto mode the group can be inserted with the first available group ID if one is not already present. If a group with the same ID is present in the stream, the new group cannot be inserted unless the replace or delete function is used.

Refer to the block diagram in [Figure 19](#) while reading the following functional description.

Figure 19. 8920MUX Block Diagram



Input Equalizing Amplifier

The equalizing amplifier lowers the impedance of the termination as frequency increases. The differential input improves the performance of the 8920MUX in the presence of common mode hum and noise.

Serial to Parallel Converter and EDH/EDA Error Processor

This circuit converts the serial data stream to the parallel data using the regenerated clock signal. Deserialized data passes through the EDH processor. The EDH processor checks for a possible data or bit error in the incoming data. Any error is reported to an FPGA internal register.

27Mhz Phase Lock Loop (PLL)

From the incoming 27 MHz clock, the PLL generates an internal, locked 27 MHz signal or produces an approximate 27 MHz free running clock in the event no input signal is detected.

Field Programmable Gate Array (FPGA)

The FPGA contains 3 independent blocks:

- Ancillary space manager
- 6.144 Mhz clock generator
- CPU interface

The ancillary space manager allows the user to manipulate the embedded audio groups (G1 through G4). The User can delete or replace an existing audio group without damaging the SD video stream or other data types in the ancillary space.

The clock generator, using Direct Digital Synthesis (DDS), generates a 6.144 MHz AES3 carrier clock from the incoming 27 Mhz.

The CPU interface provides connection between the board hardware and the CPU. From the FPGA, the CPU reads out current board status and writes back user commands to the hardware.

Multiplexer (MUX)

The MUX chip multiplexes the selected digital audio channels into the digital video stream. It supports 20- or 24-bit synchronous audio data with a 48 kHz sample rate. The MUX chip supports the generation and insertion of EDH information according to SMPTE RP 165.

Parallel to Serial Converter

The 8920MUX uses a standard 10-bit 270 Mbs Serializer.

CPU

The CPU embedded processor provides the interface between the user and all the processing logic inside 8920MUX, as well as communication between a host processor and the 8920MUX.

The CPU also contains:

- FLASH memory – stores data for FPGA programming and configuration,
- Address decoder,
- Address Latch,
- Extended address register for FLASH memory,
- EEPROM – Stores calibration and user setup data,
- Network interface, and
- ISP voltage regulator

AES3 Input

The 8920MUX board has two audio inputs that can be configured to be either AES3, 110 ohm balanced with rear connector adapter, or two AES3id, 75 ohm unbalanced coax BNC connectors. Refer to [Figure 4 on page 11](#).

The audio input signal passes through the AES3 input processor and re-clocker before it is multiplexed.

Power Supply

From the external source +12V, the on-board supply provides +5 V, -5 V and +3.3 V for the 8920MUX. The power supply uses a monolithic switching power supply operating in Buck mode. Buck mode switching regulators are used to generate a lower voltage from higher voltage input. If the supply ever activates its protective crow bar diode, a high current will be developed and the input fuse, F1 will blow.

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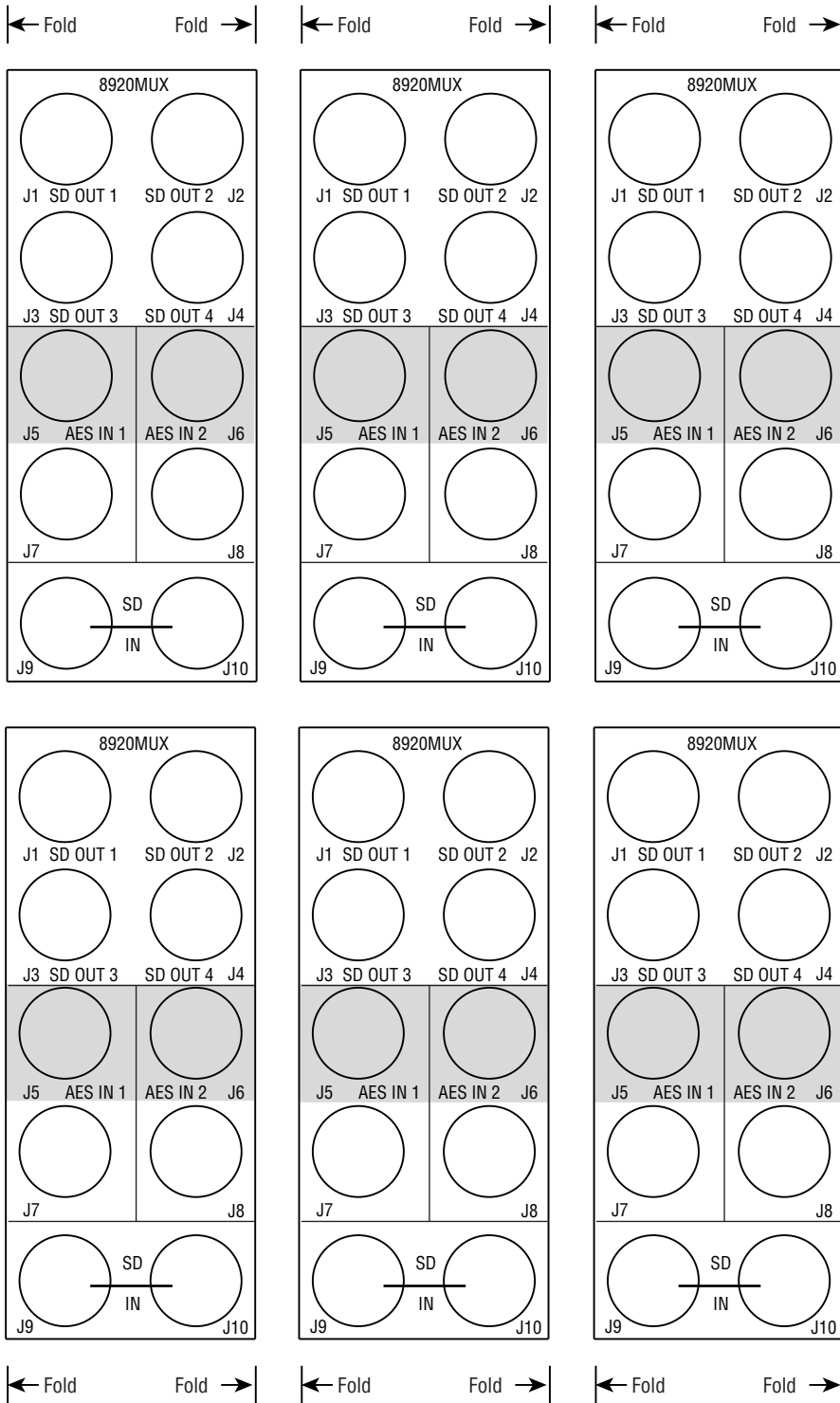
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8920MUX SD Video Audio Multiplexer Rear Connector Overlay

Fold along vertical lines to break perforations, then tear to separate vertical pairs.



8920MUX SD Video Audio Multiplexer Rear Connector Overlay

Fold along vertical lines to break perforations, then tear to separate vertical pairs.

