GRASS VALLEY GROUP

Instruction Manual

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8920ADT

AUDIO A-TO-D CONVERTER WITH DELAY TRACKING

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Preface

About This Manual

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

8920ADT Analog Audio to AES/EBU Converter with Delay Tracking

Introduction

The 8920ADT converts analog audio to digital and applies a fixed and/or auto-tracking delay to the digital audio. The right and left channel audio inputs enter via a terminal block-to-BNC adapter on the rear panel. A delay control input is provided for inserting an RS-232 level auto-tracking signal from a frame synchronizer. An external reference of AES, 48 kHz Word Clock, or 525/625 video is required to lock the module. The reference signal is connected to loop-through input BNCs. The module outputs 2 AES/EBU unbalanced 75 Ω signals through BNCs on the rear panel.

The 8920ADT can modify the outgoing signal to provide channel swapping, channel summing, tone and phase inversion. The remote control capability supports mode selection, fixed and auto-tracking delay, and input gain control (requires 8900NET module software version 2.1 or later). The 8920ADT features:

- 24-bit quantization,
- Loop-through reference input accepts 48 kHz Word Clock, 525/625 Color Black, or AES3id signals,
- 48 kHz sampling rate,
- Terminal block input and output via adapters,
- Independent input level control from +8 dBu to +28 dBu,
- Fixed delay range in 2 ms steps,
- Auto-tracking from a Grass Valley video frame sync device,
- Remote control via ethernet frame interface, and
- Remote control lockout via onboard jumper.

Installation

Installation of the 8920ADT module is a process of:

1. Placing the module in the desired frame slot, and
2. Cabling and terminating signal ports.

The 8920ADT 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 6).

Frame Capacity

The 8920ADT 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
8920ADT Modules	10	10	10	10	10

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

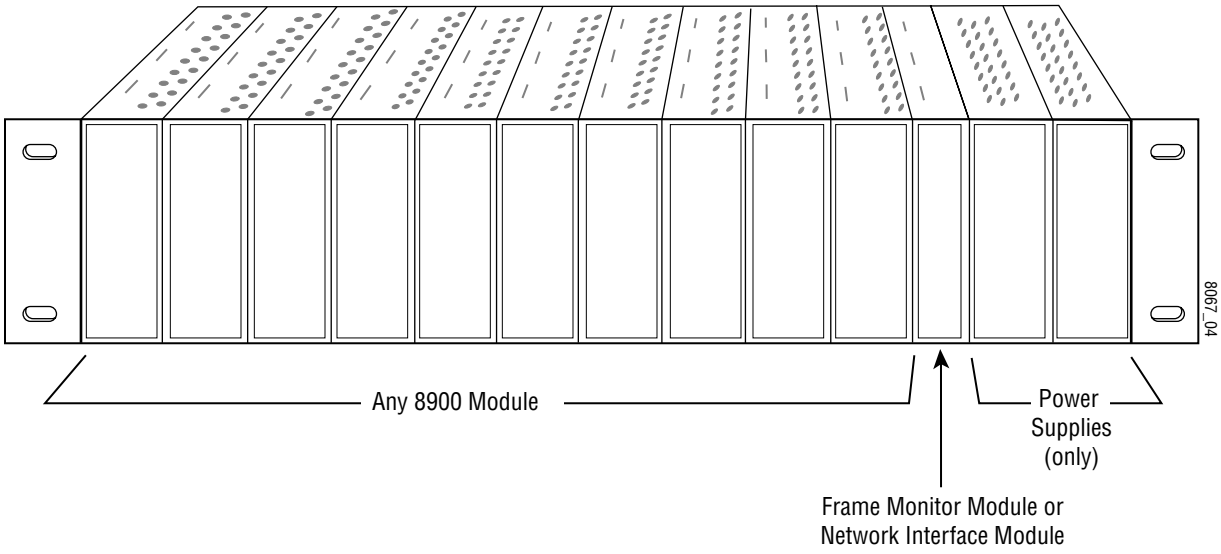
Module Placement in the 8900 Frame

There are ten cell locations in the frame to accommodate either analog or digital modules. These are the left ten locations. Refer to Figure 1 on page 3.

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

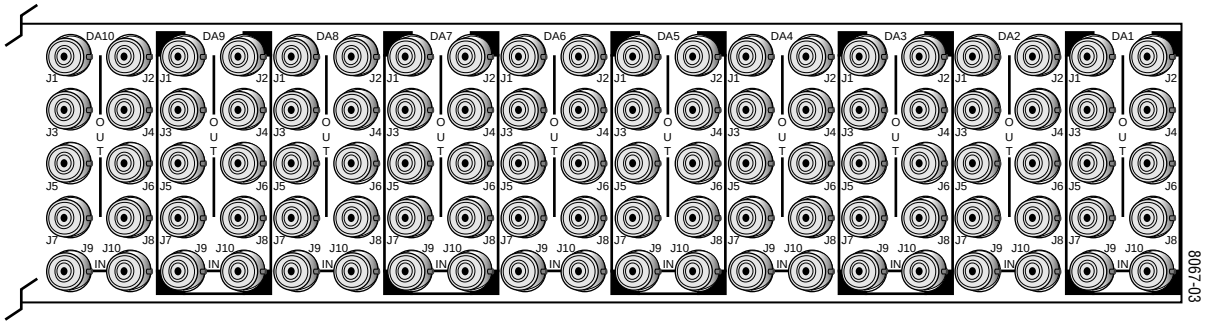
The third cell from the right is allocated for the Frame Monitor or Network Interface controller modules. These modules provide health monitoring and control options.

Figure 1. 8900 Series Frame



8900 modules are interchangeable within the module cells. There are 10 BNC connectors in each cell's I/O group. The functional assignment of each connector in a group is determined by the module that is placed in that cell. The maximum number of modules an 8900 frame can accept is ten. Figure 2 illustrates the rear connector plate for an 8900 Series frame.

Figure 2. 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

Inputs

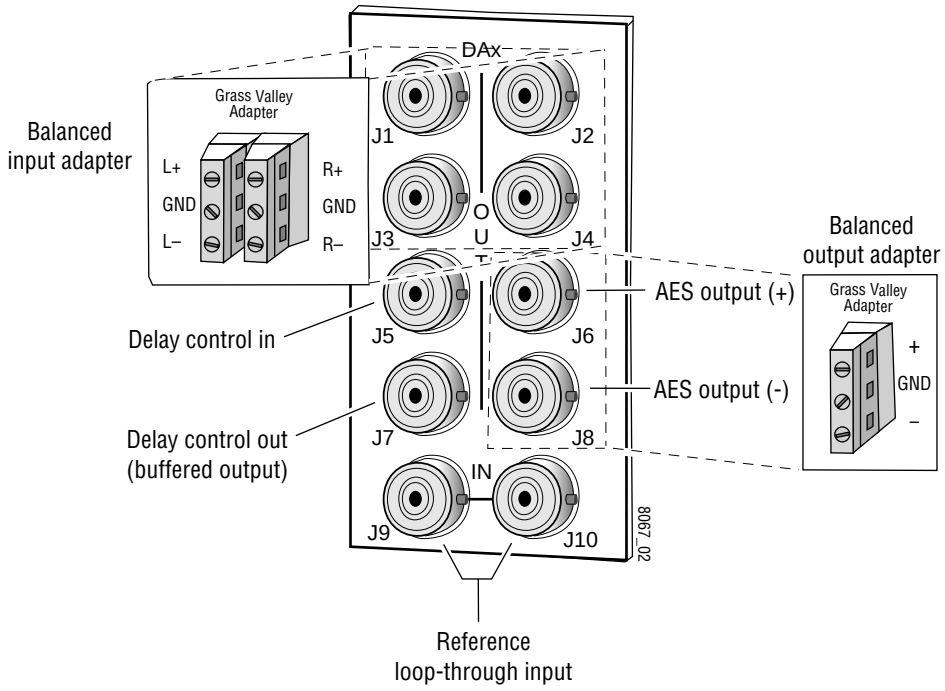
The 8920ADT receives a pair of balanced differential analog inputs (left and right channels) via the rear plug-in adapter connected to BNCs J1 – J4 as shown in Figure 3. Connect a balanced input source to the stereo pair input terminal block as specified in Table 2.

Table 2. Balanced Input Connections

Audio Channel	Input Terminal Block
Left	L +, GND, L –
Right	R +, GND, R –

CAUTION The input signal must be balanced. Connecting an unbalanced input signal at high signal levels may damage the input receivers.

Figure 3. 8920ADT *Input/Output Connectors*



Outputs

The 8920ADT provides two unbalanced AES3id/EBU serial digital outputs J6 (AES Output +) and J8 (AES Output –). The module can be jumpered to use these outputs as a balanced differential AES3id output using the BNC-to-terminal strip output adapter provided.

Connect balanced or unbalanced outputs as specified in Table 3.

Table 3. Output Connections

Unbalanced Outputs		Balanced Outputs	
Audio Channel	**BNC Connector**	**Audio Channel**	**Terminal Block**
AES3id Output +	J6, + OUT	Single balanced output	+, GND, –
AES3id Output –	J8, – OUT		

Delay Control In/Out

An RS-232 level control signal from a frame synchronizer can be connected to the Delay Control In BNC at J5 for auto-tracking audio delay. The Delay Control In signal is also buffered and sent to the Delay Control Out BNC at J7 so multiple units can be daisy chained to the frame synchronizer control line.

Reference Inputs

Loop-through input BNCs at J9 and J10 are provided for the required module reference. The reference signal can be an AES 48 kHz Word Clock, video reference (NTSC/PAL color black), or an AES3id signal. If the looping connector is not used, terminate the BNC into 75 Ω.

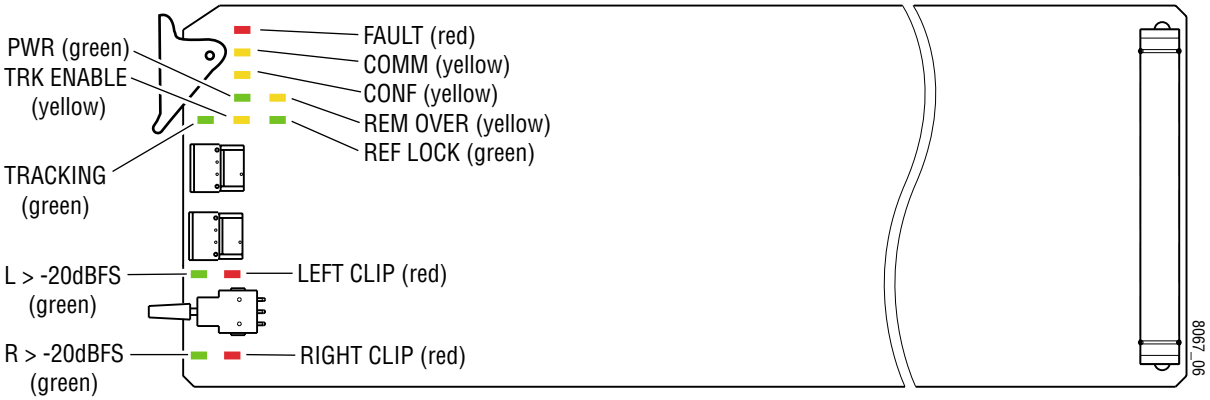
Power Up

The front LED indicators and configuration switches are illustrated in Figure 4. Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

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

Figure 4. Operation Indicator LEDs



A red FAULT LED indicates an error situation and, with the other LEDs, can indicate the operational conditions presented in Table 4. The table describes signal output and LED indications for various input/reference combinations and user settings.

Table 4. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
FAULT (red)	Off	Normal operation.
	On continuously	Module has detected an internal fault.
	Flashing	Reference input is faulty or not present.
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. Simultaneous CONF and FAULT LEDs on indicate FPGA load error.
	Flashing	Indicates rate of change of paddle-controlled analog setting.
PWR (green)	Off	No power to module or module's DC/DC converter failed.
	On continuously	Normal operation, module is powered.
REM OVER (yellow)	Off	Module configuration matches switch and jumper settings.
	On continuously	Module configuration may not match switch and jumper settings. Control has been remotely overridden.
REF LOCK (green)	Off	Module does not detect a valid reference signal.
	On continuously	Valid reference signal is present and module is locked to it.
TRK ENABLE (yellow)	This LED is currently not used. It will be on continuously.	
TRACKING (green)	Off	Delay tracking input not present.
	On continuously	Delay tracking input present.
L >-20 DBFS (green)	Off	Left channel level is less than -20 dBFS.
	On continuously	Left channel level is greater than -20 dBFS.
	Flashing	Left channel level is transitioning through -20 dBFS
R >-20 DBFS (green)	Off	Right channel level is less than -20 dBFS.
	On continuously	Right channel level is greater than -20 dBFS.
	Flashing	Right channel level is transitioning through -20 dBFS
LEFT CLIP (red)	Off	Left channel digitized signal level is less than -0.5 dBFS.
	On continuously	Left channel digitized signal level is greater than -0.5 dBFS.
	Flashing	Left channel digitized signal level is transitioning through -0.5 dBFS.
RIGHT CLIP (red)	Off	Right channel digitized signal level is less than -0.5 dBFS.
	On continuously	Right channel digitized signal level is greater than -0.5 dBFS.
	Flashing	Right channel digitized signal level is transitioning through -0.5 dBFS.

Table 5 provides the possible input conditions and the resulting output condition.

Table 5. Possible Operating Conditions

Audio Input Condition	Reference Input Condition	Output Condition
Audio inputs present	Valid reference input present	AES/EBU serial digital output sampled at 48 kHz.
No audio input signal present	Valid reference input present	AES/EBU serial digital output sampled at 48 kHz. See S/N specification for level.
Audio inputs present	Reference not present	AES/EBU serial digital output sampled at approximately 48 kHz ±1 Hz. Internal free run clock rate.
Audio inputs present	Invalid reference input	Will pull AES/EBU output toward high or low limit of lock range and could produce erratic timing shift and Channel Status Bit errors. Reference Lock LED will be invalid and GUI tally will indicate 48 K Word Clock reference present even if a video reference is used.

Configuration

The 8920ADT can be configured locally using onboard switches and jumpers or remotely using the 8900NET Network Interface module with version 2.1 or later software.

The following parameters must be set on the 8920ADT module:

- Input level (Left and Right) — gain adjustment of analog input levels for full-scale digital outputs (0 dBFS),
- Delay — amount of delay applied to digital output signal,
- Output mode — channel swapping, summing, tone and phase inversion,
- Output audio bit resolution — selection of 20-bit or 24-bit output,
- Balanced or unbalanced outputs, and
- Control mode — Local/remote or local control only (remote lockout).

Local Onboard Module Configuration

The 8920ADT module can be configured locally using the jumpers, rotary switches and the paddle switch shown in Figure 5 on page 10. The CONF LED indicates status of the configuration process.

These components perform the following:

- SW 1 Control (rotary) switch selects functions performed by paddle switch SW 3. Refer to Table 6 for details.
- SW 2 Mode (rotary) switch selects a desired output configuration (0 through 9, A through F), although not all positions are used. Refer to Table 7 on page 12 for details.
- SW 3 (paddle) switch executes the functions selected by the Control rotary switch. Refer to Table 6 for details.
- Jumper JP4 sets control mode for Local only or Remote and Local.
- Jumper JP6 sets the output bit resolution (20- or 24-bit).
- Jumpers JP7 and JP8 determine whether AES outputs are balanced or unbalanced.
- CONF (configuring) LED – when on, indicates the module is initializing or processing configuration information.

Figure 5. Module Configuration Switches and LEDs

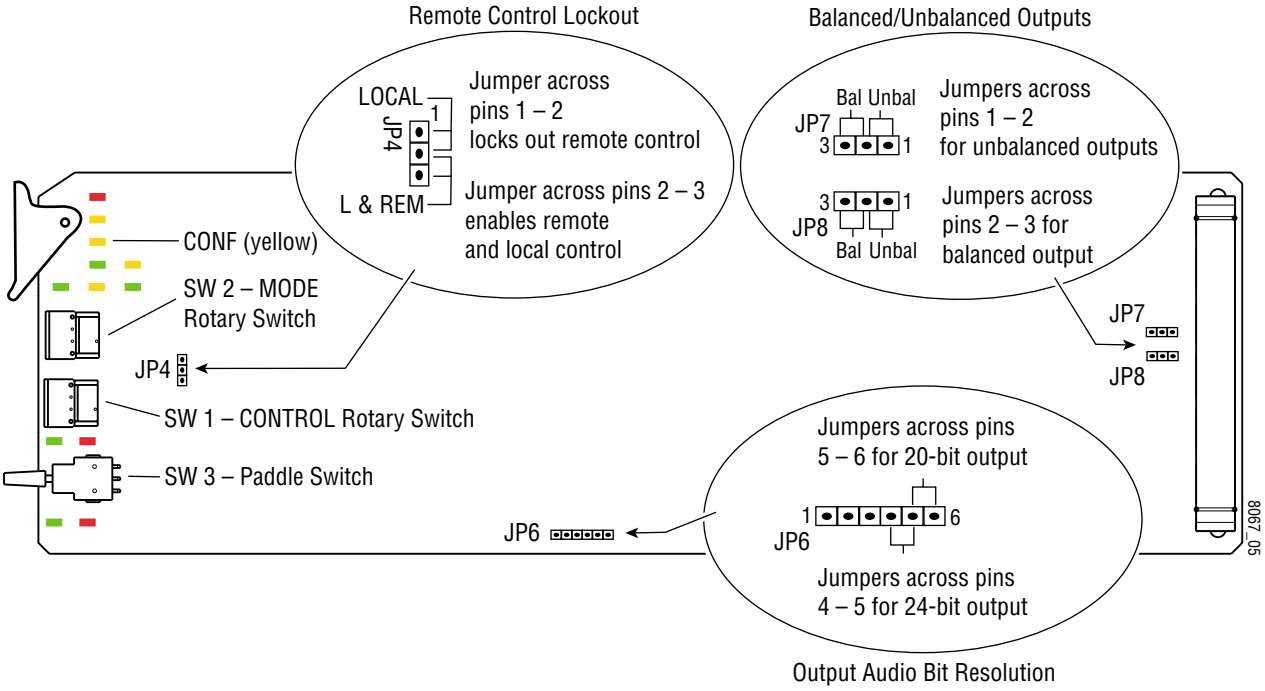


Table 6 gives the functions of each selection on the Control rotary switch (SW 1) and the action of the paddle switch (SW 3) in each function.

Table 6. Control Rotary Switch Function Selections

Control Switch		Paddle Switch	
Position	**Function**	**Up**	**Down**
0	Disable paddle control	–	–
1	Level adjust for both channels†	Increase	Decrease
2	Level adjust for left channel	Increase	Decrease
3	Level adjust for right channel	Increase	Decrease
4	Delay	Increase	Decrease
5 – D	Disable paddle control	–	–
E	User settings	Recall	Save
F	Factory settings	Recall	–

† Any offset between the channels will be maintained in this adjustment.

Input Level Adjustments

The maximum signal level of the analog input must be set for full-scale digital outputs (0 dBFS) on the left and right channels. Fine and coarse gain controls are tied together so that the gain changes in a continuous fashion with the paddle switch.

To adjust input levels, use the paddle switch (SW 3) on the front of the module and set the Control rotary switch (SW 1) to the position given in Table 6 on page 10 to adjust both channels together, or the left and right channels individually.

Default Position

Set the Mode Rotary Switch at the front of the module to the Default position marked 0 as shown at left. The Default position will put each channel output into a normal mode with no phase inversion, channel swapping or summing.

To correctly adjust the 8920ADT for your digital application, determine your maximum signal level (MSL). This is the level above which digital clipping occurs. This module has been set up at the factory with a maximum signal level default value of +24 dBu = 0 dBFS.

Note The paddle switch changes input levels by increments of approximately 0.1 dB when held momentarily. Holding the switch up or down for about 1 second activates a continuous change mode that ramps the change rate from about 0.1 dB per second to 0.6 dB per second. The yellow CONF LED will flash slow (0.1 dB rate) or fast (0.6 dB rate) to indicate the change rate.

There are three ways to adjust the paddle switch for the proper level:

- Apply the maximum signal level for your device to the analog input and monitor the AES output with a meter that indicates digital level in dBFS. Adjust the paddle switch for each channel until the meter indicates 0.0 dBFS.

Note Because the paddle switches have a resolution of 0.1 dB, you may not be able reach 0.0 dBFS exactly. Use the closest negative setting possible.

- Apply an input audio level that is -20 dB below the maximum level, (+4 dBu for the default, +24 dBu -20 dB = +4 dBu) and adjust the AES output as indicated on a digital audio meter to -20 dBFS.

Note If you have no meters calibrated in dBFS you can use the tone output position to compare with the output level. Tone output is position E on the Function Switch and outputs a 1 kHz tone at -20 dBFS. Note the internal tone level indication while monitoring the AES output and switch back to 0 or F position on the Function Switch, then adjust the gain paddle switch to the same level as the internal tone level.

- Apply the maximum signal level to the input and adjust the paddle switch for each channel until the clip LED comes on. This is -0.5 dBFS, and by tapping the paddle switch four more times you will be within 0.15 dB (worst case) of the correct setting.

Adjusting Delay

For an AES/EBU signal the front paddle switch adds (up) or subtracts (down) delay increments of 2 ms (1/16 video frame) each. Holding the switch in either direction will cause the delay to step at regular intervals until it is held for one to two seconds. After this interval, the rate of change increases to 32 ms per step until the paddle is released or minimum or maximum delay is reached. Both channels of audio are delayed together.

Note Delay should be set without an auto-tracking signal input.

Configuring Output Mode

The 8920ADT provides thirteen possible output configurations as shown in Table 7. The module can be configured using the rotary switch shown in Figure 5 on page 10. To make a configuration setting, rotate the switch to the desired output configuration. The 16-position rotary switch selects one of 13 possible output modes. Positions B and C are not used and positions 0 and F select the same mode, the factory default.

Table 7. 8920ADT Output Mode Configuration

Switch Position	Mode Description
0	Factory default – No phase inversion, channel swapping or summing.
1	Channel swap – Left and Right.
2	Both channels phase inverted.
3	Left channel phase inverted.
4	Right channel phase inverted.
5	Right channel to both channel outputs.
6	Left channel to both channel outputs.
7	Left plus Right to both channel outputs (-6 dB mono sum).
8	Left minus Right to both channel outputs.
9	Left plus Right to Left channel output and Left minus Right to Right channel output.
A	Left plus Right to both channel outputs and both channels phase inverted.
B	Not used (outputs AES silence).
C	Not used (outputs AES silence).
D	Tone 1 to all channels (AES Silence).
E	Tone 2 to all channels (1 kHz, -20 dBFS).
F	Factory default – No phase inversion, channel swapping or summing.

Remote Control Lockout

When a jumper is placed across pins 1 and 2 of jumper block JP4 (see Figure 5 on page 10), 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 2 and 3.

Remote Configuration and Monitoring

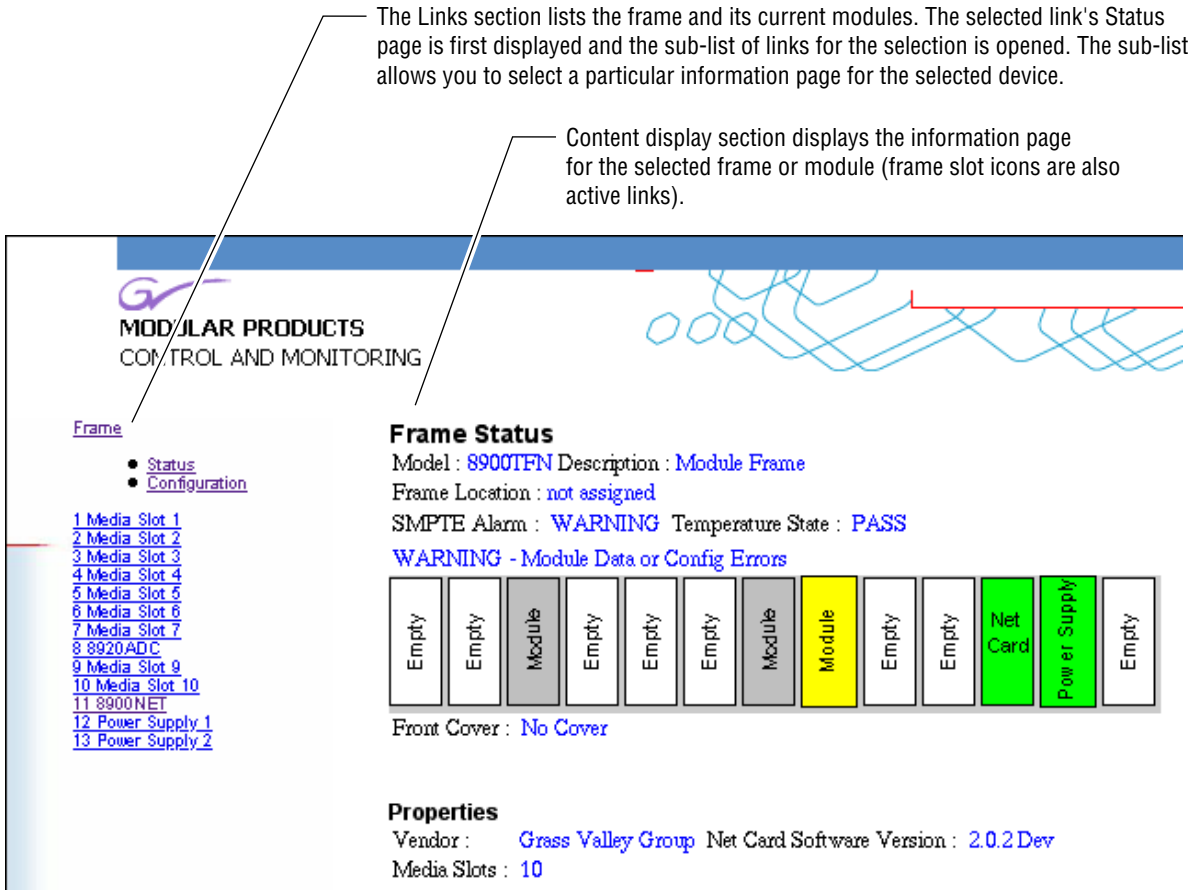
8920ADT configuration and monitoring can be performed remotely using the 8900NET interface (version 2.1 or later) in 8900TF or TFN frames (see Figure 6). This section describes the GUI access to the module configuration functions. Refer to the 8900NET Network Interface Module Instruction Manual for information on setting up and operating the 8900 frame network.

For remote access, make sure jumper block JP7 on the module is set for both Local and Remote access (Figure 5).

Note The physical appearance of the menu displays 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.

The 8900 modules can be addressed by clicking 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.

Figure 6. 8900NET GUI



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

- Missing or unlocked input, or
- Board failure.

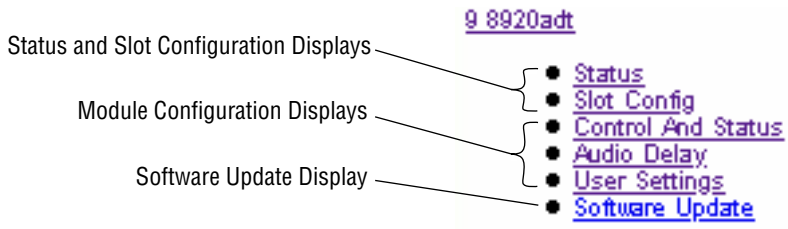
Module Configuration Displays

The 8900 GUI provides the following links and displays for the 8920ADT module (Figure 7):

- Status and Slot Configuration displays showing status and slot configuration information (location and user assigned names),
- Module Configuration displays, and
- Software Update display.

The Status and Slot Configuration displays operate in the same manner for all remote controllable 8900 modules. Refer to the 8900NET manual for more information on these displays. Some functions listed may not be supported by a particular module. These will be indicated as not supported.

Figure 7. 8920ADT Display Links



Software Update Displays

The Software Update display allows you to download new software versions for the module. Refer to the 8900NET manual and the Grass Valley Group web site at http://www.grassvalleygroup.com for complete details and new software versions.

Module Configuration Displays

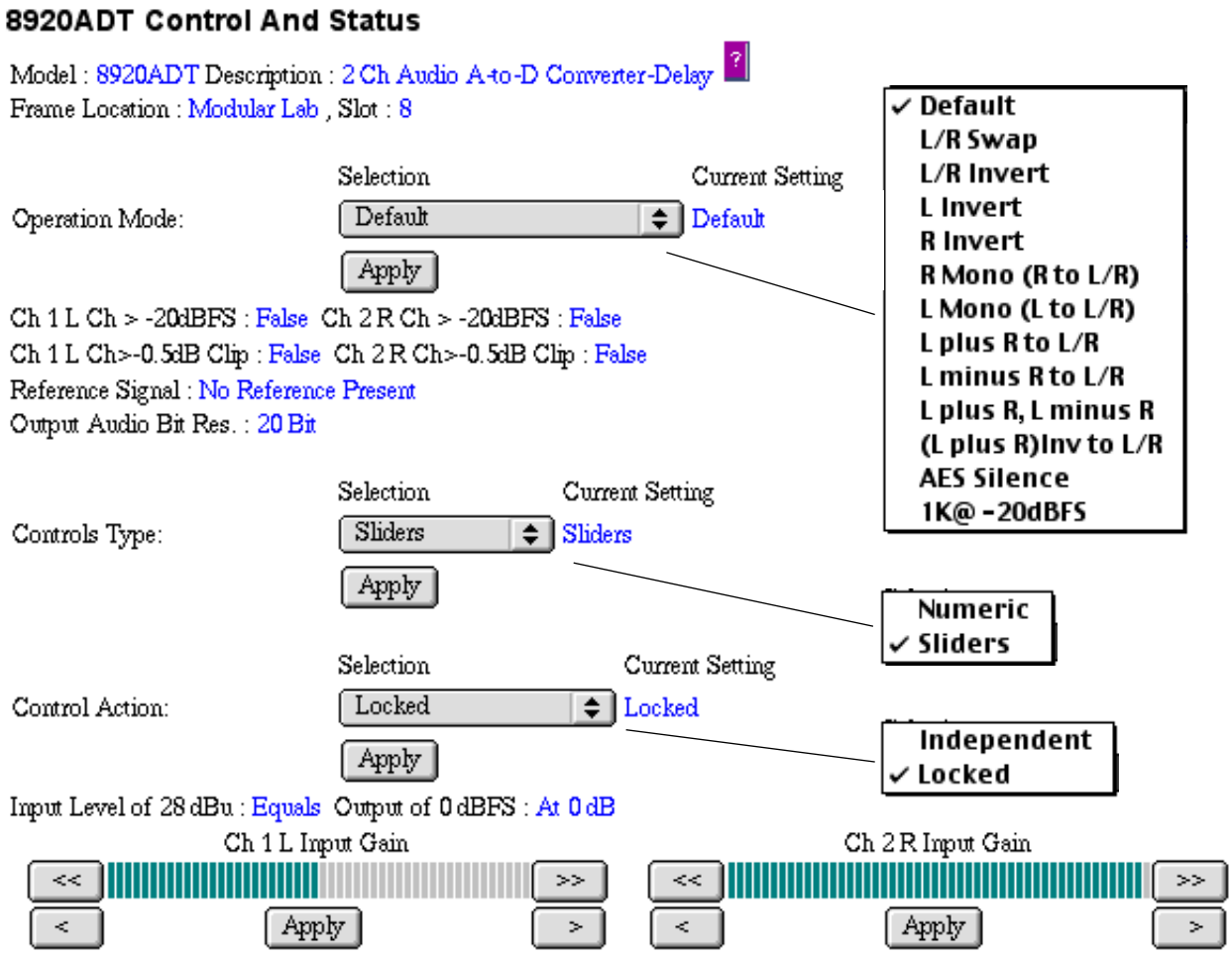
This section discusses the Module Configuration Displays used to set parameters required for 8990ADT module operation. You may select output mode, set signal levels, and adjust delay. Press the **APPLY** button to activate the selections.

Control and Status

The Control and Status display (see Figure 8) provides controls for setting the following parameters on the 8920ADT module:

- Operational (output) mode, and
- Output level adjustment.

Figure 8. Control and Status Page in Slider Control Mode



Set the Operational Mode for the desired output of the module from the thirteen selections listed below in Table 8 and shown in the menu display in Figure 8 on page 16. After making the selection, click the Apply button to activate it.

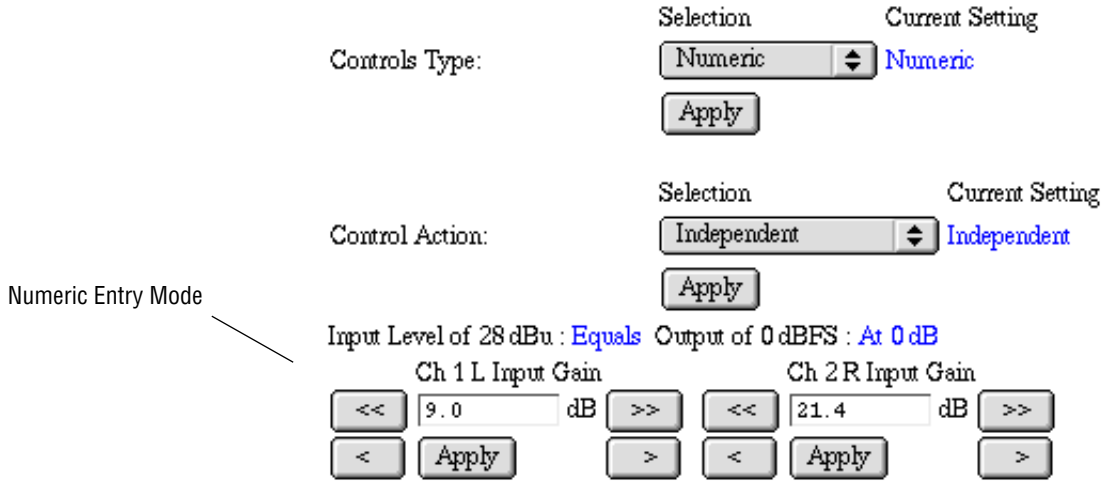
Table 8. Remote Control Output Configuration Modes

Mode Name	Mode Description
Default	Factory default with no phase inversion, channel swapping or summing.
L/R Swap	Swaps left and right channel outputs.
L/R Invert	Both left and right channel outputs phase inverted.
L Invert	Left channel output phase inverted.
R Invert	Right channel output phase inverted.
R Mono (R to L/R)	Right channel to both channel outputs.
L Mono (L to L/R)	Left channel to both channel outputs.
L plus R to L/R	Left plus right to both channel outputs.
L minus R to L/R	Left minus right to both channel outputs
L plus R, L minus R	Left plus right to left channel output and left minus right to right channel output.
(L plus R) Inv to L/R	Left plus right to both channel outputs with both channel outputs phase inverted.
AES Silence	AES silence on both left and right channel outputs.
1K@ -20dBFS	Tone to both channel outputs.

Gain adjustment of the module output levels can be done from this display. Adjust the gain in either Sliders mode or Numeric mode (shown in Figure 9 on page 18). The single arrows buttons increment or decrement the value by 0.1 dB. The double arrow buttons will increment or decrement the value by approximately 1.0 dB. These controls will allow you 0.0 to 20 dB range of adjustment.

Note In Numeric mode only, values selected with the single or double arrow keys will be enabled immediately. All other display entries, including typed in values, require pressing Apply before the selection is enabled.

Figure 9. Numeric Control Mode for Level Adjustment



The following status items will be reported in this display (see Figure 8 on page 16):

- Model name — as defined on the main Status page.
- Frame location — indicates the frame name and slot number.
- Left and Right Ch > -20 dBFS — indicates whether the left and right channel digital output levels are greater than -20 dBFS (True) or less than -20 dBFS (False).
- Left and Right Ch > -0.5 dBFS Clip — indicates whether the digital output clipping levels are greater than -0.5 dBFS (True) or less than -0.5 dBFS (False).
- Reference Signal — indicates one of these reference signal input conditions:
  - No reference signal present,
  - AES signal present,
  - 525 video signal present,
  - 625 video signal present, or
  - 48 kHz Word Clock signal present.
- Output Audio Bit Res. — 20-bit or 24-bit digital output (Jumper selection, see Figure 5 on page 10).

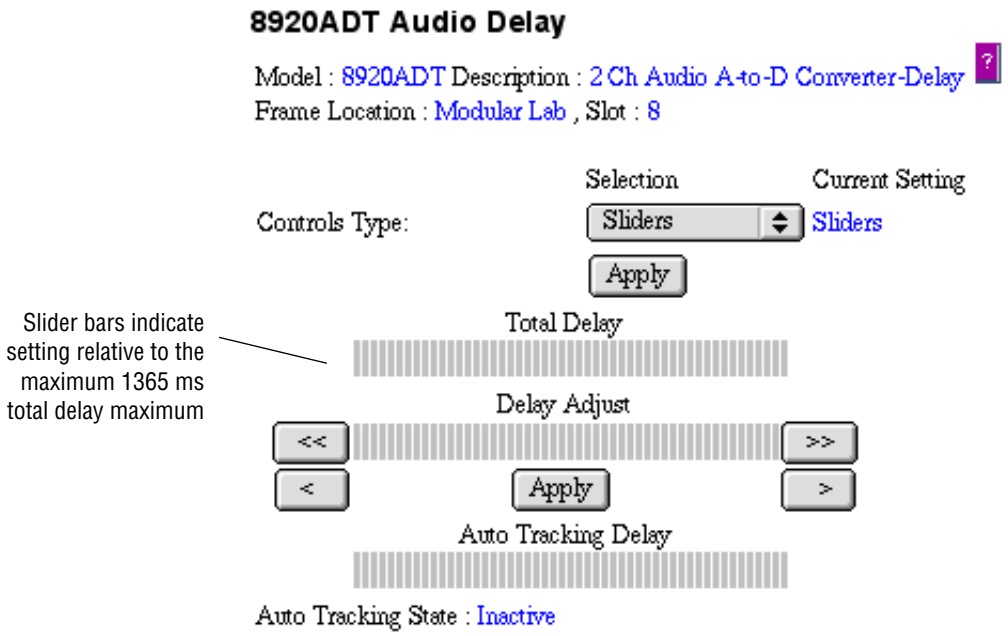
Audio Delay

The Audio Delay display (see Figure 10) provides controls for setting the:

- Control mode of the display (Slider or Numeric, and
- Fixed Delay provided by the module.

If Auto Tracking is active, the delay provided by the 8900 Frame Sync module will be added to the module's fixed delay. The display tallies amounts for Auto Tracking, fixed Delay Adjust, and the resulting Total Delay.

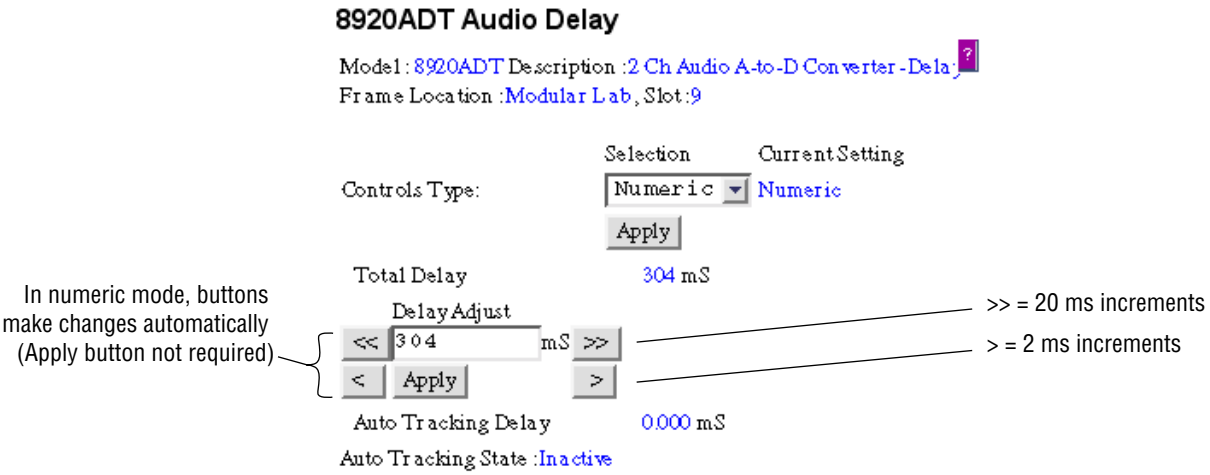
Figure 10. 8920ADT Audio Delay Display, Slider Mode



The slider mode provides a view of the delay setting relative to the module's maximum 1365 ms.

In numeric mode (see Figure 11 on page 20), the display provides delay amounts in millisecond units. When using the increment/decrement buttons the change is immediately applied. When numeric values are entered in the window, it is necessary to click on the **Apply** button.

Figure 11. 8920ADT Audio Delay Display, Numeric Mode



User Settings

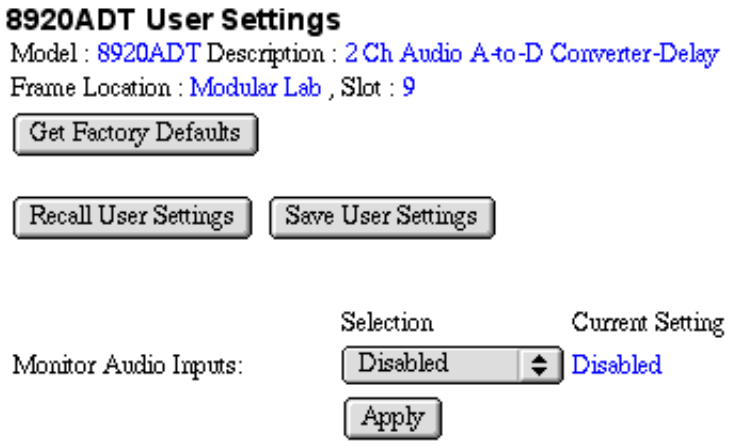
The User Settings menu allows you select the following parameters shown in Figure 12:

- Get Factory Defaults for:
  - Audio gain (left and right) — 4 dB,
  - Delay — 0.0,
  - Monitor Audio Inputs — Disabled, and
  - Control Action — Independent.
- Save/Recall User Settings including:
  - Audio gain (left and right), and
  - Delay.
- Enable/disable Monitor Audio Inputs.

  When enabled, the module Status page will indicate if input signals are present and provide a warning when they are not detected. When disabled the Status page shows a gray input signal arrow indicating the input status is not monitored.

Note Operation Mode is not saved or recalled as factory default or user settings. Operation Mode must always be changed using the on-board rotary switch or the Control and Status page.

Figure 12. 8920ADT User Settings Display



Specifications

Table 9. 8920ADT Specifications

Parameter	Value
Analog Input	
Number of inputs	2
Level for full-scale output	+8 dBu to +28 dBu
Connector type	Plug-in terminal block on adapter
Input impedance	> 22 kΩ
Common mode input voltage	±10 V maximum
Differential DC	±0.25 V maximum
Common mode rejection	> 90 dB, 50/60 Hz, > 45 dB to 20 kHz
AES Reference Input	
Number of inputs	1 Loop-through
Signal type	AES3id – 1992, word clock (48 kHz sample rate), video (PAL/NTSC)
Connector type	75 Ω BNC
Common mode range	±1 V
Differential voltage range	200 mV to 12 V p-p
Input return loss	> 15 dB 100 kHz – 10 MHz @ 75 Ω
Sample rate	48 kHz
Maximum jitter	< 6.5 ns RMS
AES/EBU Outputs	
Number of outputs	2 unbalanced 75 Ω or 1 balanced 110 Ω with terminal adapter
Connector type	75 Ω BNC or 110 Ω terminal adapter
Signal type	SMPTE 276M (AES3id – 1992) unbalanced or AES3-1992 balanced transformer output
Output level	Unbalanced 1 V ± 0.1 V p-p terminated into 75 Ω or Balanced 2 V to 7 V p-p terminated into 110 Ω
Rise/fall time	30 ns to 44 ns across 75 Ω load (AES-3id) or 5 ns to 30 ns across 110 Ω load (AES3)
Sample rate	48 kHz
Output return loss	> 15 dB (100 kHz to 6 MHz)
Maximum jitter	< 6.5 ns RMS
Channel status bits set	20-bit: Byte 0 = 85 hex, Byte 23 = 71 hex 24-bit: Byte 0 = 85 hex, Byte 2 = 04 hex, Byte 23 = 1E hex
Output bit resolution	20 or 24-bit jumper selectable
Performance (@ +28 dBU input and full scale output)	
Module insertion to operation	< 1.5 seconds
Signal-to-noise ratio	>102 dB, 20 Hz to 20 kHz >105 dB “A” weighted
THD+Noise, swept 20 Hz to 20 kHz	< 0.005%, 20 Hz to 20 kHz, + 24 dBu input
Interchannel crosstalk	< -95 dB, 20 Hz - 20 kHz, +28 dBu input
Intermodulation distortion	< -100 dB CCIF two-tone test, 19 kHz and 20 kHz tones
Frequency response	± 0.05 relative to 1 kHz, 20 Hz to 20 kHz

Table 9. 8920ADT Specifications - (continued)

Parameter	Value
DC offset	< ± 1 mV
Electrical length (input to output delay)	940 µs minimum, 1,365 ms maximum
Environmental	
Frame temperature range	0 to 45 degrees C
Operating humidity range	0 to 90% non-condensing
Non-operating temperature	-10 to 70 degrees C
Static withstand	5 kV (330 Ω, 150 pF) any input or output
Factory calibration	Calibrated for +24 dBu set to 0 dBFS (mode switch at 0)
Mechanical	
Frame type	8900 Series
Power Requirements	
Supply voltage	±12 V
Power consumption	< 2 Watts

Service

The 8920ADT modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field unless you are directed to do so by Customer Service.

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

- Check frame and module power and signal present LEDs.
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.
- Check output connections for correct I/O mapping (correct input connector is used for the corresponding channel output).

Refer to Figure 4 for the location of PWR LED and Table 4 on page 7 for proper LED indications.

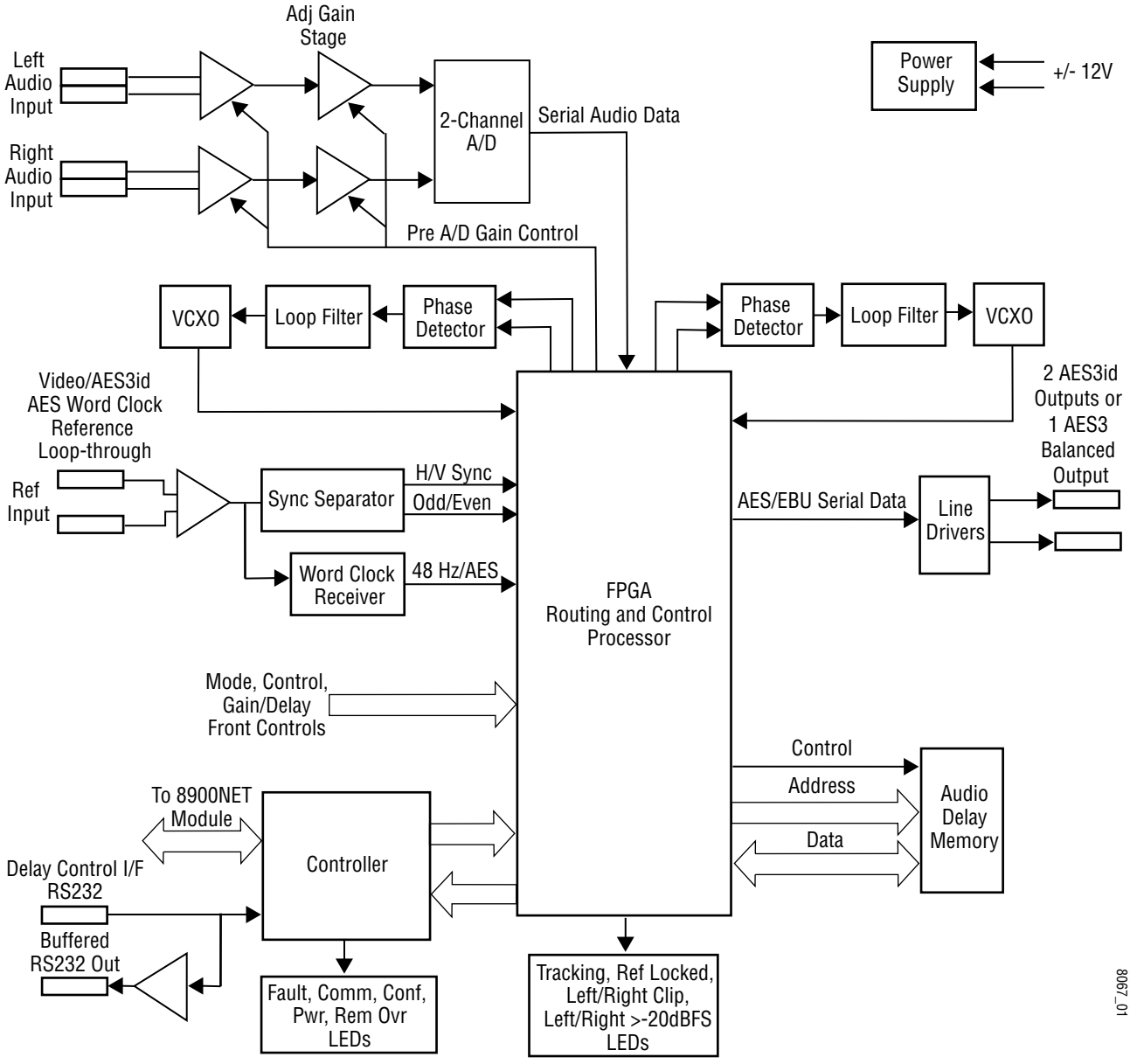
If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

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

Functional Description

Figure 13. The 8920ADT converts two channels of analog audio into one 48 kHz sample-rate serial data stream, which is then delayed and converted into an AES/EBU formatted output signal. Refer to the block diagram in Figure 14 while reading the following functional description.

Figure 14. 8920ADT Block Diagram



Differential Input, Analog Gain and A/D Converters

The analog input is applied to a differential amplifier stage. This converts the signal to single-ended and applies it to the coarse gain stage. Coarse gain control pre-conditions the incoming signal before it is applied to the A/D converters.

The fine gain control is by two center-off toggle switches on the front of the module. They provide a 2 dB range of fine gain adjustment in approximately 0.1 dB increments. The control takes approximately 6 to 10 seconds to transition from minimum to maximum.

The signal is converted back to a differential signal and applied to the 24-bit A/D converter, then to the Routing and Control FPGA (Field Programmable Gate Array).

Digital Reference Input

The digital reference is applied via the loop-through input to the AES receiver and phase-locked loop. This provides clock and data to the Control and Routing FPGA and the A/D converters.

Routing and Control FPGA

The signals from the A/D converters are applied to the Routing and Control FPGA. The incoming signal processing and level is determined by the setting of one of 16 possible mode commands from a four-bit rotary encoder switch and four signals from the level toggle switches. After processing and delaying, the signals are embedded into an AES stream and applied to the Output Drivers.

The Routing and Control section also drives the front panel LEDs and interfaces to the Controller section.

Controller

The Controller interfaces with the Routing and Control FPGA, the EEPROM and the 8900 Frame Bus. The Controller also provides the FPGA code that is downloaded to the FPGA during boot-up.

The Controller section handles local control and monitoring, as well as remote control and monitoring via the frame bus (when an 8900NET module is installed in the frame). Module settings are stored in the EEPROM for power up recall.

Power Supply

Power is fed from ±12 V rails of the frame's switching power supply. Each stage of the module receives it's own, separate, highly regulated and filtered power source. Two-stage regulation is used in the analog section of the ADC to reduce switching noise.

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