GRASS VALLEY GROUP

Instruction Manual

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8912RDA/RDA-D

AES/EBU RECLOCKING DISTRIBUTION AMPLIFIER

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

Software Downloads — Software updates, drivers, and patches can be downloaded.

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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 *8900 Series Frames Instruction Manual*).

8912RDA/RDA-D AES/EBU Reclocking Distribution Amplifier

Introduction

The 8912RDA module is a low cost, high density analog audio distribution amplifier (DA) available in single- and dual-channel versions. It is designed for use in the 8900 Audio Frame. The single-channel module has one balanced and one unbalanced (BNC) input and produces eight 110 Ω balanced outputs. The dual-channel version has two balanced inputs and two unbalanced inputs and produces four 110 Ω balanced outputs per channel. Balanced or unbalanced inputs are selectable by channel and can also be jumpered to have 75 Ω, 110 Ω, or high input impedance. The AES data is reclocked by means of a phase-locked-loop (PLL).

The 8912RDA features:

- AES3 or AES3id inputs with selectable 110 Ω, 75 Ω, or Hi impedance,
- Eight single (RDA) or four dual (RDA-D) AES3 110 Ω balanced outputs,
- Outputs re-clocked at any data rate from 32 kHz to 96 kHz, and
- Remote and local reporting of input lock and input error.

Installation

Installation of the 8912RDA module is a process of:

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

The 8912RDA 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 11).

Frame Capacity

The 8912RDA 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	8900TX-A Frame	8900TF-A Frame	8900TFN-A Frame
Power (W)	100	100	100
Recommended Module Cooling (W)	30	90	90
8912RDA Modules	10	10	10
8912RDA-D Modules	9	10	10

Note Module capacity figures assume no other modules are in the frame.
X = Not recommended without forced air cooling.

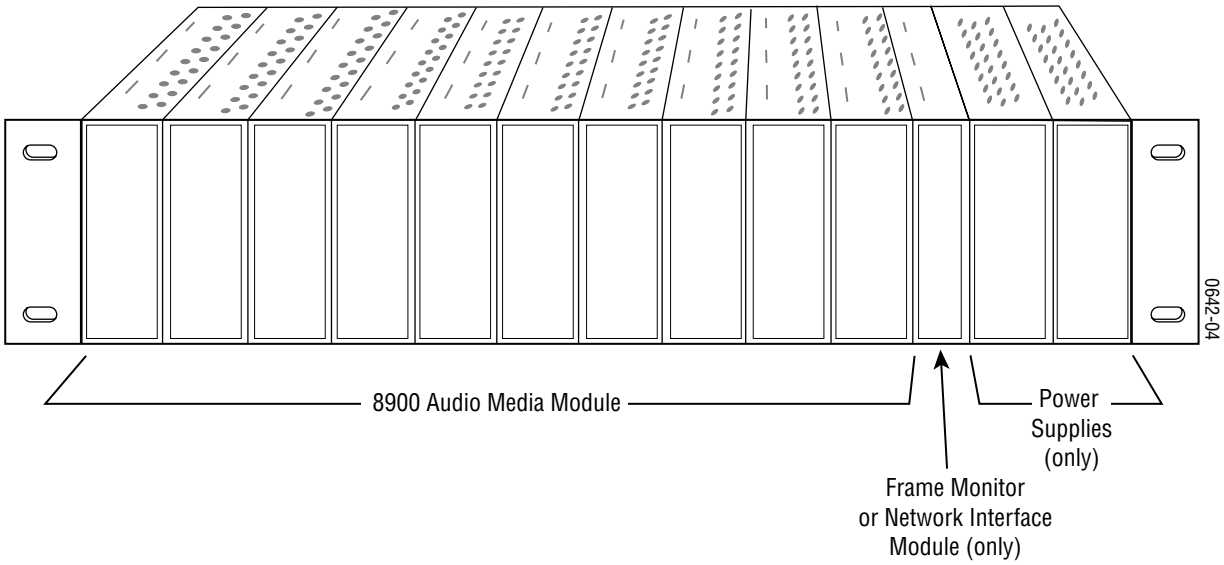
Module Placement in the 8900 Frame

There are ten slot locations in the frame to accommodate either analog or digital modules. These are the left ten locations. Refer to Figure 1 on page 9.

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

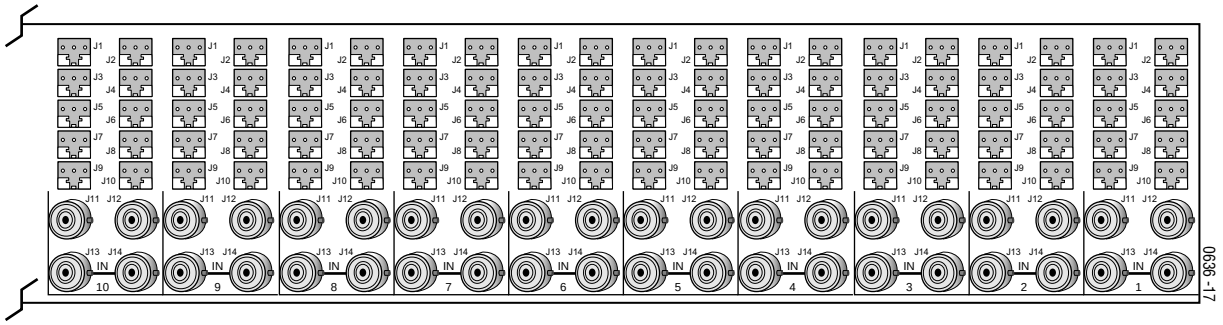
The third slot from the right is allocated for the Frame Monitor or Network Interface Controller module. These modules provide health monitoring and control options.

Figure 1. 8900 Series Frame



8900 module slots are interchangeable within the frame. There are 10 three-terminal connectors and 4 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 media 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:

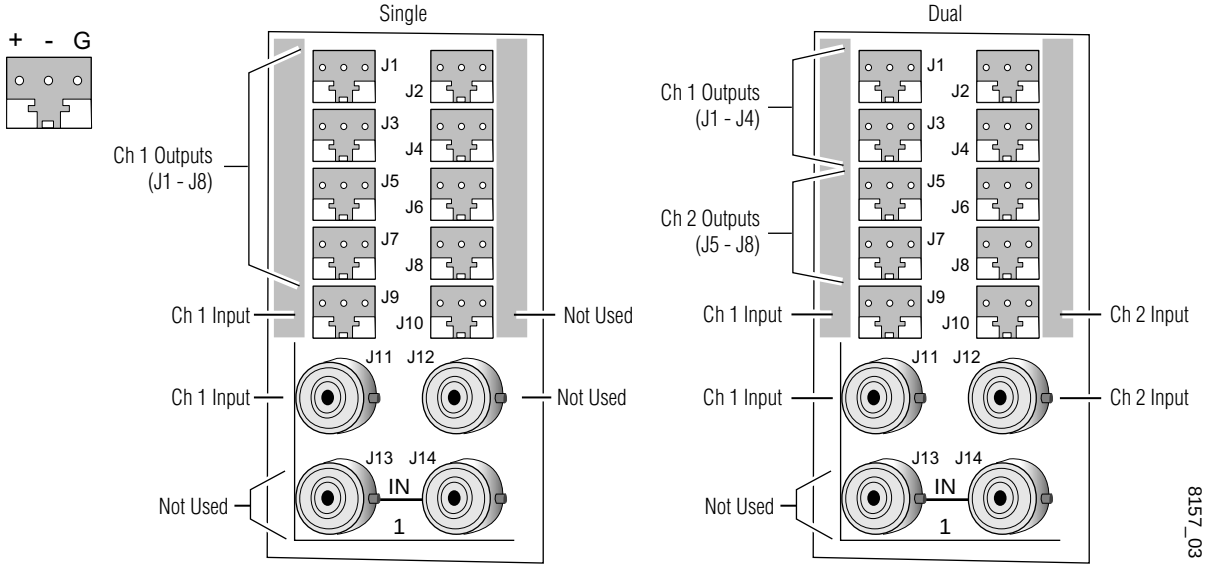
1. Insert the module, connector end first, with the component side of the module facing to the right and the ejector tab to the top.
2. Verify that the module connector seats properly against the backplane.
3. Press in the ejector tab to seat the module.

Cabling

Inputs

Connect an input source to one of the three-terminal input connectors (see Figure 3), J11 or J12 (J11 only for single channel modules). The 8912 input will accept AES3id -1992 digital audio signals.

Figure 3. 8912RDA Single and Dual Channel Input/Output Connectors



Outputs

The 8912 has eight three-terminal outputs (J1 through J8). The 8912 dual channel module uses the first four outputs (J1 through J4) for Channel 1 and the next four (J5 through J8) for Channel 2. The output signal conforms to AES3id - 1992 (AC coupled) digital audio signal standard.

Power Up

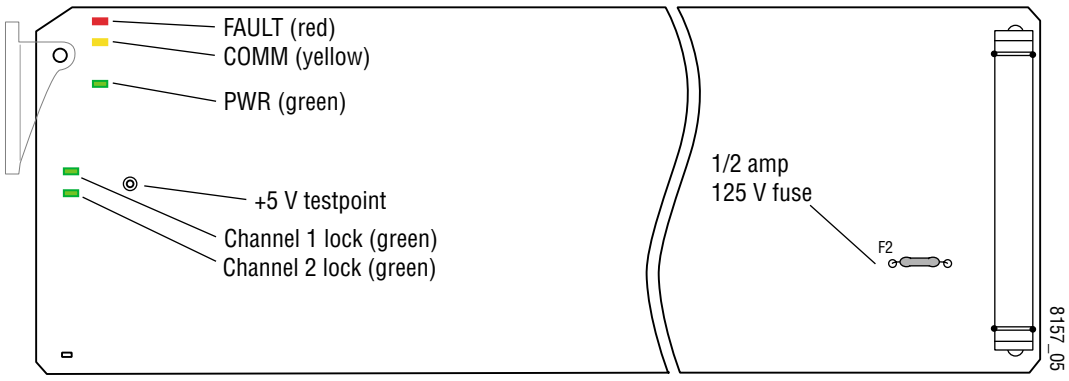
The front LED indicators and configuration switches are illustrated in Figure 4. Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

With factory default configuration and a valid input signal connected, the green PWR LED, and one or both of the green signal Channel Lock LEDs should illuminate when phase lock is achieved for valid AES/EBU input signals (refer to Table 1 on page 12 to see the possible operating indicator combinations).

The yellow COMM LED, when flashing, indicates communication is active on the frame bus. The LED also goes into a steady long interval flash when the module receives a Location command from the remote control system, providing easy visual identification of the module in a rack with multiple 8900 frames.

Figure 4. LEDs and Testpoints



A red FAULT LED indicates an error situation and, with the previously described LEDs, can indicate the operational conditions presented in Table 1 on page 12. The table describes LED indications and the signal input/output conditions that are indicated.

Table 1. LED Indications for Input Conditions and Resulting Output Signals

Fault (red)	Lock LED	Input Condition	Output Signal
OFF	ON	Valid AES/EBU inputs present.	AES/EBU serial digital output re-clocked at input sample rate
Flashing	OFF	Invalid AES/EBU inputs present.	The received bi-phase data
Flashing	OFF	No AES/EBU input signal present	No output signal
Flashing	ON	AES/EBU input with parity errors or bi-phase encoding errors, or channel status CRC errors, validity bit set	AES/EBU output will not have the error but the data may be corrupted producing audio pops and clicks
Flashing	OFF	AES/EBU input with confidence error, means eye pattern too small to reliably extract data	AES/EBU output with intermittent audio
OFF	ON	AES/EBU input at other than standard data rates	AES/EBU output reclocked at input sample rate

Configuration

The 8912RDA can be configured locally using onboard jumpers.

Configuration establishes:

- Input impedance,
- Balanced or unbalanced inputs, and
- Single- or dual-channel operation (8912RDA-D modules only).

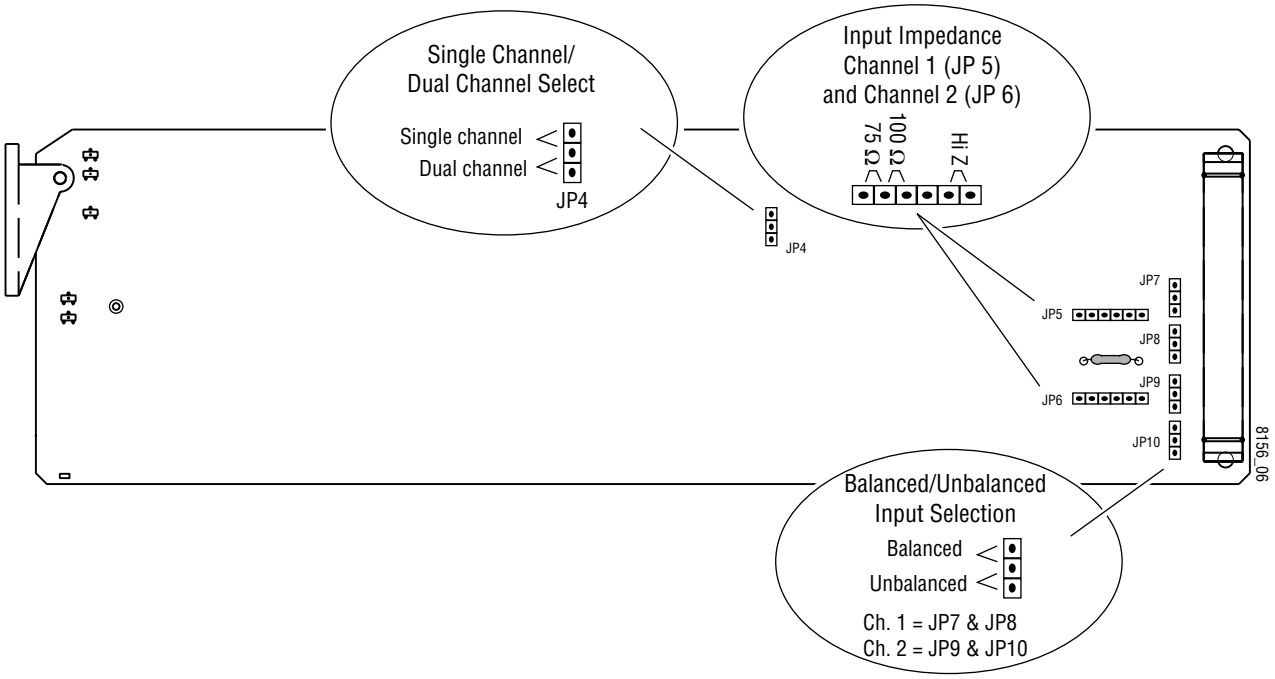
Onboard Module Configuration

The 8912RDA module is configured by setting jumpers shown in Figure 5.

These jumpers shown perform the following:

- JP5 and JP6 select 75 Ω, 110 Ω, or high impedance inputs,
- JP7 through JP10 select balanced or unbalanced inputs, and
- JP4 allows the dual-channel module to be set for either single-or dual-channel operation.

Figure 5. Module Configuration Jumpers



Remote Configuration and Monitoring

8912RDA and RDA-D have limited reporting ability and no remote configuration functionality. They will report:

- Module presence,
- Model number,
- Slot ID,
- Revision and serial numbers,
- Channel lock, and
- Channel errors.

Specifications

Table 1. 8912RDA Specifications

Parameter	Value
AES/EBU Input	
Differential voltage range	Balanced AES3: 200 mV p-p to 12 V p-p Unbalanced AES3id: 200 mV p-p to 2 V p-p
Sample rate	32 kHz to 96 kHz
Common mode range	+10/-10 V, 50 Hz to 20 kHz
Input return loss	Balanced: >15 dB, 100 kHz to 10 MHz Unbalanced: >25 dB, 100 kHz to 10 MHz
Outputs	
Number of outputs	RDA (single channel): 8 balanced RDA-D (dual channel): 4 balanced per channel
Signal type	AES3 – 1992
Signal level	3 V p-p ±0.2 V terminated into 110 Ω
Output impedance	< 110 Ω balanced
Rise/fall time	Minimum 5 ns to maximum 30 ns across 110 Ω
Sample rate	32 kHz to 96 kHz
Output return loss	>15 dB, 100 kHz to 10 MHz
Performance	
Module insertion to operation	<1.5 sec.
Electrical length (delay)	203 µs @ 32 kHz 147.6 µs @ 44.1 kHz 135.5 µs @ 48 kHz 67.7 µs @ 96 kHz
Jitter tolerance	AES3-1992 Amendment 1-1997 Jitter EQ = 10 UI p-p, 10 Hz - 200 Hz; Linear decrease from 10 UI p-p to 0.25 UI p-p from 200 Hz to 8 kHz; 0.25 UI p-p above 8 kHz
Maximum intrinsic jitter	<25 mUI peak
Ability to lock with jitter	0.200 UI peak wideband random jitter at any sample rate from 32 kHz - 96 kHz
Environmental	
Frame temperature range	0 to 45 degrees C
Operating humidity range	10 to 90% non-condensing
Non-operating temperature	-10 to 70 degrees C
Mechanical	
Frame type	8900 Audio Frame
Power Requirements	
Supply voltage	+12 V
Power consumption	<4 Watts

Service

The 8912RDA modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field unless directed otherwise by Customer Service.

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

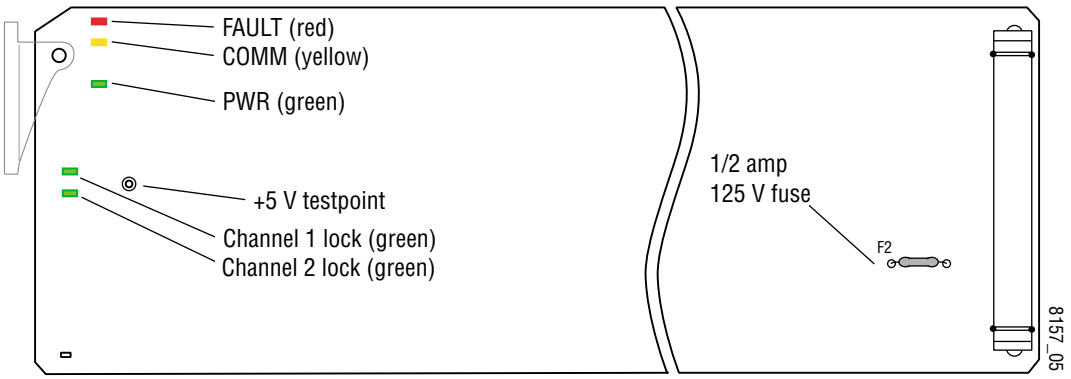
- Check frame and module power and Channel Lock LEDs.
- Verify power at the voltage testpoint (see Figure 6) and the check fuse if no voltage is detected.
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.
- Check output connections for correct I/O mapping (correct input connector is used for the corresponding channel output).

Refer to Table 1 on page 12 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 Service Information number.

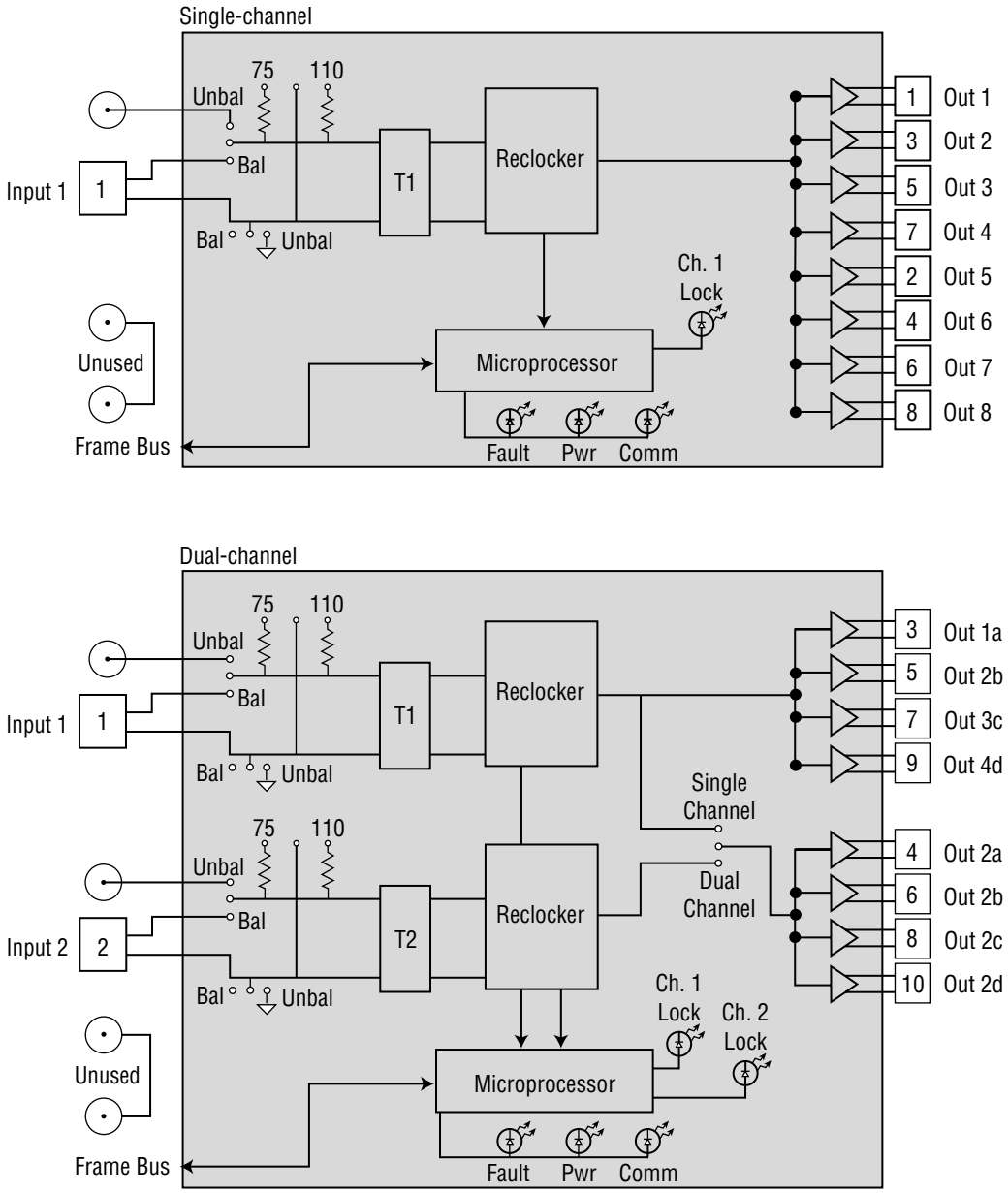
Figure 6. Fuse and Voltage Testpoint Locations



Functional Description

Refer to the block diagram in Figure 7 while reading the following functional description.

Figure 7. 8912RDA Block Diagram



AES Input

The input signals comes from the 50-pin connector, P1, in series with a DC blocking capacitor and feeds a digital audio transformer, T1 or T2, depending on the input. The output side of these transformers goes to the

differential line receiver in U6 or U7. Input for the channel is a balanced or unbalanced input and therefore has selectable termination with option of high input impedance.

U6 and U7 re-clock the data for its AES data stream. The control registers of U6 and U7 are set to allow the entire AES3 signal with the channel status bits to pass.

Outputs

After it is reclocked, the serial data is routed to the quad EIA-485 line drivers (U9 and U10). Each line driver drives four balanced output lines, which gives a fan-out of four per input.

The outputs feed a RC network that serves three purposes. The network AC couples the signal, while creating an output resistance of 110 ohms to match the cable impedance, limits the rise and fall times to meet the AES specification and in conjunction with a ferrite bead, reduces EMI. Output data comes directly from U6 and U7.

Controller

The controller is an OTP (one time programmable) P87LPC764. On power up, the microcontroller configures U6 and U7 and reads an internal register in U6 and U7 to determine if U6 or U7 is locked or not to the incoming AES input. The controller provides communications between a host processor and the 8912RDA-D.

Lock LED

The microcontroller drives the Lock LEDs, DS1 and DS2. If either LED is on, it indicates that U6 or U7 were able to lock onto the incoming AES signal.

Linear Regulator

The voltage regulators are monolithic integrated circuits with a fixed voltage output of +5 volts. The regulators employ internal current limiting and thermal shutdown. There are two +5V regulators, one for the input and reclocking chip and another for the output drivers.

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