

# Instruction Manual

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**8936**

**AUTO RECLOCKING DA MODULE**

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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*).



# *8936 Auto Reclocking DA*

## **Introduction**

The 8900 Series product line is a family of serial digital distribution amplifiers (DA). It consists of a 2 RU frame which holds up to ten modules. A variety of modules are available that can provide fanout, reclocking, monitoring, or error detection and handling capabilities. Modules are selected by the user to suit their particular requirements.

The 8936 Auto Reclocking DA module is a one input, eight output, auto reclocking, auto cable equalizing DA. It operates with SMPTE 259M or EBU Tech 3267 video formats.

The 8936 automatically selects the proper format from the incoming signal and displays it via an LED at the front of the module. If no signal is present, no LED will illuminate. If automatic selection is not desired, the user may use a DIP switch to specify the desired signal format.

The module has auto-equalization for up to 300 meters of Belden 8281 (or equivalent). There is an equalizer warning LED to indicate when the equalizer is approaching maximum capacity.

The 8936 module provides:

- Loop-through input
- Eight outputs
- Reclocked output
- Auto or manual format selection
- Auto-equalization
- Meets SMPTE 259M or EBU Tech 3267 standard
- Health monitoring
  - Input signal present monitoring
  - Input signal monitoring (EQ warning)
  - Power supply monitoring

## Installation

Installation of the 8936 module is a process of:

- Placing the module in the selected frame slot, and
- Cabling and terminating signal ports.

The 8936 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.

## Frame Capacity

The maximum number of 8900 modules allowed in a frame is determined by frame cooling capacity. [Table 1](#) provides the power capacity, cooling capacity, and maximum module count for the 8936 in 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
8936 Modules	8	10	8	10	10

**Note** Module capacity figures assume no other modules are in the frame. If the maximum number of modules a frame can handle is less than ten, provide as much space between the modules as possible.

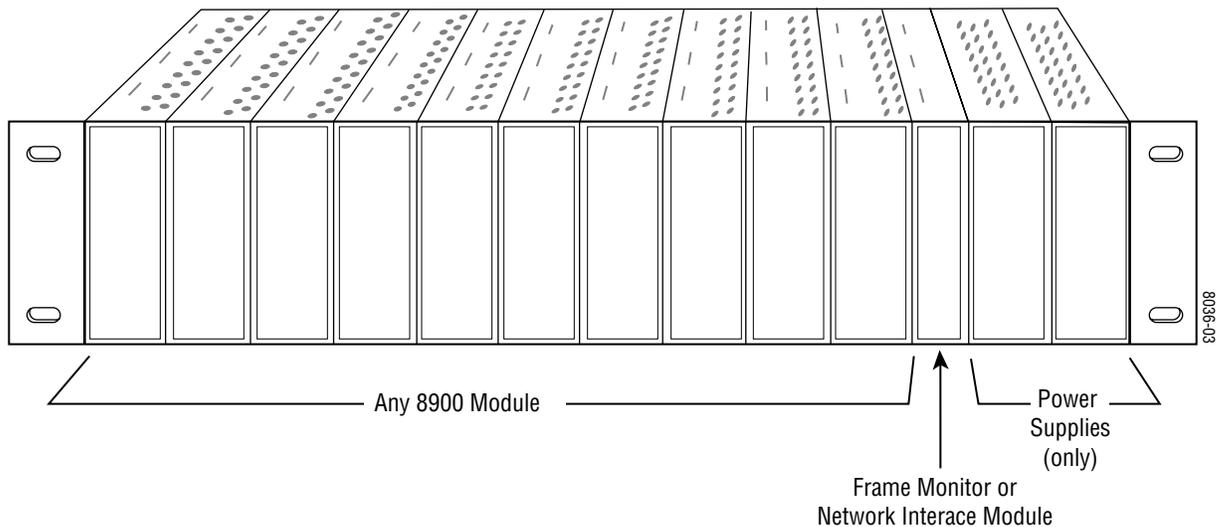
## Module Placement in the 8900 Frame

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](#).

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

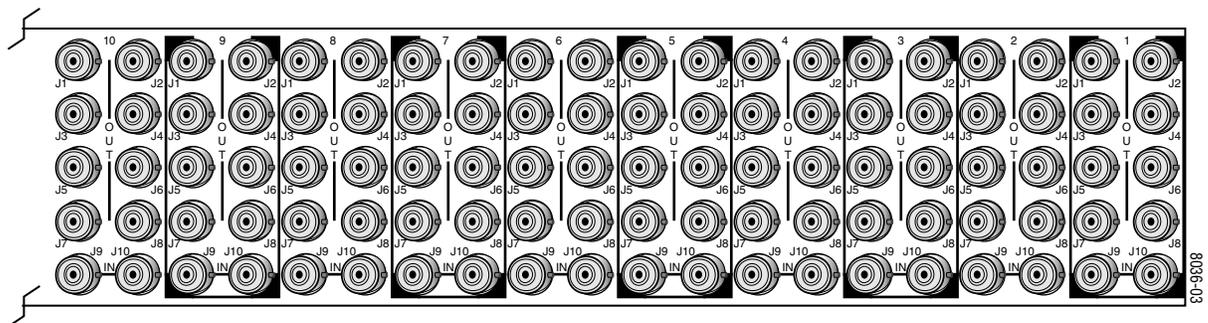
The third cell from the right is allocated for the Frame Monitor or Network Interface module. These modules provide health bus monitoring and control options.

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 Connectors



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

Refer to [Figure 3](#) when cabling your 8936 module. This illustration shows the typical input and outputs for an 8900 Series module.

### Loop-through Input

Connect an input source to one of the loopthrough input connectors, J9 or J10.

**Note** It is recommended that no more than five digital modules be looped, using cables less than two meters in length, and with an input cable less than 200 meters of Belden 8281 (or equivalent).

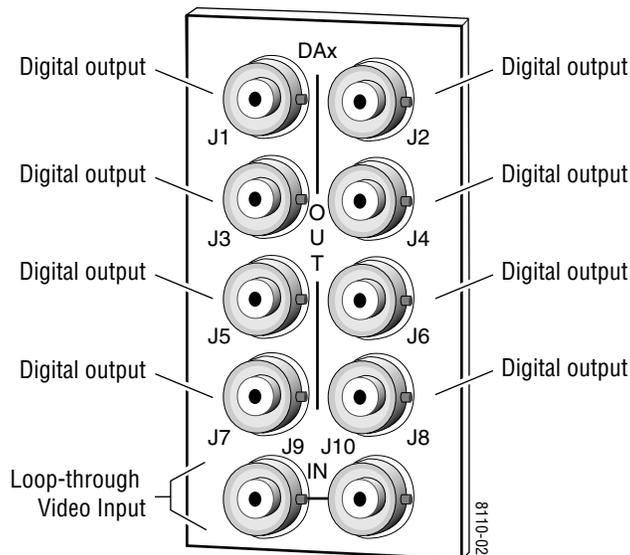
This loopthrough input must be terminated. The recommended termination for serial digital signals is CANARE BCP-TA (or equivalent).

Performance of looping inputs to equipment other than 8900 modules has not been verified; therefore, care should be taken if this is required.

### Outputs

There are eight outputs for the 8936 module, J1 through J8. The destination equipment should have an input impedance of 75  $\Omega$  unless it has loopthrough inputs, in which case the loopthrough inputs must be terminated into 75  $\Omega$ .

Figure 3. 8936 Input and Output Connectors

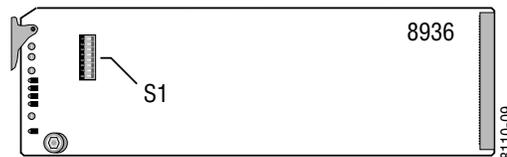


# Module Configuration

When installing the 8936 module, there is an eight position DIP switch (S1) that must be checked and/or set.

DIP switch S1 determines if automatic or manual data rate selection mode is desired. It also determines if the EQ warning alarm and video present alarm will be indicated on the health alarm line. Refer to Figure 4 for the location of S1 and the possible settings.

Figure 4. S1 Settings



Refer to Table 2 for the functions and descriptions of S1 settings.

Table 2. DIP Switch S1 Functions

S1 Switch #	Function	Description
1 – 4	Auto data rate selection	All up puts module in automatic data rate selection mode
1	143 Mb	When down, 143 Mb data rate is selected
2	177 Mb	When down, 177 Mb data rate is selected
3	270 Mb	When down, 270 Mb data rate is selected
4	360 Mb	When down, 360 Mb data rate is selected
5	EQ Warning	When down, EQ Warning Alarm is deactivated (Off)
6	Video Present	When down, Video Present Alarm is deactivated (Off)
7 – 8		Not Used

## Automatic Mode

In the automatic mode, the type of signal present is indicated by one of four signal present LEDs. If there is not a signal present, no LEDs will illuminate. Refer to Figure 4 for the switch settings for the automatic mode.

## Manual Mode

In the manual mode, the module will stay in the mode selected. The signal present LEDs will only illuminate if that particular signal is present. Refer to Figure 4 on page 5 for the switch settings for the manual mode.

**Note** For S1-1 through S1-4, only one signal selection switch can be turned on at a time for proper operation.

## SMPTE Alarm

**Note** The SMPTE alarm can function only if the Controller module is installed.

Refer to [Table 3](#) for the SMPTE alarm functions activated by the 8936.

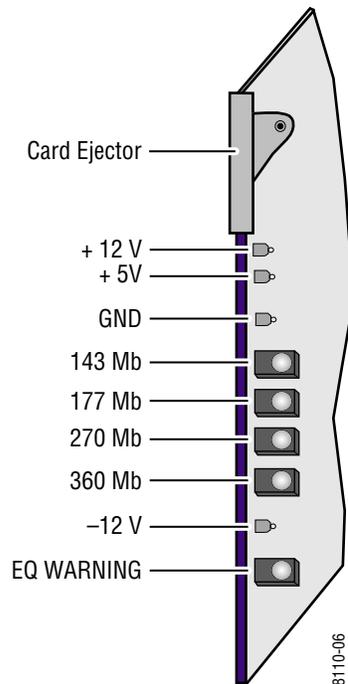
Table 3. SMPTE Alarm

Function	Alarm
No + 5V, +12V, or -12V	Full alarm
No video (if enabled)	Pulsing alarm
EQ warning (if enabled)	Pulsing alarm

## Module Front View

The front edge of the 8936 module is shown in [Figure 5](#).

Figure 5. 8936 Front View



# Module Alignment

This section discusses Alignment Equipment and EQ Warning Adjustment.

## Alignment Equipment

The 8936 module is fully aligned at the factory and normally requires no adjustment in the field. If adjustments are necessary, they should be attempted only by qualified technicians using, at a minimum, the following equipment (or equivalents):

- 270 Mb/s serial digital video test signal source with pathological test signal
- Tektronix WFM601 Waveform Monitor (or equivalent)
- 300 meters Belden 8281 cable (or equivalent)

## EQ Warning Adjustment

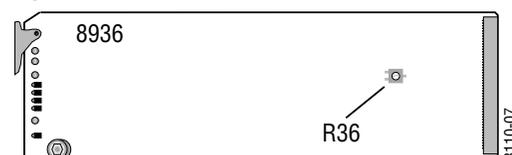
A variable resistor (R36) allows the user to adjust the corresponding cable length at which the EQ warning LED illuminates.

When R36 is turned counterclockwise, the EQ warning LED will turn on at shorter cable lengths. The EQ warning LED comes on at longer cable lengths when R36 is turned clockwise.

Follow the steps listed to adjust the EQ warning:

1. Connect a length of cable, approximately 20 meters longer than the desired length at which the EQ warning LED should turn on, to the input. The factory default is set for 300 meters. Terminate the unused input with a  $75\Omega$  termination.
2. Turn R36 clockwise until it stops. Refer to [Figure 6](#) for the location of R36.
3. Connect a 270 Mb/s serial digital video signal to the selected cable. Verify that a signal is present.
4. Turn R36 counterclockwise slowly until the EQ warning LED just turns on. The module is now set.

Figure 6. R36 Location



# Specifications

Table 4. 8936 Specifications

Parameter	Value
<b>Input</b>	
Type	One 75 $\Omega$ loop-through
Signal type	SMPTE 259M (A, B, C, and D) or EBU Tech 3267
Input signal monitoring	LED is illuminated when the input signal has equivalent loss of 310 meters of 8281 cable (or equivalent) at 360 Mb/s
Impedance	High impedance
Return loss	> 15 dB to 270 MHz
Connector type	BNC
Maximum input cable length	300 meters at 143 Mb/s, 177 Mb/s, 270 Mb/s 200 meters at 360 Mb/s of 8281 cable (or equivalent)
Signal selection	Automatic or manual
<b>Outputs</b>	
Output quantity	Eight
Signal type	Reclocked SMPTE 259M (A, B, C, and D) or EBU Tech 3267
Impedance	75 $\Omega$
Return loss	>15 dB (up to 360 MHz)
Signal amplitude	800 mV $\pm$ 10% when terminated in 75 $\Omega$
Output DC	0 V (AC coupled)
Connector type	BNC
Electrical length	10.5 $\pm$ 1 ns
<b>Module</b>	
Power consumption	< 3.5 Watts
Temperature range	0–50 °C Ambient
Power supply monitoring	Alerts SMPTE 269M fault reporting (health alarm) when the + 5V power supply voltage falls below 4.3V, +12V fails, or –12V fails
LEDs	Four signal present One EQ warning
DIP switch	Automatic or manual data rate selection Disables EQ warning to health alarm Disables video present to health alarm
Setup adjustments	EQ warning cable length

## Service

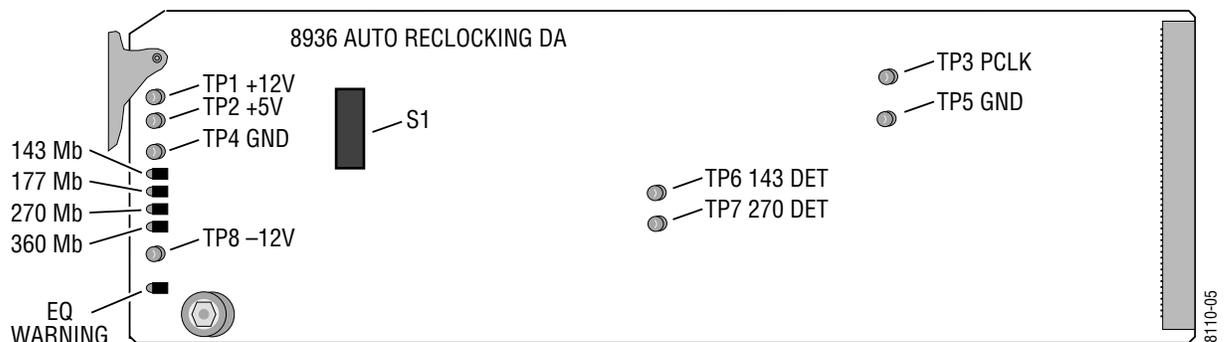
The 8936 Auto Reclocking DA modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field.

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

- Check input signals
- Check cables and connections
- Check switch positions on the module
- Verify that source equipment is operating correctly
- Check output connections

Refer to Figure 7 for test points and LEDs that are located on the 8936 module.

Figure 7. Test Point, LED, and Switch 1 Locations



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.

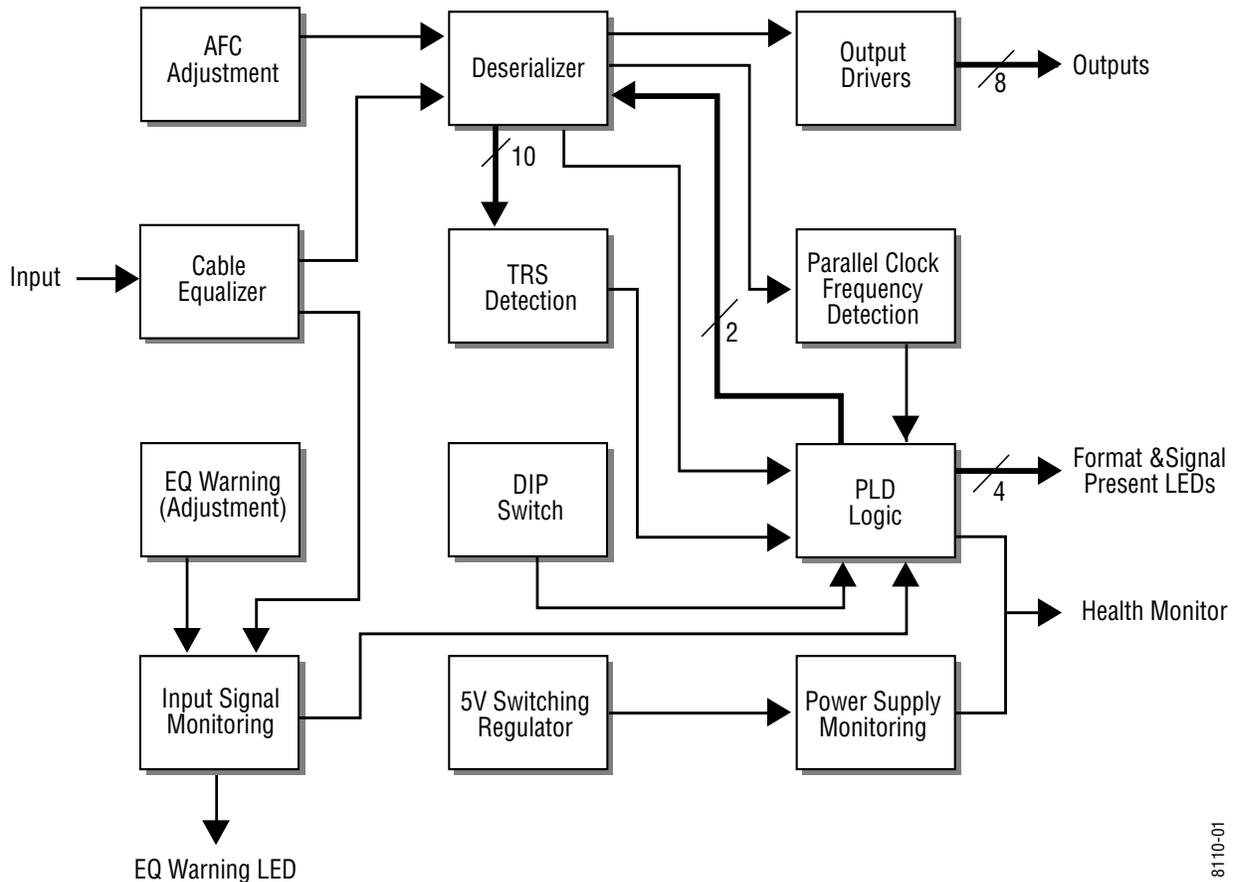
Refer to [Contacting Grass Valley Group](#) at the front of this document for the Grass Valley Customer Service Information number.

For switch settings, refer to the [Installation on page 2](#) of this manual.

## Functional Description

Refer to the simplified block diagram in [Figure 8](#) while reading the following functional description.

Figure 8. 8936 Simplified Block Diagram



The Cable Equalizer block automatically equalizes the input signal to compensate for cable loss up to 300 meters of 8281 cable (or equivalent) operating at 270 Mb/s. The signal goes to the Input Signal Monitor block which lights an LED when the EQ circuit reaches its limits of equalization (310 meters of 8281 cable operating at 270 Mb/s).

The Cable Equalizer block also feeds the Deserializer that contains a phase lock loop which locks to the frequency of the incoming signal. The input signal is then relocked to the clock generated by the phase lock loop. The Deserializer also deserializes the incoming signal to form a ten-bit parallel data stream and a parallel data clock. The parallel data clock has a frequency equal to one tenth of the incoming signal rate.

An Output Driver then amplifies and distributes the relocked serial digital video signal to eight BNC outputs.

8110-01

The Parallel Clock Frequency Detection block detects the rate of the signals coming from the parallel clock signal. This information is then fed to the PLD (Programmable Logic Device) block.

A ten-bit parallel stream from the Deserializer is fed to the TRS (Timing Reference Signal) Detection block. The output of the TRS detector switches to a logic high for one parallel clock period whenever the TRS is detected. It then feeds a one shot which holds the TRS pulse for a duration of 14 TRS pulses. If 15 consecutive TRS pulses are not detected, the output will go to a logic zero.

The PLD Logic block controls the mode selection (automatic or manual). It also controls the health alarm outputs and the signal present indicator LEDs.

The 5V Switching Regulator block provides the + 5V for the module.

Power Supply Monitoring is provided to monitor + 12V, - 12V, and 5V DC signals. It also alerts the health alarm signal if any voltage drops enough to cause circuit malfunction.

**Note**      Module health (alarm) monitoring requires that the Controller module be installed in the frame.



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