



8941

270 MBPS MONITORING DA

Instruction Manual

Software Version 1.4.0

Contacting Grass Valley

International Support Centers	France 24 x 7	+800 8080 2020 or +33 1 48 25 20 20	United States/Canada 24 x 7	+1 800 547 8949 or +1 530 478 4148
Local Support Centers (available during normal business hours)	Asia	Hong Kong, Taiwan, Korea, Macau: +852 2531 3058 Indian Subcontinent: +91 22 24933476 Southeast Asia/Malaysia: +603 7805 3884 Southeast Asia/Singapore: +65 6379 1313 China: +861 0660 159 450 Japan: +81 3 5484 6868		
		Australia and New Zealand: +61 1300 721 495	Central/South America: +55 11 5509 3443	
		Middle East: +971 4 299 64 40 Near East and Africa: +800 8080 2020 or +33 1 48 25 20 20		
	Europe	Belarus, Russia, Tadzikistan, Ukraine, Uzbekistan: +7 095 2580924 225 Switzerland: +41 1 487 80 02 S. Europe/Italy-Roma: +39 06 87 20 35 28 -Milan: +39 02 48 41 46 58 S. Europe/Spain: +34 91 512 03 50 Benelux/Belgium: +32 (0) 2 334 90 30 Benelux/Netherlands: +31 (0) 35 62 38 42 1 N. Europe: +45 45 96 88 70 Germany, Austria, Eastern Europe: +49 6150 104 444 UK, Ireland, Israel: +44 118 923 0499		

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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 *Gecko 8900 Frames Instruction Manual*).

8941 270 MBPS Monitoring DA

Introduction

The 8941 270 MBPS Monitoring DA module encodes one channel of a serial digital component video into NTSC or PAL analog composite video. The selection of output format, NTSC or PAL, is automatic depending on the input line rate. Four reclocked serial digital video outputs (2 inverting and 2 non-inverting) are also provided.

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

The 8941 module provides:

- Loop-through input
- Four analog outputs
- Two inverting reclocked digital outputs
- Two non-inverting reclocked digital outputs
- Auto format selection
- Auto-equalization
- Meets SMPTE 259M or EBU Tech 3267 standard
- Ancillary data detection
- Ancillary audio data detection
- Health monitoring

Installation

Installation of the 8941 module is a process of:

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

The 8941 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 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 8941 in each frame type.

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

Capacity Calculated	8900TX Frame	8900TF Frame	8900TFN Frame
Power (W)	100	100	100
Recommended Module Cooling (W)	30	90	90
8941 Modules	7	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.

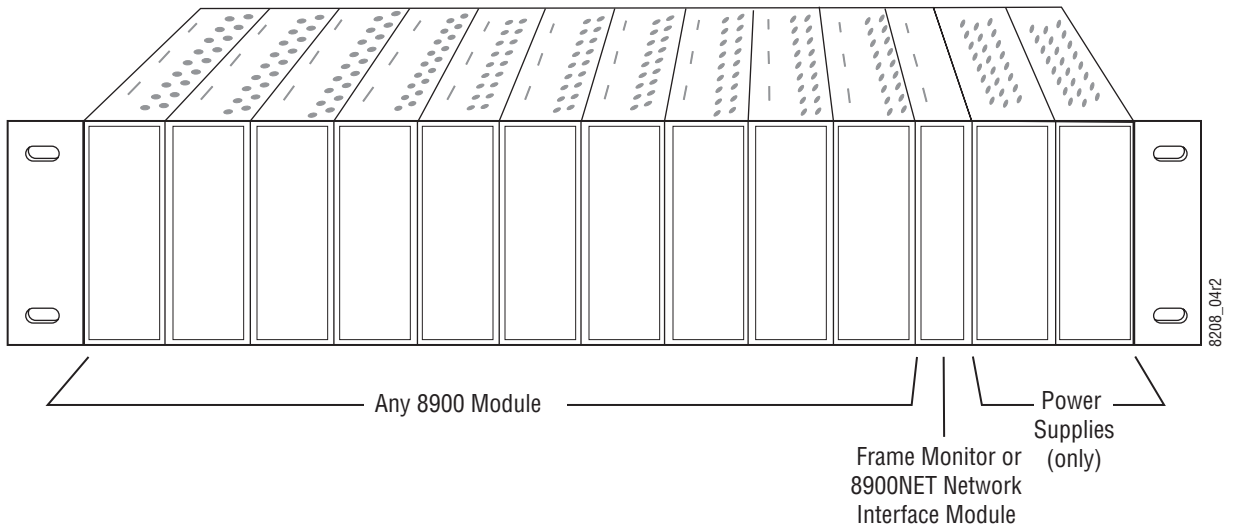
Module Placement in the 8900 Frame

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.

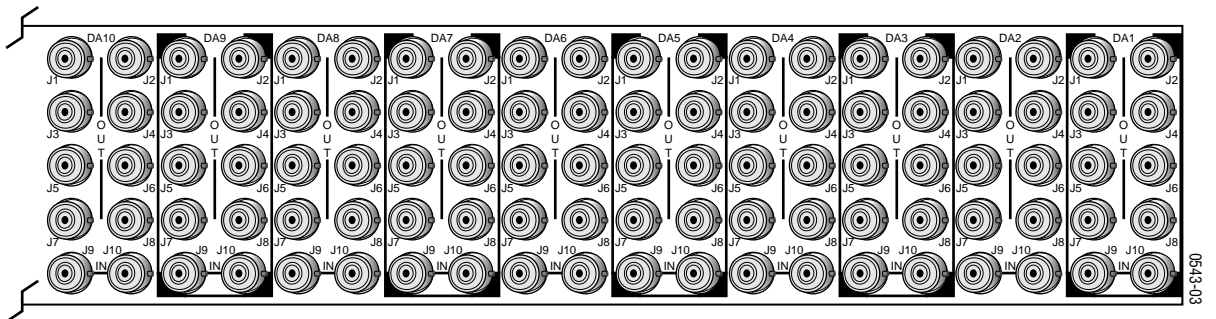
The third cell from the right is allocated for the Frame Monitor or 8900NET Network Interface module. These modules provide health bus monitoring and control options.

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



Note At the back of this manual (hard-copy only) are die-cut overlay cards that can be placed over the rear connector BNCs to identify the specific 8941 connector functions.

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

Cabling to and from the module is done at the back of the Gecko 8900 frame. Refer to [Figure 3](#). At the back of every hard copy 8941 manual are overlay cards that can be placed over the rear connectors to identify the specific 8941 connector functions.

Loop-through Input

Connect an 270 Mb/s digital input source to one of the loop-through input connectors, J9 or J10. This loop-through input must be terminated.

The recommended termination for serial digital signals is CONARE BCP-TA (or equivalent). The destination equipment should have an input impedance of 75 Ω unless it has loop-through inputs, in which case the loop-through inputs must be terminated into 75 Ω .

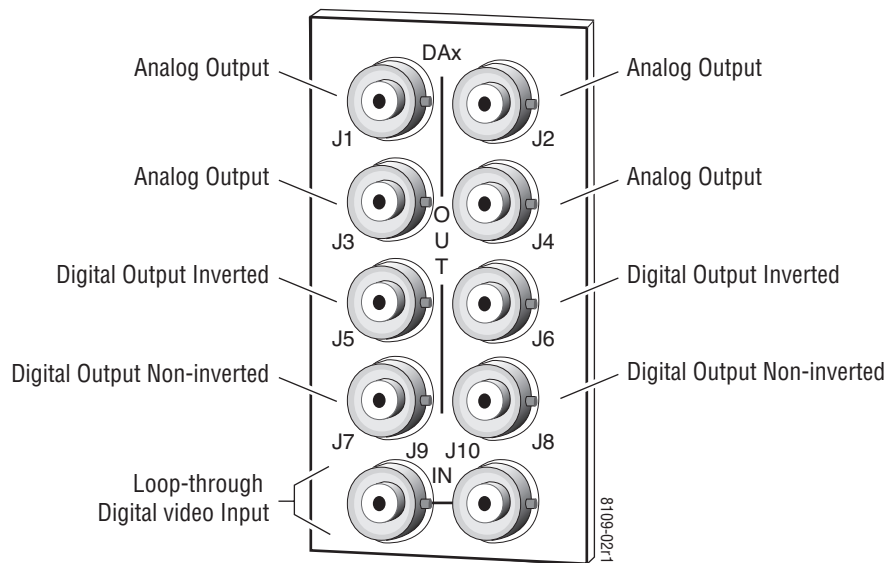
Note It is recommended that no more than five digital modules be looped, using cables less than two meters in length, and with an input cable less than 200 meters of Belden 8281 (or equivalent). Performance of looping inputs to equipment other than 8900 modules has not been verified; therefore, care should be taken if this is required.

Outputs

There are eight outputs for the 8941 module:

- Analog outputs – J1 through J4
- Inverting digital outputs – J5 and J6
- Non-inverting digital outputs – J7 and J8

Figure 3. 8941 Input, Output and GPI Connectors



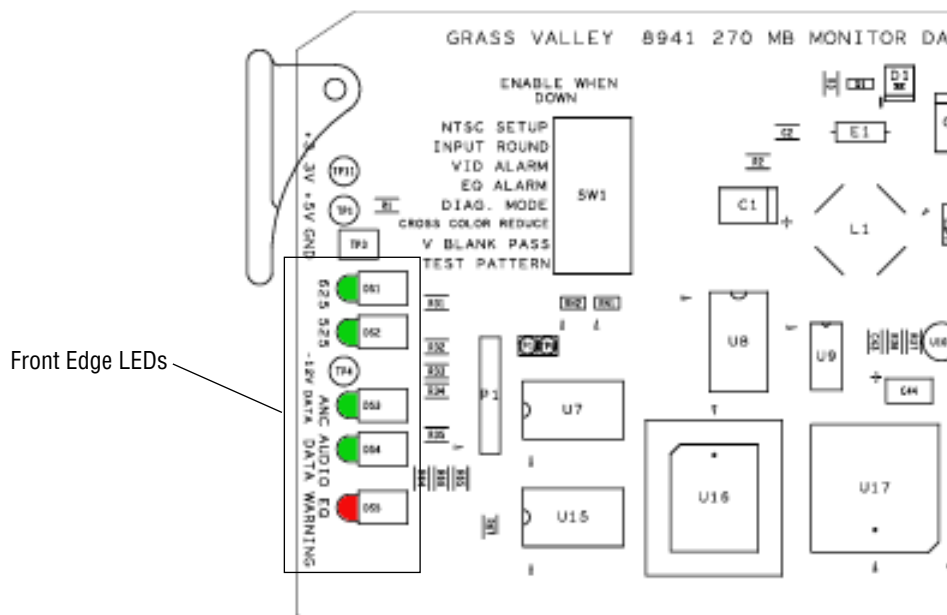
Power Up

With factory default configuration and a valid input signal connected, one of the green signal standard LEDs (525 or 625) should illuminate.

The following indicator LEDs are available on the front edge of the module as shown in [Figure 4](#):

- Video input presence is indicated by the appropriate 525 or 625 LED (indicating a 525-line or 625-line input signal has been detected).
- The green ANC DATA LED indicates the presence of ancillary data. This LED is lit for a duration of at least one field if one ancillary data package is found.
- The green AUDIO DATA LED indicates the presence of ancillary audio data. This LED is lit for a duration of at least one field if one ancillary audio data package is found.
- The red EQ WARNING LED is lit when the gain required to equalize approximately 300 meters of 8281 cable is used.

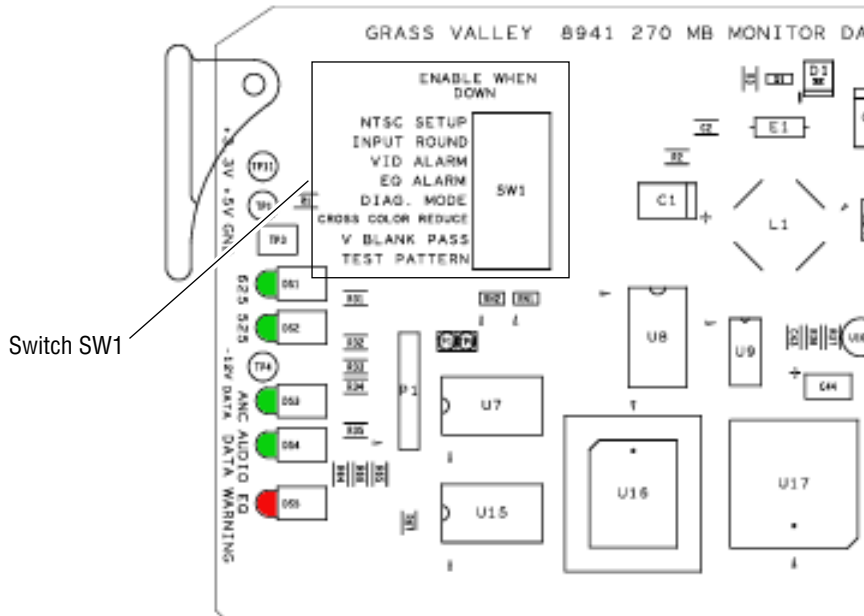
Figure 4. LEDs and Test Points



Module Configuration

When installing the 8941 module, there is an eight-position DIP switch (SW1) that must be checked and/or set. Refer to [Figure 5](#) for the location of SW1 and the possible settings.

Figure 5. SW1 Location and Settings



Refer to [Table 2](#) for the functions and descriptions of SW1.

Table 2. DIP Switch SW1 Functions

Switch #	Function Name	Description
S1-1	NTSC SETUP	When enabled (DOWN), it determines if active video has set up (with 525 inputs only)
S1-2	INPUT ROUND	When enabled (DOWN), input video is rounded to eight bits When disabled (UP), input video is truncated to eight bits With 8-bit video the last two (potentially noisy) LSBs are set to zero
S1-3	VID ALARM	When enabled (DOWN), module health alarm is activated if no video is present
S1-4	EQ ALARM	When enabled (DOWN), module health alarm is activated if an EQ warning condition exists
S1-5	DIAG. MODE	When enabled (DOWN), the serial port provides module status to a terminal, (usually set to OFF for normal operation)
S1-6	CROSS-COLOR REDUCE	When enabled (DOWN), a notch filter near the color burst frequency reduces cross-color artifacts
S1-7	V BLANK PASS	When enabled (DOWN), vertical information in the input video is passed When disabled (UP), vertical information in the input video is blanked by 21 lines for NTSC and 25 lines for PAL
S1-8	TEST PATTERN	When enabled (DOWN), a full field color bar test pattern is available if input video is present

SMPTE Alarm

Note The SMPTE alarm can function only if the Frame Controller or 8900NET module is installed in the frame (Figure 1 on page 9).

Refer to Table 3 for the SMPTE alarm functions activated by the 8941.

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
Missing EAV or SAV	Pulsing alarm

Module Alignment

This section contains:

- Alignment Equipment
- EQ Warning Adjustment
- Output Gain Adjustment

Alignment Equipment

The 8941 module is fully aligned at the factory and normally requires no adjustment in the field. If adjustments are necessary, they should be performed 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 and EDH
- Tektronix WFM601 Waveform Monitor (or equivalent)
- Analog Waveform Monitor
 - NTSC (525): Tektronix 1780 (or equivalent)
 - PAL (625): Tektronix 1781 (or equivalent)
- 300 meters Belden 8281 cable (or equivalent)

EQ Warning Adjustment

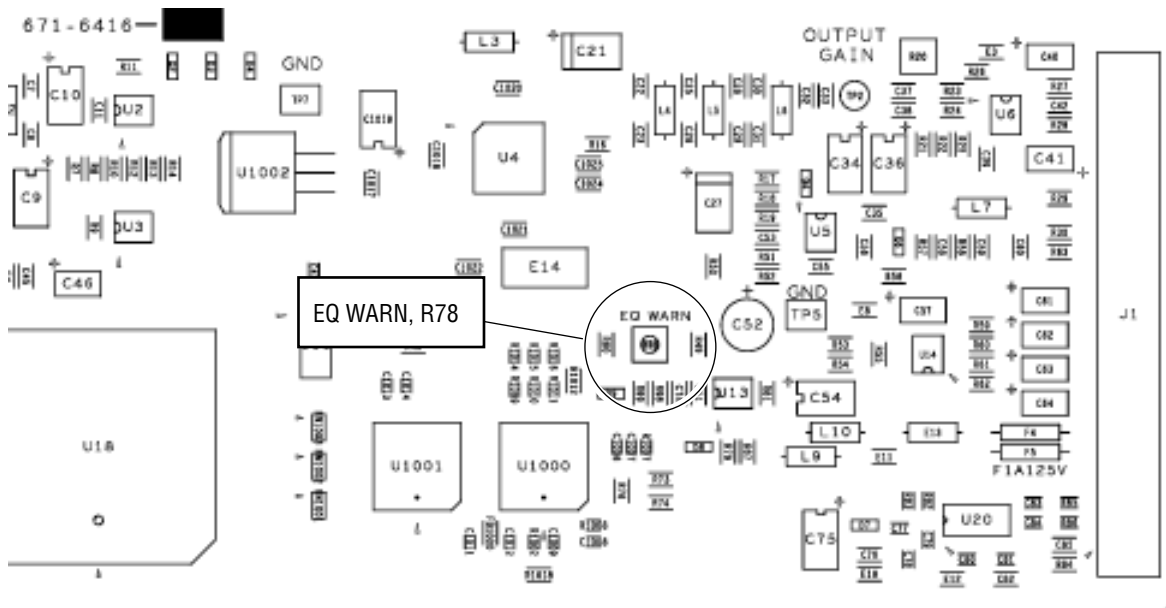
A variable resistor, EQ WARN (R78,) allows the user to adjust the corresponding cable length at which the EQ warning LED illuminates.

When R78 is turned counterclockwise, the EQ WARNING LED (Figure 4 on page 11) will turn on at shorter cable lengths. The EQ warning LED comes on at longer cable lengths when R78 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 loop-through input with a 75 Ω termination.
2. Turn R78 clockwise until it stops. Refer to Figure 6 for the location of R78.
3. Connect a 270 Mbps serial digital video signal to the selected cable. Verify that a signal is present.
4. Turn R78 counterclockwise slowly until the EQ WARNING LED just turns on. The module is now set.

Figure 6. EQ Warn, R78 Location



Output Gain Adjustment

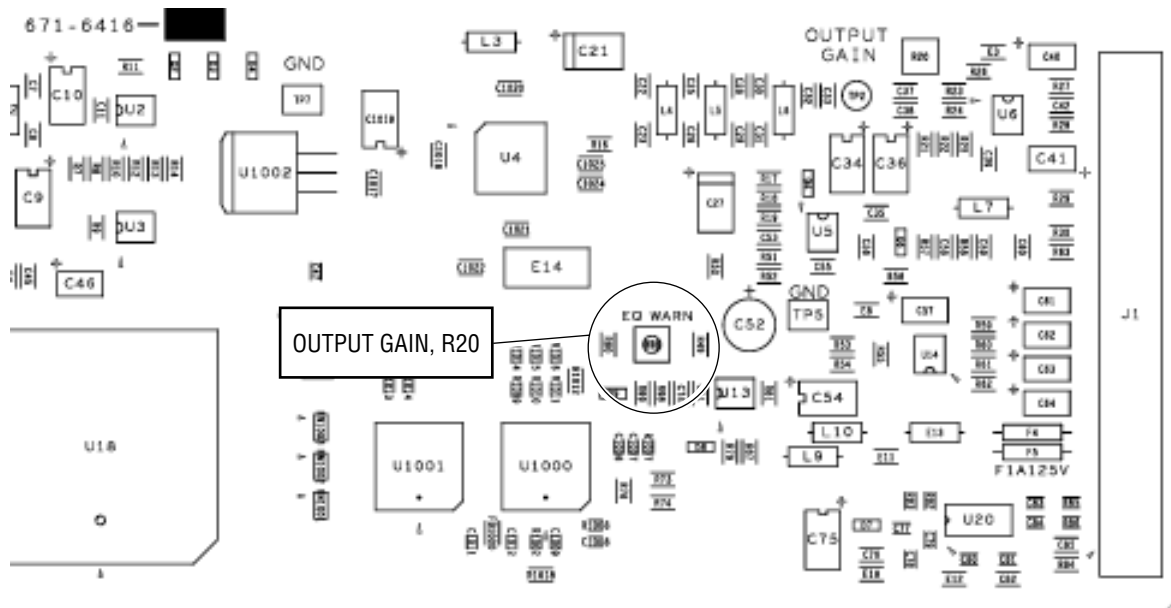
Follow the steps listed to adjust the output gain:

1. Connect a window signal to the input; terminated in 75 Ω .
2. Connect an analog output to the analog waveform monitor; terminated in 75 Ω .
3. Refer to [Figure 7](#) and adjust OUTPUT GAIN (R20) for:
 - 714 mV peak-to-peak for NTSC (blanking to peak white)

Note In NTSC, adjust for p-p value with or without setup. There will be a slight difference in amplitude (< 2 IRE) when switching between a signal with setup to one without setup.

- 700 mV peak-to-peak for PAL (blanking to peak white)

Figure 7. Output Gain, R20 Location



Specifications

Table 4. 8941 Specifications

Parameter	Value
Video Input	
Signal type	Serial digital video conforming to SMPTE 259M "Serial digital Interface for 10-bit 4:2:2 Component and 4 Fsc NTSC Composite Digital Signals"
Data type	8- or 10-bit serial video
Impedance	75 Ω
Return loss	> 18 dB (5 MHz to 270 MHz)
Number of inputs	One 75 Ω loop-through
Connector type	BNC
Analog Outputs	
Output quantity	Four
Signal type	Composite analog video conforming to SMPTE 170M for NTSC and CCIR 624 for PAL
Impedance	75 Ω
Return loss	> 40 dB to 5 MHz
Isolation	> 40 dB to 5 MHz
Connector type	75 Ω BNC
Digital Outputs	
Output quantity	Four: two inverting (J5 and J6), two non-inverting (J7 and J8)
Signal type	SMPTE 259M
Impedance	75 Ω
Return loss	> 15 dB (5 MHz to 270 MHz)
Connector type	75 Ω BNC
Electrical length	8.2 ns \pm 1 ns
Performance	
Frequency response	< \pm 0.1 dB, 10 KHz to 4.5 MHz
Group delay	< 20 ns to 4.8 MHz
Chroma/Luma gain inequality	< 3%
Chroma/Luma delay	< 10 ns
Signal-to-noise	> 60 dB (10 kHz to 5.0 MHz)
K factor (2T)	< 0.5%

Table 4. 8941 Specifications - (continued)

Parameter	Value
Line tilt	< 0.5%
Field tilt	< 0.5%
Subcarrier jitter	< 0.5°
DC offset	< 50 mV
Electrical length (NTSC/PAL)	2.275 μ s \pm 50 ns
V blanking	21 lines NTSC, 25 Lines PAL (all lines passed or blanked)
Picture centering	\pm 50 ns
Module	
Power consumption	< 4 Watts
Temperature range	0° to 50° C Ambient
Power supply monitoring	Alerts SMPTE 269M fault reporting (health alarm) when the +5 power supply voltage falls below 4.3, +12V fails, or -12V fails

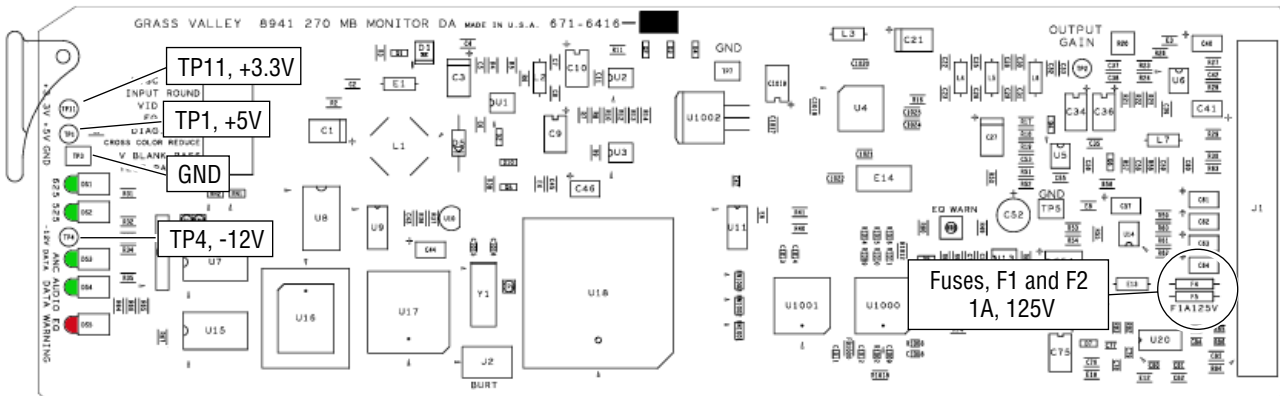
Service

The 8941 270 MBPS Monitoring 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 unless directed otherwise by Customer Service.

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

- Check input signals.
- Check cables and connections.
- Check +5 V (TP1) and +3.3 V (TP11) testpoints and fuses, F1 and F2 (Figure 8).
- Check switch positions on the module (see [Module Configuration on page 12](#)).
- Verify that source equipment is operating correctly.
- Check output connections.

Figure 8. Test Points and LEDs



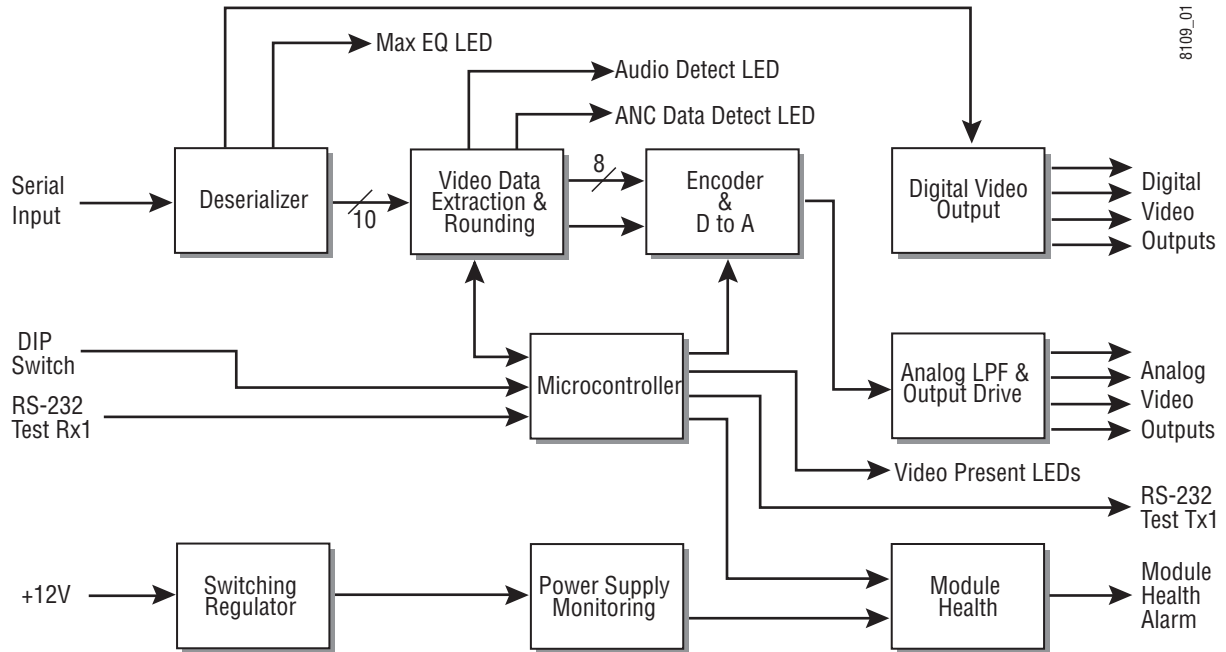
If the module is still not operating correctly, replace it with a known-good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

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

Functional Description

Refer to the simplified block diagram in [Figure 9](#) while reading the following functional description.

Figure 9. 8941 Simplified Block Diagram



The Deserializer block equalizes and reclocks the input serial digital video before going to the Digital Video Output. It generates an 27 MHz clock, and it also monitors how much of the equalizers gain is used.

Parallel D1 from the Deserializer is routed to the Video Data Extraction block where horizontal and vertical timing information is extracted and ancillary and audio data is detected. If ancillary data or audio data is detected, an LED will light.

The Video Data Extraction and Rounding block also provide the clock for the Microcontroller. It monitors the video for missing EAV (End of Active Video) or SAV (Start of Active Video) flags. If EAV or SAV are missing, an error signal is sent to the Microcontroller block. The input video is either rounded or truncated (at the user's option) to eight bits before being passed on to the Encoder.

The Encoder and D to A block separates the color difference components from the luminance, and then the signals are separately filtered. The result is added to the luminance component to form the encoded composite output signal. Externally generated timing of H and V are input from the Video Data Extraction and Rounding block to synchronize the Encoder.

In the Analog LPF (Low Pass Filter) and Output block the encoded analog video passes through the LPF where alias artifacts are removed, and it then goes to the output driver where the output level is set.

On power up, the Microcontroller performs a check-sum test and then checks for video. If video is present, the Microcontroller configures the encoder's output to the type of video required (PAL or NTSC). The Microcontroller then scans:

- DIP switches
- Changes in fault conditions
- Changes in video status

If any changes are detected, the Microcontroller takes action that requires a variation in the video standard LEDs, module health line, or in the encoder's internal registers.

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 Frame Controller or 8900NET module be installed in the frame.

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