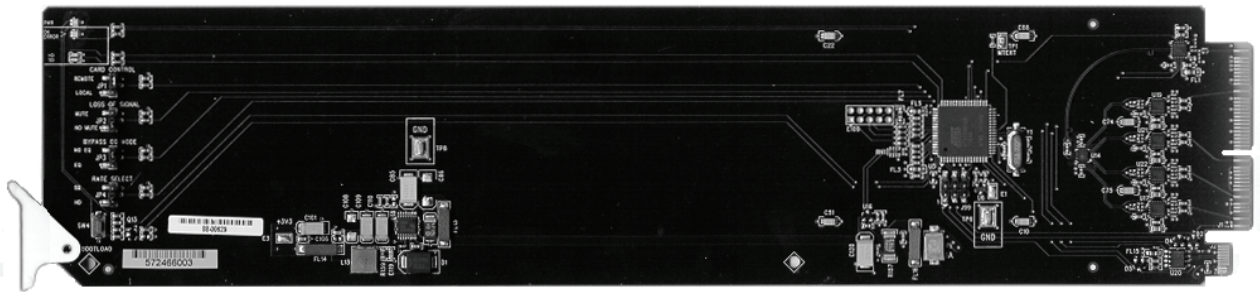


SEA-8203A

MD-SDI Equalizing Amplifier

User Manual



SEA-8203A • MD-SDI Equalizing Amplifier User Manual

- Ross Part Number: **8203ADR-004**
- Document Issue: **01**
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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the “Important Safety Instructions” listed below so as to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these Specific requirements.

Symbol Meanings



This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.



Warning

The symbol with the word “**Warning**” within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.



Caution

The symbol with the word “**Caution**” within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



Notice

The symbol with the word “**Notice**” within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.



ESD

Susceptibility

This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.

Important Safety Instructions



Caution

This product is intended to be a component product of the openGear 8300 series frame. Refer to the openGear 8300 series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as it's component products.



Warning

Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing this area.



Warning

Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.

This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair.

To reduce the risk of fire, replacement fuses must be the same type and rating.

Only use attachments/accessories specified by the manufacturer.

EMC Notices

US FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.



Notice

Changes or modifications to this equipment not expressly approved by Ross Video Ltd. could void the user's authority to operate this equipment.

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe "A" est conforme à la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002** and found to comply with the limits for a Class A Digital device.



Notice

This is a Class A product. In domestic environments this product may cause radio interference in which case the user may have to take adequate measures.

Maintenance/User Serviceable Parts

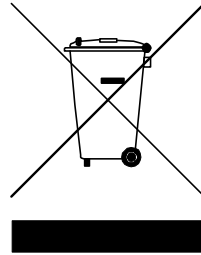
Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All RossGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

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Introduction

In This Chapter

This chapter contains the following sections:

- A Word of Thanks
- Overview
- Functional Block Diagram
- Features
- Documentation Terms

A Word of Thanks

Congratulations on choosing the openGear **SEA-8203A MD-SDI Equalizing Amplifier**. The SEA-8203A is part of a full line of Digital Products within the openGear Terminal Equipment family of products, backed by Ross Video's experience in engineering and design expertise since 1974.

You will be pleased at how easily your new SEA-8203A fits into your overall working environment. Equally pleasing is the product quality, reliability and functionality. Thank you for joining the group of worldwide satisfied Ross Video customers!

Should you have questions pertaining to the installation or operation of your SEA-8203A, contact us at the numbers listed on the back cover of this manual. Our technical support staff are always available for consultation, training, or service.

Overview

The SEA-8203A is a Multi-Definition SDI distribution amplifier, capable of equalizing all common serial digital signals. Support for both standard-definition and high-definition signals makes the SEA-8203A an extremely versatile SDI distribution amplifier.

The SEA-8203A equalizes the incoming SDI signal and produces 8 outputs, compensating for up to 300m of cable at 270Mbps and up to 100m of cable at 1.485Gbps. Special attention has been taken to ensure the SDI outputs faithfully reproduce the incoming signals, with excellent jitter and return loss specifications.

LED indicators at the front of the card identify the presence of incoming video, simplifying system troubleshooting.

Ten amplifiers can be housed in an openGear DFR-8310 series frames. The DFR-8320 series frames holds up to 10 amplifiers (with 8 outputs per card) or up to 20 (with 4 outputs per card).

Functional Block Diagram

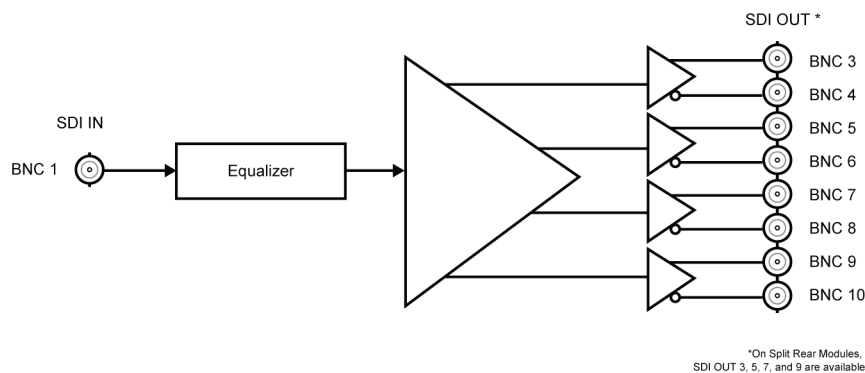


Figure 1. Simplified Block Diagram of SEA-8203A Functions

Features

The following features make the SEA-8203A the best solution for general SDI equalizing and distribution:

- One input with 8 outputs
- Equalizes all SDI signals from 143 Mbps to 1.485 Gbps
- Equalizes up to 300m of Belden 1694A cable at 270 Mbps, or up to 100m of cable at 1.485 Gbps
- LED indicators for signal presence
- Excellent input and output return loss
- Fits openGear DFR-8300 series frames
- Full compliant with openGear specifications
- 5 year transferable warranty

Documentation Terms

The following terms are used throughout this guide:

- “**Frame**” refers to the DFR-8300 series frame that houses the SEA-8203A card, as well as any openGear frames.
- All references to the DFR-8300 series frame also includes all versions of the 10-slot (DFR-8310) and 20-slot (DFR-8320) frames and any available options.
- “**Operator**” and “**User**” both refer to the person who uses the SEA-8203A.
- “**Board**” and “**Card**” both refer to the SEA-8203A card itself, including all components and switches.
- “**System**” and “**Video system**” both refer to the mix of interconnected production and terminal equipment in which the SEA-8203A operates.

Installation and Setup

In This Chapter

This chapter contains the following sections:

- Static Discharge
- Unpacking
- Rear Module Installation (Optional)
- Board Installation
- BNC Labels
- Cable Connections

Static Discharge

Whenever handling the SEA-8203A and other related equipment, please observe all static discharge precautions as described in the following note:



Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.

Unpacking

Unpack each SEA-8203A you received from the shipping container, and check the contents against the packing list to ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Rear Module Installation (Optional)

The SEA-8203A is compatible with the DFR-8310 and DFR-8320 series frames. The procedure for installing the Rear Module in your openGear frame is the same regardless of the frame or module used. However, a different module is required depending on the openGear frame you are using.

Rear Modules for the SEA-8203A

The Rear Module for the SEA-8203A depends on the openGear frame you are installing the card into.

- **DFR-8310 frames** — When installing the SEA-8203A in the DFR-8310 frames, a R1-8203 Rear Module is required. The SEA-8203A is also compatible with the 100-BNC Rear Module on the DFR-8310-BNC frame.
- **DFR-8320 frames** — When installing the SEA-8203A in a DFR-8320 series frame, a Split Rear Module (**R2S-8203**) or a Full Rear Module (**R2-8203**) can be used.

Installing the Rear Module

If you are installing the SEA-8203A in a DFR-8310-BNC frame, or the Rear Module is already installed, skip this section.

Use the following procedure to install the rear module in an DFR-8300 series frame:

1. Refer to the openGear DFR-8300 series frame User Manual, to ensure that the frame is properly installed according to instructions.
2. On the rear of the frame, locate the card frame slot.
3. Remove the Blank Plate from the rear of the slot you have chosen for the SEA-8203A installation. If there is no Blank Plate installed, proceed to the next step.
4. As shown in **Figure 2**, seat the bottom of the rear module in the seating slot at the base of the frame's back plane.

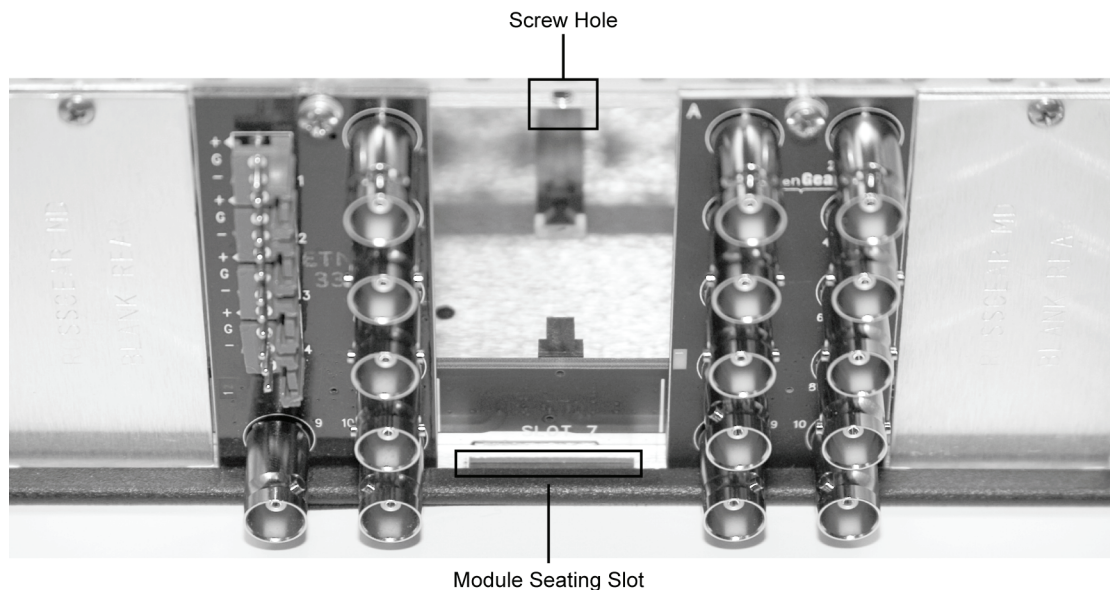


Figure 2. Rear Module Installation (SEA-8203A not shown)

5. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
6. Using a Phillips driver and the supplied screw, fasten the rear module to the frame back plane. Do not over tighten.
7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear I/O modules or blank metal plates. If you need blanks, refer to the chapter, “**Ordering Information**” in your DFR-8300 series frame User Manual, and contact your Ross Video sales representative.

This completes the procedure for installing the rear module in a DFR-8300 series frame.

Board Installation

Use the following procedure to install the SEA-8203A in a DFR-8300 series frame:

1. Refer to the User Manual of your DFR-8300 series frame, to ensure that the frame is properly installed according to instructions.
2. After selecting the desired frame installation slot, hold the SEA-8203A card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

This completes the procedure for installing the SEA-8203A in a DFR-8300 series frame.

BNC Labels

Affix the supplied BNC label, as per the included instructions, to the BNC area on the rear of the rack frame.

Cable Connections

This section provides instructions for connecting cables to the installed BNC rear modules on the DFR-8300 series frame backplane. Connect the input and output cables according to **Figure 3**. The inputs are internally terminated in 75 ohms. It is not necessary to terminate unused outputs.

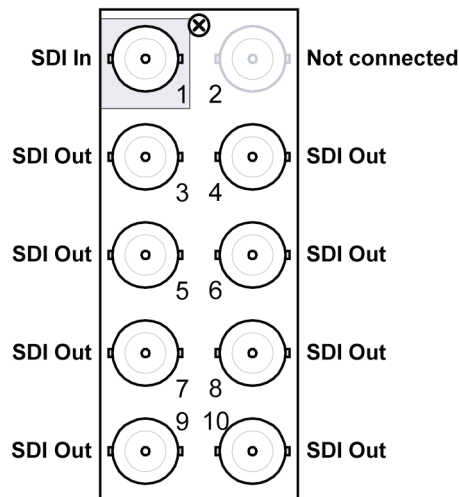


Figure 3. Cable Connections for the DFR-8310 frames with R1-8203 Rear Modules

Connections for the DFR-8320 Series Frames

In the DFR-8320 series frames, the SEA-8203A may be used with either the **R2-8203 Full Rear Module** or the **R2S-8203 Split Rear Module**.

- **R2-8203 Full Rear Module** — Each card occupies two slots and provides eight outputs (**Figure 4**). Ensure that the SRA-8203A card is installed in an even slot number.
- **R2S-8203 Split Rear Module** — Each card occupies one slot and provides four outputs. Note that each rear module provides connections for two cards. Refer to **Figure 5**.

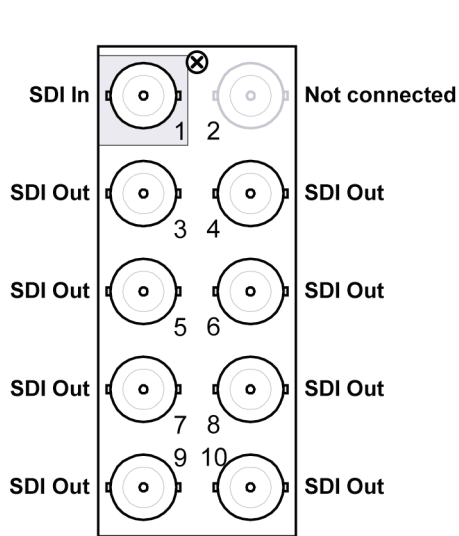


Figure 4. Cable Connections for the DFR-8320 frames with the R2-8203 Full Rear Module

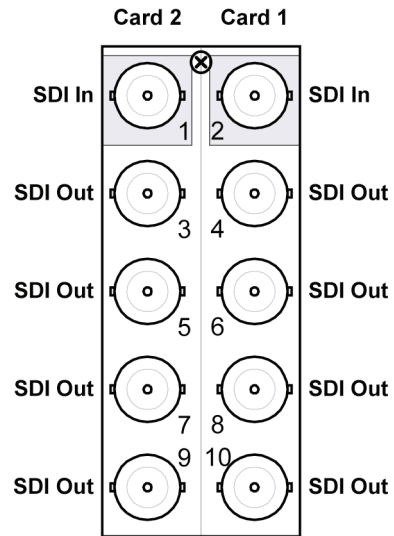


Figure 5. Cable Connections for the DFR-8320 frames with the R2S-8203 Split Rear Module

User Controls

In This Chapter

This chapter contains a description of the following SEA-8203A user controls:

- Jumper Locations
- LEDs
- Button Controls

Jumper Locations

This section describes the jumpers on the SEA-8203A. Refer to **Figure 6** for jumper locations.

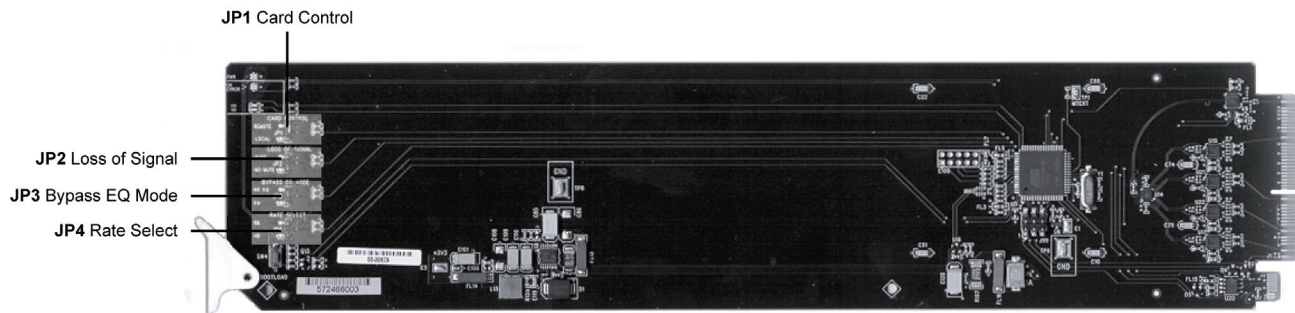


Figure 6. Jumper Locations

JP1 — Card Control

JP1 selects whether **SEA-8203A** is remotely configurable (for example via DashBoard or SNMP).

Select one of the following options:

- **REMOTE** — The remote configuration is enabled. All parameters may be configured remotely. However all jumper settings are ignored.
- **LOCAL** — The remote configuration is disabled. The card can only be configured using the card-edge controls (**JP2**, **JP3**, and **JP4**). This option is useful to lock out remote configuration changes. This is the default setting.

Note

The card status and configuration can still be monitored remotely when **JP1** is set to **LOCAL**.

JP2 — Loss of Signal

The position of **JP2** determines the card behavior on loss of input.

Note

The **JP2** setting is used only when **JP1** is set to **LOCAL**.

Select one of the following options:

- **MUTE** — The card outputs are muted when the input equalizer is unable to detect a valid input signal.
- **NO MUTE** — The card outputs are not muted on loss of input. This is the default setting.

JP3 — Bypass EQ Mode

The position of **JP3** determines the equalizer behavior when the reclocker is set to **Bypass**.

Note

The **JP3** setting is used only when **JP1** is set to **LOCAL**.

Select one of the following options:

- **EQ** — The equalizer is always enabled and the input signal is equalized.
- **NO EQ** — The equalizer is disabled when the **Reclocker Rate** is set to **Bypass**. This setting allows the SEA-8203A to pass signals that are outside the response band of the equalizer, such as <143MHz. This is useful for very low data rates such as DVB-ASI.

JP4 — Rate Select

The position of **JP4** determines the rate of the SEA-8203A.

Note

The **JP4** setting is used only when **JP1** is set to **LOCAL**.

Select one of the following options:

- **HD** — Sets the cable driver to HD Edge rates.
- **SD** — Sets the cable driver to SD Edge rates.

LEDs

This section describes the SEA-8203A LEDs and conditions. Refer to **Figure 7** for the location of each LED.

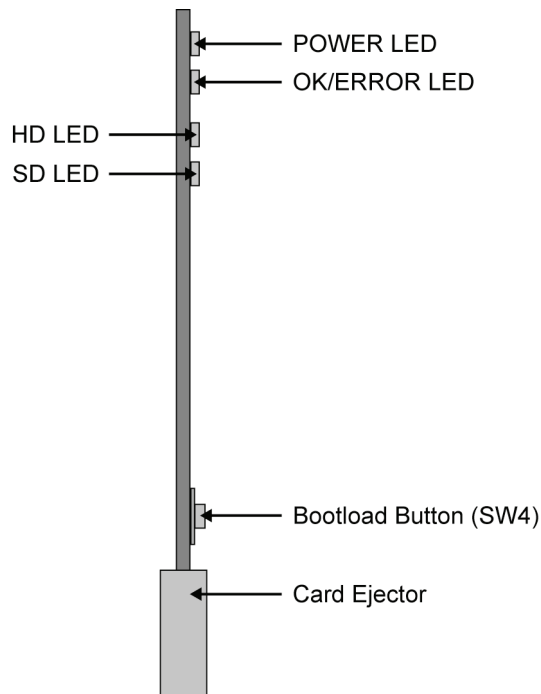


Figure 7. LED Locations

PWR (Power) LED

The **PWR** LED indicates the overall operating status of the SEA-8203A. This LED displays the following conditions:

- **Green** — The card is operating normally.
- **Flashing Green** — The card requires a software upgrade.
- **Red** — The card is not operational. Refer to the chapter, “**Service Information**” for details on this condition.

OK/Error LED

The **OK/ERROR** LED indicates the status of the SDI input. This LED displays the following conditions:

- **Green** — A valid signal SDI input signal is present.
- **Red** — The input signal is not present or not valid.

Rate LEDs

The **RATE** LEDs indicates the :

- **HD** — The SEA-8203A is configured for HD signals.
- **SD** — The SEA-8203A is configured for SD signals.

Button Controls

This section describes the SEA-8203A buttons and their functionality. Refer to **Figure 7** for the location of each button.

Bootload Button

This button is used for factory service in the unlikely event of a complete card failure. The Bootload process is further described in the chapter, “**Service Information**” of this manual.

Control and Monitoring

In This Chapter

This section provides a detailed explanation on using remote control functions with your SEA-8203A.

The following topics are discussed:

- DashBoard Control System
- SNMP Monitoring and Control

DashBoard Control System

The DashBoard Control System enables you to monitor and control openGear frames and controller cards from a computer. DashBoard communicates with other cards in the DFR-8300 series frame through the MFC-8310-N Network controller card. This card is required in order to use DashBoard to configure the SEA-8203A.

The DashBoard software and manual can be downloaded from the Ross Video website.

Using the Menus

You must first install the DashBoard Control System on your computer. Refer to the *DashBoard User Manual* for software installation procedures and using the DashBoard interface.

The Menu System

The following table and sections describe the menus, items, and parameters available from the DashBoard Control System for the SEA-8203A Equalizing Amplifier.

Status Menus

The following table summarizes the **Status Menu** options available in DashBoard.

Table 1. DashBoard Menus

Menu	Item	Parameters	Description
Product (Read-only)	Product	SEA-8203A	
	Supplier	Ross Video Ltd.	
	Board Rev	##	
	Serial Number	#####-###	
	Software Rev	#.###	
Hardware (Read-only)	Voltage (mV)	#	Supply Voltage
	Current (mA)	#	Current consumption of card
	Rear Module	#	Rear module for the card
	CPU Headroom	#	Processor power available
	RAM Available (bytes)	#	On-board processing memory available
	EE Bank	#	Storage count
Signal (Read-only)	Signal Status	Green — OK	The card is passing valid signal
		Green — No Signal	The card has no input signal, but is configured not to report loss of input
		Red — No input	The card has no input signal
	Output Status	Signal Present	The card is passing video
		No Signal	The card has no input
		Muted	The output is muted

Configuration Menus

The following table summarizes the **Configuration Menu** options available in DashBoard.

Table 2. Configuration Menus

Menu	Item	Parameters	Description
Setup	Signal Rate	HD*	Select this option if 1.485Gbps or if a mix of SD and HD signals are passed through the card
		SD	Select this option when passing rates of 143, 177, 270, 360, or 540Mbps
	Enable Equalizer	Checkbox is selected*	The input is equalized
		Checkbox is unselected	The equalizer is bypassed
	Mute on Loss of Input	Checkbox is selected	The output is muted on loss of input
		Checkbox is unselected*	The output is not muted on loss of input
	Notify on Loss of Input	Checkbox is selected*	DashBoard reports the loss of input
		Checkbox is unselected	DashBoard does not report the loss of input
	Edit Permission	Unlocked*	All configurable menu options are editable
		Locked	All configurable menu options, except this one, are locked and are read-only
		Local Only	JP1 is set to LOCAL and all configuration parameters, including this one, are locked and read-only
	Factory Defaults	Reset	Defaults all the settings

* This is the default setting.

SNMP Monitoring and Control

The MFC-8310-N Network Controller card in the DFR-8300 frames provide optional support for remote monitoring and control of your frame and SEA-8203A using SNMP (Simple Network Management Protocol), which is compatible with many third-party monitoring and control tools.

Refer to your SEA-8203A MIB (Management Information Base) file for a breakdown of SNMP controls on this card.

Refer to the manual for your DFR-8300 series frame for additional information on SNMP Monitoring and Control.

Specifications

Technical Specifications

Table 3. SEA-8203A - Technical Specifications

Category	Parameter	Specification
Serial Digital Video Inputs	Number Of Inputs	1
	Data Rates Supported	All data rates from 143Mbps to 1.485Gbps
	Impedance	75 Ω terminating
	Equalization	Up to 100m of Belden 1694A cable @ 1.485Gbps or up to 300m @ 270Mbps
	Return Loss	>15dB to 1.485GHz
Serial Digital Video Outputs	Number of Outputs	8
	Impedance	75 Ω
	Return Loss	>15dB to 1.485GHz
	Signal Level	800mV $\pm$ 10%
	DC Offset	0 Volts $\pm$ 50 mV
	Rise & Fall Time (20-80%)	700ps. Typical (270Mbps) 120ps. Typical (1.485Gbps)
	Overshoot	<1%
Other	Total Power Consumption	1.5W
	Warranty	5 year transferable

Specifications are subject to change without notice.

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Power LED Conditions
- Bootload Button
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your SEA-8203A, the following basic troubleshooting checklist may help identify the source of the problem. If the module still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the openGear Technical Support department at the numbers listed under the “Contact Us” section at the end of this manual.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reseat the Card in the Frame** — Eject the card and reinsert it in the frame.
4. **Check Control Settings** — Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Card Exchange** — Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Power LED Conditions

The top front edge of the module has a Power LED which indicates card status. The Power LED displays the following conditions:

- **Off** — no power to the card.
- **Amber** — the card is running internal diagnostics while powering up.
- **Green** — normal operation.
- **Flashing Green** — Bootload button pressed, card is receiving a new software load from the frame.
- **Green/Flashing Amber** — signal or configuration problem, check signal status and settings.
- **Red** — solid or flashing means the card is not operational. Reseat card in frame, check the rear I/O module type and connections, or call openGear Technical Support.

Bootload Button

In the unlikely event of a complete card failure, you may be instructed by a Ross Technical Support specialist to perform a complete software reload on the SEA-8203A.

Use the following procedure to perform a complete software reload on the card:

1. Eject the card.
2. Press and hold the **Bootload** button, while re-inserting the card into the frame.
3. Release the button.

The **PWR LED** will flash GREEN while the card is waiting for a new software load.

If a new software load is not sent to the card within 60 seconds, the card will attempt to restart with its last operational software load.

Contact Ross Technical Support for the latest software load for your SEA-8203A.

Warranty and Repair Policy

The SEA-8203A is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your SEA-8203A proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this SEA-8203A has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This User Manual provides all pertinent information for the safe installation and operation of your SEA-8203A. Ross Video policy dictates that all repairs to the SEA-8203A are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your SEA-8203A, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your SEA-8203A. If required, a temporary replacement module will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Ordering Information

SEA-8203A and Related Products

Your **SEA-8203A MD-SDI Equalizing Amplifier** is a part of the openGear family of products. Ross Video offers a full line of openGear terminal equipment including distribution, conversion, monitoring, synchronizers, encoders, decoders, keyers, switchers, as well as analog audio and video products.

Standard Equipment

- SEA-8203A MD-SDI Equalizing Amplifier
- 8203ADR-004 MD-SDI Equalizing Amplifier User Manual

Optional Equipment

- 8203ADR-004 MD-SDI Equalizing Amplifier User Manual (additional User Manual)
- R1-8203 openGear Rear Module for the DFR-8310 series frames
- DFR-8310 Digital Products Frame and Power Supply (2RU, holds 10 cards)
- DFR-8310-C Digital Products Frame and Power Supply with Cooling Fans (2RU, holds 10 cards)
- DFR-8310-BNC Digital Products Frame and Power Supply with fixed 100-BNC Rear Module. (2RU, holds 10 cards)
- DFR-8310-C-BNC Digital Products Frame and Power Supply with fixed 100-BNC Rear Module and Cooling Fans. (2RU, holds 10 cards)
- DFR-8310-N Digital Products Frame and Power Supply with cooling fans, and MFC-8310-N card. (2RU, holds 10 cards)
- DFR-8310-N-BNC Digital Products Frame and Power Supply with cooling fans, 100-BNC Rear Module, and MFC-8310-N card. (2RU, holds 10 cards)
- MFC-8310-N Network Controller Card (Additional)
- DFR-8320-C Digital Products Frame, Power Supply, Cooling Fans, Fan Controller Card, and COMM I/O Module (2RU, holds up to 20 cards)
- DFR-8320-CN Digital Products Frame, Power Supply, Cooling Fans, MFC-8310-N and COMM I/O Module (2RU, holds up to 20 cards)
- DFR-8320-CNS Digital Products Frame, Power Supply, Cooling Fans, MFC-8310-N, COMM I/O Module and SNMP-8310 (2RU, holds up to 20 cards)

- **R2-8203** openGear Full Rear Module for the DFR-8320 series frames (10 per frame)
- **R2S-8203** openGear Split Rear Module for the DFR-8320 series frames (10 per frame)

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Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

PHONE	General Business Office and Technical Support	613 • 652 • 4886
	After-hours Emergency	613 • 349 • 0006
	Fax	613 • 652 • 4425
E-MAIL	General Information	solutions@rossvideo.com
	Technical Support	techsupport@rossvideo.com
POSTAL SERVICE	Ross Video Limited	8 John Street, Iroquois, Ontario, Canada K0E 1K0
	Ross Video Incorporated	P.O. Box 880, Ogdensburg, New York, USA 13669-0880

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