DRA-8902A User Guide

www.rossvideo.com

Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
   - offer the best product quality and support
2. Make Cool Practical Technology
   - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

DRA-8902A · User Guide

- Ross Part Number: **8902DR-104-01**
- Revision: 1
- Release Date: January 6, 2026.
- Software Version: **1.0**

The information contained in this Guide is subject to change without notice or obligation.

Copyright

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notices

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Note: As required by the GNU General Public License, and the Lesser GNU Public License (LGPL), source code can be obtained from Ross Video for at least 3 years. Contact Ross Video Technical Support for more information. If you have any questions or comments regarding this License Agreement, please contact:

Ross Video Limited
8 John Street
P.O. Box 220
Iroquois, ON
Canada K0E 1K0
techsupport@rossvideo.com

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

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 the user will be required to correct the interference at his 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 and part 15 of the FCC Rules.

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

European Union

This equipment is in compliance with the essential requirements and other relevant provisions established under regulation (EC) No 765/2008 and Decision No 768/2008/EC referred to as the "New Legislative Framework".

Warning — *This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.*

Australia/New Zealand

This equipment is in compliance with the provisions established under the Radiocommunications Act 1992 and Radiocommunications Labeling (Electromagnetic Compatibility) Notice 2008.

Korea

This equipment is in compliance with the provisions established under the Radio Waves Act.

Class A equipment (Broadcasting and communications service for business use)

This device is a business-use (Class A) EMC-compliant device. The seller and user are advised to be aware of this fact. This device is intended for use in areas outside home.

Type of Equipment	User's Guide
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A Equipment (Industrial Broadcasting & Communication Equipment)	This equipment is **Industrial (Class A) electromagnetic wave suitability equipment** and seller or user should take notice of it, and this equipment is to be used in the places except for home.

International

This equipment has been tested under the requirements of CISPR 22:2008 or CISPR 32:2015 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 in the "**Contact Us**" section of this manual. All openGear 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 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.

Security and Privacy

If you would like more information on how Ross Video security and privacy practices have been applied to the DRA-8902A, what you should know about maintaining security of this product, and how we can partner with you to ensure security throughout this product's life-cycle, contact techsupport@rossvideo.com.

Ross Video has implemented reasonable administrative, technical, and physical safeguards to help protect against security incidents and privacy breaches involving a Ross Video product provided those products are used in accordance with Ross Video instructions for use. However, as systems and threats evolve, no system can be protected against all vulnerabilities and we consider our customers the most important partner in maintaining security and privacy safeguards. If you have any concerns, we ask that you bring them to our attention, and we will investigate. Where appropriate, we will address the issue with product changes, technical bulletins and/or responsible disclosures to customers and regulators. Ross Video continuously strives to improve security and privacy throughout the product life-cycle using practices such as:

- Privacy and Security by Design
- Product and Supplier Risk Assessment
- Vulnerability and Patch Management
- Secure Coding Practices and Analysis
- Vulnerability Scanning
- Access Controls appropriate to Customer Data
- Incident Response
- Clear paths for two-way communication between customers and Ross Video

If you would like to report a potential product related privacy or security issue (incident, breach, or vulnerability), contact techsupport@rossvideo.com.

Company Address

Ross Video Limited
8 John Street
Iroquois, Ontario, K0E 1K0
Canada

Ross Video Incorporated
P.O. Box 880
Ogdensburg, New York
USA 13669-0880

General Business Office: (+1) 613 • 652 • 4886
Fax: (+1) 613 • 652 • 4425
Technical Support: (+1) 613 • 652 • 4886
After Hours Emergency: (+1) 613 • 349 • 0006
E-mail (Technical Support): techsupport@rossvideo.com
E-mail (General Information): solutions@rossvideo.com
Website: http://www.rossvideo.com

Contents

Introduction 9
Related Publications 9
Documentation Conventions 9
Interface Elements 9
User Entered Text 9
Referenced Guides 10
Menu Sequences 10
Important Instructions 10
Contacting Technical Support 10

Before You Begin 11
Features 11
Functional Block Diagram 11
User Interfaces 12
DashBoard Control System 12
Card-edge Monitoring 12
SNMP Monitoring and Control 12

Hardware Overview 13
Supported Rear Module 13
8322AR-338 Rear Module 13
Card-Edge Monitoring Features 14
Bootload Button 14
Status LEDs 14

Physical Installation 17
Before You Begin 17
Static Discharge 17
Unpacking 17
Removing the Blank Plates from the Rear Panel 17
Installing the Rear Module 18
Installing the DRA-8902A 18

Cabling 19
8322AR-338 Cabling 19

Getting Started 21
Before You Begin 21
Accessing the DRA-8902A Interfaces in DashBoard 21

Configuration 23
Configuring the Reclocker 23
Assigning an Input to an Output Channel 23
Enabling the Failover Feature 24
Muting an Output 25
Configuring the Invalid Signal Alarms 25
Enabling the Failover Alarm 26

Upgrading the Software 27

DashBoard Menus 29
Signal Tab ... 29
Product Tab ... 31
Hardware Tab ... 32
Setup Tab ... 33
Alarms Tab ... 35

Technical Specifications 37
Supported Video Formats ... 37
SDI Inputs Specifications ... 38
SDI Outputs Specifications ... 38
Environment ... 39
Power ... 39

Service Information 41
Troubleshooting Checklist ... 41
Bootload Button ... 41
Warranty and Repair Policy ... 41

Software Licenses 43
BSD ... 43
Dual GPL ... 43
GPL ... 43
LGPL ... 47
MIT ... 48
zlib ... 48

Introduction

This guide covers the installation, configuration, and use of the DRA-8902A Dual Reclocking Distribution Amplifier. The following chapters are included:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Before You Begin**" provides general information to keep in mind before installing and configuring your card.
- "**Hardware Overview**" provides a basic introduction to the hardware features including the cabling and monitoring features of the rear module.
- "**Physical Installation**" provides instructions for the physical installation of the card and its rear module into an openGear frame.
- "**Cabling**" provides an overview for cabling the DRA-8902A rear module(s).
- "**Getting Started**" provides instructions for launching DashBoard, and accessing the DRA-8902A in DashBoard.
- "**Configuration**" outlines how to set the reclocker data rate, mute an unused output, and configure the invalid signal alarms.
- "**Upgrading the Software**" provides instructions for upgrading the software for your DRA-8902A using DashBoard.
- "**DashBoard Menus**" summarizes the DRA-8902A menus, items, and parameters in DashBoard.
- "**Technical Specifications**" provides technical specification details on the DRA-8902A.
- "**Service Information**" provides information on the warranty and repair policy for your card.
- "**Software Licenses**" provides third-party software license information for your DRA-8902A.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your DRA-8902A card:

- ***DashBoard User Guide***, Ross Part Number: 8351DR-004
- ***MFC-OG3-N and MFC-8322-S User Guide***, Ross Part Number: 8322DR-004
- ***OG3-FR Series User Guide***, Ross Part Number: 8322DR-005
- ***OGX-FR Series User Guide***, Ross Part Number: 8322DR-204

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter **`English`**.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***OGX-FR Series User Guide***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save As**," you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✶ Contact your IT department before connecting to your facility network to ensure that there are no conflicts.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Toll Free Technical Support (North America)**: 1-844-652-0645
- **Toll Free Technical Support (International)**: +800 1005 0100
- **Technical Support**: (+1) 844-652-0645
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Before You Begin

Your DRA-8902A is a Dual 12G/6G/3G/HD/SD Reclocking Amplifier, capable of equalizing and reclocking all common serial digital signals. An LED indicator for each channel, at the front of the card, identify the presence of incoming video, simplifying system troubleshooting. This chapter provides general information to keep in mind before installing and configuring your DRA-8902A.

Features

The DRA-8902A includes the following features:

- Equalizes and reclocks SDI signals of 270Mbps, 1.485Gbps, 2.97Gbps, 5.94Gbps, and 11.88Gbps
- Supports DVB-ASI (EN 50083-9), MADI (AES10), and SMPTE 310 signals
- Configure and monitor via DashBoard
- Automatic detection of incoming data rate
- Automatically mutes the channel output when a loss of input occurs
- Configurable to automatically perform a fail-over switch between the two SDI inputs
- LED indicators for input signal presence
- Fits OG3-FR and OGX-FR series frames
- Fully compliant with openGear specifications
- 5 year transferable warranty

Functional Block Diagram

Figure 1 describes the signal flow of the DRA-8902A when installed with the 8322AR-338 rear module.

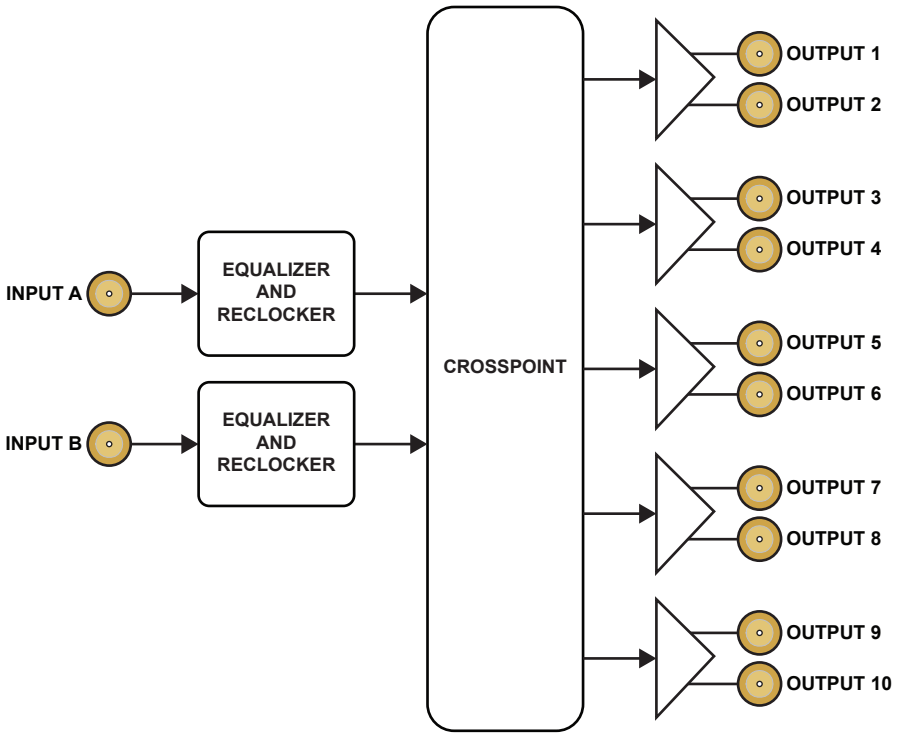


Figure 1 Simplified Diagram — DRA-8902A with the 8322AR-338

User Interfaces

The following interfaces are available for control and monitoring of your DRA-8902A.

DashBoard Control System

DashBoard enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with other cards in the openGear frame through the Network Controller Card.

For More Information on...

- the menus in DashBoard, refer to "**DashBoard Menus**".
- installing and using DashBoard, refer to the ***DashBoard User Guide***.

Card-edge Monitoring

The card-edges provide LEDs for monitoring the status of the input signal.

For More Information on...

- the card-edge LEDs, refer to "**Card-Edge Monitoring Features**".

SNMP Monitoring and Control

The Network Controller card in the openGear frame provides optional support for remote monitoring and control of your frame and openGear cards using Simple Network Management Protocol (SNMP), which is compatible with many third-party monitoring and control tools.

For More Information on...

- SNMP controls on your card, refer to your DRA-8902A Management Information Base (MIB) file.
- SNMP Monitoring and Control, refer to your ***MFC-OG3-N and MFC-8322-S User Guide***.

Hardware Overview

This chapter outlines the DRA-8902A hardware components and features.

Supported Rear Module

Notice — *Ensure that you install the DRA-8902A using the supported rear module. Installing the DRA-8902A with an unsupported rear module can damage the card, the rear module, or both.*

8322AR-338 Rear Module

The DRA-8902A supports the 8322AR-338 rear module. Each 8322AR-338 occupies two slots and accommodates one card. This rear module provides two SDI inputs, and ten SDI outputs. (**Figure 2**)

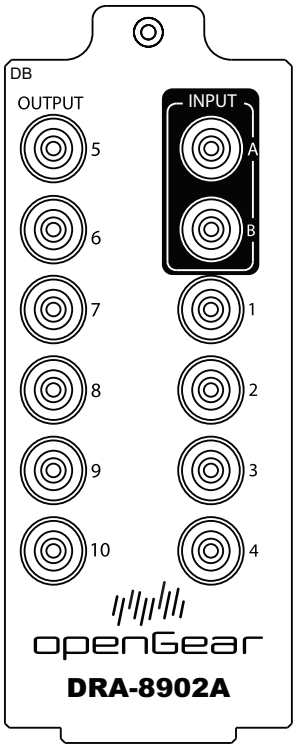


Figure 2 Rear Module Overview — 8322AR-338

Card-Edge Monitoring Features

This section describes major components of the card-edge. There are no card-edge controls as all configuration and setup is done using the menus in DashBoard.

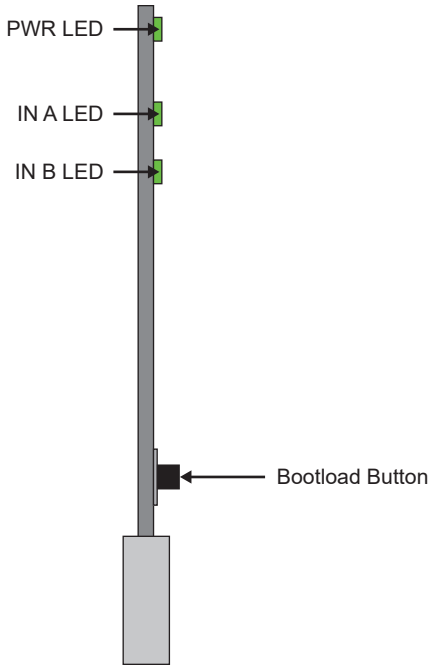


Figure 3 Locations — Bootload Button, Status LEDs

Bootload Button

This button is used for factory service in the unlikely event of a complete card failure. Do not use this button unless advised by Ross Technical Support.

For More Information on...

- the cabling designations for your card, refer to "**Supported Rear Module**".
- configuring the output, refer to "**Assigning an Input to an Output Channel**".
- the Bootload process, refer to "**Bootload Button**".

Status LEDs

Table 1 provides basic status LED displays and descriptions.

Table 1 Status LEDs

LED	Color	Display and Description
PWR	Green	When lit green, this LED indicates that the card is functioning normally and that no anomalies have been detected.
	Flashing Green	When flashing green, this LED indicates that the Bootload button was pressed, and the card is receiving a new software load from the frame.
	Flashing Green/Orange	When lit green with flashing orange, this LED indicates a signal or configuration problem. Verify the signal status and settings.
	Amber	When lit amber, this LED indicates the card is running internal diagnostics while powering up.

Table 1 Status LEDs (Continued)

LED	Color	Display and Description
PWR	Red	When lit red or flashing red, this LED indicates the card is not operational. Re-seat card in frame, check the rear module cable connections, or call Ross Video Technical Support.
	Off	When off, this LED indicates there is no power to the card.
IN #	Green	When lit green, this LED indicates that a valid SDI signal is present for the corresponding rear module input BNC.
	Red	When lit red, this LED indicates that the SDI signal is missing or invalid for the corresponding rear module input BNC.

Physical Installation

This chapter provides instructions for installing the rear module for your DRA-8902A, and then installing the card in the openGear frame.

If you have questions pertaining to the cabling of the DRA-8902A, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your openGear frame is properly installed according to the instructions in the manual that accompanied it.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

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

Unpacking

Unpack each card you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Removing the Blank Plates from the Rear Panel

When a frame slot is not populated with an openGear card, a blank plate must be installed to ensure proper frame cooling and ventilation.

Notice — *Installing the rear module in a frame other than an OG3-FR or OGX-FR series frame could damage the card, the rear module, or both.*

To remove a blank plate from the openGear frame

1. Locate the slots in the openGear frame you wish to install the DRA-8902A into.

   It is recommended to use the following slot combinations:

   - Slots 1, 2
   - Slots 3, 4
   - Slots 5, 6
   - Slots 7, 8
   - Slots 9, 10
   - Slots 11, 12
   - Slots 13, 14
   - Slots 15, 16
   - Slots 17, 18
   - Slots 19, 20

2. Use a Phillips screwdriver to unfasten each blank plate from the openGear frame backplane.
3. Remove each blank plate from the chassis and set aside.

Installing the Rear Module

You must first install the rear module in the frame and then install the card in the appropriate slot within that frame. The DRA-8902A can be installed in the openGear frame with the supported rear module. This section outlines how to install the rear module.

✶ If the rear module is already installed in the frame, proceed to "**Installing the DRA-8902A**".

To install the rear module in the openGear frame

1. On the rear of the frame, locate the card frame slots.
2. Seat the bottom of the rear module in the seating slot at the base of the frame's back plane.
3. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
4. Using a Phillips screwdriver and the supplied screw, fasten the rear module to the back plane. Do not over-tighten.
5. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear modules or blank metal plates.

Installing the DRA-8902A

The slot that the DRA-8902A installs into depends on the slot combination you installed the rear module in. This allows adequate spacing to avoid damaging the card, the cards installed in the neighboring slots, or both.

To install the DRA-8902A into the openGear frame

1. Locate the slot the DRA-8902A card will slide into.

   Refer to **Table 2** for valid slot combinations.

Table 2 Card Slot Combinations

Rear Module is Installed in	Card Installs into Slot
Slots 1, 2	2
Slots 3, 4	4
Slots 5, 6	6
Slots 7, 8	8
Slots 9, 10	10
Slots 11, 12	12
Slots 13, 14	14
Slots 15, 16	16
Slots 17, 18	18
Slots 19, 20	20

2. Verify that the DRA-8902A card aligns with the rear module.
3. Using a Phillips screwdriver fasten the rear module to the backplane using the provided screws.

✶ Do not over tighten the screws.

4. Hold the card by the edges and carefully align the card edges with the slot rails in the frame.
5. Fully insert the card into the frame until the card is properly seated in the rear module.

Cabling

This chapter provides an overview of connecting input and output devices to a rear module of the DRA-8902A.

If you have questions pertaining to the cabling of the DRA-8902A, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

✶ All outputs are non-inverting. It is recommended to mute unused outputs via DashBoard as described in "**Muting an Output**". Or you may choose to terminate the unused outputs.

8322AR-338 Cabling

Refer to **Figure 4** when cabling the **SDI inputs** on the 8322AR-338 rear module.

Refer to **Figure 5** when cabling the **SDI outputs** on the 8322AR-338 rear module.

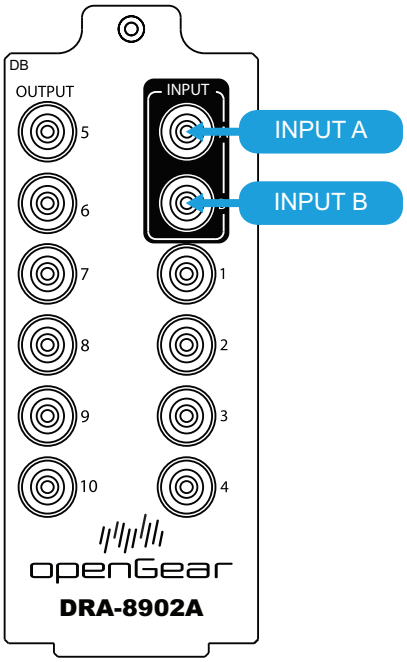


Figure 4 8322AR-338 — SDI Inputs

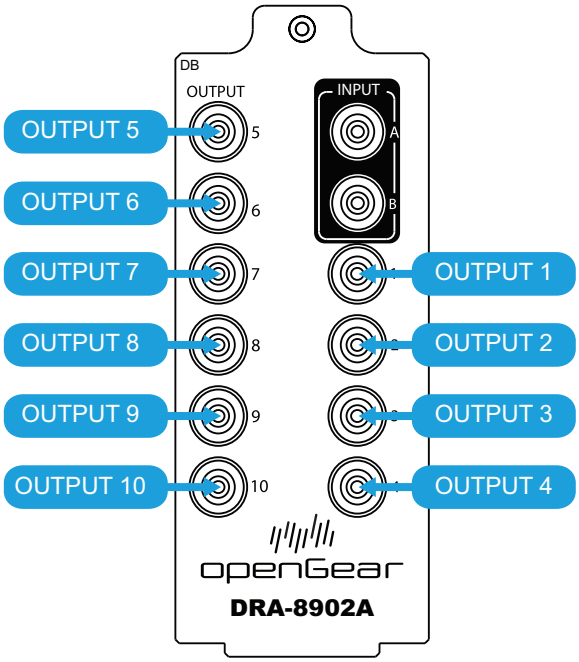


Figure 5 8322AR-338 — SDI Outputs

Getting Started

This chapter provides instructions for launching DashBoard, and accessing the DRA-8902A interfaces in DashBoard. If you have questions pertaining to the operation of DRA-8902A, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Before You Begin

Ensure that:

- An MFC-OG3-N or MFC-OGX-N Network Controller Card is installed in your OGX-FR frame.
- The openGear frame that houses the DRA-8902A displays in the Basic Tree View of DashBoard.
- DashBoard is running on a computer that has a physical wired ethernet connection. Wireless connections do not allow device discovery.

For More Information on...

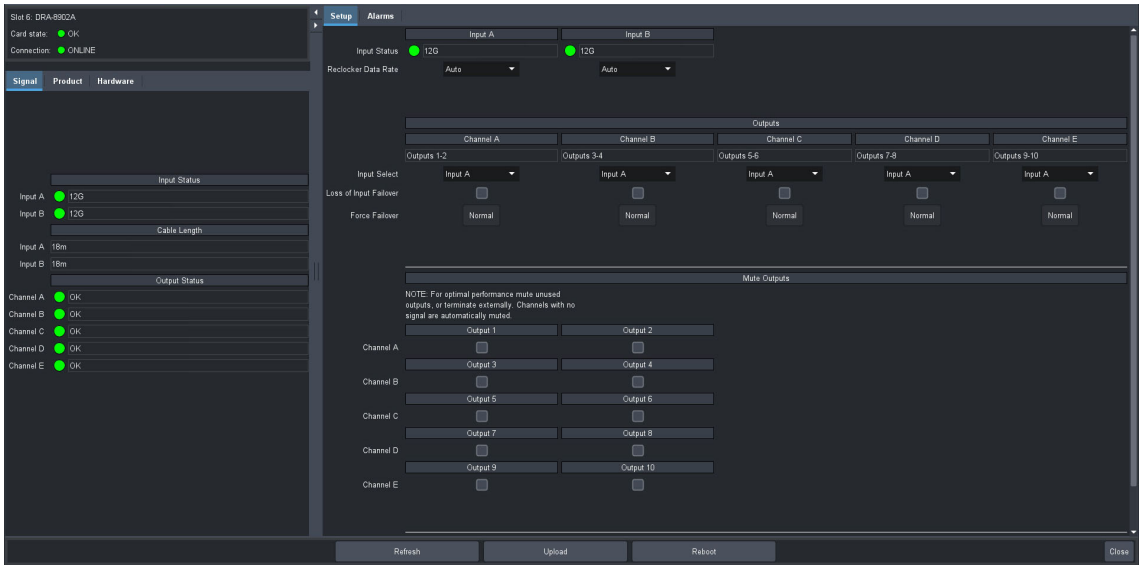
- downloading and installing the DashBoard client software, refer to the ***DashBoard User Guide***.

Accessing the DRA-8902A Interfaces in DashBoard

The interfaces are accessed by expanding the DRA-8902A sub-node in the DashBoard Tree View.

To display the DRA-8902A in DashBoard

1. Ensure that you are running DashBoard software version 9.14 or higher.
2. Launch DashBoard by double-clicking its icon on your computer desktop.
3. In the Basic Tree View of DashBoard, locate the openGear frame the DRA-8902A is installed in.
4. Expand the openGear frame node to display a list of sub-nodes.
5. Locate the DRA-8902A node in the openGear frame tree.
6. Double-click the DRA-8902A sub-node to display the interface in the right pane of the DashBoard window.



Configuration

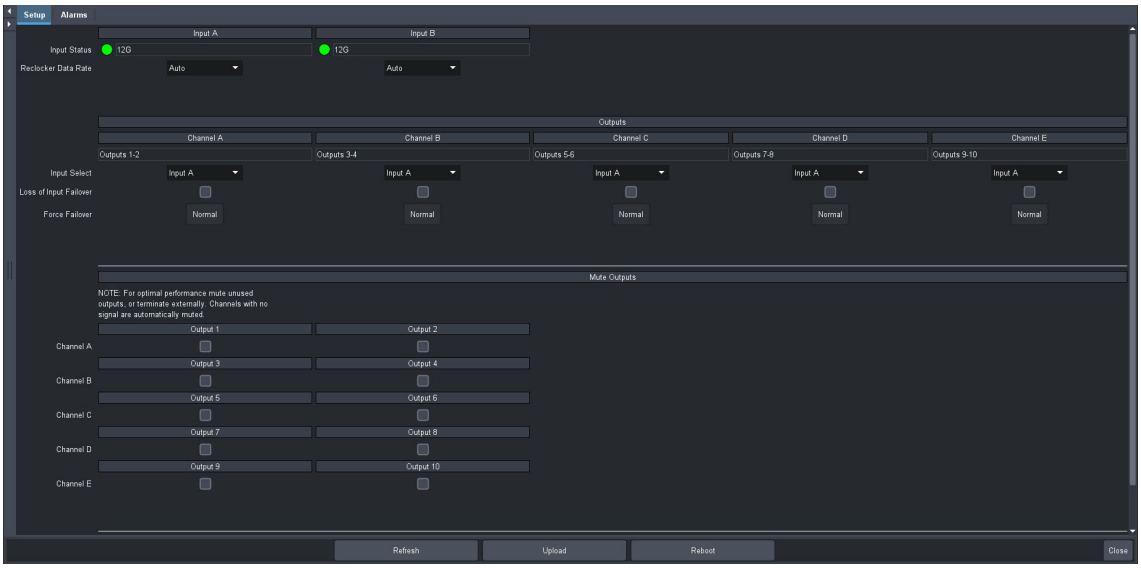
This chapter briefly outlines how to configure the DRA-8902A using the options available in DashBoard.

Configuring the Reclocker

This section summarizes how to select a data rate for the reclocker. This enables the card to reclock to a specific data rate or automatically detect and reclock the data rate. It also sets the input signal rate type that the DRA-8902A will process.

To set the reclocker data rate

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Setup** tab.



3. Use the **Reclocker Data Rate** menu to select a data rate for the input signal. Choose from the following:
   - **Auto** — The DRA-8902A automatically reclocks at the detected rate for the input.
   - **125M (MADI)** — The DRA-8902A is set to reclock at MADI rate of 125Mbps only. This is the required setting when using MADI signals.
   - **270M (SD)** — The DRA-8902A is set to reclock at 270Mbps only.
   - **1.5G (HD)** — The DRA-8902A is set to reclock at 1.485Gbps only.
   - **3G** — The DRA-8902A is set to reclock at 2.97Gbps only.
   - **6G** — The DRA-8902A is set to reclock at 5.94Gbps only.
   - **12G** — The DRA-8902A is set to reclock at 11.88Gbps only.

Assigning an Input to an Output Channel

A channel groups two output signals, enabling you to configure groups of outputs quickly using the same settings. When you assign an input signal to a channel, all the outputs in that channel will use the specified input signal. For example, if you assign Input A to Channel C on the DRA-8902A, Outputs 5 and 6 will use Input A.

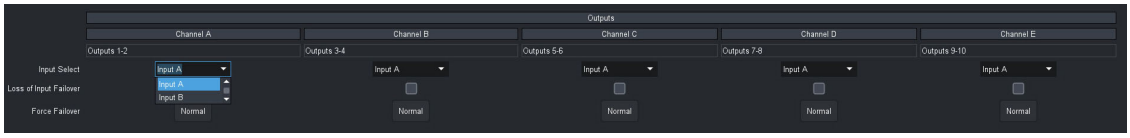
Refer to **Table 3** to learn the default rear module output mapping for each channel.

Table 3 Channel to Output Mapping

Channel	Maps to Outputs
A	1
	2
B	3
	4
C	5
	6
D	7
	8
E	9
	10

To assign an input to an output channel

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Setup** tab.
3. Locate the options for the channel you want to configure.



4. Use the **Input Select** menu to assign an input signal to a specific output group. Choose from the following:
   - **Input A** — Assigns the source available on the **INPUT A** BNC of the rear module.
   - **Input B** — Assigns the source available on the **INPUT B** BNC of the rear module.

Enabling the Failover Feature

The failover feature enables the DRA-8902A to use a backup input source when the primary input source is lost and a valid backup input is detected. Once the DRA-8902A determines that the primary input source is stable (valid and locked), it automatically switches back to the primary source. The **Input** field on the **Signal** tab reports when the backup source is in use for either channel.

✶ The primary source assignments are determined using the procedure "**To assign an input to an output channel**".

To enable the failover feature to automatically switch inputs

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Setup** tab.
3. Select the **Loss of Input Failover** box for the channel.

To immediately force a failover switch

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Setup** tab.
3. Toggle the **Force Failover** button for the channel.

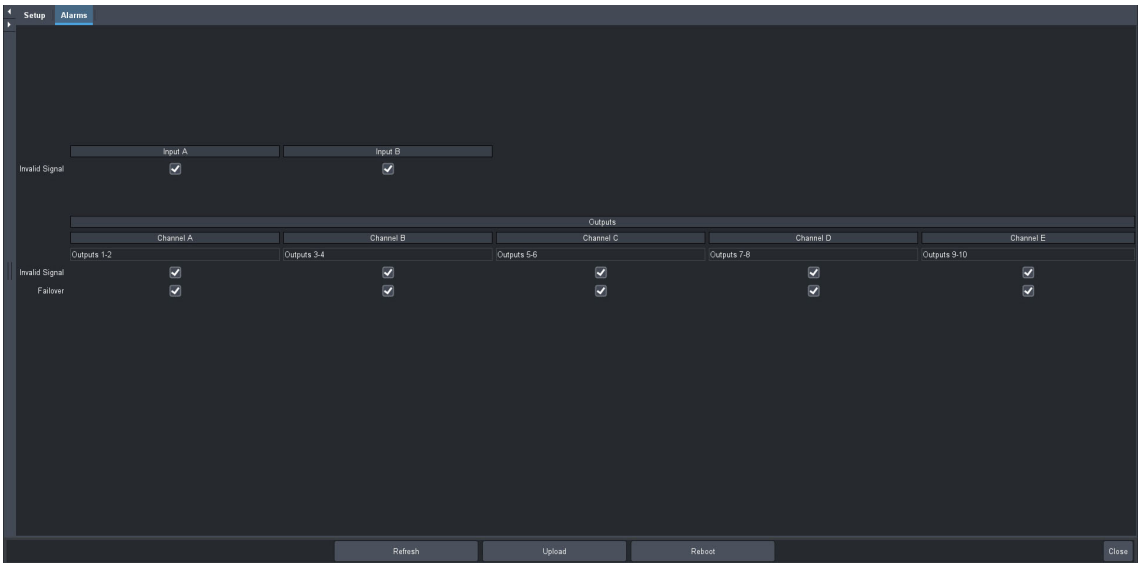
   The button label changes to **Forced** and the button is lit red.

To enable an alarm during a force failover switch

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Alarms** tab.
3. Select the **Failover** box for the channel.

   The box displays a check-mark.

   The **Signal** tab will report when the channel is in failover mode.



Muting an Output

If you have an unused output, it is recommended to either terminate the output or mute the output via the Mute Outputs options available in DashBoard.

To mute an unused output

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Setup** tab.
3. Locate the **Mute Outputs** area located near the bottom of the **Setup** tab. You may need to scroll down the tab.
4. Select the **Output** box for the output you wish to mute.

   The box displays a check-mark.

Configuring the Invalid Signal Alarms

When enabled, this feature will indicate an alarm condition (red) in the corresponding **Status** field(s) of the **Signal** tab. This occurs if the DRA-8902A does not detect a valid input signal for that channel. To verify which BNC to troubleshoot, refer to the rear module labeling.

For More Information on...

- the rear module cabling designations, refer to "**Supported Rear Module**".

To enable the alarm for an invalid input signal

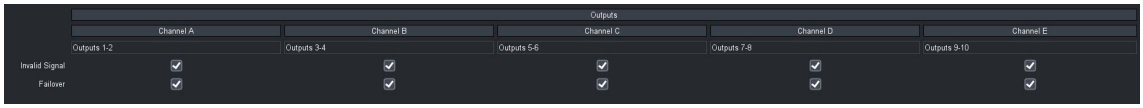
1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Alarms** tab.
3. To raise an alarm when an invalid input signal is detected, select the **Invalid Signal** box in the **Input** area of the tab for the input you wish to monitor.

   The **Input Status** fields in the **Signal** tab and the **Status** tab report when an invalid input signal is detected on the corresponding Input BNC.

To enable the alarm for an invalid output signal

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Alarms** tab.
3. To raise an alarm when an invalid output signal is detected, select the **Invalid Signal** box in the **Channel** area of the tab for the output you wish to monitor.

   The corresponding **Output Status** field in the **Signal** tab reports when an invalid input signal is detected.



Enabling the Failover Alarm

Enabling the Failover alarm allows the card to report when a loss of input has occurred and the output channel automatically switched to the backup source specified in "**Enabling the Failover Feature**". When the source is switched over, a failover message displays in the **Output Status** fields of the **Signal** tab and the **Setup** tab. If the alarm is disabled, the status fields do not report when the loss of input failover has occurred.

To enable the failover alarm

1. Navigate to the DRA-8902A as outlined in "**To display the DRA-8902A in DashBoard**".
2. Select the **Alarms** tab.
3. To raise an alarm when the output signal is switched to the backup source, select the **Failover** box in the **Channel** area of the tab for the output you wish to monitor.

   The corresponding **Output Status** field in the **Signal** tab reports when an invalid input signal is detected.

Upgrading the Software

The DRA-8902A can be upgraded in the field via DashBoard.

To upgrade the software on a card

1. Contact Ross Technical Support for the latest software version file.
2. Ensure the Ethernet cable is connected to the **Ethernet** port on the openGear frame.
3. From the **Tree View**, expand the node for the DRA-8902A you want to access.
4. Double-click the **Global** sub-node to display the interface in the right-half of DashBoard.
5. Select **Upload**, located near the bottom of the interface, to display the **Select file Upload** dialog.
6. Navigate to the ***.bin** file you want to upload.
7. Click **Open**.
8. If you are upgrading a single card:
   a. Click **Finish** to start the upgrade.
   b. Proceed to step 10.
9. If you are upgrading multiple cards:
   a. Click **Next >** to display the **Select Destination** menu. This menu provides a list of the compatible cards.
   b. Specify the card(s) to upload the file to by selecting the check box(es) for the cards you want to upload the file to.
   c. Verify the card(s) you want to upload the file to. The **Error/Warning** fields indicate any errors, such as incompatible software or card type mismatch.
   d. Click **Finish**.
10. Monitor the upgrade.
    - An **Upload Status** dialog enables you to monitor the upgrade process.
    - Notice that each card is listed in the dialog with a button. This button is replaced with a **Reboot** button once the software file is loaded to that card.

✶ Avoid clicking the individual Reboot buttons until all cards have successfully completed the file upload process and the OK button, located in the bottom right corner of the dialog, is enabled.

- Click **OK** to reboot all the cards listed in the **Uploading to Selected Devices** dialog.
- The **Reboot Confirm** dialog displays, indicating the number of cards that will reboot. Click **Yes** to continue the upgrade process. Note that clicking **Cancel** or **No** returns you to the **Uploading to Selected Devices** dialog without rebooting the card(s).
- The card(s) are temporarily taken off-line during the reboot process. The process is complete once the status indicators for the **Card State** and **Connection** return to their previous status.

DashBoard Menus

This chapter briefly summarizes the menus, items, and parameters available from DashBoard for the DRA-8902A. Default parameters are noted with an asterisk (*).

✶ Wait 30 seconds after the last setting change to ensure all changes are saved to the non-volatile memory of the card.

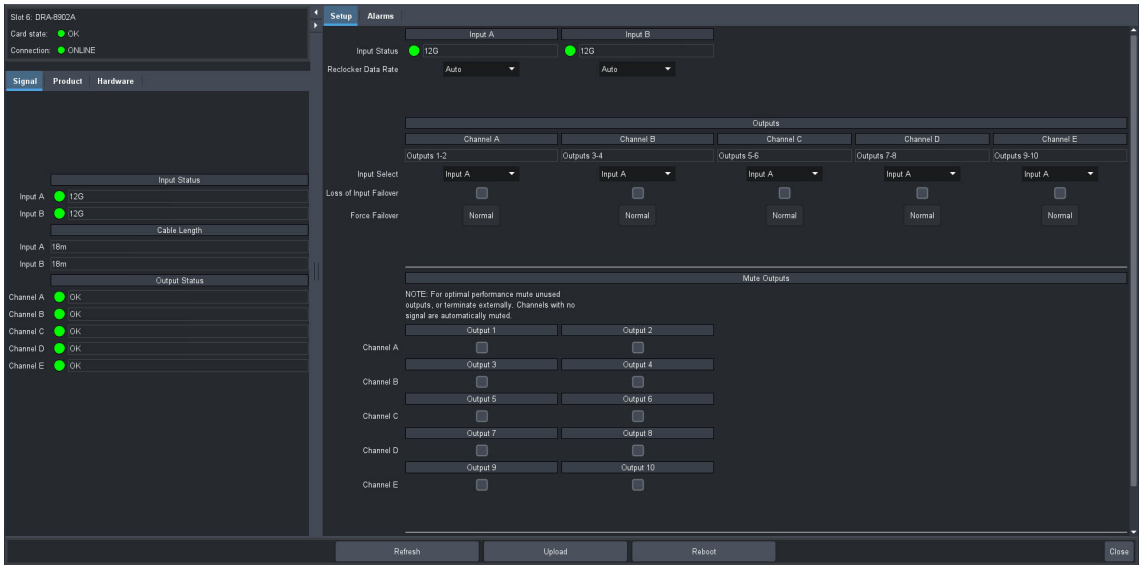


Figure 6 Example of the DRA-8902A in DashBoard

Signal Tab

The fields in the **Signal** tab vary in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. (**Figure 7**) Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

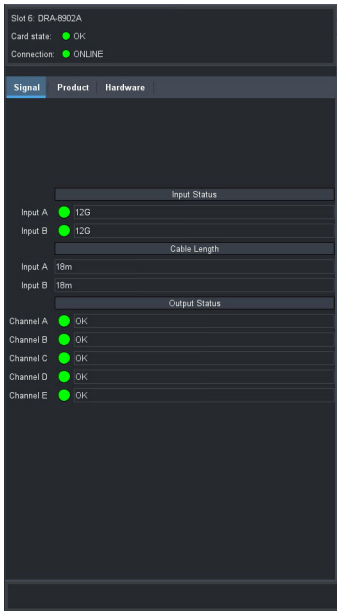


Figure 7 Example of the Signal Tab

Table 4 outlines the read-only information displayed in the **Signal** tab.

Table 4 Signal Tab Items

Item	Parameters	Description
Input Status		
Input #	125M (MADI) (Green)	A MADI signal detected at 125Mbps is present
	270M (SD) (Green)	A valid 270Mbps input signal is present
	1.5G (HD) (Green)	A valid 1.485Gbps input signal is present
	3G (Green)	A valid 2.97Gbps input signal is present
	6G (Green)	A valid 5.94Gbps input signal is present
	12G (Green)	A valid 11.88G input signal is present
	Signal Not Locked (Green)	An input signal is present, but not locked but the Invalid Signal alarm on the Alarms tab is disabled.
	Signal Not Locked (Red)	A valid input signal is detected and is not locked
	No signal (Green)	A valid input signal is not detected but the Invalid Signal alarm on the Alarms tab is disabled.
	No signal (Red)	A valid input signal is not detected. The Invalid Signal alarm on the Alarms tab is enabled.
Cable Length		
Input #	#	Indicates the approximate Belden 1694A cable length used for the input signal
	N/A	A valid input source was not detected on the input BNC
	No input detected	Indicates that a valid signal clock is not present
Output Status		
Channel #	OK (Green)	A valid output signal is detected
	Auto Failover (Green)	The channel is in Failover mode (the Loss of Input Failover box is selected in the Setup tab) but the Failover alarm is not enabled on the Alarms tab for the channel
	Auto Failover (Red)	The channel is in Failover mode (the Loss of Input Failover box is selected in the Setup tab) for the channel
	Force Failover (Green)	The output is in a forced Failover mode (the **Force Failover** button was clicked in the Setup tab) but the Failover alarm is not enabled on the Alarms tab for the channel
	Force Failover (Red)	The output is in a forced Failover mode (the **Force Failover** button was clicked in the Setup tab) for the channel

Table 4 Signal Tab Items (Continued)

Item	Parameters	Description
Channel #	No Signal (Green)	The channel is not present. The Alarms > Invalid Signal alarm for this channel is disabled.
	No Signal (Red)	The channel is not present. The Alarms > Invalid Signal alarm for this channel is enabled.
	Signal Not Locked (Green)	An output signal is present, but not locked. The Alarms > Invalid Signal alarm is disabled for this channel.
	Signal Not Locked (Red)	An output signal is present, but not locked. The Alarms > Invalid Signal alarm is enabled for this channel.

Product Tab

The Product tab provides read-only information about the DRA-8902A that helps identify it. (**Figure 8**)

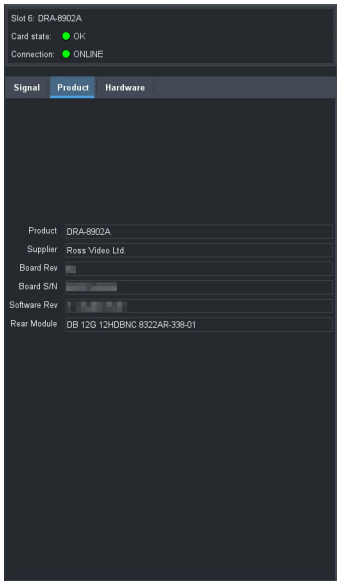


Figure 8 Example of the Product Tab

Table 5 outlines the read-only information displayed in the **Product** tab.

Table 5 Product Tab Items

Item	Parameters	Description
Product	DRA-8902A	Displays the card model
Supplier	Ross Video Ltd.	Indicates the manufacturer of your card
Board Rev	##	Indicates the version of the PCB
Board S/N	######	Indicates the card serial number
Software Rev	##.##	Indicates the software version

Table 5 Product Tab Items (Continued)

Item	Parameters	Description
Rear Module	#	Describes the rear module installed with this card
	No Rear Module	The card does not detect a rear module
Rear Module Status	OK (Green)	The card is correctly installed with a supported rear module
	Incompatible Rear Module (Yellow)	A rear module is detected but it is not supported by the card. Refer to "**Supported Rear Module**".
	No Rear Module (Red)	The card does not detect a valid connection to a rear module

Hardware Tab

The Hardware tab reports measured information about the physical card such as voltage, current, and available RAM. (**Figure 9**)

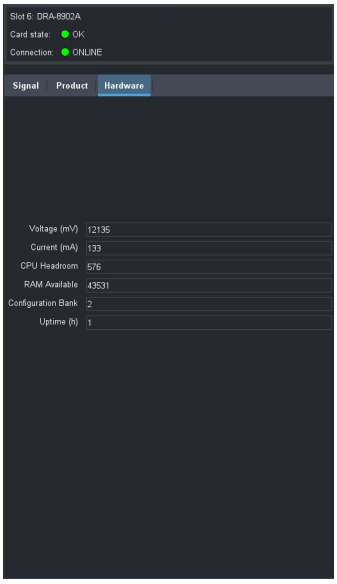


Figure 9 Example of the Hardware Tab

Table 6 outlines the read-only information displayed in the **Hardware** tab.

Table 6 Hardware Tab Items

Item	Parameters	Description
Voltage (mV)	#	Supply voltage
Current (mA)	#	Current consumption of card in milliamperes
CPU Headroom	#	Processing power available
RAM Available	#	On-board processing memory available
Configuration Bank	#	Storage count
Uptime (h)	#	Displays the number of hours since the last reboot of the card

Setup Tab

The **Setup** tab provides configuration options such as assigning an input, setting a reclocker rate, and muting unused outputs. (**Figure 10**)

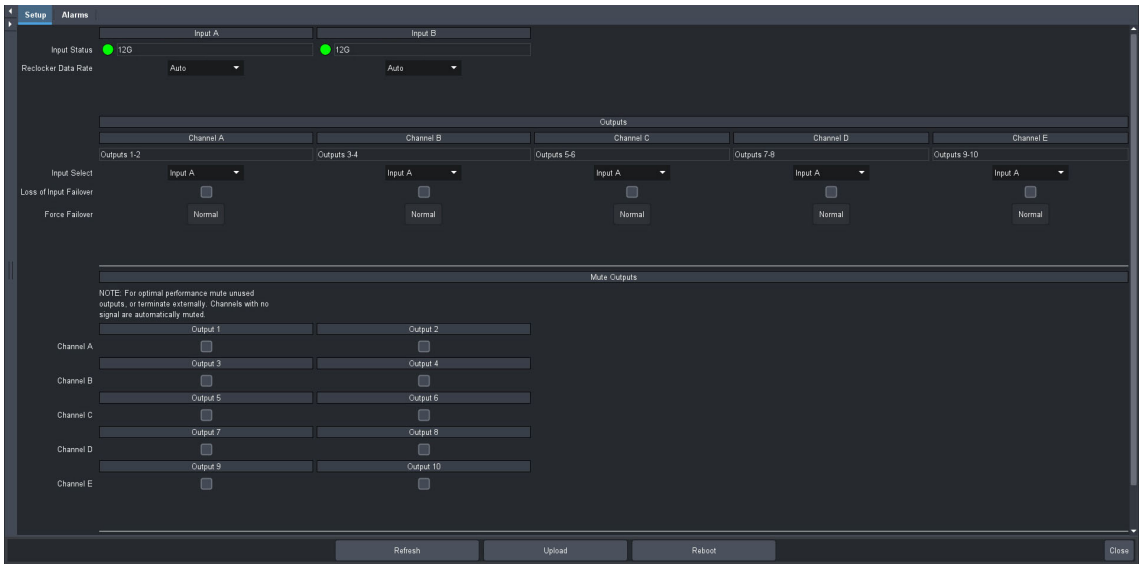


Figure 10 Example of the Setup Tab

Table 7 summarizes the **Setup** options available in DashBoard.

Table 7 Setup Tab Items

Item	Parameters	Description
Input #		
Input Status (read-only)	125M (MADI) (Green)	A MADI signal at 125Mbps is present
	270M (SD) (Green)	A valid 270Mbps input signal is present
	1.5G (HD) (Green)	A valid 1.485Gbps input signal is present
	3G (Green)	A valid 2.97Gbps input signal is present
	6G (Green)	A valid 5.94Gbps input signal is present
	12G (Green)	A valid 11.88G input signal is present
	Signal Not Locked (Green)	An input signal is present, but not locked. The Alarms > Invalid Signal alarm is disabled.
	Signal Not Locked (Red)	An input signal is present, but not locked.
	No signal (Green)	A valid input signal is not present, but the Invalid Signal alarm is disabled in the Alarms tab.
	No signal (Red)	A valid signal is not present

Table 7 Setup Tab Items (Continued)

Item	Parameters	Description
Reclocker Data Rate[a]	Auto*	Card automatically detects the incoming data rate
	125M (MADI)	Reclocker is set to 125Mbps
	270M	Reclocker is set to 270Mbps
	1.5G	Reclocker is set to 1.485Gbps
	3G	Reclocker is set to 2.97Gbps
	6G	Reclocker is set to 5.94Gbps
	12G	Reclocker is set to 11.88Gbps
Outputs		
Output # (read-only)	Outputs 1-2	Indicates the OUT BNCs included in the channel
	Outputs 3-4	
	Outputs 5-10	
	Outputs 10-16	
Input Select	Input A	Specifies that the signal on the SDI INPUT A BNC is the primary source for this output
	Input B	Specifies that the signal on the SDI INPUT B BNC is the primary source for this output
Loss of Input Failover	Selected	The input signal is automatically switched to the backup when the card detects the primary is unavailable. Note that the card returns to the primary input once the primary input signal is stable.
	Cleared	Disables the failover feature
Force Failover	Normal*	Forces the input to be switched to the backup input, even if the primary input is still valid. If the card is in Forced Failover mode, the button label will display "Forced". To return to the primary input, click the button again.
	Forced	
Mute Outputs - Channel #		
Output #	Selected	Mutes the specified output. It is recommended to terminate or mute unused outputs.
	Cleared*	The output is not muted.
Edit Permission	Unlocked*	All configurable menu options are editable
	Locked	All configurable menu options, except this one, are locked and are read-only
Factory Defaults	Reset	Resets all editable parameters to the factory default values

a. When using MADI signals, you must set the Reclocker Data Rate to 125M (MADI) and not Auto.

Alarms Tab

The **Alarms** tab enables you to specify what input(s) and/or outputs to monitor. (**Figure 11**)

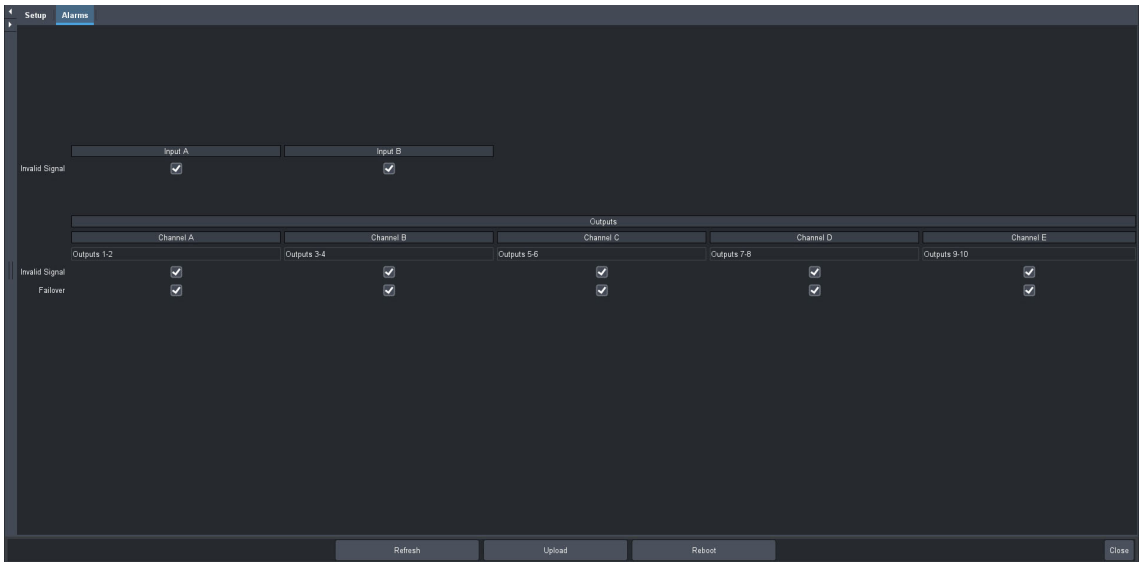


Figure 11 Example of the Alarms Tab

Table 8 summarizes the **Alarms** options available in DashBoard.

Table 8 Alarms Tab Items

Item	Parameters	Description
Input #		
Invalid Signal	Selected*	The Status field in the Signal tab reports the loss of the input as an error/alarm
	Cleared	The Status field in the Signal tab reports the loss of the input as information only (status indicator does not report an alarm condition)
Output #		
Invalid Signal	Selected*	The specified Channel field in the Output Status area of the Signal tab reports the detected invalid input as an error/alarm
	Cleared	The specified Channel field in the Output Status area of the Signal tab reports that an invalid input is detected, but as information only (status indicator does not report an alarm condition)
Failover	Selected*	The specified Channel field in the Output Status area of the Signal tab reports when the channel has switched to failover mode
	Cleared	The specified Channel field in the Output Status area of the Signal tab reports the switch to failover mode as information only (status indicator does not report an alarm condition)

Technical Specifications

This chapter includes the technical specifications for the DRA-8902A.

✶ Specifications are subject to change without notice.

Supported Video Formats

Table 9 Technical Specifications — Supported Video Formats

Video Format
SD Formats
480i 59.94Hz
576i 50Hz
HD Formats
720p 50Hz
720p 59.94Hz
1080i 50Hz
1080i 59.94Hz
1080p 23.98Hz
1080p 24Hz
1080p 25Hz
1080p 29.97Hz
1080p 30Hz
1080p 50Hz
1080p 59.94Hz
1080p 60Hz
UHD Formats
2160p 23.98Hz
2160p 24Hz
2160p 25Hz
2160p 29.97Hz
2160p 30Hz
2160p 50Hz
2160p 59.94Hz
2160p 60Hz

SDI Inputs Specifications

Table 10 Technical Specifications — SDI Inputs

Item	Specifications
Number of Inputs	2
Connector Type	HD-BNC
Data Rates and SMPTE Standards Accommodated	19.39Mbps, 38.78Mbps, SMPTE 310 MADI, AES10-2008 270Mbps, 525/625 Component, SMPTE 259M 270Mbps, DVB-ASI 1.485Gbps Component, SMPTE 292M 2.97Gbps Component, SMPTE 424M 5.94Gbps Component, SMPTE 2081 11.88Gbps Component, SMPTE 2082
Impedance	75ohm
Equalization (Belden 1694A cable)	>430m (1410ft) @ 270Mbps
	>200m (656ft) @ 1.485Gbps
	>150m (492ft) @ 2.97Gbps
	>80m (262ft) @ 5.94Gbps
	>60m (197ft) @ 11.88Gbps
Return Loss (typical)	>15dB to 1.485Gbps
	>10dB to 2.97Gbps
	>7dB to 5.94Gbps
	>4dB to 11.88Gbps

SDI Outputs Specifications

✶ All outputs are non-inverting. It is recommended to mute unused outputs via the Mute Outputs options available in the Setup tab of DashBoard. Or you may choose to terminate the unused outputs.

Table 11 Technical Specifications — SDI Outputs

Item	Specifications
Number of Outputs[a]	10
Connector Type	HD-BNC
Impedance	75ohm
Return Loss (typical)	>15dB to 1.485Gbps
	>10dB to 2.97Gbps
	>7dB to 5.94Gbps
	>4dB to 11.88Gbps

Table 11 Technical Specifications — SDI Outputs (Continued)

Item	Specifications	
Rise & Fall Times	MADI:	1.0-3.0nS, <0.5nS difference
	270Mbps:	0.4-1.5nS, <0.5nS difference
	1.485Gbps:	<270ps, <100ps difference
	2.97Gbps:	<135ps, <50ps difference
	5.94Gbps:	<80ps, <30ps difference
	11.88Gbps:	<45ps, <18ps difference
Jitter	MADI:	<2.0UI (<4.0nS)
	270Mbps:	<0.2UI, jitter measured 10Hz-1kHz
	1.485Gbps:	<1.0UI jitter measured 10Hz-100kHz, <0.2UI above 100kHz
	2.97Gbps:	<1.0UI jitter measured 10Hz-100kHz, <0.3UI above 100kHz
	5.94Gbps:	<2.0UI jitter measured 10Hz-100kHz, <0.3UI above 100kHz, band limit @594MHz
	11.88Gbps:	<2.0UI jitter measured 10Hz-100kHz, <0.3UI above 100kHz, band limit @1188MHz
Signal Level	800mV ±10%	
DC Offset	0V ±50mV (MADI is 400mV +/- 10%)	
Overshoot	<10%	

a. All outputs are non-inverting when using DVB-ASI and 270Mbps signals.

Environment

Table 12 Technical Specifications — Environment

Item	Specifications
Maximum Ambient Temperature	40°C (104°F)

Power

Table 13 Technical Specifications — Power

Item	Specifications
Maximum Power Consumption	5.6W

Service Information

This chapter provides information on the warranty and repair policy for your card.

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your card, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed in "**Contacting Technical Support**".

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** — Verify the power indicator LED on the openGear 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. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
5. **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.

Bootload Button

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

To reload the software on the card

1. Eject the card from the openGear frame.
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 card.

Warranty and Repair Policy

The DRA-8902A 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 DRA-8902A 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 DRA-8902A 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 openGear Product. Ross Video policy dictates that all repairs to the DRA-8902A 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 DRA-8902A, please contact the Ross Video Technical Support Department (see "**Contacting Technical Support**").

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 DRA-8902A. If required, a temporary replacement frame 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.

Software Licenses

This chapter provides third-party software license information for your DRA-8902A. This product includes multiple software components which are individually licensed under one or more of the following licenses included in this chapter.

BSD

Copyright (c) 1991,1993, The Regents of the University of California. All rights reserved.

This code is derived from software contributed to Berkeley by Kenneth Almquist.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. <BSD Advertising Clause omitted per the July 22, 1999 licensing change ftp://ftp.cs.berkeley.edu/pub/4bsd/README.Impt.License.Change> California, Berkeley and its contributors.

4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Dual GPL

Portions of this software are copyright (C) 1996-2002 The FreeType Project (www.freetype.org). All rights reserved.

This project is also covered under the GPL v2.

GPL

GNU GENERAL PUBLIC LICENSE
Version 3, 29 June 2007
Copyright (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>
Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

a. The work must carry prominent notices stating that you modified it, and giving a relevant date.

b. The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".

c. You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d. If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a. Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b. Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c. c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d. d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e. e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7. Additional Terms.

"Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

a. Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or

b. Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or

c. Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or

d. Limiting the use for publicity purposes of names of licensors or authors of the material; or

e. Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or

f. Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered "further restrictions" within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An "entity transaction" is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever

licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11. Patents.

A "contributor" is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's "contributor version".

A contributor's "essential patent claims" are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, "control" includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a "patent license" is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To "grant" such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. "Knowingly relying" means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is "discriminatory" if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

LGPL

GNU LESSER GENERAL PUBLIC LICENSE
Version 3, 29 June 2007
Copyright (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

This version of the GNU Lesser General Public License incorporates the terms and conditions of version 3 of the GNU General Public License, supplemented by the additional permissions listed below.

0. Additional Definitions.

As used herein, "this License" refers to version 3 of the GNU Lesser General Public License, and the "GNU GPL" refers to version 3 of the GNU General Public License.

"The Library" refers to a covered work governed by this License, other than an Application or a Combined Work as defined below.

An "Application" is any work that makes use of an interface provided by the Library, but which is not otherwise based on the Library. Defining a subclass of a class defined by the Library is deemed a mode of using an interface provided by the Library.

A "Combined Work" is a work produced by combining or linking an Application with the Library. The particular version of the Library with which the Combined Work was made is also called the "Linked Version".

The "Minimal Corresponding Source" for a Combined Work means the Corresponding Source for the Combined Work, excluding any source code for portions of the Combined Work that, considered in isolation, are based on the Application, and not on the Linked Version.

The "Corresponding Application Code" for a Combined Work means the object code and/or source code for the Application, including any data and utility programs needed for reproducing the Combined Work from the Application, but excluding the System Libraries of the Combined Work.

1. Exception to Section 3 of the GNU GPL.

You may convey a covered work under sections 3 and 4 of this License without being bound by section 3 of the GNU GPL.

2. Conveying Modified Versions.

If you modify a copy of the Library, and, in your modifications, a facility refers to a function or data to be supplied by an Application that uses the facility (other than as an argument passed when the facility is invoked), then you may convey a copy of the modified version:

a. under this License, provided that you make a good faith effort to ensure that, in the event an Application does not supply the function or data, the facility still operates, and performs whatever part of its purpose remains meaningful, or

b. under the GNU GPL, with none of the additional permissions of this License applicable to that copy.

3. Object Code Incorporating Material from Library Header Files.

The object code form of an Application may incorporate material from a header file that is part of the Library. You may convey such object code under terms of your choice, provided that, if the incorporated material is not limited to numerical parameters, data structure layouts and accessors, or small macros, inline functions and templates (ten or fewer lines in length), you do both of the following:

a. Give prominent notice with each copy of the object code that the Library is used in it and that the Library and its use are covered by this License.

b. Accompany the object code with a copy of the GNU GPL and this license document.

4. Combined Works.

You may convey a Combined Work under terms of your choice that, taken together, effectively do not restrict modification of the portions of the Library contained in the Combined Work and reverse engineering for debugging such modifications, if you also do each of the following:

a. Give prominent notice with each copy of the Combined Work that the Library is used in it and that the Library and its use are covered by this License.

b. Accompany the Combined Work with a copy of the GNU GPL and this license document.

c. For a Combined Work that displays copyright notices during execution, include the copyright notice for the Library among these notices, as well as a reference directing the user to the copies of the GNU GPL and this license document.

d. Do one of the following:

1) Convey the Minimal Corresponding Source under the terms of this License, and the Corresponding Application Code in a form suitable for, and under terms that permit, the user to recombine or relink the Application with a modified version of the Linked Version to produce a modified Combined Work, in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.

2) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (a) uses at run time a copy of the Library already present on the user's computer system, and (b) will operate properly with a modified version of the Library that is interface-compatible with the Linked Version.

e. Provide Installation Information, but only if you would otherwise be required to provide such information under section 6 of the GNU GPL, and only to the extent that such information is necessary to install and execute a modified version of the Combined Work produced by recombining or relinking the Application with a modified version of the Linked Version. (If you use option 4d0, the Installation Information must accompany the Minimal Corresponding Source and Corresponding Application Code. If you use option 4d1, you must provide the Installation Information in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.)

5. Combined Libraries.

You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities that are not Applications and are not covered by this License, and convey such a combined library under terms of your choice, if you do both of the following:

a. Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities, conveyed under the terms of this License.

b. Give prominent notice with the combined library that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

6. Revised Versions of the GNU Lesser General Public License.

The Free Software Foundation may publish revised and/or new versions of the GNU Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library as you received it specifies that a certain numbered version of the GNU Lesser General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that published version or of any later version published by the Free Software Foundation. If the Library as you received it does not specify a version number of the GNU Lesser General Public License, you may choose any version of the GNU Lesser General Public License ever published by the Free Software Foundation.

If the Library as you received it specifies that a proxy can decide whether future versions of the GNU Lesser General Public License shall apply, that proxy's public statement of acceptance of any version is permanent authorization for you to choose that version for the Library.

MIT

zlib

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files ftp://ds.internic.net/rfc/rfc1950.txt (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).