

HDA-3961

***Single/Dual 12G/3G/HD/SD SDI Distribution Amplifier
(DA) with Optional Fiber Connectivity***

Guide to Installation and Operation

13-03070-010-AB-M00

2019-09-27

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This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for Class A digital devices.

NOTE: 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.



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- EN 55022 Class A radiated and conducted emissions
- EN 55024 Immunity of Information Technology Equipment
- EN 61000-3-2 Harmonic current injection
- EN 61000-3-3 Limitation of voltage changes, voltage fluctuations and flicker
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-5 Surge immunity

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1 HDA-3961 Single/Dual 12G/3G/HD/SD SDI Distribution Amplifiers

1.1 Introduction

The HDA-3961 from Grass Valley, a Belden Brand, provides single and dual channel distribution for 12G/3G/HD/SD-SDI signals with flexible routing of inputs to outputs. Flexible output selection enables the HDA-3961 to be used either as a single channel DA with up to 10 outputs, or in dual channel mode with up to five outputs per input.

The HDA-3961 provides up to ten reclocked outputs with automatic cable equalization.

The HDA-3961 offers fiber connectivity, making it ideal for longer cable lengths. The HDA-3961 provides a user-configurable fiber optic transceiver for bidirectional conversion of 12G, 3G, HD and SD-SDI signals to 1310 nm optical signals. Ideal for mixed coax and fiber workflows, the HDA-3961 allows users to configure the inputs and outputs to match their infrastructure needs.

1.2 Features

- Single/dual 12G/3G/HD/SD-SDI inputs
- Flexible selection of inputs allows single or dual channel operation
- Supports bitrates up to 11.88 Gb/s
- Automatic format detection and cable equalization
- Up to 6 × 12G/3G/HD/SD-SDI BNC outputs on the HDA-3961-3SRP-2IN rear
- Up to 10 × 12G/3G/HD/SD-SDI HD-BNC outputs on the HDA-3961-3SRP-HF rear
- Up to 7 × 12G/3G/HD/SD-SDI HD-BNC outputs on the HDA-3961-3SRP rear
- Optional fiber I/O on the HDA-3961-3SRP-HF rear

1.3 Block Diagrams

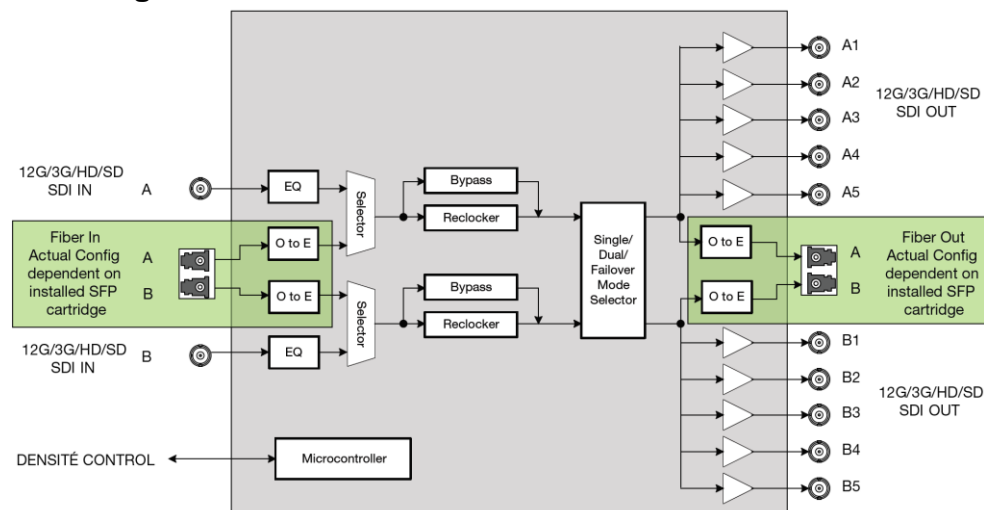


Figure 1 HDA-3961 Functional Block Diagram

When using the HDA-3961-3SRP REAR, the HDA-3961 operates in single mode and the following outputs are available: A1, A2, A3, A4, A5, B1, and B2. Only input SDI IN A is available.

The actual connections available are supported by the chosen rear panel. See 2.3 - Rear Connector Panels.

1.4 Front Card-edge Interface

The front card-edge of the HDA-3961 incorporates two elements:

- Status LED (see section 3.2)
- Select Button (see section 4)

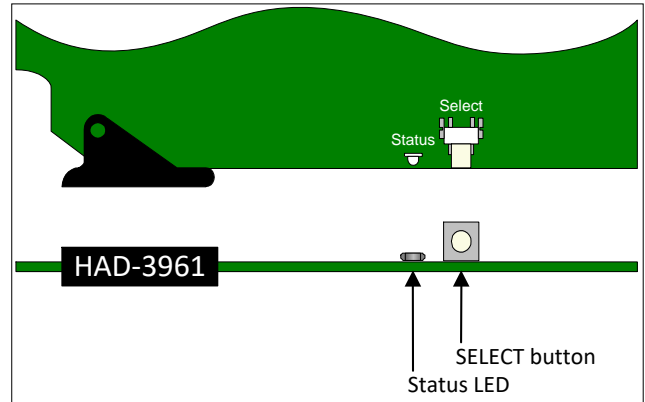


Figure 2 Front card-edge layout

2 Installation

2.1 Installation of Rear Connector Panels

The HDA-3961 card is sized to fit into Grass Valley's Densité 3 frame. Grass Valley Densité-series cards are each associated with a rear connector panel, which must be installed in the Densité 3 frame before the card can be inserted.

The following rear connector panels are available for the HDA-3961:

- HDA-3961-3SRP-HF Single rear panel with single 1×10 or dual 2×5 HD-BNC with fiber option support
- HDA-3961-3SRP-2IN Single rear panel with single 1×6 or dual 2×3 BNCs
- HDA-3961-3SRP Single rear panel with single 1×7 BNCs.

All cards and rear panels can be installed with the frame power on. The card has connectors which plug into a mid-frame mother board for distribution of power and for connection to the controller card, and a second connector which plugs directly into the rear connector panel for input and output.

The rear connector panel must be installed with the card out of the frame.

- To remove an existing card from the slot, tilt up the swivel handle on the front of the card to lever the connectors apart, then use the handle to pull the card straight out of the slot.

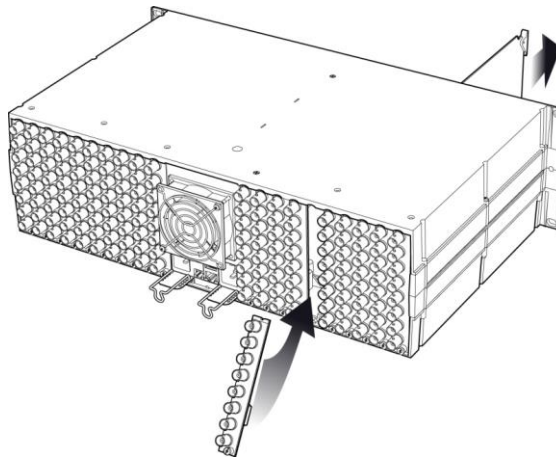


Figure 3 Densité 3 frame – rear panel installation

To install the connector panel:

1. If a card is installed in the slot whose rear panel is being changed, remove it as described above.
2. Remove the existing panel (either blank or belonging to an existing card that is being changed) by releasing the captive screw(s) at the bottom.
3. Position the new panel and secure it in place with the captive screw(s) at the bottom.

2.2 Card Installation

Once a matching rear connector panel has been installed, install the HDA-3961 card as follows:

1. Open the front panel of the frame.
2. Slide the HDA-3961 card into the slot and push gently on the handle to seat the connectors.

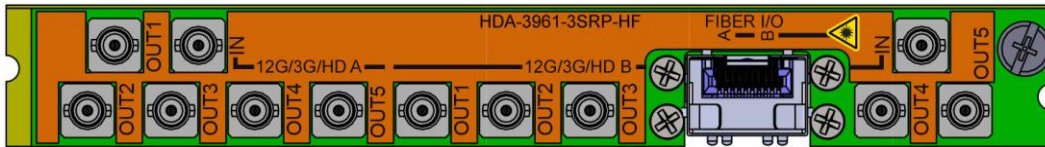
Inserting the card into the wrong slot will not damage the card, and will be flagged by the on-card status LED flashing red to indicate that there is no connection to the rear panel.

- Close the front panel of the frame.

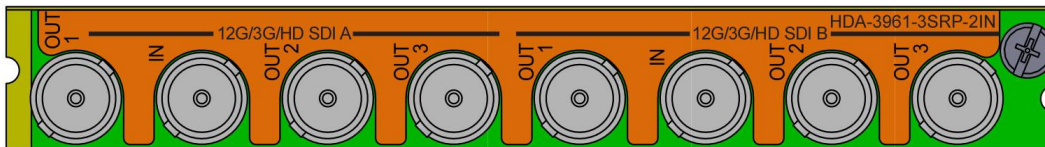
2.3 Rear Connector Panels

The following diagrams illustrate the layout and connectors on the available HDA-3961 rear panels. Note that the HDA-3961 functionality is determined by the rear panel that is installed.

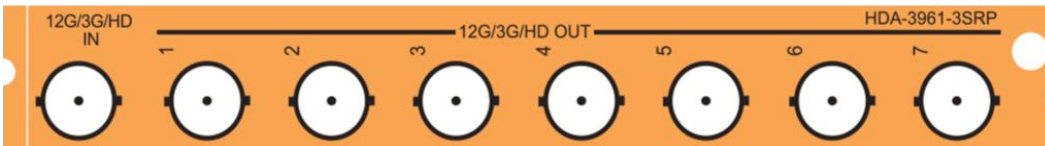
HDA-3961 Rear Panels:



- HDA-3961-3SRP-HF** Single rear panel with single 1x10 or dual 2x5 HD-BNC with fiber option support.



- HDA-3961-3SRP-2IN** Single rear panel with single 1x6 or dual 2x3 BNCs.



- HDA-3961-3SRP** Single rear panel with single 1x7 BNCs.

This table summarizes the input/output connections on the various rear panels shown above:

Rear panel type	I/O Connections		
	12G/3G/HD/SD SDI IN	12G/3G/HD/SD SDI OUT	FIBER I/O
HDA-3961-3SRP-HF	2	10	●
HDA-3961-3SRP-2IN	2	6	
HDA-3961-3SRP	1	7	

12G/3G/HD/SD IN – Serial digital Video Inputs

Connect a serial digital video signal, conforming to the ST 2082-1 for 12G-SDI, ST 424 for 3G-SDI, SMPTE 292M standard for HD input signals or SMPTE 259M standard for SD input signals, to the BNC labeled **12G/3G/HD SDI IN**. The HDA-3961 will automatically switch to the detected video line format.

12G/3G/HD/SD OUT – Serial Digital Video Outputs

The HDA-3961 provides multiple 12G/3G/HD/SD SDI video outputs on BNC or HD-BNC connectors, labeled **12G/3G/HD OUT 1, 2**, etc. The SDI video signal conforms to the SMPTE 292M and SMPTE 259M-C standard.

Fiber I/O connector

SFP optical modules are small, hot-pluggable cartridges which provide fiber connectivity to the HDA-3961 distribution amplifiers. By using fiber instead of coaxial cable, these interfaces can be used over much longer distances without impacting signal quality.

SFP Modules can be installed into HDA-3961 rear panels that offer SFP connectivity, easily identifiable by a -F extension in the Grass Valley Rear part number. A single SFP optical module offers either 1 or 2 fiber connections, available as single Tx or Rx, or dual Rx or Tx.

The fiber I/O connector accepts any of the following SFP cartridges.

SFP Modules	Description
SFP-U-R-LC	12G Single RX Fiber with LC/PC
SFP-U-RR-LC	12G Dual Rx Fiber with LC/PC
SFP-U-RT-S13-LC	12G Dual Rx/Tx Fiber 1310 nm with LC/PC
SFP-U-T-S13-LC	12G Single Tx Fiber 1310 nm with LC/PC
SFP-U-TT-S13S13-LC	12G Dual Tx Fiber 1310 nm with LC/PC
SFP-R-LC	Single fiber RX cartridge with LC/PC connector
SFP-RR-LC	Dual fiber Rx cartridge with LC/PC connector
SFP-T-S13-LC	Single fiber TX cartridge at 1310 nm with LC/PC connector
SFP-TT-S13S13-LC	Dual fiber Tx cartridge at 1310 nm with LC/PC connector
SFP-RT-S13-LC	Dual fiber Rx/Tx cartridge 1310 nm with LC/PC connector

Note: The HDA-3961 can also make use of SFP optical plug-in cartridges from the WDM and CWDM series. Other types of SFP optical plug-in cartridges may be available.

Insert the appropriate cartridge for your application into the Fiber I/O connector, and then connect the fibers to the cartridge via the LC connectors.

- **See ANNEX 2 on page 26 for a detailed description of the installation & removal procedure.**

3 Operation

3.1 Control Options

The HDA-3961 can be controlled in two different ways:

- The local control panel and its push-buttons can be used to move through a menu of parameters and to adjust parameter values (see section 4).
- Grass Valley’s iControl system can be used to access the card’s operating parameters from a remote computer, using a convenient graphical user interface (GUI). (see section 5)

3.2 Card-Edge Status LED

The status monitor LED is located on the front card-edge of the HDA-3961, and is visible through the front access door of the DENSITÉ 3 frame. This multi-color LED indicates the status of the HDA-3961 by color, and by flashing/steady illumination.

The chart shows how the various error conditions that can be flagged on the HDA-3961 affect the LED status.

- If a cell is gray, the error condition cannot cause the LED to assume that status
- If more than one LED status is possible for a particular error condition, the status is configurable.
See Section 5.7 for details.
- The factory default status is shown by a ⚙

The LED will always show the most severe detected error status that it is configured to display, and in the chart error severity increases from left to right, with green representing no error/disabled, and flashing red the most severe error.

Error Condition	LED Status			
	Green	Yellow	Red	Flashing Red
No input signal presence			⚙	
No lock on input signal		⚙		
No rear				⚙

⚙ : Factory default.

If the LED is Flashing Yellow, it means that the card is selected for local control using the Densité frame’s control panel. See Section 4 for details.

The LED will be Yellow when the card is in the “Firmware Update” mode.

4 Local Control Using the Frame’s Control Panel

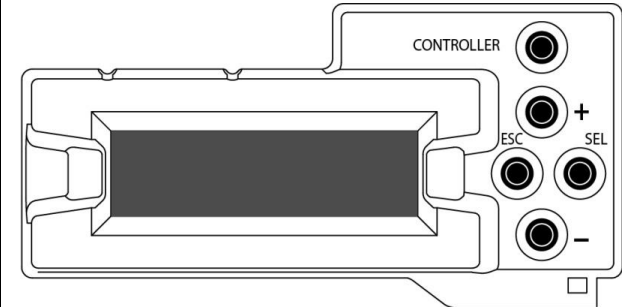
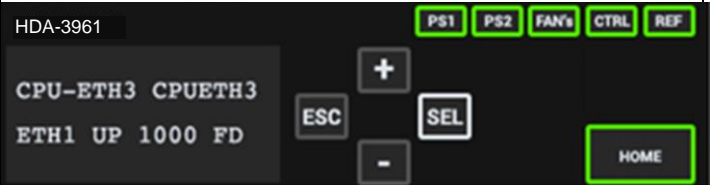
Push the SELECT button on the HDA-3961 card edge (see Section 1.4) to assign the local control panel to operate the HDA-3961.

- The STATUS LED on the HDA-3961 card edge flashes yellow.

Use the control panel buttons to navigate through the menu, as described below.

- The complete menu structure is shown in [ANNEX 1 – HDA-3961 Local User Interface](#) on page 25.

Two versions of the local control panel exist:

Panel type	Frame models	Appearance
Physical	Densité-2, Densité-3, Densité-3+FR1,	
Touch screen	Densité 3+FR4, GV Node	

The local control panel is fastened to the front of the frame’s controller card.

- The physical panel is accessed by opening the front door of the frame.
- The touch screen panel is accessed through an aperture in the frame door.

The panel incorporates a display capable of displaying two lines of text, each 16 characters in length, and four pushbuttons. The functionality of the pushbuttons is as follows:

[+] [-] Used for menu navigation and value modification

[SELECT] Gives access to the next menu level. When a parameter value is shown, pushing this button once enables modification of the value using the [+] and [-] buttons; a second push confirms the new value

[ESC] Cancels the effect of parameter value changes that have not been confirmed; pushing [ESC] causes the parameter to revert to its former value.

Pushing [ESC] moves the user back up to the previous menu level. At the main menu, [ESC] does *not* exit the menu system. To exit, re-push the [SELECT] button for the card being controlled.

- Notes:
1. If you do not touch any buttons on the local control panel, the controller will revert to its normal standby mode after 30 seconds.
 2. If you changed a parameter from the control menu, but have not applied your change (you did not touch the SEL button on the control panel), once the 30-second timeout has occurred, the parameters will be confirmed as if you had touched the SEL button

5 Remote Control Using iControl

The operation of the HDA-3961 may be controlled using Grass Valley's iControl system.

- This manual describes the control panels associated with the HDA-3961 and their use.
- Please consult the iControl User's Guide for information about setting up and operating iControl.

In iControl Navigator or iControl Websites, double-click on the HDA-3961 icon to open the control panel.

5.1 The iControl Graphic Interface Window

The basic window structure for the HDA-3961 is shown in figure 3.2. The window identification line gives the card type (HDA-3961) and the slot number where the card is installed in its Densité frame.

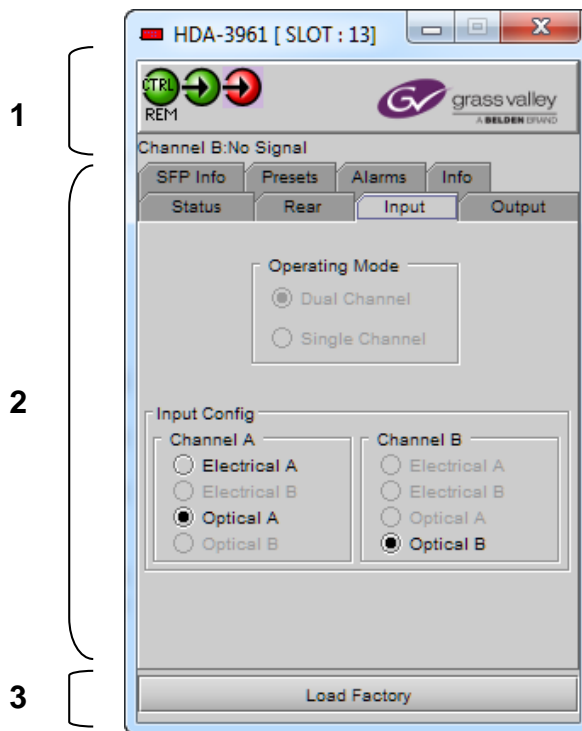


Figure 4 HDA-3961 iControl graphic interface window:

There are three main sections in the window itself, shown in Figure 3.2:

1. The top section displays icons on the left. These icons report the status of some parameters associated with this HDA-3961. Figure 3.3 shows the three icons that may appear.

Move the mouse over an icon and a status message appears below the icon providing additional information.

If there is an error, the error status message appears in the message area without mouse-over.

- If there are multiple errors, the error messages cycle
- The icon whose status or error message is shown is highlighted with a mauve background

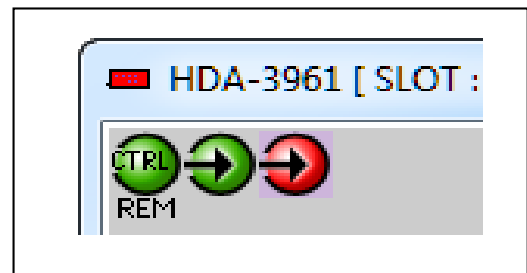








Figure 5 iControl Status Icons

The table below lists the various status icons that can appear, and how they are to be interpreted.

- In cases where there is more than one possible interpretation, read the error message in the iControl window to see which applies.

Table – iControl Status Icon interpretation

Icon #1 – Manual Card Configuration	
 (green)	Remote card control activated. The iControl interface can be used to operate the card
 (yellow)	Local card control active. The card is being controlled using the Densité 3 frame control panel, as described in section 4. Any changes made using the iControl interface will have no effect on the card.
Icon #2 – Input A status	
 (green)	Signal detected and valid. <ul style="list-style-type: none"> • Beneath the icon, the format will be indicated as 12G, 3G, HD or SD, and the specific format details will be listed if the cursor is moved over the icon.
 (red)	No signal or Input signal error No rear
Icon #3 – Input B status	
 (green)	Signal detected and valid. <ul style="list-style-type: none"> • Beneath the icon, the format will be indicated as 12G, 3G, HD or SD, and the specific format details will be listed if the cursor is moved over the icon.
 (red)	No signal or Input signal error No rear

2. The center portion of the iControl graphic interface window contains a series of control and information panels, selected by tabs.
 - Click on a tab to display the associated panel.
 - Each of these panels is described individually in the following sections.
3. The Load Factory button is always visible at the bottom of the panel. Click the **Load Factory** button to reset all parameters on this HDA-3961 card to factory default values.
 - The factory default values are shown underlined in the menus found in the Annex to this document, beginning on page 25.

5.2 The *Input* panel

This panel allows the user to select the input that will be processed through the available channels in the HDA-3961.

Two channels are available. The rear panel may have one or two electrical inputs, and may have two optical inputs. Channel B will be greyed out if no signal is available for it.

Input Config

Select the input for Channel A and Channel B, using the radio buttons.

- 1- Select Operating Mode (DUAL/SINGLE)
- 2- DUAL mode, if available:
 - a. Select Electrical A or Optical A for channel A
 - b. Select Electrical B or Optical B for channel B
- 3- SINGLE mode:
 - a. Select input: Electrical A, Electrical B, Optical A or Optical B if available.

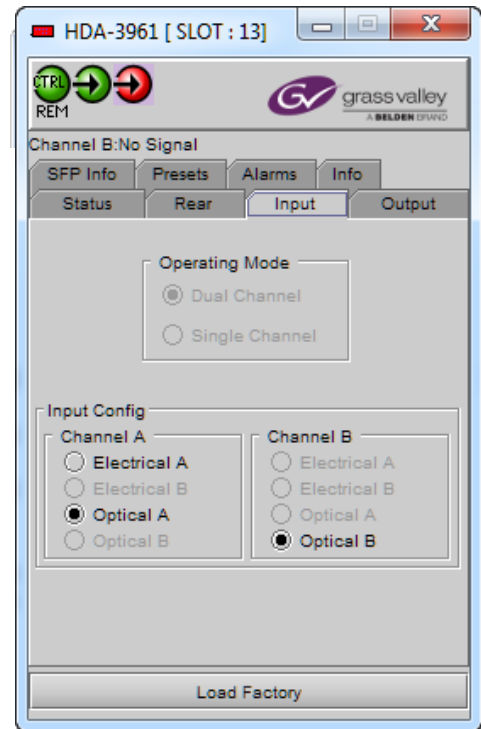


Figure 6 Input panel – HDA-3961

5.3 The *Output* panel

This panel controls the optical output functions (when equipped; see the Status tab) related the HDA-3961 output:

Output Config

If an optical output is available, use the radio buttons to independently turn the two optical outputs OFF or ON:

- Optical output is only available for rear panels with a Fiber I/O connector and an installed single or dual output (TX) cartridge
- Optical output A, can only carry channel A
- On an HDA-3961, optical output B can carry Channel A when the Operating Mode is set to Single Channel (see the Input tab), or it carries Channel B when the Operating Mode is set to Dual Channel

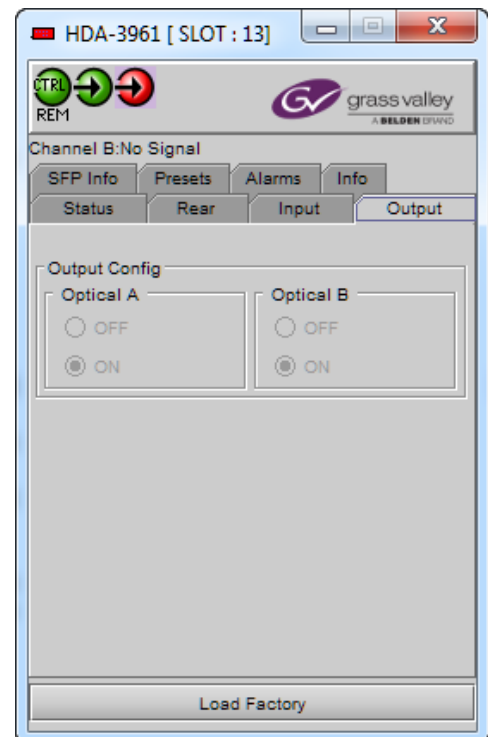


Figure 7 Output panel – Dual Channel Operating Mode

5.4 The Rear panel

This panel identifies the type of rear panel installed with this HDA-3961. The name of the installed rear panel appears in the data box.

- If no rear is installed, “No Rear” appears in the data box.

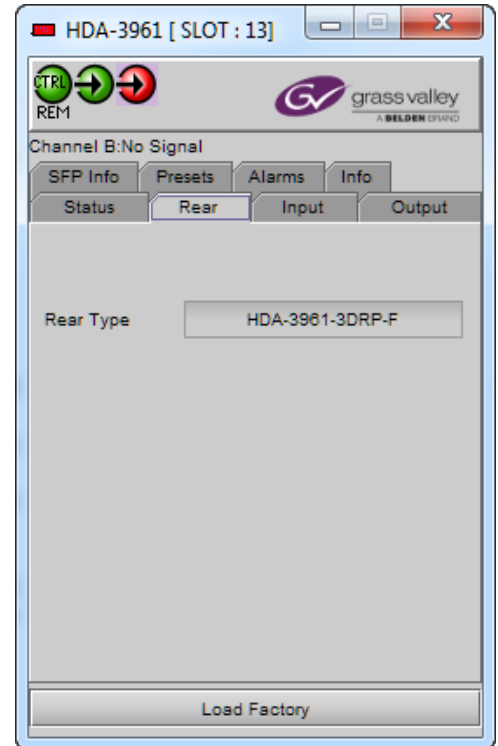


Figure 8 Rear Panel

5.5 The Status panel

This panel shows the status of the various inputs to this HDA-3961.

Electrical inputs (A and B)

Data rate (270 Mbps / 1.5 Gbps / 3 Gbps/12 Gbps) – the detected input data rate is indicated by a green status icon

No Lock / No Signal – either of these conditions is indicated by a red status icon

Fiber

Module type: the type of fiber module installed in the rear panel will be shown in the text box:

- None
- Single RX
- Single TX
- Dual RX
- Dual TX
- Bidirectional

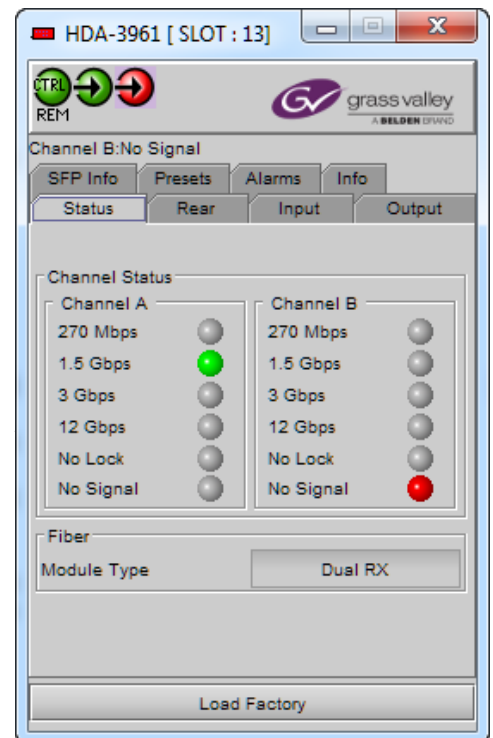


Figure 9 Status panel

5.6 The SFP Info panel

This panel shows information about the currently-installed SFP optical module. See Rear Connector Panels on page 8.

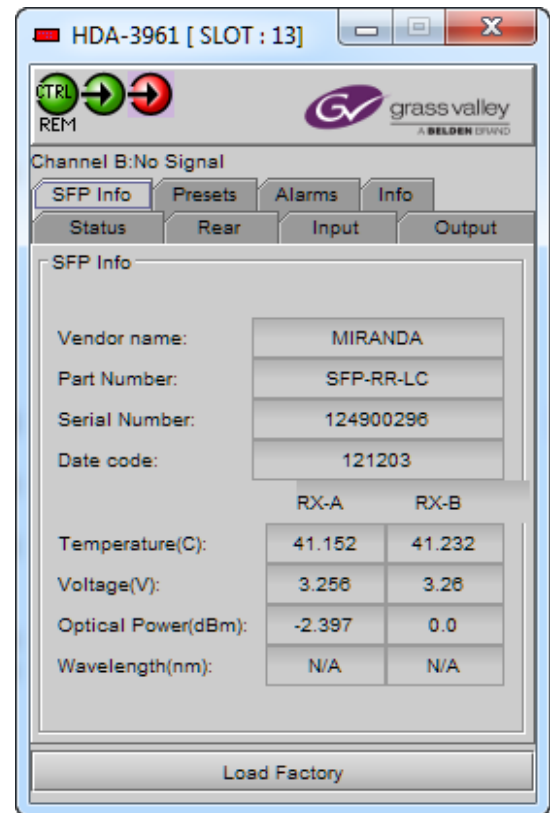


Figure 10 SFP Info panel

5.7 The Alarms panel

This panel allows the alarm reporting of the HDA-3961 to be configured.

Click on the Alarm Config button to open the Alarm Configuration window.

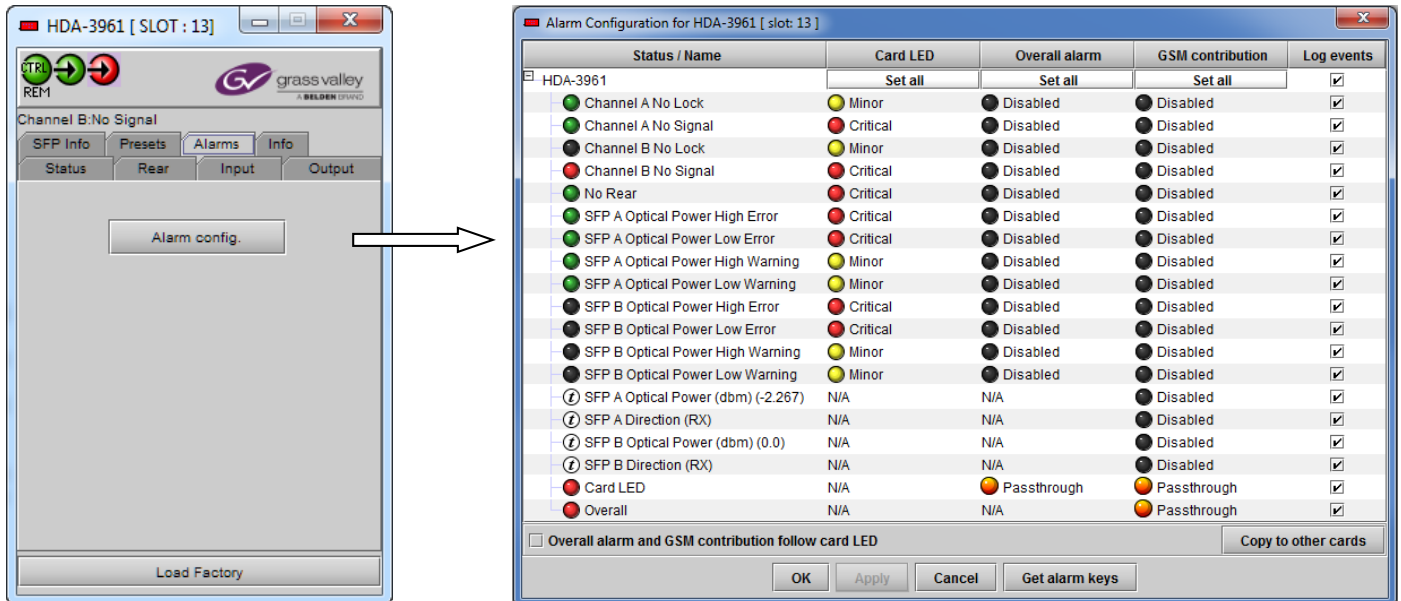


Figure 11 Alarms panel and Alarm Configuration window

The Alarm Configuration window is organized in columns

Status/Name

This contains an expandable tree listing all the alarms reported by this HDA-3961 card.

- Each alarm name includes an icon that shows its current status

The **Card LED**, **Overall alarm** and **GSM contribution** columns contain pulldown lists that allow the level of contribution of each individual alarm to the alarm named in the column heading to be set.

- If there is no arrowhead in the box, there is no pulldown and the alarm is not user-configurable

Card LED

This column allows configuration of the contribution of each individual alarm to the status reported by the Status LED on the front edge of the HDA-3961 card, visible through the front door of the Densité frame.

Overall Alarm

This column allows configuration of the contribution of each individual alarm to the Overall Alarm associated with this card. The Overall Alarm is shown in the upper left corner of the iControl panel, and also appears at the bottom of the Status/Name column.

GSM Contribution






This column allows configuration of the contribution of each individual alarm to the GSM Alarm Status associated with this card. GSM is a dynamic register of all iControl system alarms, and is also an alarm provider for external applications. The possible values for this contribution are related to the Overall alarm contribution:

- If the Overall alarm contribution is selected as Disabled, the GSM alarm contribution can be set to any available value

- If the Overall alarm contribution is selected as any level other than disabled, the GSM contribution is forced to follow the Overall Alarm.

Levels associated with these alarms:

The pulldown lists may contain some or all of the following options:

-  Disabled The alarm makes no contribution (black icon)
-  Minor The alarm is of minor importance (yellow icon)
-  Major The alarm is of major importance (orange icon)
-  Critical The alarm is of critical importance (red icon)
-  Passthrough The alarm exists but has no effect (used for text and composite alarms)

Shortcut: if you click on one of the “Set All” boxes in the Card LED, Overall Alarm or GSM Contribution columns, you will open a pulldown that lets you assign a level to all alarms in that section of the column simultaneously.

Log Events

iControl maintains a log of alarm events associated with the card. The log is useful for troubleshooting and identifying event sequences. Click in the checkbox to enable logging of alarm events for each individual alarm.

At the bottom of the window are several other controls.

Copy to other cards

Click this button to open a panel that allows the alarm configuration set for this card to be copied into another HDA-3961 card.

- Select one or more destination cards from the list in the window by setting in the checkboxes, or set all of them by setting in the *All* checkbox at the top of the column

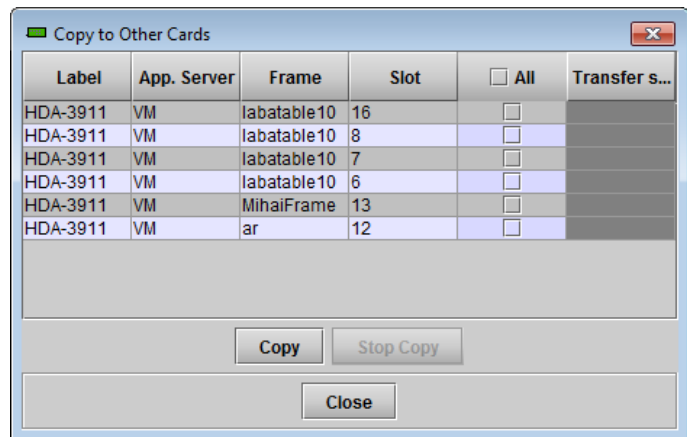


Figure 12 Copy to Other Cards

Get alarm keys

Click this button to open a save dialog where you can save a file containing a list of all alarms on this card and their current values, along with an Alarm Key for each. The alarm keys are useful for system integration and troubleshooting.

- The file is saved in .csv format

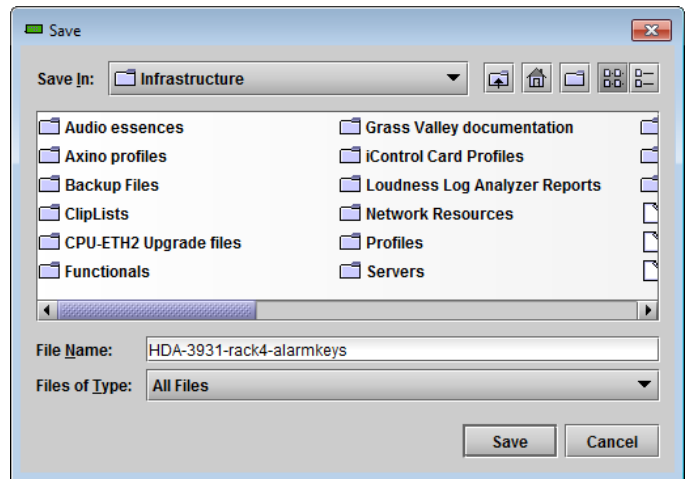


Figure 13 Save dialog for Get Alarm Keys

OK, Apply, Cancel

- **OK** accepts the settings and closes the window once the card confirms that there are no errors.
- **Apply** accepts the settings, but leaves the window open
- **Cancel** closes the window without applying any changes, and leaves the previous settings intact.

5.8 The Info panel

When the HDA-3961 is included in an iControl environment, certain information about the card should be available to the iControl system. The user can enter labels and comments that will make this card easy to identify in a complex setup. This information is entered into data boxes in the Info control panel.

Label: type the label that is shown for this HDA-3961 when it appears in iControl applications

Short Label type the short-form label that iControl uses in some cases (8 characters)

Source ID type a descriptive name for this HDA-3961

Comments: type any desired text

The remaining data boxes show manufacturing information about this card.

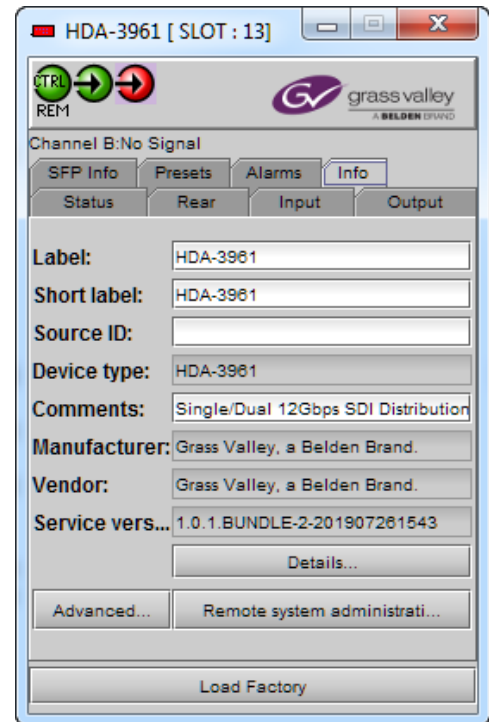


Figure 14 Info panel

Three buttons in the panel give access to other information.

- **Details...:** Reports the Firmware version, service version, and panel version for this card

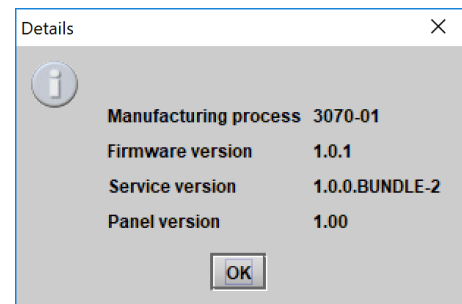


Figure 15 Details window

- **Advanced...:** Shows the Long ID, which is the address of this HDA-3961 in the iControl network.

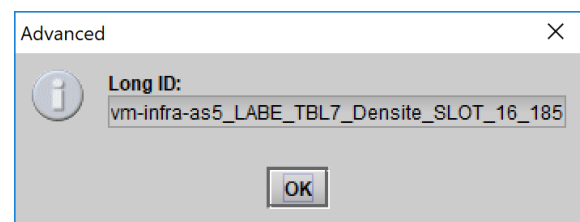


Figure 16 Advanced window

- **Remote System Administration:** opens the Joining Locators data box, which lists remote lookup services to which this HDA-3961 is registered.

Add: Force the iControl service for this HDA-3961 to register itself on a user-specified Jini lookup service, using the following syntax in the Input data box:

jini://<ip_address>

where <ip_address> is the IP address of the server running the lookup service

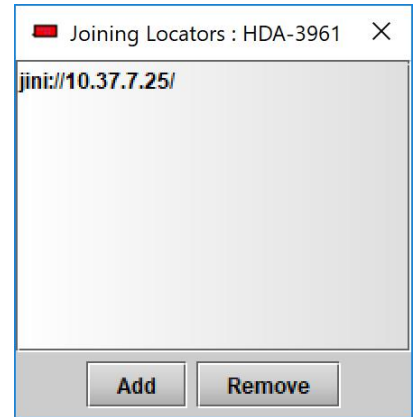
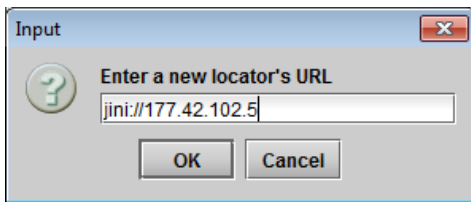
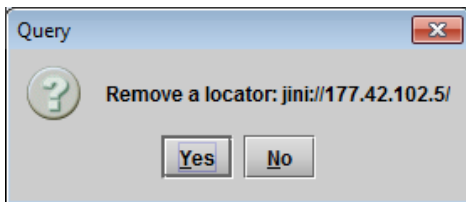


Figure 17 Joining Locators window

Remove: select one of the services listed in the Joining Locators window by clicking on it, and click *Remove* to delete it from the window. You will be asked to confirm the removal in a Query box.



5.9 The Presets panel

User Presets

The HDA-3961 has memory registers which can hold up to 5 user-defined parameter settings.

Select any one of the five presets using the pull-down list. The name of the currently-selected User Preset is shown on the name bar.

Click **Load** to load the contents of the selected User Preset into the HDA-3961. All parameter settings and values will be replaced by the contents of the selected User Preset.

Click **Save** to store the current parameter settings and values from the HDA-3961 into the selected User Preset. The existing contents of the preset will be overwritten without asking for confirmation.

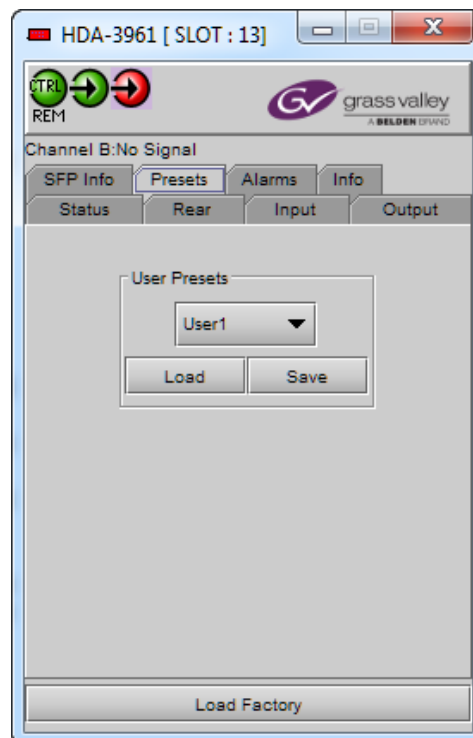


Figure 18 Presets panel

6 Specifications

Electrical Inputs and Outputs

Physical:

- 8 BNC connectors: 2 In, 6 Out (HDA-3961- 3SRP-2IN)
- 12 HD-BNC connectors: 2 In, 10 Out (HDA- 3961-3SRP-HF)
- 8 BNC connectors: 1 In, 7 Out (HDA-3961- 3SRP)

SDI standards:

- SMPTE ST 259-C (270 Mb/s)
- SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)
- SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)
- SMPTE ST 2082-1:2015 (11.88Gbs et 11.88/1001 Gbs)

Cable length (Belden 1694A cable):

- 365m (1312 ft.) at 270 Mb/s
- 125m (656 ft.) at 1.485 Gb/s
- 110m (492 ft.) at 2.970 Gb/s

Cable length (Belden 4794R cable):

- 60m (197 ft.) at 11.88 Gb/s

Return loss:

- >15 dB up to 1.5 GHz
- >10 dB from 1.5 GHz to 3 GHz
- >TBD at 12 GHz

Jitter (wideband): <0.2 UI p-p

Rise/fall time:

- <135 ps for all formats (12G, 3G, HD, SD)

Processing Performance

Processing delay: 7 ns typical

Electrical

Power: less than 12.5W max

7 Contact Us

Grass Valley Technical Support

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the *Contact Us* section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

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3499 Douglas-B.-Floreni

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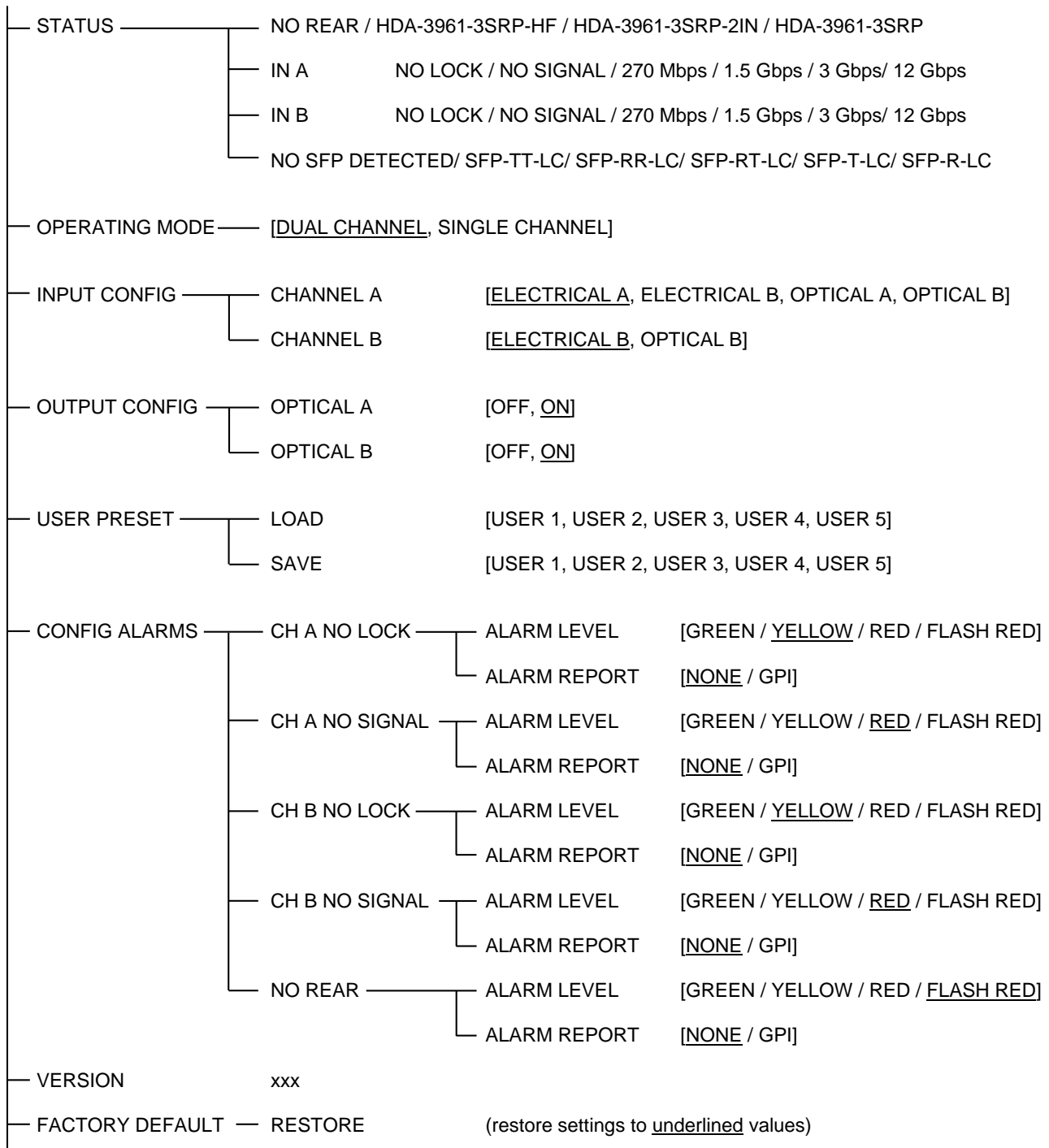
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Telephone: +1 514 333 1772

Fax: +1 514 333 9828

www.grassvalley.com

ANNEX 1 – HDA-3961 Local User Interface



ANNEX 2 – Installing the Optical Interface

Installing and removing the Fiber I/O interface cartridge requires special care. This annex describes the process.

Some rear panels used with the HDA-3961 incorporate a fiber optic interface. The interface consists of two parts:

- A socket on the rear panel into which an interface module is plugged
- An SFP (Small Form-factor Pluggable) module into which the optical fibers are plugged, and which incorporates the optical/electrical interface

Cautions and Warnings



SFP Transmitter modules contain a class 1 laser, which emits invisible radiation whenever the module is powered up. Because the SFP is hot-swappable, the module may be powered up as soon as it is installed.

DO NOT LOOK INTO AN OPERATING SFP MODULE'S CONNECTORS, AS EYE DAMAGE MAY RESULT.



The SFP module is sensitive to electrostatic discharge (ESD). It is recommended that you use an ESD-preventive wrist strap grounded to the Densité 3 chassis while handling the SFP module.



SFP modules are subject to wear, and their useful lifetime is reduced each time they are inserted or removed. Do not remove them more often than is absolutely necessary.



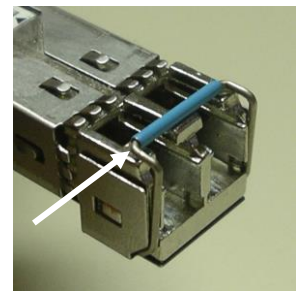
Never remove or install an SFP module with the fiber optic cables connected. Damage to the cables could result.



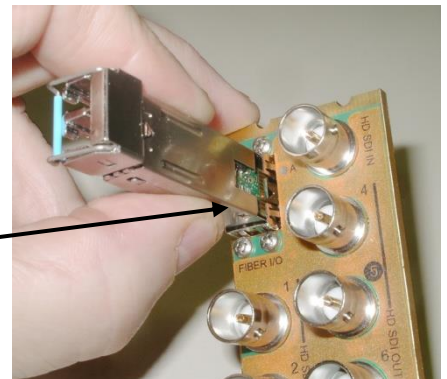
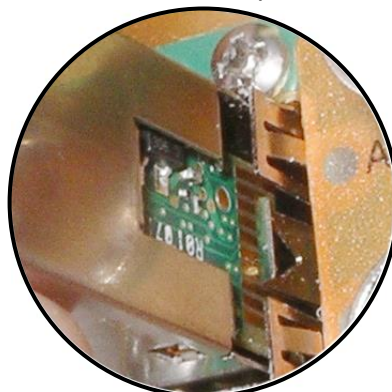
The presence of dust and debris can seriously degrade the performance of an optical interface. It is recommended that you insert a dust plug into the SFP module whenever a fiber optic cable is not connected.

Installing an SFP module

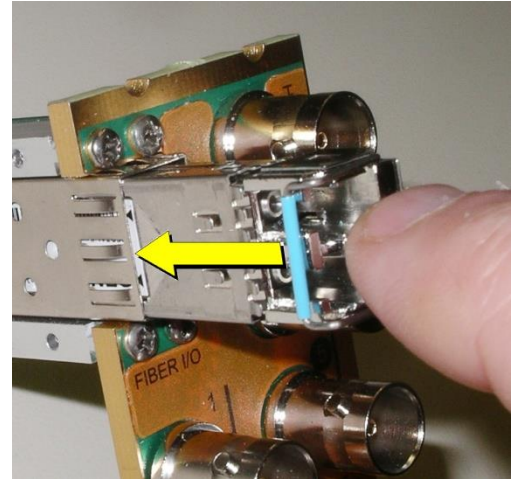
1. Make sure that the latch is in the closed position



2. Position the SFP module so that the recessed slot is lined up with the tab side of the socket.



3. Slide the module straight into the socket, and push gently until it clicks into position.



Connecting the fiber optic cables

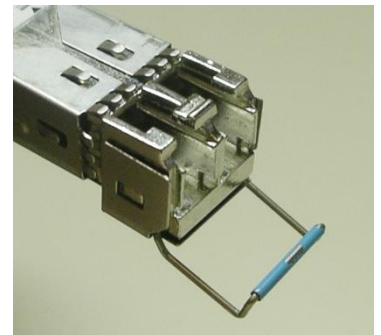
1. Remove the dust plug from the SFP module if present
2. Verify that the exposed end of the optical fiber in the LC connector is clean
 - Carefully remove any debris if necessary.
3. Plug the LC-terminated fiber optic cable into the SFP module

Removing the fiber optic cables

1. Grasp the LC fiber optic connector that is plugged into the SFP module, and pull it straight out to disengage the optical fiber from the SFP.
 - Never pull the fiber optic cable itself, as catastrophic damage may occur.
2. Insert a dust plug into the SFP module.

Removing the SFP module

1. Move the latch to the open position.



GUIDE TO INSTALLATION AND OPERATION

2. Grasp the SFP module between your thumb and forefinger, and pull it straight out of the slot.
 - Do NOT pull on the latch to remove the module, as it is easily damaged
 - You may find that you need to wiggle the module, or perhaps push it into the slot a bit, before it will release and slide out.

3. Insert a dust plug into the SFP module.

