

# 2040RDA

WIDEBAND RECLOCKING DA MODULE

Instruction Manual

SOFTWARE VERSION 1.0

071802602  
MAY 2007



Affiliate with the N.V. KEMA in The Netherlands

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United States

15655 SW Greystone Ct.  
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United States

10 Presidential Way  
3<sup>rd</sup> Floor, Suite 300  
Woburn, MA 01801  
United States

Nederland B.V.  
4800 RP BREDA  
The Netherlands

Weierstadt, Germany  
Brunnenweg 9  
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Germany

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France

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95801 Cergy Pontoise  
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# 2040RDA

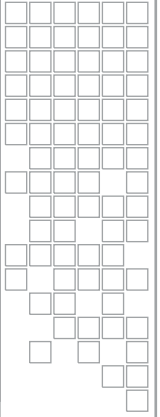
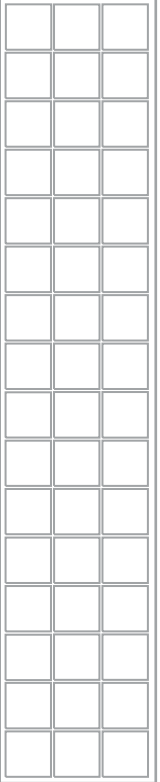
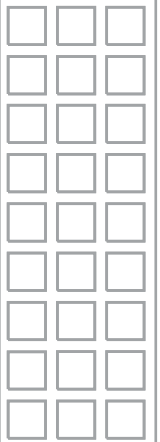
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# Contacting Grass Valley

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

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# *Preface*

## **About This Manual**

This manual describes the features of a specific 2000 Series module in the Kameleon Media Processing System. As part of this module family, it is subject to Safety and Regulatory Compliance described in the 2000 Series frame and power supply documentation (see the *2000 Series Frames Instruction Manual*).





# *2040RDA Wideband Reclocking Distribution Amplifier*

## **Introduction**

The 2040RDA Wideband Reclocking Distribution Amplifier provides high HDTV distribution density with eight non-inverting outputs. It has auto-detect and reclocking capability at all SD (standard definition) and HD (high definition) data rates. The reclocking circuit can be bypassed to distribute compressed signals down to 4 Mbps. Like any Kameleon 2000 Series analog or SDI (serial digital interface) distribution amplifier, the 2040RDA can be removed from the front of the Kameleon frame without powering down or removing cables from the rear of the frame (hot swappable).

The 2040RDA features include:

- Eight outputs,
- Module is hot-swappable,
- Automatic data rate detection,
- Reclocks at 143 Mbps, 177 Mbps, 270 Mbps, 360 Mbps, or 1.5 Gbps,
- Distributes transport streams in bypass mode,
- Auto-equalizing up to 100 meters for reclocked HD video or a bypassed carrier and 300 meters for reclocked SD video, and
- Supports networked control and monitoring.

# Installation

Installation of the 2040RDA module is a process of:

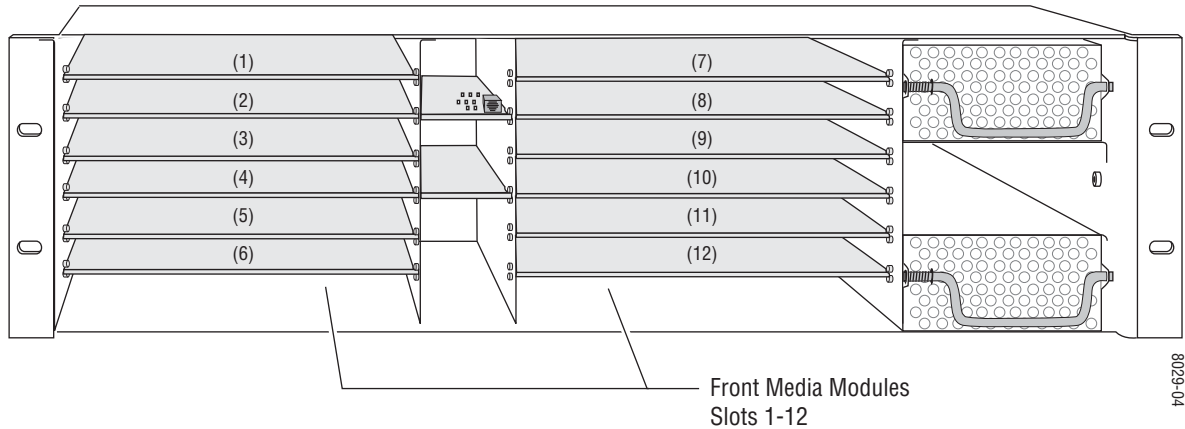
- Placing the Coax PRM (passive rear module) in a frame slot,
- Placing the front media module in the corresponding front slot, and
- Cabling signal ports.

The 2040RDA module can be plugged in and removed from a Kameleon 2000 Series frame with power on. When power is applied to the module, LED indicators reflect the initialization process (see [Power Up on page 13](#)).

## Module Placement in the 2000 Frame

There are twelve media module slot locations in the 3 RU frame to accommodate either analog or digital modules. The 2040RDA consists of a two module set with a 2040RDA front media module and a Coax PRM passive rear connector module that can be plugged into any of the 12 frame slots. Each 2040RDA media module plugs into the front of the 2000 Series frame mid-plane as illustrated in [Figure 1](#). The Passive Rear module plugs into the corresponding rear media slot to provide the input and output interface connectors.

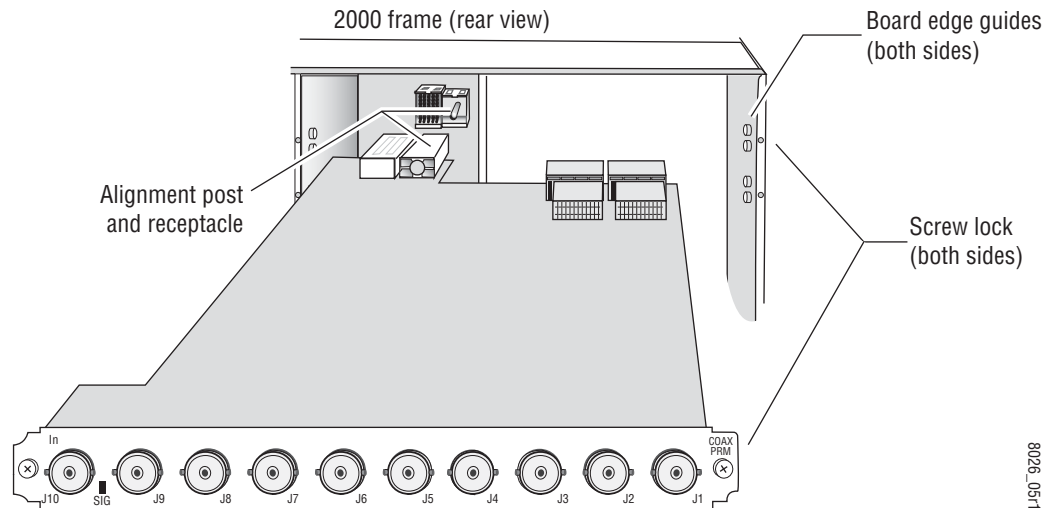
Figure 1. 2000 Series Frame, Front Slots



## Install the Passive Rear Module

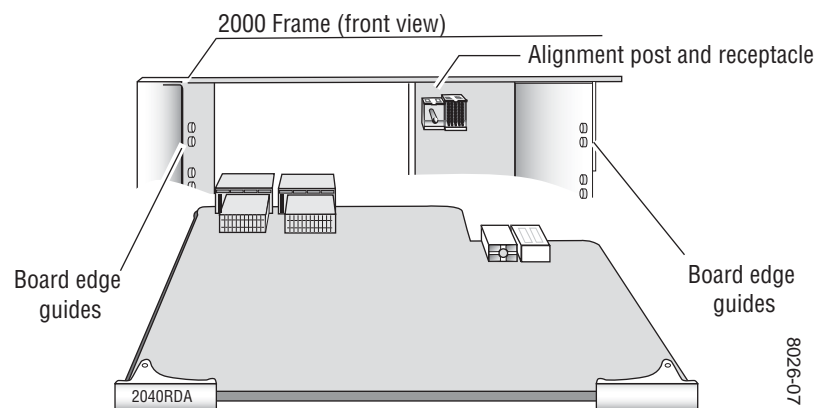
1. Install the Passive Rear module first by inserting it into any rear slot (1 – 12) of the frame as illustrated in [Figure 2](#).

Figure 2. Installing Passive Rear Module



2. Verify that the module connector seats properly against the midplane.
3. Secure the module to the rear of the frame with the two screw locks on either side of the back panel using a crossblade screwdriver.

Figure 3. Installing Front Media Module



4. With the component side up, insert the front media module in the corresponding front slot (see [Figure 3](#)).
5. Verify that the module connector seats properly against the midplane and rear module connector.
6. Press firmly on both ejector tabs to seat the module.

## Cabling

All cabling to the 2040RDA module is done on the corresponding Passive Rear module at the back of the 2000 frame. Refer to [Figure 4](#) for a detailed illustration of the rear connections referenced in the steps below.

### Input

Connect an HD or SD video input to BNC J10. The 2040RDA will accept any of the serial digital component video signals conforming to the following SMPTE formats:

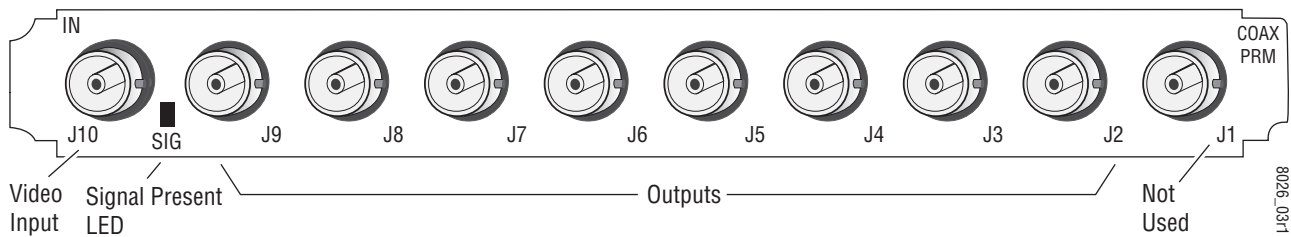
- SMPTE 292M
- 259M (143 Mbps, 177 Mbps, 270 Mbps, 360 Mbps)
- EBU 1697
- 4 Mbps to 1.5 Gbps (tested with PN20 pseudonoise sequence ratio, maximum 19:1)
- SMPTE 310M
- DVB-ASI

### Outputs

The input signal is distributed to eight output ports. Connect video output devices to outputs J2 through J9 provided on the Coax Passive Rear module.

**Note** BNC J1 is not used on this module. On earlier versions of the 2040RDA labeled with part number 671-4962-00, BNC J1 provided an output.

Figure 4. Coax Passive Rear Module Input/Output Connectors



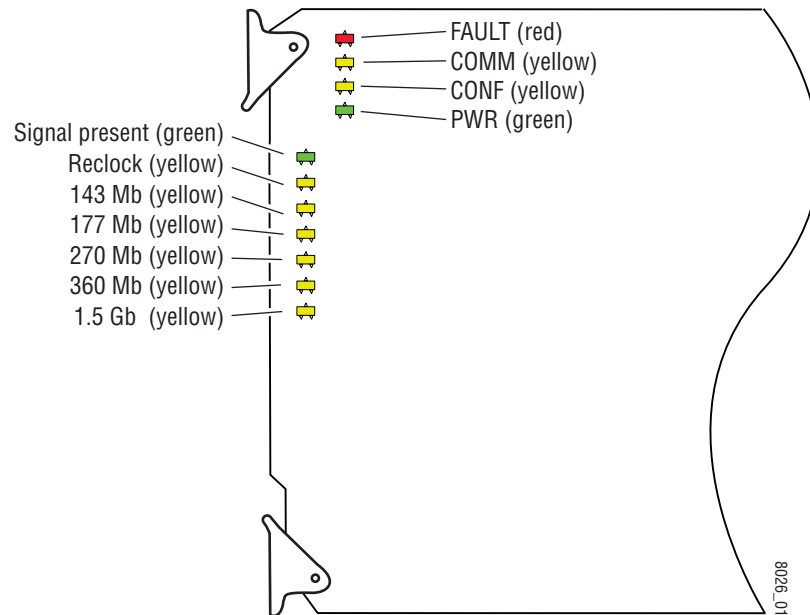
# Power Up

The front LED indicators are illustrated in [Figure 5](#). Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

## Operation Indicator LEDs

With factory default configuration and a valid input signal connected, the green PWR LED, the green Signal present LED and the detected signal data rate LED should be on. Refer to [Table 1 on page 13](#) to see a complete list of possible operating conditions and the resulting indicator status.

Figure 5. LEDs and Configuration Switches



A red FAULT LED indicates an error situation and, when noted with the other indicator LEDs, can indicate a specific problem area. [Table 1](#) describes signal output and LED indications for the various input/reference combinations and user settings.

Table 1. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
<b>FAULT (red)</b>	Off	Normal operation
	On continuously	Module has detected internal fault
	Long flash	Configuration problems, check inputs and settings
<b>COMM (yellow)</b>	Off	No activity on frame communication bus
	Long flash	Location Command received by the module from a remote control system
	Short flash	Activity present on the frame communication bus

Table 1. Indicator LEDs and Conditions Indicated - (continued)

LED	Indication	Condition
<b>CONF (yellow)</b>	Off	Module is in normal operating mode
	On continuously	Module is initializing, changing operating modes or updating firmware
<b>PWR (green)</b>	Off	No power to module or module's DC/DC converter failed
	On continuously	Normal operation, module is powered
<b>Signal Present (green)</b>	On	Input carrier signal detected
<b>Bypass (yellow)</b>	Off	Reclocking enabled and auto-rate detection mode is active
	On	Bypass mode, input signal will not be reclocked
<b>143 Mb (yellow)</b>	On	Input signal is reclocked at 143 Mbps rate
<b>177 Mb (yellow)</b>	On	Input signal is reclocked at 177 Mbps rate
<b>270 Mb (yellow)</b>	On	Input signal is reclocked at 270 Mbps rate
<b>360 Mb (yellow)</b>	On	Input signal is reclocked at 360 Mbps rate
<b>1.5 Gb (yellow)</b>	On	Input signal is reclocked at 1.5 Gbps rate

Table 2 provides the various output conditions possible for a given input and module setting.

Table 2. Possible Output Conditions

Input	Setting	Output Condition
Standard Definition SDI video	Auto or Bypass	Standard Definition SDI video
High Definition SDI video	Auto or Bypass	High Definition SDI video
Other carrier	Auto or Bypass	Other carrier
No signal or over EQ range	All modes	Muted

## Configuration

The 2040RDA can be configured locally using on-board jumpers or remotely using the 2000NET network interface.

The following parameter options can be set on the 2040RDA module:

- Remote control and monitoring lockout,
- Automatic reclocking mode,
- Bypass mode (disabled reclocking), and
- Manual input signal selection mode (remote only).

## Local On-board Module Configuration

The 2040RDA module can be configured locally using the jumpers shown in Figure 6. The CONF LED indicates status of the configuration process.

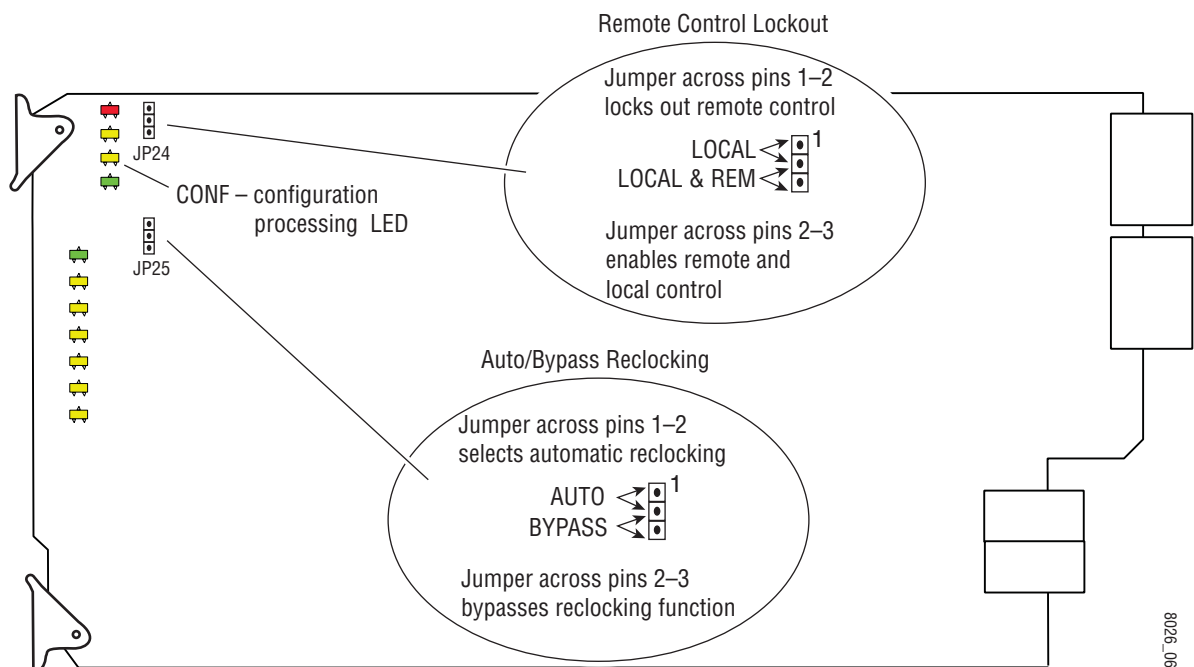
These components perform the following:

- Jumper J24 – sets control mode for Local only or Remote and Local.
- Jumper J25 – enables or disables the reclocking function.
- CONF (configuring) LED – when on, indicates the module is initializing or processing configuration information.

### Remote Control Jumper

When the jumper is placed across pins 1 and 2 of jumper block J24, module settings are changed from the on-board jumpers only. To have both Local and Remote access, set the jumper across pins 2 and 3.

Figure 6. Module Configuration Jumpers



### Auto/Bypass Jumper

When the jumper is placed across pins 1 and 2 of jumper block J25, The detected video signal will be reclocked at the appropriate rate. With the jumper across pins 2 and 3 all reclocking is bypassed.

## Remote Configuration and Monitoring

2040RDA configuration and monitoring can be performed remotely using the 2000NET interface (see [Figure 7](#)). This section describes the GUI access to the module configuration functions. Refer to the *2000NET Network Interface Module Instruction Manual* for information on setting up and operating the 2000 frame network.

For remote access, make sure jumper block J24 on the module is set for both Local and Remote access ([Figure 6 on page 15](#)).

**Note** The physical appearance of the menu displays shown in this manual represent the use of a particular platform, browser and version of 2000NET module software. They are provided for reference only. Displays will differ depending on the type of platform and browser you are using and the version of the 2000NET software installed in your system.

Figure 7. 2000NET GUI

The Links section lists the frame and its current modules. The selected link's Status page is first displayed and the sub-list of links for the selection is opened. The sub-list allows you to select a particular information page for the selected device.

Content display section displays the information page for the selected frame or module (frame slot icons are also active links).

The screenshot displays the 2000NET GUI interface. On the left, a 'Frame' menu lists various slots: 1 Media Slot 1, 2 Media Slot 1, 3 Media Slot 1, 4 Media Slot 1, 5 Media Slot 1, 6 Media Slot 1, 7 Media Slot 1, 8 Media Slot 1, 9 Media Slot 1, 10 Media Slot 1, 11 Media Slot 1, 12 Media Slot 1, 13 2000NET, 15 Media Slot 1, 19 Power Sled Slot 1, and 21 Power Sled Slot 3. The main content area is titled 'Frame Status' and shows 'Model : 2000T3N', 'Description : Module Frame', 'Frame Location : Studio B', 'Temperature State : PASS', and 'Fan Status Summary : PASS'. Below this is a 'Front View' table:

Media Module	Net Card	Empty	Empty
Empty		Media Module	Empty
Media Module	Empty	Empty	
Media Module		Empty	
Media Module		Media Module	Power Sled
Media Module		Empty	

At the bottom, the 'Properties' section shows 'Vendor : Grass Valley Group', 'Net Card Software Version : 2.0.0', and 'Media Slots : 24'.

0612-13

The 2000 modules can be addressed by clicking on a specific module icon in the frame status display or on a module name or slot number in the link list on the left.



## Module Configuration Displays

The 2000 GUI provides the following links and displays for the 2040RDA module (see [Figure 8](#)):

- Status and Slot Configuration displays showing module status and slot configuration information (location and user assigned names), and
- Standard Selection and Recall displays.

The Module Status and Slot Configuration displays are the same for all remote controllable 2000 modules. Refer to the 2000NET manual for more information on these displays. Some functions listed may not be supported by a particular module. These will be indicated as not supported.

Figure 8. 2040RDA Display Links



## Standard Selection and Recall Displays

This section discusses the Standard Selection and Recall Factory Defaults Displays available to set and monitor the 2040RDA module parameters remotely.

## Software Updating

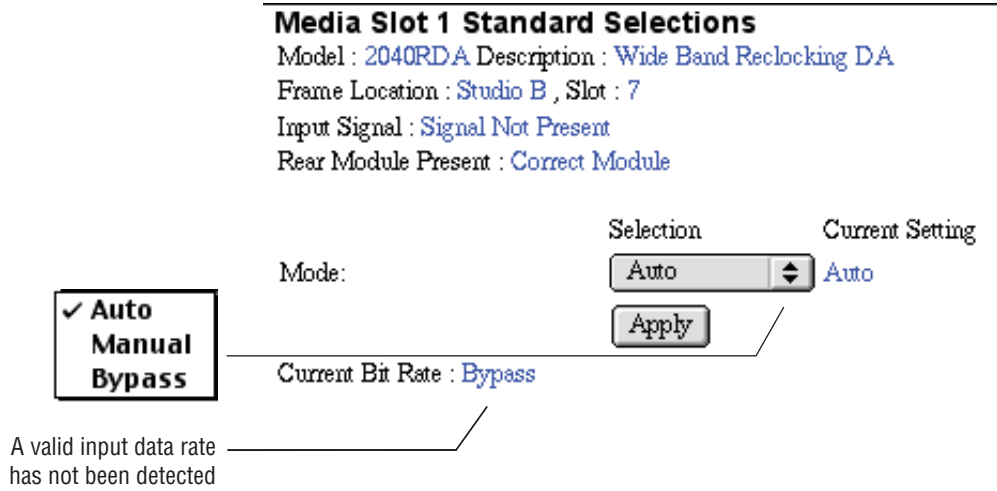
Remote software updating is not possible on the 2040RDA module. Software updating requires a cable assembly and kit available from Grass Valley Customer Service (8900-FLOAD-CBL). Refer to the 2000NET manual and the Thomson Grass Valley web site at <http://www.thomsongrassvalley.com> for complete details.

- [Status](#)
- [Slot Config](#)
- [Standard Selections](#)
- [Recall Factory Defaults](#)

### Standard Selection

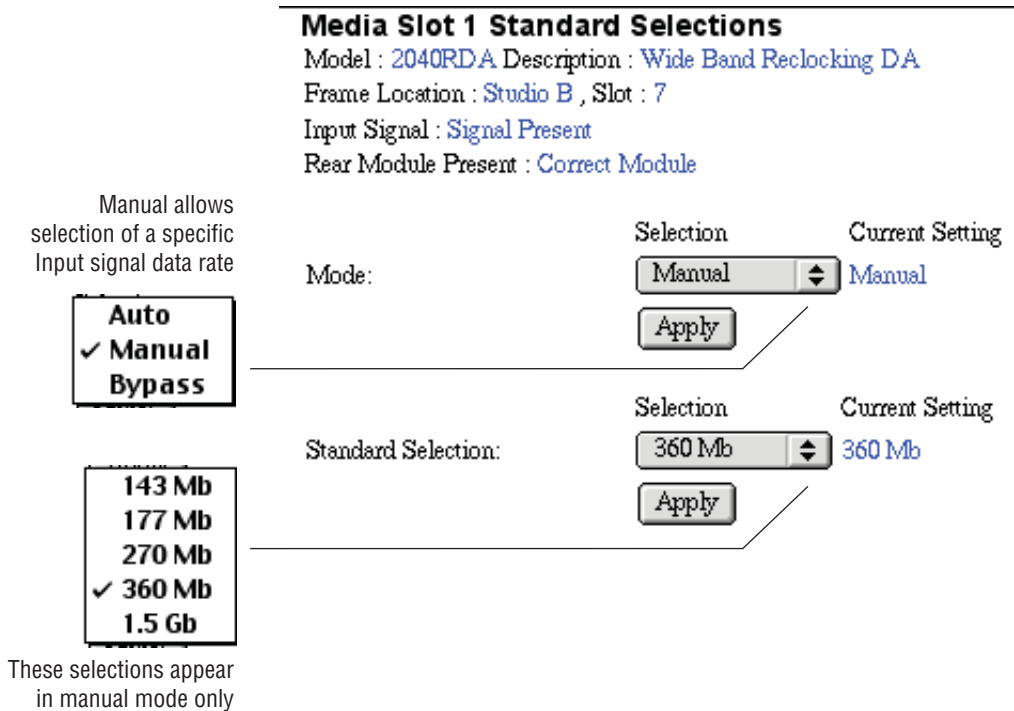
The Standard Selection display is shown in Auto mode in [Figure 9](#). In this mode, if the module does not detect a valid data rate, the **Current Bit Rate** will display **Bypass**.

Figure 9. Standard Selection Display in Auto Mode



To select one input signal standard, pull down the **Selection** window and choose **Manual**. After selecting manual mode, click the **Apply** button to activate it. In manual mode (see [Figure 10](#)), a pull-down window is available to choose one of the various input standard data rates.

Figure 10. Manual Standard Selection Display



- Use [● Status](#)  
This [● Slot Config](#)  
Link [● Standard Selections](#)  
[● Recall Factory Defaults](#)

## Recall Factory Default Settings

To recall the original factory default setting (Auto selection mode), click on the **Recall Factory Default** button ([Figure 11](#)).

Figure 11. Recall Factory Defaults Display

---

### Media Slot 1 Recall Factory Defaults

Model : [2040RDA](#) Description : [Wide Band Reclocking DA](#)

Frame Location : [Studio B](#) , Slot : [7](#)

Recall Fact. Default

# Specifications

Table 3. 2040RDA Specifications

Parameter	Value
<b>Serial Digital Component Input</b>	
Number and type of inputs	One 75 ohm BNC
Input signal formats (Reclocked or Bypass)	Serial digital component video conforming to the following formats: <ul style="list-style-type: none"> <li>• SMPTE 292M</li> <li>• 259M (143 Mbps, 177 Mbps, 270 Mbps, 360 Mbps)</li> </ul>
Input signal formats (Bypass only)	<ul style="list-style-type: none"> <li>• 4 Mbps to 1.5 Gbps with PN20 pseudonoise sequence, max ratio 19:1</li> <li>• SMPTE 310M</li> <li>• DVB-ASI</li> </ul>
Signal level	SDI 800 mV $\pm$ 10% maximum
Return loss	>15 dB 0.004 to 750 MHz, >10 dB to 1.5 GHz
Equalization	Auto equalization: <ul style="list-style-type: none"> <li>• HD – up to 100 meters</li> <li>• SD – up to 300 meters (with Belden 1694A cable or equivalent)</li> <li>• BYPASS mode – up to 100 meters</li> </ul>
<b>Serial Digital Component Outputs</b>	
Number and type of outputs	Eight 75 ohm BNCs
Output signal formats	Serial digital component video conforming to the following formats: <ul style="list-style-type: none"> <li>• SMPTE 292M</li> <li>• 259M (143 Mbps, 177 Mbps, 270 Mbps, 360 Mbps)</li> <li>• 4 Mbps to 1.5 Gbps with PN20 pseudonoise sequence, max ratio 19:1</li> <li>• SMPTE 310M</li> <li>• DVB-ASI</li> </ul>
Output level	SDI 800 mV $\pm$ 10%
Return loss	>15 dB 0.004 to 750 MHz, >10 dB to 1.5 GHz
Error checking	Transparent to embedded EDH
Electrical length	23 ns for 143 Mbps $\pm$ 1 ns 21 ns for 177 Mbps $\pm$ 1 ns 18 ns for 270 Mbps $\pm$ 1 ns 14 ns for 360 Mbps $\pm$ 1 ns 16 ns for 1.5 Gbps $\pm$ 1 ns 10 ns for bypass $\pm$ 1 ns
Rise and fall time	160-260 ps between 20-80%
Output polarity	Non-inverted
Jitter	<0.2 UI
<b>Power</b>	
Input power maximum	<7 Watts
<b>Environmental</b>	
Operating temperature range	0 to 45 ° C
Non-operating Temperature	-10 to 70 ° C
Operating Humidity Range	0 to 90% non condensing

# Service

The 2040RDA modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field unless as directed by Customer Service.

## Power-up Diagnostics Failure

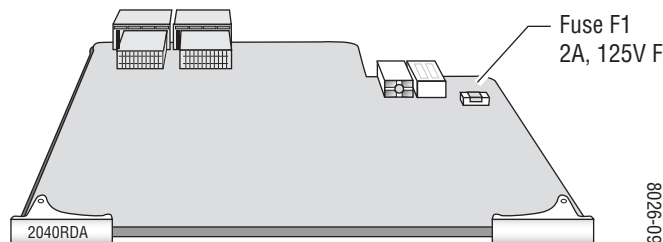
If the module has not passed self-diagnostics, do not attempt to troubleshoot. Return the unit to Thomson Grass Valley (see [Module Repair](#)).

## Troubleshooting

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

- Check frame and module power.
- If module power is not present, check fuse F1 (see [Figure 12](#)).
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.

Figure 12. 2040RDA Fuse Location



## Module Repair

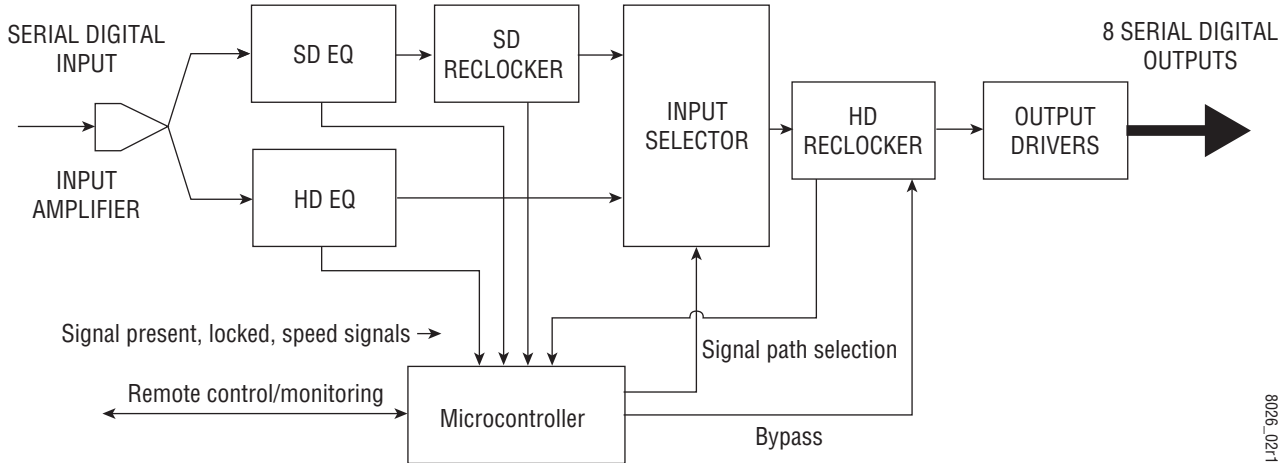
If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Thomson Grass Valley repair depot. Call your Thomson Grass Valley representative for depot location.

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

## Functional Description

A block diagram of the 2040RDA is shown in [Figure 13](#).

Figure 13. 2040RDA Block Diagram



### Input and Output Processing

The input section has a parallel input path from the passive rear input module for SD (standard definition) and HD (high definition) signal equalizing and reclocking. The input section can also bypass the signal through the HD EQ and HD Reclocker directly to the output amplifiers. The output amplifiers drive eight equal-phase outputs on the passive rear module (BNCs J2 – J9).

### Microprocessor and Input Selector

The primary purpose of the microprocessor is to provide remote control and monitoring capability for the 2040RDA. It receives signal present, signal lock, and speed detection signals from the equalizer and reclocker circuits. Using this information, local jumper settings, and remote control commands, the microprocessor selects the internal signal path and gives feedback through the LEDs and remote control bus.

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