

# Model 3231 Industrial Ethernet Extender with LCD Interface

## User Manual



### Important

This is a Class A device and is intended for use in a light industrial environment. It is not intended nor approved for use in an industrial or residential environment.

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This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall Patton Electronics be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. Patton Electronics specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

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# About this guide

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This guide describes installing and operating the Patton Electronics Model 3231 Industrial Ethernet Extender with LCD interface.

## Audience

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This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

## Structure

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This guide contains the following chapters and appendices:

- [Chapter 1](#) on page 13 provides information about 3231 features and capabilities.
- [Chapter 2](#) on page 18 contains an overview describing 3231 operation and configuration.
- [Chapter 3](#) on page 28 provides describes how to configure and monitor G.SHDSL.
- [Chapter 4](#) on page 34 provides describes how to configure settings using the web interface.
- [Chapter 5](#) on page 39 describes how to save the configuration, reset the 3231 to the factory default condition, and upgrade the system software.
- [Chapter 6](#) on page 43 contains information on contacting Patton technical support for assistance.
- [Appendix A](#) on page 46 contains compliance information for the 3231.
- [Appendix B](#) on page 49 contains specifications for the 3231.
- [Appendix C](#) on page 53 describes the DSL port pin-out.
- [Appendix D](#) on page 55 describes the Ethernet port pin-out.
- [Appendix E](#) on page 57 describes the Console port pin-out.

For best results, read the contents of this guide *before* you install the 3231.

## Precautions

Notes, cautions, and warnings, which have the following meanings, are used throughout this guide to help you become aware of potential problems. **Warnings** are intended to prevent safety hazards that could result in personal injury. **Cautions** are intended to prevent situations that could result in property damage or impaired functioning.

**Note** A note presents additional information or interesting sidelights.



The alert symbol and IMPORTANT heading calls attention to important information.



The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.



The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.



**The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.**



**The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.**

## Safety when working with electricity



- This device contains no user serviceable parts. The equipment shall be returned to Patton Electronics for repairs, or repaired by qualified service personnel.
- **AC Powered Units:** The external power adaptor shall be a listed Limited Power Source. Ensure that the power cable used meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker.
- **DC Powered Units:** The interconnecting cables shall be rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.
- Hazardous network voltages are present in WAN ports, regardless of whether power to the unit is ON or OFF. To avoid electric shock, use caution when near WAN ports. When detaching the cables, detach the end away from the device first.
- Do not work on the system or connect or disconnect cables during periods of lightning activity.



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.

## General observations

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids

## Typographical conventions used in this document


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This section describes the typographical conventions and terms used in this guide.

### General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the <b>Go to Previous View</b> button  in the Adobe® Acrobat® Reader toolbar to return to your starting point.
<b>Futura bold type</b>	Commands and keywords are in <b>boldface</b> font.
<b><i>Futura bold-italic type</i></b>	Parts of commands, which are related to elements already named by the user, are in <b>boldface italic</b> font.
<i>Italicized Futura type</i>	Variables for which you supply values are in <i>italic</i> font
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.

# Chapter 1 **General information**

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## Model 3231 Overview

The Patton Electronics Model 3231 Industrial Ethernet Extender with LCD provides high speed 2-wire connectivity to ISPs, PTTs, and enterprise environments using Symmetrical High-data-rate Digital Subscriber Line (G.SHDSL) technology.

The Model 3231 provides a 10/100BaseT Ethernet interface on a shielded RJ-45 jack, the DSL on an RJ-11 jack, and the RS-232 console port on an RJ-45 jack.

As a symmetric, full-duplex NTU, the DSL port offers equal data rates in both directions over a single twisted pair using TC-PAM modulation. Line connection is made through the RJ-11 jack. Standard versions of Model 3231 are powered by a UI (universal 100–240 VAC) supply.



Figure 1. Model 3231

## Features

- LCD panel for easy configuration and monitoring
- Symmetrical high data-rate DSL (G.SHDSL)
- Data rates up to 4.6Mbps in 64-kbps intervals
- 10Base-T/100Base-TX Ethernet interface
- RS-232 console port for management and configuration
- Built-in testing and diagnostics
- Interoperable with other Patton G.SHDSL modems
- Configurable as remote (CP) units
- Configurable as central (CO) units to operate back-to-back
- Front-panel status indicators
- CE marked

## Front Panel

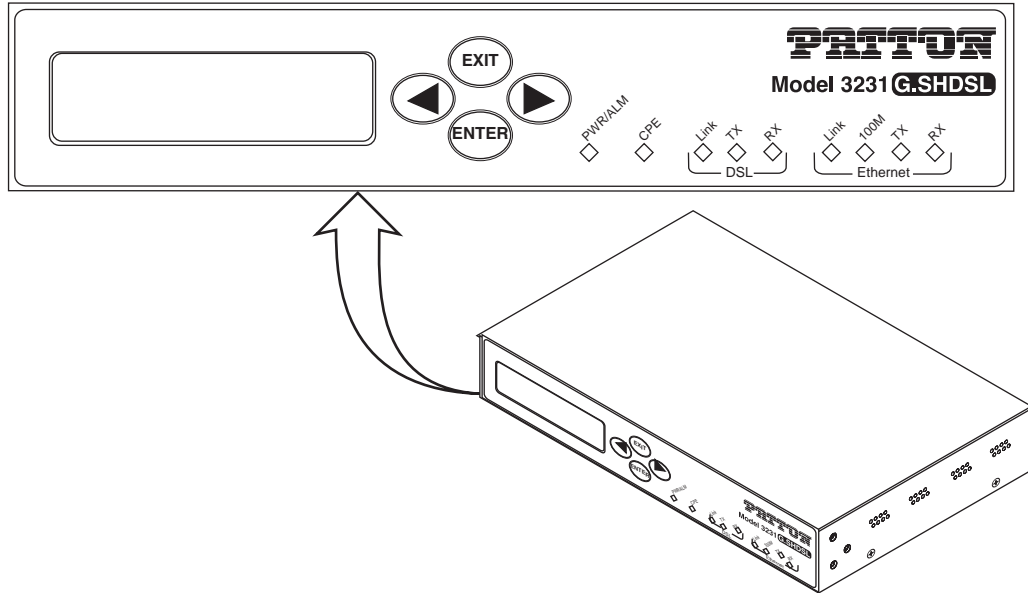


Figure 2. Model 3231 front panel

### Menu keypad

The Model 3231 contains an LCD menu and keypad, located on the front panel, for configuring the unit.

The four keys on the menu keypad and their functions are:

Table 2. LCD Menu Keypad - Front Panel

Key	Purpose
<b>ENTER</b>	<ul style="list-style-type: none"> <li>• Select the current item</li> <li>• Advance into a submenu</li> <li>• Confirm changes in a menu item</li> </ul>
<b>EXIT</b>	<ul style="list-style-type: none"> <li>• Deselect the current item</li> <li>• Exit out of a submenu</li> <li>• Cancel a change in a menu item</li> </ul>
<b>LEFT ARROW</b>	<ul style="list-style-type: none"> <li>• Move to the previous item in a menu</li> <li>• Move to the previous value for an item in a menu</li> <li>• Increment the current digit or character in an IP address or string</li> </ul>
<b>RIGHT ARROW</b>	<ul style="list-style-type: none"> <li>• Move to the next item in a menu</li> <li>• Move to the next value for an item in a menu</li> <li>• Select the next digit or character to change in an IP address or string</li> </ul>

**Note** For information on how the LCD menu is structured, see “Using the LCD Menu” on page 20.

**LEDs**

The Model 3231 contains nine LEDs on the front panel. All LEDs will blink twice when the unit is first powered on.

Table 3. Model 3231 LEDs

LED	Color	Purpose
<b>PWR/ALM</b>	Green/Red	<ul style="list-style-type: none"> <li>• Green when power is applied and alarm state is clear</li> <li>• Red when alarm state is not clear</li> </ul>
<b>CPE</b>	Green	<ul style="list-style-type: none"> <li>• On when configured as DSL CPE</li> <li>• Off when configured as DSL CO</li> </ul> <p>*Note: The <b>Restart DSL</b> menu item must be selected after changing between CO and CPE in order for the LED to change. *</p>
<b>DSL Link</b>	Green	<ul style="list-style-type: none"> <li>• On when DSL link is up</li> <li>• Flashes when DSL link is connecting</li> <li>• Off when DSL link is down</li> </ul>
<b>DSL TX</b>	Green	<ul style="list-style-type: none"> <li>• Flashes when transmitting data over DSL</li> </ul>
<b>DSL RX</b>	Green	<ul style="list-style-type: none"> <li>• Flashes when receiving data over DSL</li> </ul>
<b>Ethernet Link</b>	Green	<ul style="list-style-type: none"> <li>• On when Ethernet link is up</li> <li>• Off when Ethernet link is down</li> </ul>
<b>Ethernet 100M</b>	Green	<ul style="list-style-type: none"> <li>• On when Ethernet link negotiates to 100 Mbps</li> <li>• Off when Ethernet link negotiates to 10 Mbps</li> </ul>
<b>Ethernet TX</b>	Green	<ul style="list-style-type: none"> <li>• Flashes when transmitting an Ethernet packet</li> </ul>
<b>Ethernet RX</b>	Green	<ul style="list-style-type: none"> <li>• Flashes when receiving an Ethernet packet</li> </ul>

**Note** You can test the operation of certain LEDs using the CLI. For more information, see “CLI Commands” on page 24.



## Rear Panel

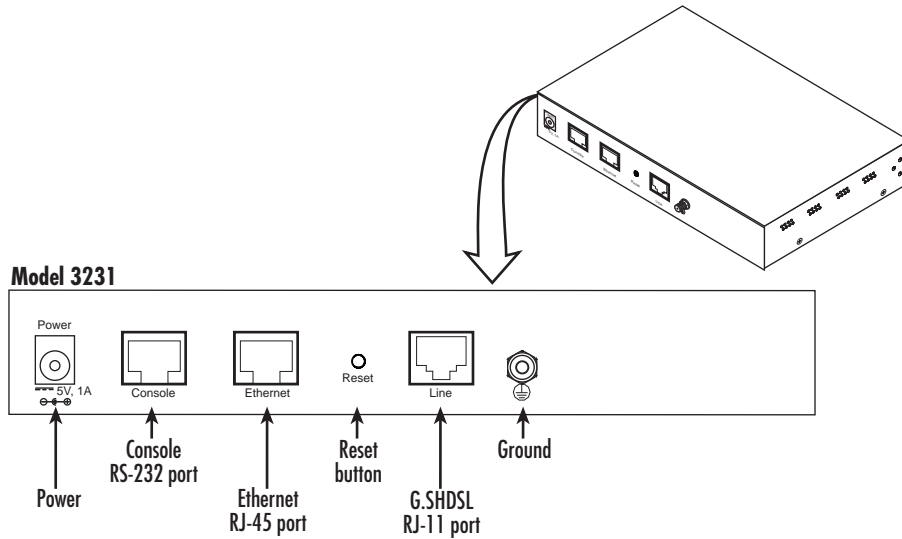


Figure 3. Model 3231 rear panel

## Application

The Model 3231 is used as a network extender using a PPPoH bridge over DSL. PPPoH is an Ethernet extension because the same logical LAN exists at both ends of the modems and only bridging is required. PPPoH is network extension in the more general sense since a different logical network is on each end of the modems.

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## Introduction

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The Model 3231 is configured through the LCD menu on the front panel. More advanced features may be configured through the Web GUI interface.

The 3231 is Plug 'n' Play with the Model 3096RC G.SHDSL concentrator card or compatible G.SHDSL card.

## Power up the 3231

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Your 3231 comes with an external AC adaptor with detachable power cord.



Ensure that the power cable used with the external power adaptor meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.

### AC power-up

1. Connect female plug of the AC power cord to the AC adaptor provided.
2. Connect the barrel-type connector of the AC adaptor to the barrel-type power jack on the 3231.
3. Insert the male plug of the AC power cord into an AC power outlet (100–240 VAC).



There are no user-servicable parts in the power supply section of the Model 3231. Fuse replacement should only be performed by qualified service personnel. See Chapter 6, “Contacting Patton for assistance” on page 43.

### Power-up indication

The *Power* LED is lit while the unit is powering up.

## Connecting the G.SHDSL port

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1. Obtain single-twisted-pair cable with an RJ-11 plug connector at each end.
2. Plug one end of the cable into the (yellow) RJ-11 socket (labelled *Line*) on the 3231. (See [figure 4](#).)
3. Plug the other end of the cable into the RJ-11 wall socket that provides your G.SHDSL service.
4. From the top level menu on the LCD panel, use the Left and Right arrow keys to navigate to G.SHDSL, then press ENTER. See “G.SHDSL” on page 21 for configuration options.

**Note** If two Model 3231 units are connected back-to-back, one must be configured as **CO**, the other as **CPE**. See “Setting the unit as CO/CPE” on page 23.

5. The *WAN Link* LED will flash while in the process of establishing a link. The LED will be on constantly once a valid DSL connection is established.

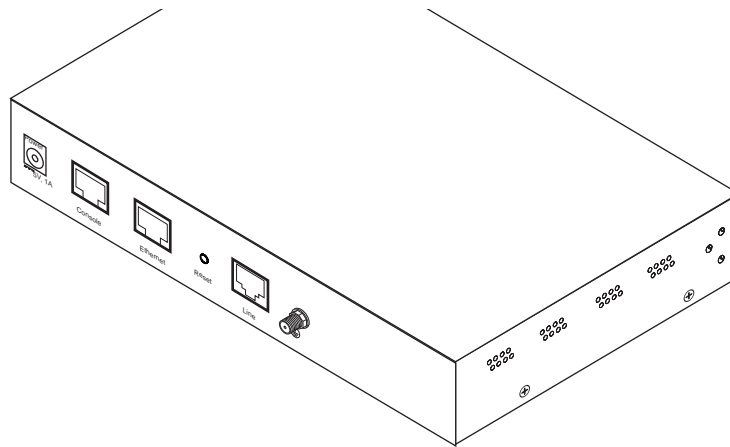


Figure 4. Rear view of 3231

## Using the LCD Menu

The following sections are options in the top level menu on the LCD interface:

- **“G.SHDSL”** on page 21  
Use this menu to configure the G.SHDSL link including line rate, I-bits, mode, annex, transmit gain, and the ethernet link.
- **“LAN”** on page 21  
Use this menu to configure the LAN IP address, netmask, and default gateway.
- **“CPE Config”** on page 21  
Use this menu on the CO unit to configure the CPE unit.
- **“STP (Spanning Tree Protocol)”** on page 22  
Use this menu to configure STP. (STP prevents loops from occurring in a network).
- **“Syslog”** on page 22  
Use this menu to configure the system, including the host IP address, facility settings, system password, alarms, saving the current configuration, and the LCD screen contrast.
- **Password**  
If a password is set, a user must enter the password to access the LCD submenus. Enter an empty string to remove the password.
- **Clear Alarms**  
Clear DSL, Ethernet, and any other alarm indications.
- **Save Config**  
Save the current configuration to flash.
- **LCD Contrast**  
Adjust the contrast of the LCD screen. Use the Left and Right Arrow keys to adjust the contrast, then press the Enter key to save your changes.

**G.SHDSL**

Table 4. G.SHDSL Menu Options

Submenu	Options
<b>Line Rate</b>	192 kbps – 4608 kbps
<b>I-bits</b>	0 – 7
<b>Mode</b>	CO or CPE
<b>Annex</b>	A or B
<b>Transmit Gain</b>	-1.6 dB – 1.6 dB
<b>Eth Link Kill</b>	Enabled or Disabled If enabled, the Ethernet link will go down if the DSL link goes down.
<b>Noise Margin</b>	View the noise margin in dB. (This option is not configurable).
<b>Restart DSL</b>	Reconfigure DSL and retrain link. This must be selected after any of the G.SHDSL options are changed (except Eth Link Kill, which takes effect immediately).

**LAN**

Table 5. LAN Menu Options

Submenu	Options
<b>IP Address</b>	Set and modify the LAN IP address
<b>Netmask</b>	Set and modify the LAN netmask
<b>Default GW</b>	Set to 000.000.000.000 to remove the default gateway

**CPE Config**

Use this menu on the CO unit to configure the CPE unit.

(None of the items in this menu may be configured if this unit is set as the CPE).

Table 6. CPE Config Menu Options

Submenu	Options
<b>CPE Cfg State</b>	<b>Wait until this state reaches Idle before configuring any of the CPE options.</b> This may take 1-2 minutes after the DSL link comes up. Any changes to the CPE options that are made before reaching the Idle state will be lost.
<b>CPE Line Rate</b>	192 kbps – 4608 kbps
<b>CPE IP Address</b>	Set and modify the CPE IP address
<b>CPE Netmask</b>	Set and modify the CPE netmask
<b>CPE Default GW</b>	Set to 000.000.000.000 to remove the CPE's default gateway
<b>Get CPE Config</b>	Request the CPE to report its configuration to this unit. This is unnecessary because the CO will always request the CPE's configuration when the link comes up.
<b>Set CPE Config</b>	Send new configuration to the CPE. This must be selected after changing any of the parameters in this menu.

## STP (Spanning Tree Protocol)

Table 7. (STP) Spanning Tree Protocol Menu Options

Submenu	Options
<b>Enabled</b>	Enable or Disable STP
<b>Fwd Delay</b>	4 – 30 seconds
<b>Hello Time</b>	1 – 10 seconds
<b>Max Age</b>	6 – 40 seconds

## Syslog

Table 8. Syslog Menu Options

Submenu	Options
<b>Host IP</b>	Set the external syslog server that the unit logs to.
<b>Facility</b>	disable / user / mail / daemon / auth / syslog / lpr / news / uucp / cron authpriv / ftp / local0 / local1 / local2 / local3 / local4 / local5 / local6 / local7

## Setting the unit as CO/CPE

---

### Configuring the unit as CO

To set the unit as CO:

1. From the top level menu on the LCD panel, use the Left and Right arrow keys to navigate to **G.SHDSL**, and press **ENTER**.
2. Use the arrow keys to highlight **Mode**, then press **ENTER**.
3. Select **CO**, and press **ENTER**.
4. To activate the unit as **CO**, select **Restart DSL** from the **G.SHDSL** menu, and press **ENTER**.

The CPE LED on the front panel should **not** be lit.

### Configuring the unit as CPE

To set the unit as CPE:

1. From the top level menu on the LCD panel, use the Left and Right arrow keys to navigate to **G.SHDSL**, and press **ENTER**.
2. Use the arrow keys to highlight **Mode**, then press **ENTER**.
3. Select **CPE**, and press **ENTER**.
4. To activate the unit as **CPE**, select **Restart DSL** from the **G.SHDSL** menu, and press **ENTER**.

The CPE LED on the front panel should be lit.

**Note** Do not use the CPE Config options in the LCD menu on the CPE unit for CPE configuration. Use the Model 3231 that you set as the CO to configure the CPE unit. See “[CPE Config](#)” on page 21 for CPE configuration options.

## Using the CLI

The Model 3231 may be configured through the CLI, although basic settings should be configured through the LCD menu on the unit.

**Note** Use the LCD panel menu to primarily configure the unit. Refer to “Using the LCD Menu” on page 20 for configuration options in the LCD menu.

### Connect a PC and log in

Use an RS-232/Ethernet cable and DB9-RJ45 adapter to connect a PC’s serial port to the 3231’s *Console* port (see figure 5).

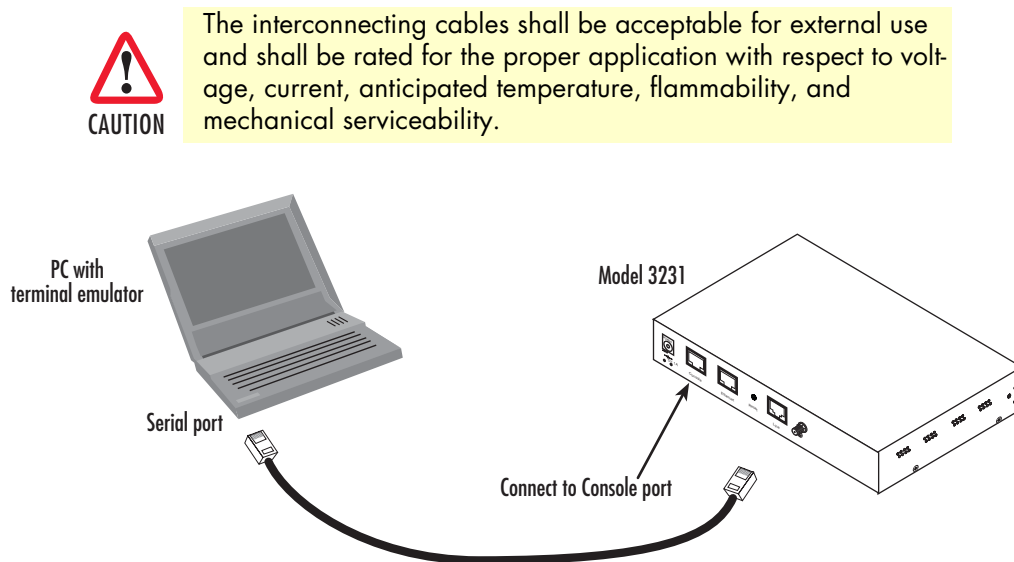


Figure 5. Connecting the 3231 to the PC’s serial port

1. Start a HyperTerminal session on the PC using the settings:  
9600 bps, 8 data bits, no parity, 1 stop bit, no flow control
2. Log in to the 3231 using the factory-default login (*superuser*) and password (*superuser*):

### CLI Commands

The following settings can be configured through the CLI:

- “G.SHDSL” on page 25  
Use these commands to configure the timeslots and i-bits for the G.SHDSL link.
- “CPE Configuration” on page 25  
Use these commands to configure the CPE unit, including the line rate, IP address, netmask, and default gateway.
- “STP (Spanning Tree Protocol)” on page 25  
Use these commands to configure the forward delay time, hello time, and maximum age for STP.
- “LEDs” on page 26  
Use this command to test the operation of specific LEDs.



## G.SHDSL

Table 9. G.SHDSL - CLI Commands

Command	Explanation
<b>gshdsl set dslrateTS &lt;#timeslots&gt;</b>	Set the number of timeslots that each DSL frame will carry. The DSL data rate will be (64 kbps x #timeslots) + #ibits.
<b>gshdsl set datarateI &lt;#ibits&gt;</b>	Set the number of i-bits that each DSL frame will carry. The DSL data rate will be (64 kbps x #timeslots) + #ibits.
<b>gshdsl set action start</b>	Force the DSL link to retrain. The data rate settings will not take effect until this command is issued.

## CPE Configuration

Table 10. CPE Config - CLI Commands

Command	Explanation
<b>cpeconfig show</b>	Show the CPE's configuration
<b>cpeconfig set dslrateTS &lt;3-72&gt;</b>	Set the CPE's line rate. This will not be sent to the CPE until the <b>cpeconfig action set</b> command is run.
<b>cpeconfig set ipaddress &lt;A.B.C.D&gt;</b>	Set the CPE's IP address. This will not be sent to the CPE until the <b>cpeconfig action set</b> command is run.
<b>cpeconfig set netmask &lt;A.B.C.D&gt;</b>	Set the CPE's netmask. This will not be sent to the CPE until the <b>cpeconfig action set</b> command is run.
<b>cpeconfig set defaultgw &lt;A.B.C.D&gt;</b>	Set the CPE's default gateway. This will not be sent to the CPE until the <b>cpeconfig action set</b> command is run.
<b>cpeconfig action get</b>	Get the CPE's configuration. This will automatically happen each time the DSL link comes up.
<b>cpeconfig action set</b>	Command the CPE to configure itself with the desired line rate, IP address, netmask, and default gateway.

## STP (Spanning Tree Protocol)

Table 11. STP - CLI Commands

Command	Explanation
<b>bridge show</b>	Show STP configuration.
<b>bridge set spanning {enabled   disabled}</b>	Enable/Disable STP.
<b>bridge set spanning forwarddelay &lt;4-30&gt;</b>	Set STP forward delay time in seconds.
<b>bridge set spanning hellotime &lt;1-10&gt;</b>	Set STP hello time in seconds.
<b>bridge set spanning maxage &lt;6-40&gt;</b>	Set STP max age in seconds.

## LEDs

Table 12. LEDs - CLI Commands

Command	Explanation
<b>console process led message &lt;led&gt; &lt;message&gt;</b>	<p>This command may be used to test the operation of specific LEDs. It should not be used in normal operation.</p> <p>This command causes the specified message to be played on the specified led. The led may be any number, 0-9. The message is a string that may include any of the following characters:</p> <ul style="list-style-type: none"> <li>• <b>'D'</b> or <b>'d'</b>: Set the LED to its default on/off state.</li> <li>• <b>'.'</b>: Turn the LED off.</li> <li>• <b>'*'</b>: Turn the LED on.</li> <li>• <b>'X'</b> or <b>'x'</b>: Toggle the LED.</li> </ul> <p>For example, the command:  <b>console process led message 0 *.*.*.*.</b>  will cause the power LED to blink on then off 5 times.</p>

## Connecting to the Web GUI

**Note** Use the LCD panel menu to configure the unit. Refer to “Using the LCD Menu” on page 20 for configuration options in the LCD menu. The Web GUI should be used for advanced configuration and advanced monitoring only.

### Factory default IP address

The 3231 is shipped with a factory-configured IP address assigned to the *Ethernet* LAN port (green outline). The address is *192.168.200.10*. In most cases, you must change the address to be on the same subnet as your PC, as described in the procedures below. If you are not sure which IP address to use for your installation, contact your network administrator.

### Modifying the IP address

1. From the top level menu on the LCD panel, use the Left and Right arrow keys to navigate to LAN, then press ENTER.
2. In the LAN menu, navigate to IP Address, and press ENTER.
3. Enter the IP address. Use the Left arrow key to increase a number, and use the Right arrow key to move to the next number to change. The number that is currently selected will be underlined. When you are done entering the new IP address, press ENTER.

### Connecting to the local IP network

Now you can connect the 3231 to your local IP network and access advanced configuration features from your PC using a standard web browser.

Connect the 3231's *Ethernet* port (green) to the same Ethernet segment as your PC (see [figure 6](#)). The front-panel *Ethernet Link* LED should turn on. If it does not, press the rear-panel MDI-X switch so that the *Ethernet Link* LED illuminates. You can check the connection with the ping command.

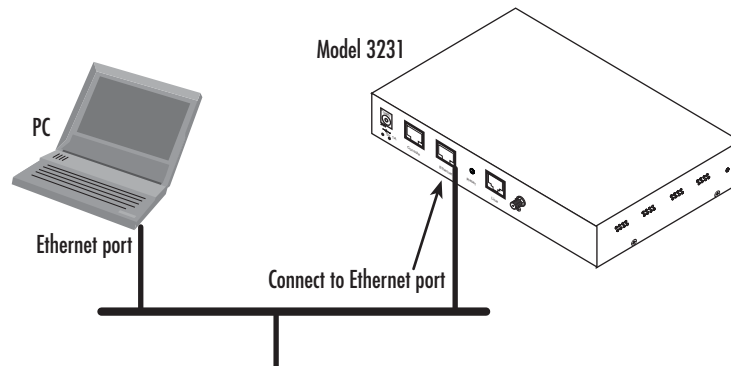


Figure 6. Connecting the RocketLink-G to the local IP network

### Logging into the web management interface

You can access the web management graphical user interface (GUI) using a standard web browser (such as Netscape Browser, Mozilla Firefox, or Internet Explorer).

1. At your PC, open a web browser and enter the IP address you assigned to the unit's Ethernet LAN port in the section "Modifying the IP address" on page 26. (In this example, 10.10.4.10.).
2. Log in to the web management home page using the username *superuser* and the password *superuser*.

**Note** See Chapter 4, "Web Interface Configuration" on page 34 for configuring features through the web interface, including SNMP, CPE Configuration, and STP (Spanning Tree Protocol).

## Chapter 3 **G.SHDSL Configuration and Status**

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## G.SHDSL Configuration

Use the LCD panel to configure G.SHDSL. From the top level menu on the LCD panel, use the Left and Right arrows to navigate to **G.SHDSL**, and press **ENTER**. The following options are available in the G.SHDSL submenu:

**Note** After you change a G.SHDSL option, you must select **Restart DSL** (in the G.SHDSL menu) and press **ENTER** to activate your changes. This must be selected after changing any G.SHDSL option *except* **Eth Link Kill**, which takes effect immediately.

### G.SHDSL Options

- **Mode:** CO or CPE. (See “Setting the unit as CO/CPE” on page 23 for more information).
- **Annex:** A or B.
- **Line Rate (kbps):** This selects the desired DSL data rate between 192 kbps – 4608 kbps. Use the Left arrow key to move through the options.
- **Tx Gain:** Select an option between -1.6 dB – 1.6 dB. Use the Left arrow key to move through the options.
- **Eth Link Kill:** Enable or Disable. If enabled, the Ethernet link will go down if the DSL link goes down.
- **Restart DSL:** Reconfigure DSL and retrain the link. This must be selected after any of the G.SHDSL options are changed (except Eth Link Kill, which takes effect immediately).

### G.SHDSL Error Monitor Configuration

You can use the Web GUI to monitor the DSL error counters. (See “Connecting to the Web GUI” on page 26)

**Note** It is **NOT** recommended that you configure G.SHDSL through the Web GUI. Use the LCD panel menu to configure G.SHDSL options, and use the Web GUI for advanced status monitoring only.

The DSL Error Monitor provides various statistics for the DSL line. The monitor parameters are configured here. The error counters are also cleared from this menu.

DSL Error Monitor Configuration	
Clear Error Counters	Do not Clear
Error Monitor Max Interval Errors	3
Error Monitor Interval Time(sec)	1
Error Monitor Interval Count	3
Error Monitor Total Intervals	10
Error Monitor Start Up Delay	5
<input type="button" value="Configure"/>	

Figure 7. DSL Error Monitor Configuration

The following shows the relationship of the DSL Error Monitor parameters:

Startup Delay	Interval #1	Interval #2	...	Interval #Total Intervals
↔Start Up Delay↔	↔Interval Time (sec)↔	↔Interval Time (sec)↔	↔Interval Time (sec)↔	↔Interval Time (sec)↔

The DSL error monitor inspects intervals to see if they have met the error threshold (Max Interval Errors). If the error monitor finds a certain number (Interval Count) of intervals that meet or exceed the error threshold, it will restart the DSL link. The error monitor will wait (Start Up Delay) seconds after the DSL link comes up before it begins monitoring errors. After the startup delay, it will check the number of errors that have occurred during each (Interval Time) seconds to see if they meet the error threshold. The error monitor inspects (Total Intervals) intervals before it stops.

**Note** Setting **Max Interval Errors** to 0 disables the error monitor and setting **Total Intervals** to 0 causes the error monitor to run continuously.

The following commands configure the error monitor:

- **Error Monitor Max Interval Errors:** Sets the number of errors allowed in an interval causes it to be considered an errored interval. If this is set to 0, then the error monitor is disabled.
- **Error Monitor Interval Time (sec):** Sets the length of each interval.
- **Error Monitor Interval Count:** Sets the number of errored intervals that causes the DSL link to restart.
- **Error Monitor Total Intervals:** Sets the number of intervals to inspect for errors before disabling the error monitor. If this is set to 0, then the error monitor will run continuously.
- **Error Monitor Start Up Delay:** Sets the number of seconds to wait after the DSL link comes up before the error monitor starts inspecting intervals.

## Viewing G.SHDSL Status

You can view the status of the G.SHDSL link through the Web GUI. (See “[Connecting to the Web GUI](#)” on page 26). Selecting the *Status* hyperlink on the *Configuration Menu* provides the web page containing the G.SHDSL status and the Bridged PPP link status. The G.SHDSL Status is divided into three groups, *Run-Time Statistics*, *DSL Line Error Counters*, and *Local Interface Error Counters*.

**Note** It is NOT recommended that you configure G.SHDSL through the Web GUI. Use the LCD panel menu to configure G.SHDSL options, and use the Web GUI for advanced status monitoring only.

### Run-Time Statistics

The *Run-Time Statistics* provide the state and relative health of the DSL link. The statistical parameters are described.

G.SHDSL Status			
Run-Time Statistics			
G.SHDSL State	<i>Normal Operation</i>	Connected	<i>TRUE</i>
Loss Of Signal	<i>Signal Found</i>	Loss Of Sync	<i>Sync Word Found</i>
DSL Sync State:	<i>In Sync</i>	Noise Margin: (dB)	20.5

Figure 8. DSL Run-time Statistics

- **G.SHDSL State:** The link may be in one of these states, *Deactivated*, *In Progress*, or *Normal Operation*.
- **Connected:** If there is a valid physical DSL link, the field is *TRUE*. If not, it displays *FALSE*.
- **Loss Of Signal:** Indicates *Signal Loss* or *Signal Found*.
- **Loss of Sync:** Indicates whether the Sync Word is synchronized.
- **DLS Sync State:** The sync state of the DSL link may be *Out of Sync*, *In Sync*, *Acquiring Sync*, or *Loss of Sync*.
- **Noise Margin (dB):** The maximum tolerable increase in external noise power that still allows for BER of less than  $1 \times 10^{-7}$ .

**Note** **G.SHDSL State vs. DSL Sync State**—The G.SHDSL State describes whether the DSL is training (in progress), linked (success), deactivated, or idle.

The DSL Sync State describes whether no sync words have been found (out of sync), whether there are no sync word errors (in sync), or whether we are transitioning from out of sync to in sync (acquiring sync) or vice versa (losing sync). Typically, when the link is training, the sync state goes from out of sync to acquiring sync to in sync.

### DSL Line Error Counters

Five counters display how many *Loss of Sync*'s have occurred, *CRC Errors*, *SEGD Errors*, *SEGA Errors*, and *Loss of Delineation*. Loss of Sync and CRC Errors are the most commonly used statistics in normal performance evaluation.

DSL Line Error Counters:			
Loss of Sync	14	CRC Errors	13
SEGD Errors	0	SEGA Errors	0
Loss of Delineation	0		

Figure 9. DSL line error counters

- **Loss of Sync:** The number of times that synchronization has been lost since the error counters have been cleared.
- **CRC Errors:** Shows the number of CRC errors that have occurred since either startup or the last time that error counters were cleared.
- **SEGD Errors:** The number of SEGD errors in the DSL link.
- **SEGA Errors:** The number of SEGA errors in the DSL link.
- **Loss of Delineation:** The number of time that delineation has been lost.

### Local Interface Error Counters

These counters are rarely used for normal performance evaluation or troubleshooting. However they are shown and listed here.

Local Interface Error Counters:	
RX Error Counter:	0
TX Error Counter:	168
DPLL Error Counter:	2

Figure 10. Local Interface Error Counters



### Clearing Error Counters

The error counters may be cleared in the Configuration web page or here in the Status web page. Select *Clear All Counters* and click on the **Submit** button.

DSL Line Error Counters:			
Loss of Sync	14	CRC Errors	13
SEGD Errors	0	SEGA Errors	0
Loss of Delineation	0		

Local Interface Error Counters:	
RX Error Counter:	0
TX Error Counter:	168
DPLL Error Counter:	2

Do not Clear	<input type="button" value="Submit"/>
--------------	---------------------------------------

Figure 11. Clearing the error counters

## Chapter 4 **Web Interface Configuration**

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## Using the Web Interface

---

The Model 3231 provides a web interface for advanced configuration of:

- “SNMP” on page 36
- “STP (Spanning Tree Protocol)” on page 37
- “CPE Configuration” on page 38

**Note** The Web GUI should be used for advanced configuration and advanced monitoring only. Use the LCD panel menu to configure the unit. Refer to “Using the LCD Menu” on page 20 for configuration options in the LCD menu.

**Note** For information on how to connect to the web interface, see “Connecting to the Web GUI” on page 26.

**Note** For information on how to monitor the G.SHDSL link through the web interface, see Chapter 3, “G.SHDSL Configuration and Status” on page 28.

## SNMP

You can use the Web GUI to configure SNMP. (See “Connecting to the Web GUI” on page 26).

**Note** It is **NOT** recommended that you configure basic options through the Web GUI. Use the LCD panel menu to configure basic options such as G.SHDSL, and use the Web GUI for advanced configuration only, such as SNMP.

This section describes how to configure the SNMP server so that an agent can monitor the unit via SNMP. To get to the SNMP configuration page in the Web GUI, click on **System Configuration > SNMP Daemon** on the left navigation menu.

### SNMP Daemon Settings

This allows the user to modify the SNMP settings for this unit.

#### Static Variables

System Description	<input type="text" value="not set"/>
System Location	<input type="text" value="not set"/>
System Contact	<input type="text" value="not set"/>
System Name	<input type="text" value="not set"/>
<input type="button" value="Update"/>	

#### Community Table

Index	Password	Management IP	Access	Del
1	<input type="text" value="private"/>	<input type="text" value="192.168.200.1"/>	Write <input type="button" value="v"/>	<input type="checkbox"/> <input type="button" value="Update"/>
2	<input type="text" value="public"/>	<input type="text" value="0.0.0.0"/>	Read <input type="button" value="v"/>	<input type="checkbox"/> <input type="button" value="Update"/>
NEW	<input type="text"/>	<input type="text" value="0.0.0.0"/>	Write <input type="button" value="v"/>	<input type="button" value="Create"/>

#### Trap Table

Index	Password	Management IP	Del
1	<input type="text" value="password"/>	<input type="text" value="192.168.200.1"/>	<input type="checkbox"/> <input type="button" value="Update"/>
NEW	<input type="text"/>	<input type="text"/>	<input type="button" value="Create"/>

#### Save SNMP Configuration

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Figure 12. SNMP Settings in the Web GUI

From this page, you can configure the following options:

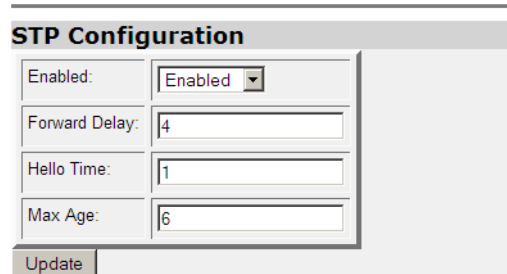
- **Static Variables:** Set the system MIB variables.
- **Community Table:** Add/delete communities that have access to this unit. The password is the community string. If the management IP is 0.0.0.0, all requests from that community will be accepted regardless of the originating IP address.
- **Trap Table:** Add/delete trap daemons. The IP address is the address of the PC running a trap daemon. The unit will send SNMPv1 traps on DSL and Ethernet link up and down events.
- **Save SNMP Configuration:** Save SNMP configuration. For SNMP configuration to persist across reboots, click the Save button on this page, and then, save the system configuration. Both must be done in that order.

## STP (Spanning Tree Protocol)

This section describes how to configure Spanning Tree Protocol through the web interface. To get to the STP configuration page in the Web GUI, click on **Services Configuration > STP** on the left navigation menu.

**Note** Use the LCD panel menu to configure basic options. See “[STP \(Spanning Tree Protocol\)](#)” on page 22 for information on configuring STP through the LCD menu.

### Spanning Tree Protocol:



STP Configuration	
Enabled:	Enabled
Forward Delay:	4
Hello Time:	1
Max Age:	6
Update	

Figure 13. Configuring STP in the Web GUI

To configure STP through the Web GUI:

1. Select **Enabled** from the **Enabled** drop-down menu to enable STP.
2. Enter the **Forward Delay** time (4–30 seconds).
3. Enter the **Hello Time** (1–10 seconds).
4. Enter the **Max Age** (6–40 seconds).
5. Click **Update**.

**Note** When enabling STP, the unit will go into the discovery state for a period of time (typically about 30-60 seconds) until it reaches the forwarding state. While in the discovery state, the unit will not pass traffic over the Ethernet port. For this reason, the web page will not respond for the next several seconds. This is normal, and the web page will respond when the unit has reached the forwarding state.

## CPE Configuration

This section describes how to configure the CPE unit through the web interface. To get to the CPE Configuration page in the Web GUI, click on **G.SHDSL > CPE Configuration** on the left navigation menu.

**Note** Use the LCD panel menu to configure basic options. See “CPE Config” on page 21 for information on configuring the CPE through the LCD menu.

### CPE Configuration:

**Status**

Configuration State: Idle

Get CPE Configuration

**Configuration**

These settings must be applied after the link has come up and the settings have been retrieved from the CPE.

DSL Data Rate	4608K
IP Address	192.168.200.10
Netmask	255.255.255.0
Default Gateway	0.0.0.0

Configure CPE

Figure 14. Configuring the CPE in the Web GUI

To configure the CPE through the Web GUI:

1. Click **Get CPE Configuration**.
2. Wait for the **Configuration State** to reach **Idle** before making configuration changes to the CPE. Otherwise, your changes will not save.
3. Select the line rate from the **DSL Data Rate** drop-down menu.
4. Enter the **IP Address** for the CPE unit.
5. Enter the **Netmask** for the CPE unit.
6. Click **Configure CPE**.

## Chapter 5 **System Management**

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## Reset for Factory Default

To recover from a forgotten password, the user may reset the unit to its factory configuration. There is a **Reset** button located on the rear panel of the unit between the Ethernet and Line ports.

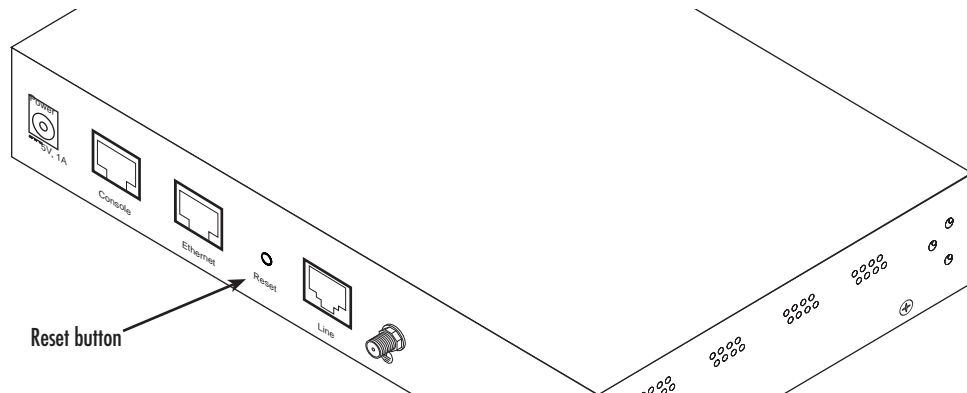


Figure 15. Reset button

To reset for factory default:

1. Make sure that the top level menu is displayed on the LCD panel.
2. Press and hold the **Reset** button for three seconds.
3. After waiting for seven seconds, the LCD screen will go blank, indicating that the system has restarted.

## Saving the configuration

To save all configuration changes into non-volatile memory:

1. From the top level menu on the LCD panel, use the Left and Right arrow buttons to navigate to **Save Config**, and press **ENTER**.

The current configuration is now saved to flash memory.

## Backing up and restoring saved configurations

At times, you may want to store the completed configuration of your 3231 on a PC so you can return to a working configuration easily. You can use the Web GUI to back up and restore saved configurations. (See “Connecting to the Web GUI” on page 26).

**Note** It is **NOT** recommended that you configure basic options through the Web GUI. Use the LCD panel menu to configure basic options such as G.SHDSL, and use the Web GUI for advanced configuration only, such as SNMP.



Click on the **Backup/Restore Configuration** hyperlink under the **System Management** menu.

## Configuration Backup/Restore

This page allows you to backup the configuration settings to your computer, or restore configuration from your computer.

### Backup Configuration

Backup configuration to your computer.

### Restore Configuration

Restore configuration from a previously saved file.

Configuration File

Figure 16. Backing up and reloaded saved configurations

To back up the current *saved* configuration, click on **Backup configuration in your computer** link. You will have the option of either viewing the configuration file or saving it directly to your PC. (See [figure 16](#).)

To execute the reverse operation, click on the **Browse...** button, find and select the configuration file on your PC. Then click on the **Restore** button for reloading the previously saved configuration into the 3231.

## System Software Upgrade

Over the course of time, new software is released. You can use the Web GUI to upgrade the system software. (See “[Connecting to the Web GUI](#)” on page 26).

**Note** It is **NOT** recommended that you configure basic options through the Web GUI. Use the LCD panel menu to configure basic options such as G.SHDSL, and use the Web GUI for advanced configuration only, such as SNMP.

In the **System Management** menu, click on **Software Upgrade**.

## Firmware Update

From this page you may update the system software on your network device

### Select Update File

Updates (where available) may be obtained from [Patton Electronics Company](#)

New Firmware Image

[Options](#)

Figure 17. Upgrading software on the 3231

Click on the **Browse** button to find and select the desired software version on your PC. Then, click on **Update** to invoke the upgrade process. It is *Essential* to wait until the upgrade is completed before attempting any access of the 3231.

Click on the **Options** link. This takes you to the **Firmware Update Configuration** page. Leave this set to **Enabled**. When enabled, the 3231 will detect if you are trying to do a software upgrade with an incorrect or improper software image. (See [figure 18](#).)

## Firmware Update Configuration

---



Figure 18. Software upgrade protection

## Syslog Options in the LCD Menu

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The following options may be configured through the LCD menu on the front panel:

- **Host IP:** The external syslog server to log to.
- **Facility:** disable, user, mail, daemon, auth, syslog, lpr, news, uucp, cron, authpriv, ftp, local0, local1, local2, local3, local4, local5, local6, local7.

# Chapter 6 **Contacting Patton for assistance**

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## Introduction

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This chapter contains the following information:

- “Contact information”—describes how to contact Patton technical support for assistance.
- “Warranty Service and Returned Merchandise Authorizations (RMAs)”—contains information about the warranty and obtaining a return merchandise authorization (RMA).

## Contact information

---

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

### **Patton support headquarters in the USA**

- Online support: available at [www.patton.com](http://www.patton.com)
- E-mail support: e-mail sent to [support@patton.com](mailto:support@patton.com) will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 8:00 am to 5:00 pm EST (1300 to 2200 UTC/GMT)—by calling +1 (301) 975-1007
- Fax: +1 (253) 663-5693

### **Alternate Patton support for Europe, Middle East, and Africa (EMEA)**

- Online support: available at [www.patton-inalp.com](http://www.patton-inalp.com)
- E-mail support: e-mail sent to [support@patton-inalp.com](mailto:support@patton-inalp.com) will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 8:00 am to 5:00 pm CET (0900 to 1800 UTC/GMT)—by calling +41 (0)31 985 25 55
- Fax: +41 (0)31 985 25 26

## Warranty Service and Returned Merchandise Authorizations (RMAs)

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Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

**Note** If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

### **Warranty coverage**

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

### *Out-of-warranty service*

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

### *Returns for credit*

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

### *Return for credit policy*

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

### **RMA numbers**

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1007** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

### *Shipping instructions*

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

#### **Patton Electronics Company**

RMA#: xxxx

7622 Rickenbacker Dr.

Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

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## Compliance

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### EMC

- FCC Part 15, Class A
- EN55022, Class A
- EN55024

### Safety

- UL 60950-1/CSA C22.2 N0. 60950-1
- IEC/EN60950-1
- AS/NZS 60950-1

### PSTN Regulatory

- FCC Part 68
- CS-03
- AS/ACIF S043:2003

## FCC Part 68 (ACTA) Statement

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This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. On the bottom side of this equipment is a label that contains—among other information—a product identifier in the format *US: AAAEQ##TXXXX*. If requested, this number must be provided to the telephone company.

The method used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

## Radio and TV Interference (FCC Part 15)

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This equipment generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. This equipment has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reason-

able protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the equipment causes interference to radio or television reception, which can be determined by disconnecting the cables, try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

## Industry Canada Notice

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This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

This Declaration of Conformity means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.

## CE Declaration of Conformity

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We certify that the apparatus identified in this document conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

The safety advice in the documentation accompanying this product shall be obeyed. The conformity to the above directive is indicated by the CE sign on the device.

## Authorized European Representative

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D R M Green

European Compliance Services Limited.

Avalon House, Marcham Road

Abingdon,

Oxon OX14 1UD, UK



## Appendix B **Specifications**

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## General characteristics

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- Compact low-cost Plug 'n' Play NTU
- 10/100 Ethernet port
- Unlimited host support
- Comprehensive hardware diagnostics, independent of operating system, easy maintenance and effortless installation
- Built-in web configuration
- Simple software upgrade using HTTP and TFTP
- Nine front panel LEDs indicate Power, DSL WAN, Ethernet LAN speed and status
- Convenient and standard RJ connectors for Ethernet, Line, and Console
- External UI
- Field factory default option
- Standard 1 year warranty

## G.SHDSL characteristics

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- 4.6 Mbps maximum speed over 2-wire
- Data rates from 192 kbps to 4.608 Mbps
- Annex A (ANSI), Annex B (ETSI) PSD selection
- 2-wire support ITU G.991.2 and ETSI TS 101524 with G.994.1 handshake
- When connecting two NTUs in a point-to-point application, one 3231 must be set for central mode, the other for remote mode
- EOC management channel for remote end-to-end management

## Ethernet

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- Auto-negotiating Full-duplex 10Base-T/100Base-TX Ethernet
- Standard RJ-45
- IEEE 802.1d transparent learning bridge up to 1024 addresses and Spanning Tree Protocol

## Protocol support

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- Complete internetworking with IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826)
- Built-in Ping and Traceroute facilities
- Point-to-Point Protocol over HDLC

## Management

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- Web-based configuration via embedded web server
- CLI menu for configuration, management, and diagnostics
- Local (VT-100 or Telnet)
- Console port set at 9600 bps, 8 bits, no parity, 1 stop bit, no flow control

## 10Base-T/100Base-TX interface

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The Ethernet port is a shielded RJ-45 jack, autonegotiate, full- or half-duplex . See Appendix D, “RJ-45 shielded 10/100 Ethernet port” on page 55 for the pinout.

## Serial connector

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The console port is an RS-232 interface (EIA-561) on an RJ-45 jack. See Appendix E, “RS-232 console interface pin assignments” on page 57 for the pinout.

## Diagnostics

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Various diagnostic features are integrated into the 3231. Ping and Traceroute facilities. DSL run-time statistics, DSL line error counters, Local interface error counters, Bridged PPP statistics, Ethernet port statistics, and front panel status LEDs (see section “Status LEDs”).

## Status LEDs

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### Power/Alarm

The Power/Alarm LED glows solid green during normal operation. The Power/Alarm LED will glow red if the alarm state is not clear.

### CPE

The CPE LED glows solid green if the unit is configured as the DSL CPE. This LED will be off if the unit is configured as the CO.

### DSL Link

The DSL LED glows solid green when the DSL Link is up. It will flash while the DSL Link is connecting.

### DSL Tx

The DSL Tx LED flashes when transmitting data over DSL.

### DSL Rx

The DSL Rx LED flashes when receiving data over DSL.

### Ethernet Link

The Ethernet Link LED glows green when the Ethernet link is up.

### Ethernet 100M

The Ethernet 100M LED glows green when the Ethernet link negotiates to 100 Mbps. This LED is off when the Ethernet link negotiates to 10 Mbps.

### Ethernet Tx

The Ethernet Tx LED flashes when transmitting an Ethernet packet.

### Ethernet Rx

The Ethernet Rx LED flashes when receiving an Ethernet packet.

## Power

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Ensure that the power cable used with the external power adapter meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.

The Model 3231 power input is 5 VDC from an external desk top power supply, universal input 100–240 VAC, 50–60 Hz, 0.3 A. The universal input power supply has a male IEC-320 power entry connector. This power supply connects to the Model 3231 by means of a barrel jack (center pin is +5V) on the rear panel. Many international power cords are available for the universal power supply.

The Model 3231 powers up as soon as it is plugged into an AC outlet—there is no power switch.

### G.SHDSL Physical connection & Transmission Line

RJ-11, Two-wire (single twisted pair), polarity insensitive, pins 3 & 4. (See [Appendix C](#) on page 53.)

### Line Coding

TC-PAM 16 (Trellis Coded Pulse Amplitude Modulation) for rates from 192 kbps to 2.304 Mbps. TC-PAM 32 for rates above 2.304 Mbps.

## Line Interface

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Transformer coupled, 2500 VRMS isolation

## Environment

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Operating temp: 32–122°F (0–50°C)

Humidity: 5–95% non-condensing

Altitude: 0–15,000 feet (0–4,600 meters)

## Dimensions

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4.2W x 1.6H x 5.55L inches (10.7W x 4.1H x 14.1L cm)

## Appendix C **RJ-11 non-shielded DSL port**

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## RJ-11 non-shielded DSL port

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Single twisted-pair (TP) for full-duplex transmission. The signals are polarity insensitive.

Pin #	Signal
1	
2	Tip
3	Ring
4	

# Appendix D **RJ-45 shielded 10/100 Ethernet port**

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## RJ-45 shielded 10/100 Ethernet port

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**Note** The following table assumes the MDI-X switch is in the out position.

Pin #	Signal
1	TX+ (output)
2	TX- (output)
3	RX+ (input)
4	
5	
6	RX- (input)
7	
8	



# Appendix E **RS-232 console interface pin assignments**

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## RS-232 console interface pin assignments

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RJ-45 non-shielded Connector (EIA-561)

Pin	Signal
1	DSR (out)
2	CD (out)
3	DTR (in)
4	Signal Ground
5	RD (out)
6	TD (in)
7	CTS (out)
8	RTS (in)