INSTALLATION & GETTING STARTED GUIDE

LGB5028A-R2, LGB5052A-R2

GBE MANAGED SWITCHES

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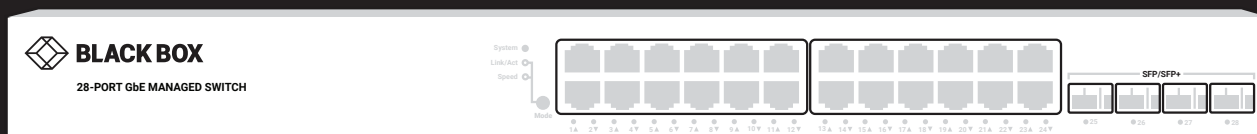

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28-PORT GbE MANAGED SWITCH

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The switch's default values are listed below:

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.254

Username: admin

Password: <none> (Just press the Enter key.)

SAFETY INFORMATION

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SAFETY INFORMATION

CAUTION: Circuit devices are sensitive to static electricity, which can damage their delicate electronics. Dry weather conditions or walking across a carpeted floor may cause you to acquire a static electrical charge.

To protect your device, always:

- Touch the metal chassis of your computer to ground the static electrical charge before you pick up the circuit device.
- Pick up the device by holding it on the left and right edges only.
- If you need to connect this device to an outdoor device, add an arrester on the cable between the outdoor device and this device.

NOTE: The switch is indoor device; if it will be used in an outdoor environment or connects with an outdoor device, you must use a lightning arrester to protect the switch.

WARNING:

- Self-demolition on the product is strictly prohibited. Damage caused by self-demolition will be charged repairing fees.
- Do not place product at outdoor or sandstorm..
- Before installation, make sure the input power supply and product specifications are compatible with each other.
- To reduce the risk of electric shock, disconnect all AC or DC power cord and RPS cables to completely remove power from the unit.
- Before importing/exporting a configuration, make sure the firmware version is always the same.
- After a firmware upgrade, the switch will replace the configuration automatically with the latest firmware version.

WARNING: EYE HAZARD! The SFP modules are Class 1 laser devices. Do not look direcly at the beam coming from the transmit port.

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RELATED PUBLICATIONS/REVISION HISTORY

RELATED PUBLICATIONS

The following publications give specific information on how to operate and use the management functions of the switch:

- GUI User Guide
- CLI User Guide

To download the user guides from blackbox.com:

1. Go to www.blackbox.com

2. Enter the part number in the search box (for example, LGB5028A-R2 or LGB5052A-R2).

3. Click on the product in the "Products" page.

4. Click on the "Support" tab on the product page and select the document you wish to download.

REVISION HISTORY

Current version: Release 6.38, Revision A1

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CHAPTER 1: INTRODUCTION

1.1 OVERVIEW

This LGB5028A-R2, LGB5052A-R2 Gigabit Ethernet (GbE) Managed Switches offer a full suite of L2 Ethernet Switch features and additional 10GbE uplink connections, including advanced L3 features such as Static Route for Enterprise networks via fiber or copper connections.

◆ LGB5028A-R2 has 24 (10M/100M/1G) RJ-45 ports, 4 GbE/10G SFP+ ports and DB9 console port.

◆ LGB5052A-R2 has 48 (10M/100M/1G) RJ-45 ports, 4 GbE/10G SFP+ ports and an RJ-45 console port.

◆ Both switches provide high hardware performance and environment flexibility for SMBs and Enterprises.

The switches are ideal to deliver management simplicity, optimum user experience, and lower cost. The embedded Device Managed System is designed to be extremely easy-to-use/manage/install IP Phone, IP Cam, or Wifi-AP for Enterprise Applications.
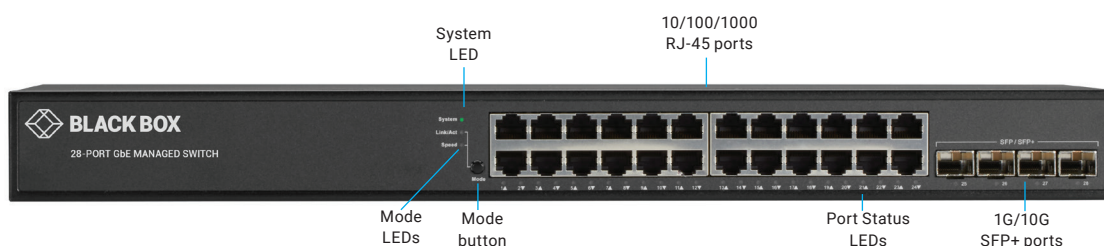
1.2 FRONT VIEW OF THE SWITCH

FIGURE 1-1. FRONT PANEL OF THE LGB5028A-R2 SWITCH

1.3 REAR VIEW OF THE SWITCH

FIGURE 1-2. BACK PANEL OF THE LGB5028A-R2 SWITCH

CHAPTER 1: INTRODUCTION

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1.4 SWITCH ARCHITECTURE

The switch performs wire-speed, non-blocking switching. This allows wire-speed transport of multiple packets at low latency on all ports simultaneously. The switch also features full-duplex capability on all ports, which effectively doubles the bandwidth of each connection.

This switch uses store-and-forward technology to ensure maximum data integrity. With this technology, the entire packet must be received into a buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network.

1.5 NETWORK MANAGEMENT OPTIONS

The switch can also be managed over the network with a web browser or Telnet application. The switch includes a built-in network management agent that allows it to be managed in-band using SNMP or RMON (Groups 1, 2, 3, 9) protocols. The LGB5028A-R2 has a DB9 console port and the LGB5052A-R2 has an RJ-45 console port connector for out-of-band management.
A PC may be connected to this port for configuration and monitoring out-of-band via a null-modem serial cable.

NOTE: For a detailed description of the management features, refer to the user guides.

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2.1 1000BASE-T PORTS

The switch contains 24 or 48 1000BASE-T RJ-45 ports. All RJ-45 ports support automatic MDI/MDI-X operation, auto-negotiation and IEEE 802.3x auto-negotiation of flow control, so the optimum data rate and transmission can be selected automatically.

2.2 SFP+ TRANSCEIVER SLOTS

The LGB5028A-R2 or LGB5052A-R2 switch supports the Small Form Factor Pluggable (SFP+) transceiver slots on ports 25-28 or 49-52.

The following table shows a list of transceiver types that have been tested with the switch. For an updated list of vendors supplying these transceivers, contact your local dealer. For information on the recommended standards for fiber optic cabling, see Section 4.8 in Chapter 4.

TABLE 2-1. COMPATIBLE SFP/SFP+ MODULES

PRODUCT CODE	DESCRIPTION
LFP411	SFP, 1250-Mbps Fiber with Extended Diagnostics, 850-nm Multimode, 550 m LC
LFP412	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Multimode, 2 km LC
LFP413	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 10 km LC
LFP414	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 30 km LC
LFP415	SFP with SerDes Interface, 1250 Mbps, RJ45, 1000BASE-T, Extended Diagnostics
LFP416	SFP with SGMII Interface, 1250 Mbps, RJ45, 10/100/1000BASE-T, Extended Diagnostics
LFP417	SFP with SerDes Interface, 1250 Mbps, RJ45, 1000BASE-T, Extended Diagnostics
LFP418	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1550-nm Single-Mode, 80 km, LC
LFP420	SFP, 1250-Mbps Simplex Fiber with Extended Diagnostics, 1550-nm TX, 1310-nm RX, Single-Mode, 10 km, LC
LFP421	SFP, 1250-Mbps Simplex Fiber with Extended Diagnostics, 1310-nm TX, 1550-nm RX, Single-Mode, 10 km, LC
LFP401	SFP, 155-Mbps Fiber with Extended Diagnostics, 850-nm Multimode, 2 km, LC
LFP402	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Multimode, 2 km, LC
LFP403	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 30 km, LC
LPF404	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 60 km, LC

2.3 PORT AND SYSTEM STATUS LEDS

The LGB5028A-R2 and LGB5052A-R2 switches include a display panel for system and port indications that simplify installation and network troubleshooting. The LEDs are located on left hand side of the front panel for easy viewing. Details are shown below and described in the following tables.

TABLE 2-2. MODE STATUS LEDS

LED	CONDITION	STATUS
TP Link/Act	Green/Blinking	Lights Green when TP link is good Blinks when any traffic is present
TP Speed	Green/Yellow	Lights Green when TP link is running at 1000 Mbps Yellow when TP link is running at 10/100 Mbps
SFP Link/Act	Green/Blinking	Lights ON Green when SFP link is good Blinks when any traffic is present
SFP Speed	Blue/Green	Lights Blue when SFP link is running at 10 Gbps Lights Green when SFP link is running at 1000 Mbps

TABLE 2-2. SYSTEM STATUS LED

SYSTEM LED	CONDITION	STATE
Power	Green	Lights ON when power is coming up
	OFF	Power is OFF

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CHAPTER 3: INSTALLING THE SWITCH

3.1 WHAT'S INCLUDED

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com

- 28-Port or 52-Port Gigabit Ethernet (GbE) Managed Switch
- Rackmount brackets and hardware
- AC power cord
- DB9 console cable (for LGB5028A-R2) or RJ-45 console cable (for LGB5052A-R2)
- (4) adhesive rubber feet
- This Installation and Getting Started Guide

WARNING: EYE HAZARD! The SFP modules are Class 1 laser devices. Do not look direcly at the beam coming from the transmit port.

3.2 SELECTING A SITE

The Switch can be mounted in a standard 19-inch equipment rack (via an included rackmount kit) or on a flat surface. Be sure to follow the guidelines below when choosing a location.

The site should:

- Be at the center of all the devices you want to link and near a power outlet.
- Be able to maintain its temperature within 32 to 113° F 0 to 45° C) and its humidity within 10% to 90%, non-condensing.
- Be accessible for installing, cabling and maintaining the devices.
- Allow the status LEDs to be clearly visible.
- Make sure the twisted-pair Ethernet cable is always routed away from power lines, radios, transmitters or any other electrical interference.
- Make sure that LGB5028A-R2, LGB5052A-R2 10Port Series Switch is connected to a separate grounded power outlet that provides 100 to 240 VAC, 50 to 60 Hz.

3.3 ETHERNET CABLING

To ensure proper operation when installing the switch into a network, make sure that the current cables are suitable for 100BASE-TX or 1000BASE-T operation. Check the following criteria against the current installation of your network:

- Cable type: We recommend using Unshielded twisted pair (UTP) or shielded twisted pair (STP) cable with RJ-45 connectors; Category 5 or Category 5e with maximum length of 328 feet (100 meters) for 100BASE-TX, and Category 5e or 6 with maximum length of 328 feet (100 meters) for 1000BASE-T.
- Protection from radio frequency interference emissions.
- Electrical surge suppression.
- Separation of electrical wires and data based network wiring.
- Safe connections with no damaged cables, connectors or shields.

CHAPTER 3: INSTALLING THE SWITCH

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3.4 MOUNTING THE SWITCH IN A 19-INCH RACK

Before rack mounting the switch, pay attention to the following factors:

◆ Temperature: Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range of 32 to 113° F (0 to 45° C).

◆ Mechanical Loading: Do not place any equipment on top of a rackmounted unit.

◆ Circuit Overloading: Be sure that the supply circuit to the rack assembly is not overloaded.

◆ Grounding: Rackmounted equipment should be properly grounded.

To rackmount devices:

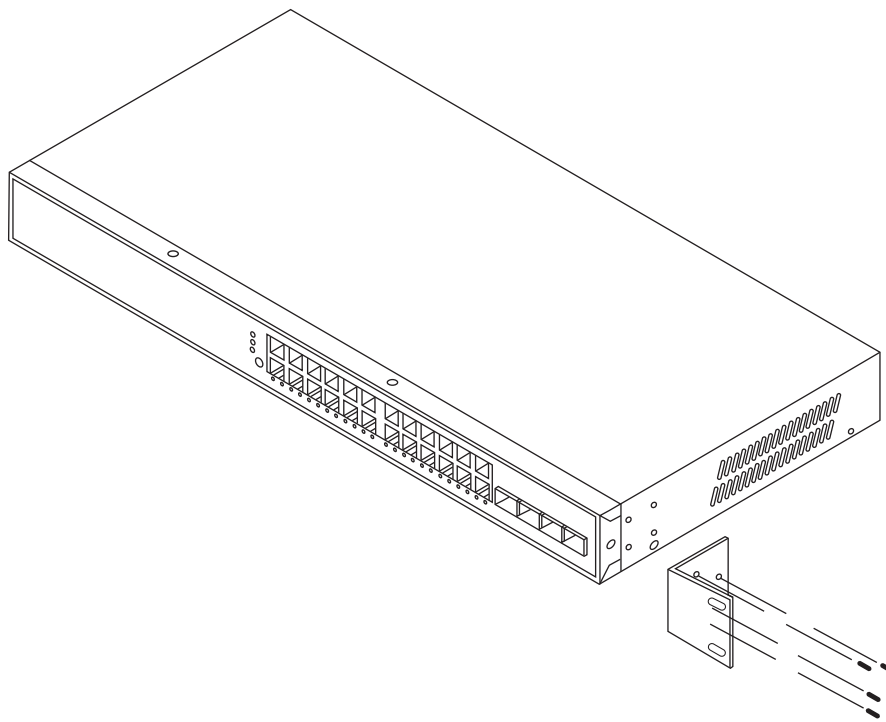**STEP 1:** Attach the brackets to the device using the screws provided in the rackmounting kit.

FIGURE 3-1. ATTACH THE MOUNTING BRACKETS

CHAPTER 3: INSTALLING THE SWITCH

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STEP 2: Mount the device in the rack (via the included rackmount kit), using four rackmounting screws (included). Be sure to secure the lower rack-mounting screws first to prevent the brackets being bent by the weight of the switch.
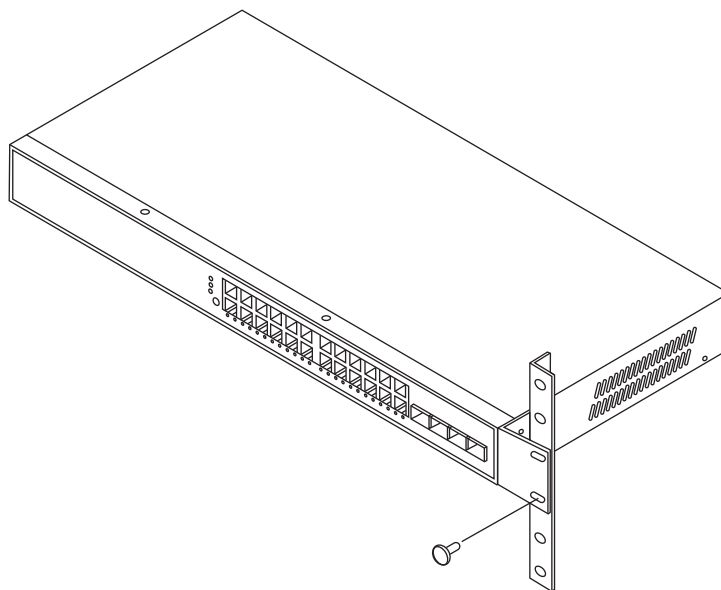

FIGURE 3-2. INSTALL THE SWITCH IN THE RACK

STEP 3: If installing a single switch only, go to Section 3.7, Connecting to a Power Source.

STEP 4: If installing multiple switches, mount them in the rack, one below the other, in any order.

3.5 MOUNTING THE SWITCH ON A DESK OR SHELF

STEP 1: Attach the four adhesive rubber feet to the bottom of the first switch.

STEP 2: Set the device on a flat surface near an AC power source, making sure there are at least two inches of space on all sides for proper air flow.

STEP 3: If installing a single switch only, go to Section 3.7, Connecting to a Power Source.

STEP 4: If installing multiple switches, attach four adhesive feet to each one. Place each device squarely on top of the one below, in any order.

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CHAPTER 3: INSTALLING THE SWITCH

3.6 INSTALLING AN OPTIONAL SFP TRANSCEIVER

You can install or remove an SFP transceiver from an SFP slot without having to power off the switch.

- The SFP slots are shared with the four 10/100/1000BASE-T RJ-45 ports. If an SFP transceiver is installed in a slot, the associated RJ-45 port is disabled and cannot be used.

- The SFP ports operate only at full duplex. Half duplex operation is not supported.

- Ensure the network cable is NOT connected when you install or remove an SFP transceiver.

CAUTION: Use only supported SFPs. Using incompatible SFPs may cause the switch to malfunction.

TABLE 3-1. COMPATIBLE SFP/SFP+ MODULES

PRODUCT CODE	DESCRIPTION
LFP411	SFP, 1250-Mbps Fiber with Extended Diagnostics, 850-nm Multimode, 550 m LC
LFP412	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Multimode, 2 km LC
LFP413	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 10 km LC
LFP414	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 30 km LC
LFP415	SFP with SerDes Interface, 1250 Mbps, RJ45, 1000BASE-T, Extended Diagnostics
LFP416	SFP with SGMII Interface, 1250 Mbps, RJ45, 10/100/1000BASE-T, Extended Diagnostics
LFP417	SFP with SerDes Interface, 1250 Mbps, RJ45, 1000BASE-T, Extended Diagnostics
LFP418	SFP, 1250-Mbps Fiber with Extended Diagnostics, 1550-nm Single-Mode, 80 km, LC
LFP420	SFP, 1250-Mbps Simplex Fiber with Extended Diagnostics, 1550-nm TX, 1310-nm RX, Single-Mode, 10 km, LC
LFP421	SFP, 1250-Mbps Simplex Fiber with Extended Diagnostics, 1310-nm TX, 1550-nm RX, Single-Mode, 10 km, LC
LFP401	SFP, 155-Mbps Fiber with Extended Diagnostics, 850-nm Multimode, 2 km, LC
LFP402	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Multimode, 2 km, LC
LFP403	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 30 km, LC
LPF404	SFP, 155-Mbps Fiber with Extended Diagnostics, 1310-nm Single-Mode, 60 km, LC

To install an SFP in the switch, follow these instructions:

STEP 1: Consider network and cabling requirements to select an appropriate SFP transceiver type.

STEP 2: Insert the transceiver with the optical connector facing outward and the slot connector facing down.

NOTE: SFP transceivers are keyed so they can only be installed in one orientation.

STEP 3. Slide the SFP transceiver into the slot until it clicks into place.

NOTE: SFPs are ordered separately.

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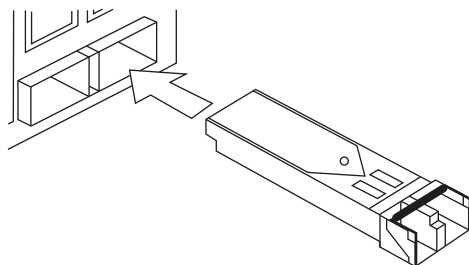**TECHNICAL**
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FIGURE 3-3. INSTALL THE SFP MODULE IN THE SWITCH

3.7 CONNECTING TO A POWER SOURCE

You can plug or remove power cord from AC power socket, to switch the power on and off.

WARNING: For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the socket type in your country.

Inserting the Power Cord into AC Power Socket

STEP 1: Insert the power cable plug directly into the AC socket located at the back of the switch.

STEP 2: Plug the other end of the cable into a grounded, 3-pin, AC power source.

STEP 3: Check the front-panel LEDs as the device is powered on to be sure the POWER LED is lit. If not, check that the power cable is correctly plugged in.
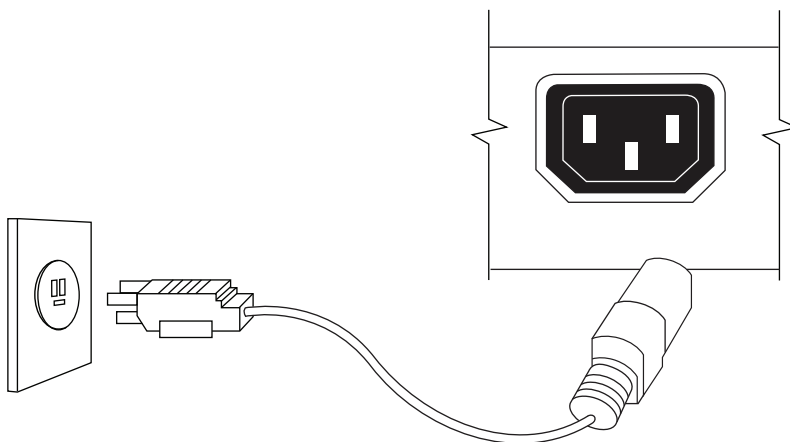

FIGURE 3-4. INSERTING THE POWER CORD INTO THE AC POWER SOCKET

3.8 CONNECTING TO THE CONSOLE PORT

The DB9 serial port on the LGB5028A-R2 switch's back panel is used to connect to the switch for out-of-band console configuration. The command-line-driven configuration program can be accessed from a terminal or a PC running a terminal emulation program. The pin assignments are shown below.

NOTE: The LGB5052A-R2 switch has an RJ-45 serial console port (not pictured) located on the front panel of the switch to the right of the SFP+ slots.
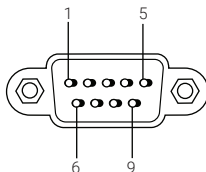
FIGURE 3-7. DB9 SERIAL PORT PINOUT FOR LGB5028A-R2

3.9 WIRING MAP FOR SERIAL CABLE (LGB5028A-R2 ONLY)

The DB9 cable is used for connecting a terminal or terminal emulator to the LGB5028A-R2 Managed Switch's RS-232 port to access the command-line interface. An RJ-45 cable (not pictured) is used to connect the LGB5052A-R2 switch to the terminal or emulator.

TABLE 3-2. SERIAL CABLE WIRING

FUNCTION	MNEMONIC	PIN
Carrier Detect	CD	1
Receive Data	RD	2
Transmit Data	TD	3
Data Terminal Ready	DTR	4
Signal Ground	GND	5
Data Set Ready	DSR	6
Request to Send	RTS	7
Clear to Send	CTS	8

NOTE: No other pins are used.
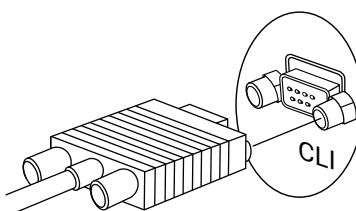
FIGURE 3-8. PLUG INTO THE CONSOLE PORT

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The serial port's configuration requirements are as follows:

- Default Baud rate: 115,200 bps

- Character Size: 8 Characters

- Parity: None

- Stop bit: One

- Data bits: 8

- Flow control: none

3.10 OPERATION OF WEB-BASED MANAGEMENT

The switch's default values are listed below:

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0
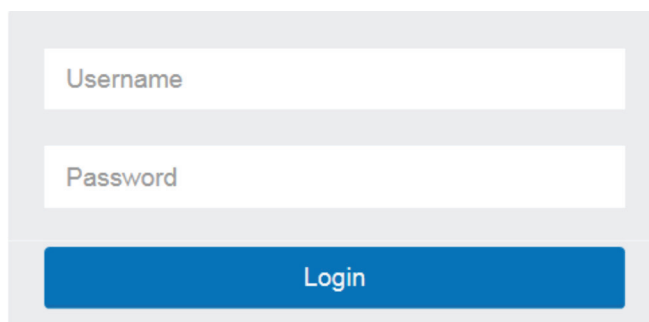
Default Gateway: 192.168.1.254

Username: admin

Password: <none> (Just press the Enter key.)

To access the web management of LGB5028A-R2, LGB5052A-R2 switch, enter the default IP Address in your web browser and press enter. e.g., http://192.168.1.1

Once you have entered the IP Address into the web browser, you will be prompted to enter a Username and Password in order to access the web management interface. Enter the default values as shown above.

FIGURE 3-9. LOGIN SCREEN

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CHAPTER 4: MAKING NETWORK CONNECTIONS

4.1 CONNECTING NETWORK DEVICES

The switch is designed to be connected to 10, 100 or 1000Mbps network cards in PCs and servers, as well as to other switches and hubs. It may also be connected to remote devices using optional SFP transceivers.

4.2 TWISTED-PAIR DEVICES

Each device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. Use Category 5, 5e or 6 cables for 1000BASE-T connections, Category 5 or better for 100BASE-TX connections.

4.3 CABLING GUIDELINES

The RJ-45 ports on the switch support automatic MDI/MDI-X pinout configuration, so you can use standard straight-through twisted-pair cables to connect to any other network device (PCs, servers, switches, routers, or hubs).

CAUTION: Do not plug a phone jack connector into an RJ-45 port. This will damage the switch. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

4.4 CONNECTING TO PCS, SERVERS, HUBS AND SWITCHES

STEP 1: Attach one end of a twisted-pair cable segment to the device's RJ-45 connector.
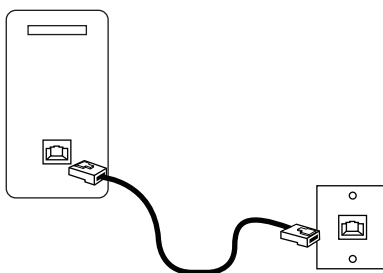
FIGURE 4-1. TWISTED=PAIR CONNECTION

STEP 2: If the device is a network card and the switch is in the wiring closet, attach the other end of the cable segment to a modular wall outlet that is connected to the wiring closet. (See Section 4.5, Network Wiring Connections.) Otherwise, attach the other end to an available port on the switch.

Make sure each twisted-pair cable does not exceed 328 feet (100 meters) in length.

NOTE: Avoid using flow control on a port connected to a hub unless it is actually required to solve a problem. Otherwise, back pressure jamming signals may degrade overall performance for the segment attached to the hub.

STEP 3: As each connection is made, the Link LED (on the switch) corresponding to each port will light green (1000 Mbps) or amber (100 Mbps) to indicate that the connection is valid.

CHAPTER 4: MAKING NETWORK CONNECTIONS

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4.5 NETWORK WIRING CONNECTIONS

A punch-down block is an integral part of many of the newer equipment racks. It is actually part of the patch panel. Instructions for making connections in the wiring closet with this type of equipment follows.

STEP 1: Attach one end of a patch cable to an available port on the switch, and the other end to the patch panel.

STEP 2: If not already in place, attach one end of a cable segment to the back of the patch panel where the punch-down block is located, and the other end to a modular wall outlet.

STEP 3: Label the cables to simplify future troubleshooting. See Chapter 5, Cable Labeling and Connection Records.
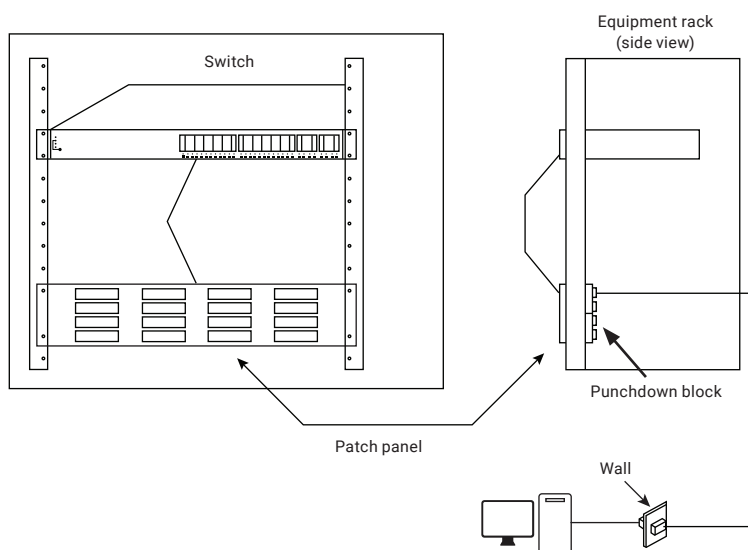
FIGURE 4-2. NETWORK WIRING CONNECTIONS

4.6 FIBER OPTIC SFP DEVICES

An optional Gigabit SFP transceiver can be used for a backbone connection between switches, or for connecting to a high-speed server.

Each single-mode fiber port requires 9/125 micron single-mode fiber optic cable with an LC connector at both ends. Each multimode fiber optic port requires 50/125 or 62.5/125 micron multimode fiber optic cabling with an LC connector at both ends.

WARNING: This switch uses lasers to transmit signals over fiber optic cable. The lasers are inherently eye safe in normal operation. However, users should never look directly at a transmit port when it is powered on.

WARNING: When selecting a fiber SFP device, considering safety, please make sure that it can function at a temperature that is not less than the recommended maximum operational temperature of the product. You must also use an approved Laser SFP transceiver.

CHAPTER 4: MAKING NETWORK CONNECTIONS

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STEP 1: Remove and keep the LC port's rubber plug. When not connected to a fiber cable, the rubber plug should be replaced to protect the optics.

STEP 2: Check that the fiber terminators are clean. You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little ethanol. Dirty fiber terminators on fiber optic cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port.

STEP 3: Connect one end of the cable to the LC port on the switch and the other end to the LC port on the other device. Since LC connectors are keyed, the cable can be attached in only one orientation.

STEP 4: As a connection is made, check the Link LED on the switch corresponding to the port to be sure that the connection is valid.

The fiber optic ports operate at 1 Gbps. The maximum length for fiber optic cable operating at Gigabit speed will depend on the fiber type in Section 4.8, 1000 Mbps Gigabit Ethernet Collision Domain.

4.7 CONNECTIVITY RULES

When adding hubs to your network, note that because switches break up the path for connected devices into separate collision domains, you should not include the switch or connected cabling in your calculations for cascade length involving other devices.

4.8 1000BASE-T AND FIBER CABLE REQUIREMENTS

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, it is recommended that for all critical connections, or any new cable installations, Category 5e or Category 6 cable should be used. The Category 5e and 6 specifications include test parameters that are only recommendations for Category 5. Therefore, the first step in preparing existing Category 5 cabling for running 1000BASE-T is a simple test of the cable installation to be sure that it complies with the IEEE 802.3-2005 standards. Fiber cable should meet the fiber standards shown in the following tables.

TABLE 4-1. MAXIMUM 1000BASE-T GIGABIT ETHERNET CABLE LENGTH

CABLE TYPE	MAXIMUM CABLE LENGTH	CONNECTOR
Category 5, 5e or 6 100-ohm UTP or STP	328 ft. (100 m)	RJ-45

TABLE 4-2. MAXIMUM 1000BASE-SX GIGABIT FIBER CABLE LENGTHS

CABLE TYPE	FIBER BANDWIDTH	MAXIMUM CABLE LENGTH	CONNECTOR
62.5/125 micron multimode fiber	160 MHz/km 200 MHz/km	722 ft. (220 m) 902 ft. (275 m)	LC LC
50/125 micron multimode fiber	400 MHz/km 500 MHz/km	1641 ft. (500 m) 1805 ft. (550 m)	LC LC

TABLE 4-3. MAXIMUM 1000BASE-LX/LHX/XD/ZX GIGABIT FIBER CABLE LENGTHS

CABLE TYPE	FIBER BANDWIDTH	MAXIMUM CABLE LENGTH	CONNECTOR
9/125 micron single-mode fiber, 1310 nm	N/A	6.2 mi. (10 km)	LC
9/125 micron single-mode fiber, 1550 nm	N/A	18.64 mi. (30 km) 31.06 mi. (50 km)	LC LC

TABLE 4-4. MAXIMUM 1000BASE-LX SINGLE FIBER GIGABIT FIBER CABLE LENGTHS

CABLE TYPE	FIBER BANDWIDTH	MAXIMUM CABLE LENGTH	CONNECTOR
Single-mode fiber: TX: 1310 nm; RX: 1550 nm	N/A	12.42 mi. (20 km)	BIDI LC
Single-mode fiber: TX: 1550 nm; RX: 1310 nm	N/A	12.42 mi. (20 km)	BIDI LC

TABLE 4-5. MAXIMUM FAST ETHERNET CABLE LENGTHS

CABLE TYPE	MAXIMUM CABLE LENGTH	CONNECTOR
Category 5, 5e or 6 100-ohm UTP or STP	328 ft, (100 m)	RJ-45

CHAPTER 5: CABLE LABELING AND CONNECTION RECORDS

When planning a network installation, it is essential to label the opposing ends of cables and to record where each cable is connected. This will allow the user to easily locate inter-connected devices, isolate faults and change your topology without need for unnecessary time consumption.

To best manage the physical implementations of your network, follow these guidelines:

- Clearly label the opposing ends of each cable.
- Using your building's floor plans, draw a map of the location of all network-connected equipment. For each piece of equipment, identify the devices to which it is connected.
- Note the length of each cable and the maximum cable length supported by the switch ports.
- For ease of understanding, use a location-based key when assigning prefixes to your cable labeling.
- Use sequential numbers for cables that originate from the same equipment.
- Differentiate between racks by naming accordingly.
- Label each separate piece of equipment.
- Display a copy of your equipment map, including keys to all abbreviations at each equipment rack.

CHAPTER 6: TROUBLESHOOTING

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BASIC TROUBLESHOOTING TIPS

Most problems are caused by the following situations. Check for these items first when starting your troubleshooting:

◆ Connecting to devices that have a fixed full- duplex configuration.

The RJ-45 ports are configured as "Auto." That is, when connecting to attach devices, the switch will operate in one of two ways to determine the link speed and the communication mode (half duplex or full duplex):

- If the connected device is also configured to Auto, the switch will automatically negotiate both link speed and communication mode.

- If the connected device has a fixed configuration, for example 100 Mbps, at half or full duplex, the switch will automatically sense the link speed, but will default to a communication mode of half duplex.

Because the switch devices behave in this way (in compliance with the IEEE802.3 standard), if a device connected to the switch has a fixed configuration at full duplex, the device will not connect correctly to the switch. The result will be high error rates and very inefficient communications between the switch and the device.

Make sure all devices connected to the switch devices are configured to auto negotiate, or are configured to connect at half duplex (all hubs are configured this way, for example).

◆ Faulty or loose cables. Look for loose or obviously faulty connections. If they appear to be OK, make sure the connections are snug. If that does not correct the problem, try a different cable.

◆ Non-standard cables. Non-standard and miswired cables may cause network collisions and other network problems, and can seriously impair network performance. Use a new correctly-wired cable. For pinouts and correct cable wiring. A category 5 cable tester is a recommended tool for every 100BASE-TX and 1000BASE-T network installation.

◆ Improper Network Topologies. It is important to make sure you have a valid network topology. If you no longer experience the problems, the new topology is probably at fault. In addition, you should make sure that your network topology contains no data path loops.

◆ Check the port configuration.

A port on your Switch may not be operating as you expect because it has been put into a " blocking" state by Spanning Tree, GVRP (automatic VLANs), or LACP (automatic trunking). (Note that the normal operation of the Spanning Tree, GVRP, and LACP features may put the port in a blocking state.) Or, the port just may have been configured as disabled through software.

The following table provides information for users to easily troubleshoot problems by taking actions based on the suggested solutions.

TABLE 4-1. TROUBLESHOOTING

SYMPTOM	ACTION
Power LED is OFF	Check connections between the switch, the power cord and the wall outlet.
	Contact Black Box Technical Support at 877-877-2269 or info@blackbox.com
Link LED is OFF	Verify that the switch and attached device are powered on.
	Be sure the cable is plugged into the switch and corresponding device.
	If the switch is installed in a rack, check the connections to the punch-down block and patch panel.
	Verify that the proper cable types is used and its length does not exceed specified limits.
	Check the adapter on the attached device and cable connections for possible defects. Replace the defective adapter or cable if necessary.

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7.1 INSTALLATION

If the power indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply. If the unit powers off after running for a while, check for loose power connections, power losses or surges at the power outlet. If you still cannot isolate the problem, the internal power supply may be defective. Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (such as the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly

7.2 IN-BAND ACCESS

You can access the management agent in the switch from anywhere within the attached network using Telnet, a web browser. You must first configure the switch with a valid IP address, subnet mask, and default gateway. If you have trouble establishing a link to the management agent, check to see if you have a valid network connection. Then verify that you entered the correct IP address. Also, be sure the port through which you are connecting to the switch has not been disabled. If it has not been disabled, then check the network cabling that runs between your remote location and the switch.

NOTE: The management agent accepts up to four simultaneous Telnet sessions. If the maximum number of sessions already exists, an additional Telnet connection will not be able to log into the system.

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CHAPTER 8: SPECIFICATIONS

SPECIFICATIONS

Physical Characteristics	
Connectors	LGB5028A-R2: (24) 10/100/1000 Mbps UTP, (4) 1 G/10Gbps SFP+, (1) DB9M console port; LGB5052A-R2: (48) 10/100/1000 Mbps UTP, (4) 1 G/10Gbps SFP+, (1) RJ-45 console port

Network Interface	LGB5028A-R2:
	  Ports 1-24: RJ-45 connector, auto MDI/X;
	    10BASE-T: RJ-45 (100-ohm, UTP cable; Category 3 or better);
	    100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better);
	    1000BASE-T: RJ-45 (100-ohm, UTP or STP cable; Category 5, 5e or 6)
	    *Maximum Cable Length - 328 ft. (100 m)
	  Ports 25 to 28: 10G/10G SFP+ ports;
	LGB5052A-R2:
	  Ports 1-48: RJ-45 connector, auto MDI/X;
	    10BASE-T: RJ-45 (100-ohm, UTP cable; Category 3 or better);
	    100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better);
	    1000BASE-T: RJ-45 (100-ohm, UTP or STP cable; Category 5, 5e or 6)
	    *Maximum Cable Length - 328 ft. (100 m)
	  Ports 49 to 52: 10G/10G SFP+ ports

Buffer Architecture	4096 bytes on-chip frame buffer
Aggregate Bandwidth	LGB5028A-R2: 128 Gbps; LGB5052A-R2: 176 Gbps
Switching Database	32K MAC address entries
LEDs	System: (1) Power: Per TP port: (1) Status (Link/Act), (1) 10/100/1000 M; Per SFP+ port: (1) Status (Link/Act/Speed), (1) 1G/10G
Dimensions	1.7"H x 17.4" x 8.3"D (4.4 x 44.2 x 21.1 cm)
Power Requirements	
Power Supply	100 to 240 VAC, 50 to 60 Hz
Environmental	
Operating Temperature	32 to 113° F (0 to 45° C)
Operating Humidity	10 to 90%, noncondensing
Switch Features	
Flow Control	Full duplex: IEEE 802.3x; Half duplex: Backpressure
Forwarding Mode	Store-and-forward
Throughput	LGB5028A-R2: 95.232 Mpps; LGB5052A-R2: 130.95 Mpps
Management Features	
In-Band Management	SSH/SSL, Telnet, SNMP or HTTP
Out-of-Band Management	LGB5028A-R2: DB9M console port (located on the back panel of the switch); LGB5052A-R2: RJ-45 console port (located on the front panel of the switch to the right of the SFP+ slots)
Software Loading	HTTP, TFTP in-band, console out-of-band

CHAPTER 8: SPECIFICATIONS

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SPECIFICATIONS (CONTINUED)

Approvals	
Standards	IEEE 802.3 => 10BASE-T Ethernet (Twisted-pair Copper) IEEE 802.3u => 100BASE-TX Ethernet (Twisted-pair Copper) IEEE 802.3ab => 1000BASE-TX Ethernet (Twisted-pair Copper) IEEE 802.3z => 1000BASE-X Ethernet IEEE 802.3x => Flow Control Capability ANSI/IEEE 802.3 => Auto-negotiation IEEE 802.1Q => VLAN IEEE 802.1p => Class of Service IEEE 802.1X => Access Control" IEEE 802.1D => Spanning Tree IEEE 802.1w => Rapid Spanning Tree IEEE 802.1s => Multiple Spanning Tree IEEE 802.3ad => ink Aggregation Control Protocol (LACP) IEEE 802.1AB => Link Layer Discovery Protocol (LLDP)
Emissions	EN55022 (CISPR 22) Class A EN 61000-3 FCC Class A CE Mark
Immunity	EN 61000-4-2/3/4/5/6/8/11 EN 55024

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APPENDIX A: REGULATORY INFORMATION

A.1 FCC STATEMENT

This equipment has been 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

APPENDIX A: REGULATORY INFORMATION

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A.2 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:
    A: El cable de poder o el contacto ha sido dañado; u
    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    C: El aparato ha sido expuesto a la lluvia; o
    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    E: El aparato ha sido tirado o su cubierta ha sido dañada.

APPENDIX B: DISCLAIMER/TRADEMARKS

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B.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

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