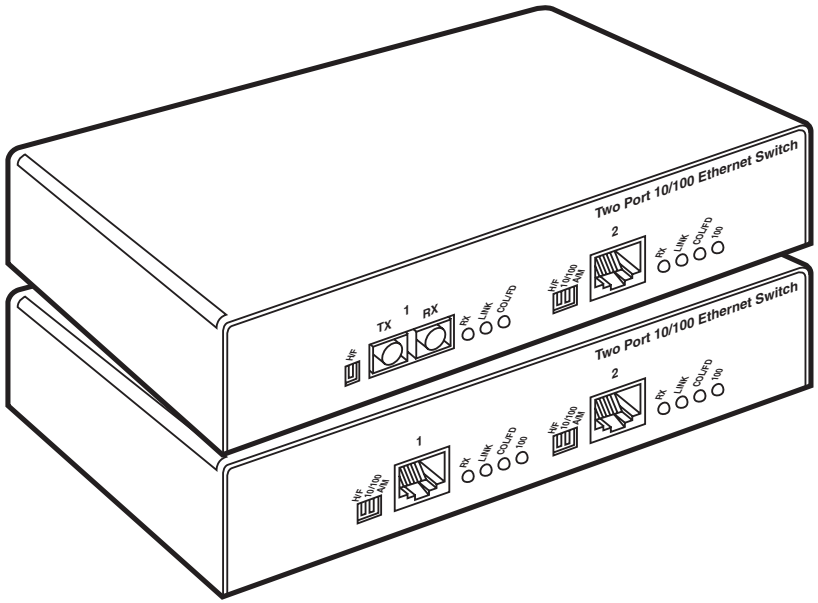
BLACK BOX®
NETWORK SERVICES

OCTOBER 1997
LB9801A
LB9802A
LB9803A
LB9804A

Two-Port 10/100 Ethernet Switches

Dual 10/100 UTP Port

10/100 UTP Port with (1) 100BASE-FX Port



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate 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 communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

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.

TRADEMARKS USED IN THIS MANUAL

UL is a registered trademark of Underwriters Laboratories Incorporated.

Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

CE MARK

The CE mark symbolizes compliance with the European Community's EMC directive. The Two-Port 10/100 Ethernet Switches meet or exceed these technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment"
- EN 50082-1 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial and light industry"
- IEC 801-2 — "Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements"—Severity level 3
- IEC 801-3 — "Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiated electromagnetic field requirements"—Severity level 2
- IEC 801-4 — "Electromagnetic compatibility for industrial-process measurement and control equipment Part 4: Electrical fast transient/burst requirements"—Severity level 2
- CISPR 22 — Radiated and Line-conducted Class A
- EN 60950 — ITE Safety

Contents

1. Specifications

Speed —	10/100 Mbps
Duplex Support —	Half and full
Compatibility —	IEEE 802.3; IEEE 802.3u (Fast Ethernet standard)
Connectors —	LB9801A: (2) RJ-45 10/100 autosensing; LB9802A: (1) RJ-45 10/100 autosensing, (1) fiber for multimode; LB9803A–04A: (1) RJ-45 10/100 autosensing, (1) fiber for single mode
Diagnostics —	LINK (*Green*): ON when another 10BASE-T hub or NIC is connected to the port; RX (*Green*): ON indicates receive data from a connected hub or NIC card; COL/FD: *Yellow*, port is in a collision state; *Green*, port is configured for full-duplex communication; 100 (UTP) [*Green*]: ON indicates port configured for 100 Mbps
Standards Compliance —	UL® 1950; CSA 22.2 No 950; VCCI; FCC Part 15, Class A; CE EN 60950
Mounting —	19" rack mounting for up to 2 units
Operating Temperature —	32 to 104°F (0 to 40°C)
Storage Temperature —	14 to 122°F (-10 to +50°C)
Humidity —	Up to 85% maximum, noncondensing
Power —	100–240 VAC, 50–60 Hz, 1 amp maximum at 220V
Size —	1.8"H x 8"W x 10"D (4.6 x 20.3 x 25.4 cm)
Weight —	2.3 lb. (1 kg)

Optical —	*LB9802A*	*LB9803A*	*LB9804A*
Distances (km)	0 to 2	0 to 18	17 to 40
Fiber Mode	MM	SM	SM
Fiber Attenuation (dB)	3	0.4	0.4
Output Power Range (dBm)	-19 to -14	-19 to -14	-10 to -7
Receiver Sensitivity (dBm)	-30	-30	-30
Receiver Saturation (dBm)	-14	-14	-14
Optical Power Budget (dB)	11 to 16	11 to 16	20 to 23

2. Introduction

2.1 Description

The Two-Port 10/100 Ethernet Switches are standalone, dual-port Ethernet-to-Fast-Ethernet switches. In addition to enabling 10/100-Mbps and 100/100-Mbps switching, the Switches can also extend the diameter of Fast Ethernet networks up to 100 km.

The Two-Port 10/100 Ethernet Switch is available in both a UTP and a fiberoptic version. Each copper port on the Two-Port 10/100 Ethernet Switch offers IEEE standard NWay auto-negotiation and is configurable for either half-duplex (for a 100-Mbps shared connection) or full-duplex (for a 200-Mbps point-to-point collision-free connection). Each fiber port is configurable for only a 100-Mbps half-/full-duplex connection.

The Two-Port 10/100 Ethernet Switch uses self-learning of network addresses, and filters local traffic, collisions and error packets.

2.2 Features

- Complies with IEEE 802.3 and IEEE 802.3u standards.
- Uses UTP, multimode, or single-mode DSC connectors.
- Up to 110 km over single-mode fiber.
- Full-/half-duplex operation on all ports and speeds.
- NWay auto-negotiation for automatic speed and duplex configuration (UTP only).
- Plug-and-play installation and support for all network operating systems and protocols.
- Status LEDs indicate switch operations for easy maintenance.

3. Applications

Figures 3-1 and 3-2 illustrate some of the Switch's application possibilities. Connections can include 10-Mbps and 100-Mbps servers, a Fast Ethernet backbone, 10/100-Mbps hubs or individual stations, all functioning in half-/full-duplex mode. The medium can be either 10BASE-T/100BASE-TX UTP or 100BASE-FX fiber. The various fiber modules offer distance extensions in a 2-km to 110-km range (1.2 to 68.4 miles).

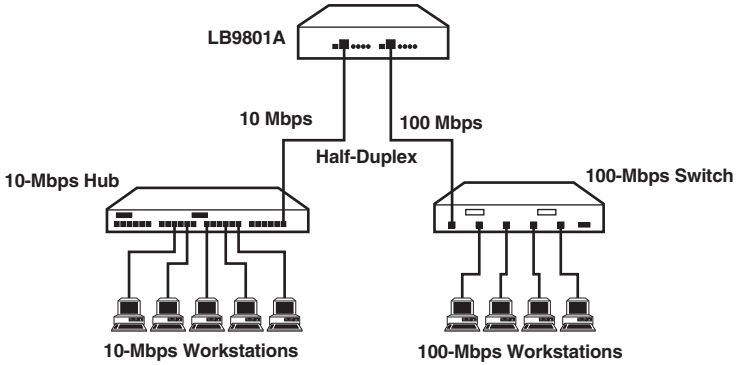


Figure 3-1. LB9801A.

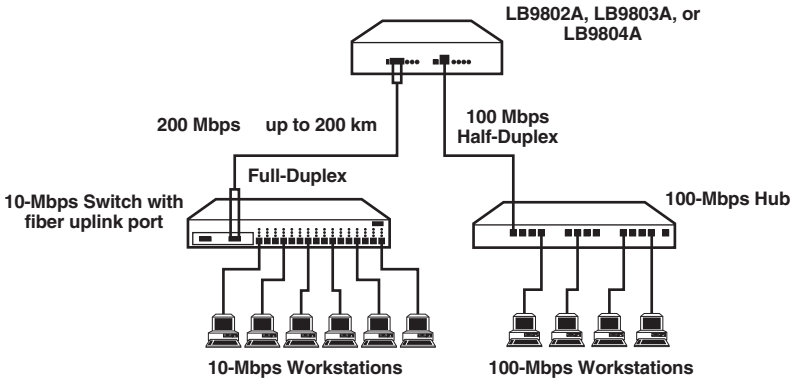


Figure 3-2. LB9802A, LB9803A, or LB9804A.

4. Installation and Setup

Two-Port 10/100 Ethernet Switches are standalone units designed for 19" rack mounting. LED indicators help with installation and maintenance. Figures 4-1 and 4-2 show the front panels of the different models.

4.1 Front Panels

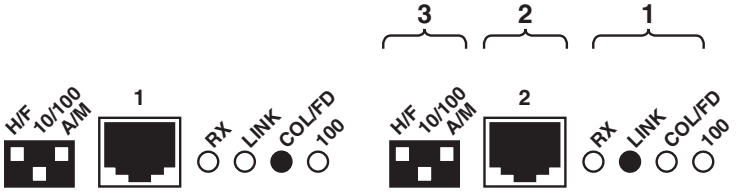


Figure 4-1. Front panel—LB9801A.

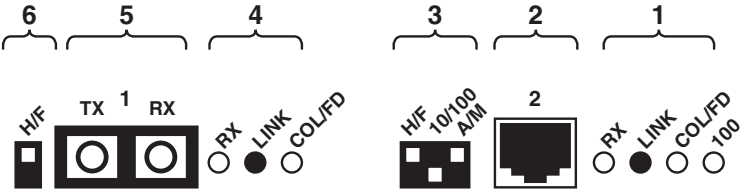


Figure 4-2. Front panel—LB9802A, LB9803A, and LB9804A.

4.2 LEDs

Group 1 Right of UTP port (2); 10/100BASE-TX port LEDs

RX	Data is being received from a connected hub or NIC card.
LINK	Indicates connection to another switch, a hub, or a NIC.
COL/FD	Bi-color LED. *Yellow*: port is in collision state. *Green*: port is configured for full-duplex communication.
100	Port is configured for 100 Mbps (UTP connection only).

Group 4 Right of fiberoptic port (5); 100BASE-FX port LEDs

These LEDs have the same functions as the Group 1 LEDs with the same names.

4.3 DIP Switches

The DIP switches change port configuration only during power-up.

In order to work in a fixed-rate mode, **A/M** (auto-negotiation/manual) must be set to **UP**. Then set **H/F** (Duplex) and **10/100** (Rate) to 10 half-, 10 full-, 100 half-, or 100 full-duplex modes.

To work in auto-negotiation mode, **A/M** must be set to **DOWN**. Then **H/F** can be set to the desired duplex mode (half/full).

4.4 Copper Port

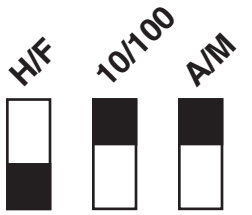


Figure 4-3. Copper port default configuration: 100 half-duplex mode.

Group 3

	H/F Duplex	10/100 Rate	A/M Auto/Manual
UP	Full	100	Manual
DOWN	Half	10	AutoNeg

4.5 Fiber Port

Figure 4-4. Fiber port default configuration: 100 half-duplex mode.

Group 6

	H/F Duplex
UP	Full
DOWN	Half

WARNING

Activating both auto-negotiation and full-duplex modes of operation is not defined by the IEEE 802.3u standard and may lead to unpredictable results.

5. Troubleshooting

The Two-Port 10/100 Ethernet Switches are highly reliable. However, if a problem occurs, follow the steps below.

5.1 Problems

1) *Symptom:* None of the LEDs light or blink.
   Cause: The Switch isn't getting power or isn't working properly.
   Action: First, make sure the power cord is plugged in firmly. Make sure the outlet works. If the cord and outlet are fine, call Black Box about getting a replacement Switch.

2) *Symptom:* The LINK LED does not light when…

Copper Port

a) …the port is configured through DIP switches for 10 Mbps, no auto-negotiation, with a connection to a 10-Mbps PC adapter.

b) …the port is configured through DIP switches for 100 Mbps, no auto-negotiation, with a connection to a 100-Mbps PC adapter.

c) …the port is configured through DIP switches for 10 Mbps, no auto-negotiation, with a connection to a 10-Mbps hub.

d) …the port is configured through DIP switches for 100 Mbps, no auto-negotiation, with a connection to a 100-Mbps hub.

Cause: For a) and b), cable is *not* crossed or not connected securely.
For c) and d), cable *is* crossed or not connected securely.

Action: Check cable connections in all four cases.

Fiber Port

…the Two-Port 10/100 Ethernet Switch's port is connected to the fiberoptic port of any 100-Mbps hub or switch.

Cause: a) Fiberoptic cable is not connected securely.
b) The Two-Port 10/100 Ethernet Switch is defective.

Action: a) Check cable connections.
b) Replace the Two-Port 10/100 Ethernet Switch.

3) *Symptom:* Copper port is configured through DIP switches to 100 Mbps, half-/full-duplex; 100 LED does not light.
   Cause: LED isn't working properly.
   Action: Call Black Box about getting a replacement Switch.

4) *Symptom:* COL/FD LED does not light Green when the copper/fiber port is configured through DIP switches to full-duplex (with/without auto-negotiation).
Cause: LED isn't working properly.
Action: Call Black Box about getting a replacement Switch.

5.2 Calling Black Box

If you determine that your Two-Port 10/100 Ethernet Switch is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at (724) 746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

5.3 Shipping and Packaging

If you need to transport or ship your Two-Port 10/100 Ethernet Switch:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Two-Port 10/100 Ethernet Switch for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Materials Authorization (RMA) number.

NOTES

1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746