BLACK BOX®
NETWORK SERVICES

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Max Express Ethernet Switch
17 Ports 10/100Base-TX/FX
Base Unit: LB9217A-R2
Modules:
LB9213A, LB9214A, LB9215A
LB9216A, LB9218A, LB9219A
LB9220C-ST, LB9220C-SC

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FEDERAL COMMUNICATIONS COMMISSION AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
RADIO FREQUENCY INTERFERENCE STATEMENT

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 B 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 the Canadian Department of Communications.

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 le ministère des Communications du Canada.

Normas Oficiales Mexicanas (NOM)
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.

Preface

This manual describes how to install and use the 17-Port modular Fast Ethernet Switch LB9217A. The switch introduced here is a base unit providing 3 expansion slots, including two slots for 8-port modules and one slot for single-port module. The 8-port modules allow for 10/100BaseT/TX or 100BaseFX; the single-port module allows for 100BaseFX. Over a dozen of TX and FX modules or a combination of TX/FX are available for fitting the switch. Furthermore, the 17-Port Switch supports port-based VLAN and MAC-based trunking technologies.

To get the most out of this manual, you should have an understanding of networking concepts such as bridging, IEEE 802.3u 100BaseTX/FX Fast Ethernet, and local area networks (LANs).

In this manual, you will find:

- Features on the 17-Port Switch: LB9012A-R2
- Illustrative LED functions
- Installation instructions
- Configuration instructions for VLAN & trunking
- Specifications

Table of Contents

Introduction

LB9217A: 17-Port Modular Fast Ethernet Switch

The 17-Port Switch is a modular switch consisting of three expansion slots: two for 8-port 10/100BaseTX/FX module, and one for 1-port 100BaseFX module. This allows the switch to provide up to 17 ports when all the three slots are fit with modules.

Cost-Effective Migration

The 17-Port Switch is capable of integrating legacy 10Mbps networks with 100Mbps Fast Ethernet networks. In addition, the 17-Port Switch provides an easy and affordable solution for migrating from copper cabling to fiber connection when it is equipped with suitable modules to provide both TX and FX ports.

Flexibility through Modules

Seeing fiber connection become popular while the fiber cabling in small business environment is still not widespread, the 17-Port Switch is designed to deliver flexibility through a wide variety of TX and FX modules. Most of the modules combine TX and FX ports to provide more customization options.
<NOTE>　　Desired module shall be ordered separately.

Fiber-Connectivity

As a Fast Ethernet switch, the 17-Port Switch is specifically designed to meet the demanding need for fiber. The switch provides up to 17 ports for 100BaseFX, multi-mode or single-mode fiber. For multi-mode fiber port, it allows SC, ST, MT-RJ, VF-45 or LC connector. For single-mode fiber port, it allows SC connector only. The fiber ports allow maximum segment distance of 75 km when using single-mode fiber, and therefore, the 17-Port Fiber Switch is an optimum solution for long distance connection.

Basic Configuration Features

The 17-Port Switch supports port-based Virtual Local Area Networking (VLAN) and MAC-based trunking technologies. Such advanced features bring network administrators a powerful yet easy-to-use tool to reduce unnecessary traffic, efficiently segment the network, and enhance network security.

Standards Compliant

The 17-Port Switch fully complies with IEEE802.3 10BaseT as well as IEEE802.3u 100BaseTX/FX standards.

Product Features

- Base unit with three expansion slots
- Auto-negotiation for speed and duplexity on TX ports
- True non-blocking architecture
- Full wire-speed forwarding rate
- Store-and-forward mechanism
- Back-pressure and IEEE 802.3x compliant flow control
- Supports 8K MAC addresses
- Supports 4M bits buffer memory
- Front panel reset button
- Front panel port status LEDs
- Standard 19" rack-mount size, one-unit-height

Modules:
- Allows two 8-port expansion modules: each of up to eight ports for 10/100BaseTX or 100BaseFX
- Supports auto-MDIX on TX ports of 8-port expansion module
- Allows one single-port expansion module: one port for 100BaseFX

Connectors:
- Choices of SC, ST, MT-RJ, VF-45, or LC connectors for 100BaseFX multi-mode fiber module
- SC connector allowed for 100BaseFX single-mode fiber module

Basic Configuration Support:
- Supports port-based VLAN & MAC-based Trunking
- Programmable re-configuration for fixed speed and duplexity

Packing List

When you unpack this product package, you will find the items listed below.
Please inspect the contents, and report any apparent damage or missing items
immediately to our authorized reseller.

- The 17-Port Switch
- User's Manual
- AC power cord
- RS232 cable
- Rack Mount Ears with screws

Front Panel for Base Unit

The front panel of the 17-port Switch consists of three expansion slots to house
two 8-port modules and one single-port module.

An array of LED indicators on each module provides you with instant feedback on
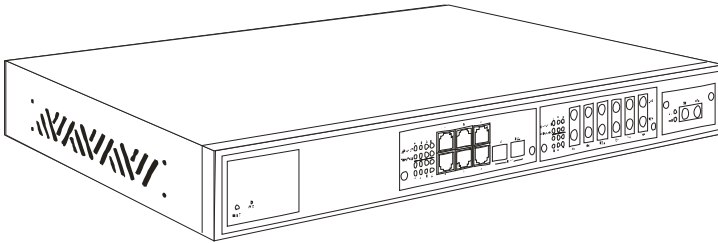the status of the switch.

Figure 1: Front View of 17-Port Modular Switch

Modules

There are total 8 different modules available to choose that fit best with your network environment needs. Please see the table below for detailed information.
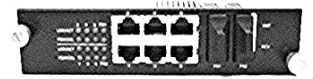
| Module Name	10/100RJ45 copper	multi-mode fiber
LB9213A	8	0
LB9214A	0	8 (ST)
LB9215A	0	8 (SC)
LB9216A	6	2 (ST)
LB9218A	6	2 (SC)
LB9219A	4	4 (SC)
LB9220C-ST	0	1(ST)
LB9220C-SC	0	1 (SC)

LB9213A: 8-port 10/100Base TX

LB9215A: 8-port 100Base multi-mode FX with SC type connector. ST type connector is available in LB9214A.

LB9218A: 6-port 10/100Base TX & 2-port 100Base FX with SC type connector. ST type connector is available in LB9214A.
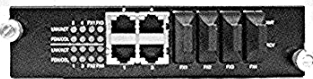
LB9219A: 4-port 10/100Base TX & 4-port 100Base FX with SC type connector. Due to the space constrain, there is no ST type connector available in this kind of module.

LB9220C-SC: 1-port 100Base FX with SC type connector. ST type connector is available in LB9220C-ST.

Note: All the copper (TX) ports here are auto MDIX and can be connected to another switch or hub with straight or crossover cable

Module Installation

There are two sets of different modules available for LB9217A-R2, the base unit for Max Express Ethernet Switch. Modules LB9213A~LB9219A are equipped with 8 ports TX/FX while LB9220C-ST & LB9220C-SC are designed with one fiber port to meet different needs in your network environment. Please see page 9 for detailed information.
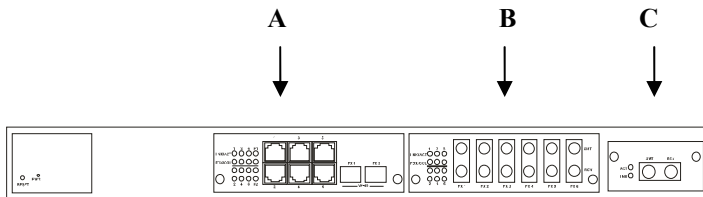
A　　　　　　　**B**　　　　　**C**

Figure 2: Position A & B are designed for 8-port module, position C is for single port module only

Step by Step Installation for 8-port Module:
LB9213A, LB9214A, LB9215A, LB9216A, LB9218A, LB9219A

1. Remove the module from the static-free container.
2. Unscrew the cover plate(s) from base unit on position A and or B.
3. Remove the plate and keep it for future use if modules need to be removed later on.
4. With the power off, slide the module(s) into the desired slot, following the internal plastic guide rails.
5. Once it is slid in fully, snap in the module to make a proper connection and fasten the screws.

<NOTE> Before you start with any installation, ensure that the power is off. The module is not hot swappable.

Step by Step Installation for Single Port Module:
LB9220C-ST & LB9220C-SC

1. Remove the module from the static-free container.
2. Unscrew the cover plate(s) from base unit on position C.
3. Remove the plate and keep it for future use if the module needs to be detached later on. **Keep the screws for the installation. Unlike 8-port module, screws are not attached on single port module.**
4. With the power off, slide the module(s) into the desired slot, following the internal plastic guide rails.
5. Once it is slid in fully, snap in the module to make a proper connection and fasten the screws that obtained from removing the original plate.

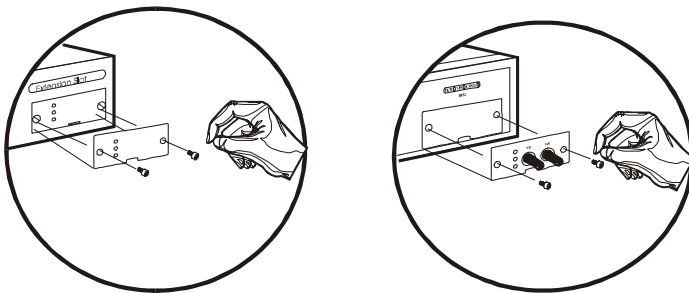**<NOTE> Before you start with any installation, ensure that the power is off. The module is not hot swappable.**

Figure 3: Removal of cover plate   Fiber module being installed

LEDs & Reset Button

The array of LED indicators on the front panel conveys status and configuration information to help you monitor and troubleshoot the switch.
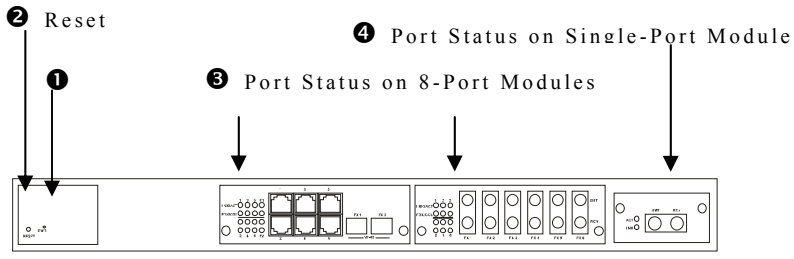

Figure 4: LED & Button Indicators on the 17-Port Switch

❶ Power
This LED comes on when the switch is connected to power and turned on.

❷ Reset Button
If the switch should become unresponsive, you may reset it by pressing this button.

❸ Port Status on 8-Port Modules
The front panel of the 17-Port Switch allows two 8-port modules. The ports numbered from 1 to 8 on full TX module.

The LEDs are located at the left side of each section, displaying status for each respective port. Please refer to Table 1 for more details.

Table 1: Port Status

LED	State	Indication
LNK/ACT	Steady	A valid network connection established. LNK stands for LINK.
	Flashing	Transmitting or receiving data. ACT stands for ACTIVITY.
FDX/COL	Steady	Connection in full duplex mode. FDX stands for FULL-DUPLEX.
	Flashing	Collision occurred. COL stands for COLLISION.
	Off	Connection in half-duplex mode.

❹ Port Status on Single-Port Module

A set of three LEDs conveys the port status on the single-port module. Consult Table 2 for details.

Table 2: Port status on single-port Module

LED	State	Indication
100/TX	Steady	A valid 100Mbps network connection established. 100 stands for 100Mbps.
	Flashing	Transmitting data. TX stands for TRANSMIT.
10/RX	Steady	A valid 10Mbps network connection established. 10 stands for 10Mbps.
	Flashing	Receiving data. RX stands for RECEIVE.
FDX/COL	Steady	Connection in full duplex mode. FDX stands for FULL-DUPLEX.
	Flashing	Collision occurred. COL stands for COLLISION.

Ports

Up to 17 Ports

The 17-Port Switch provides up to 17 ports for 10/100BaseTX or 100BaseFX, etc.

Multi-Connectivity

The 8-port modules allow for 10/100BaseTX or 100BaseFX, and the single-port modules allow for 100BaseFX.

For 100BaseFX modules, the multi-mode fiber ports accommodate ST, SC, MT-RJ, VF-45, or LC connector, and the single-mode fiber ports accommodate SC connector only.

Longer Segment Distance

The maximum connection distance between a node and a switch port is up to 75 km over single-mode fiber for 100BaseFX networks. For information on the cables for fiber module installation, please refer to Table 3.

Switch Configuration

This section explains the configuration of VLAN and trunking settings.

Setting up Console Port Connection

To configure your switch through the console port, it is necessary to first configure a terminal emulation program. The HyperTerminal for Windows 95, 98, and NT is suggested.

- First, check the switch, cables, and computers for proper installation before configuration.

- Connect a PC or any VT100 compatible terminal to the console port on the back of the unit using one RS232 serial cable. Turn on both end devices.

- Configure the baud rate and character format of the terminal or PC to match the default settings shown below.

Console Port Default Settings

Terminal type	VT100
Port type	(COM 1~4)
Communication Mode	8 data bits, 1 stop bit, no parity baud rate of 9600bps (for initial configuration)
Flow Control	Yes
Hardware Compression	N/A

Main Menu

This main menu shows you the default configuration of the switch.
By default, all TX ports are set at auto-negotiation and flow control on, all FX ports are set at 100Mbps with full duplex and flow control off, and all ports are grouped into V1 (VLAN group 1).

These are the valid commands; capitalization is not required:

[W]	Move the cursor up
[S]	Move the cursor down
[A]	Move the cursor to the left
[D]	Move the cursor to the right
[R]	Default
[V]	Routing
[SPACE]	Option
[ENTER]	Apply and save the setting
[ESC]	Abort

Port Settings

The duplex mode and speed can be altered and the flow control can be turned on/off to accommodate special needs.

Follow these steps to change the speed/duplex mode setting or to toggle flow control ON/OFF:

* Move the cursor to **MODE** column to change the speed/duplex mode setting, or move the cursor to **FLW** column to change the flow control setting
* Move the cursor and select a port
* Press **[SPACE]** and select a desired setting from the list that appears on the screen
* Press **[ENTER]** to apply and save the setting

FX Ports

The port setting for the fiber module is slightly different from the TX port. Consult the following table for a brief description on FX ports:

Table 4: Mode Setting on FX Ports

Communication Mode	Description
Flow control	Always N (off) and can not be changed
100FD	100Mbps at full duplex mode
100HD	100Mbps at half duplex mode

TX Ports

Consult the following table for a brief description on TX ports:

Table 5: Mode Setting on TX Ports

Communication Mode	Description
Flow control on / off	Y (on) / N (off)
Auto	Auto-Negotiation
100FD	100Mbps at full duplex mode
100HD	100Mbps at half duplex mode
10FD	10Mbps at full duplex mode
10HD	10Mbps at half duplex mode

Port-based VLAN & Settings

The 17-Port Switch allows up to sixteen port-based VLAN domains. Assign each port to a VLAN group or a couple of VLAN groups according to accessibility needs.

The VLAN setting: follow these steps to assign VLAN groups.
- Move the cursor to **VLAN1 ~ 16** column
- Move the cursor and select a port
- Press **[SPACE]** and show **V** to the desired port
- Press **[ENTER]** to apply and save the setting

For example, here we have the port 17 assigned as routing (uplink) port. The port 1 ~ port 16 are divided into five different VLAN groups (VLAN 1, 2, 3, 4, and 5).
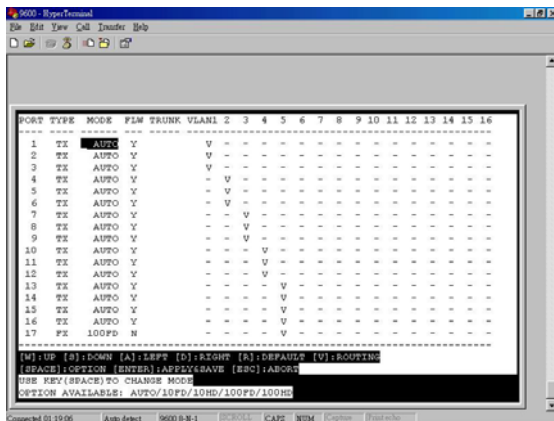
VLAN 1: port 1, 2, 3
VLAN 2: port 4, 5, 6
VLAN 3: port 7, 8, 9
VLAN 4: port 10, 11, 12
VLAN 5: port 13, 14, 15, 16, 17

For example, the port 1, 2, and 3 (VLAN 1) can not communicate with the port 4, 5, and 6 (VLAN 2).

The routing (uplink) port setting: follow these steps to have an assigned routing (uplink) port. Then separate the rest each port to a different VLAN group. The rest each port can only uplink through the assigned routing (uplink) port and can't communicate with each other.
- Enter **[V]** from the Main Menu
- Move the cursor to a desired routing (uplink) port
- Press **[SPACE]** and show **V** to the desired routing (uplink) port

- Press **[ENTER]** to apply and save the setting, then all the other ports will be assigned to each different VLAN group and use the desired port as the routing (uplink) port

For example, here we have the port 17 assigned as routing (uplink) port. The port 1 ~ port 16 are divided into each different VLAN groups. And the user on the port 1 ~ port 16 can uplink through the port 17 only and can not communicate with each other.

MAC-based Trunking & Settings

Trunking is also called link aggregation, which serves as a shortcut to increase the bandwidth on your network. Trunking is a method of physically linking together several ports to act as a single port with higher bandwidth. This functionality allows scaling of bandwidth.

The 17-Port Switch supports trunking of up to 4 ports, either 2-port or 4-port. For a 100BaseTX/FX network, you will gain 400Mbps bandwidth when you trunk two ports, each of 200Mbps. The more ports you trunk, the more bandwidth you gain.

Follow these steps to configure the 2-port trunking.

- Move the cursor to **TRUNK** column
- Move the cursor and select port 1
- Press **[SPACE]** and show **T** to port1 and port2
- Press **[ENTER]** to apply and save the setting
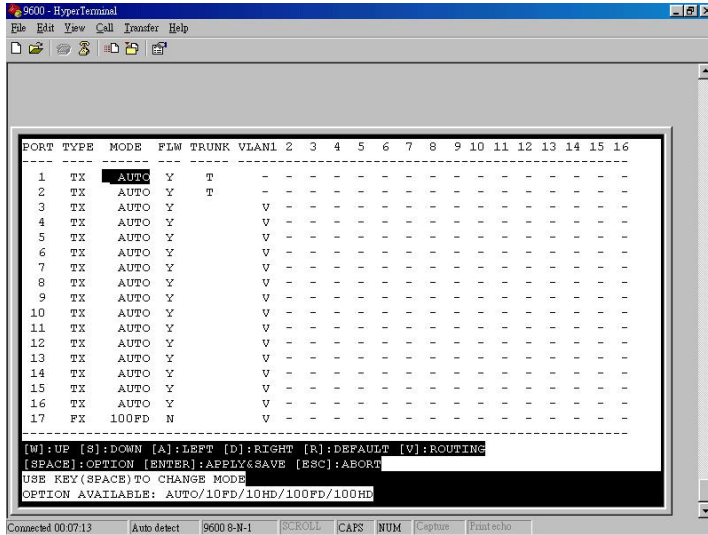
<NOTE>   Can only choose port1 and port2 for 2-port trunking

Follow these steps to configure the 4-port trunking.

- Move the cursor to **TRUNK** column
- Move the cursor and select port 1
- Press **[SPACE]** and show **T** to port1 and port2
- Move the cursor and select port 3
- Press **[SPACE]** and show **T** to port3 and port4
- Press **[ENTER]** to apply and save the setting

<NOTE>   The trunking ports will be disabled for VLAN group settings.

Installation

This chapter gives step-by-step installation instructions for the 17-Port Switch.

Selecting a Site for the Switch

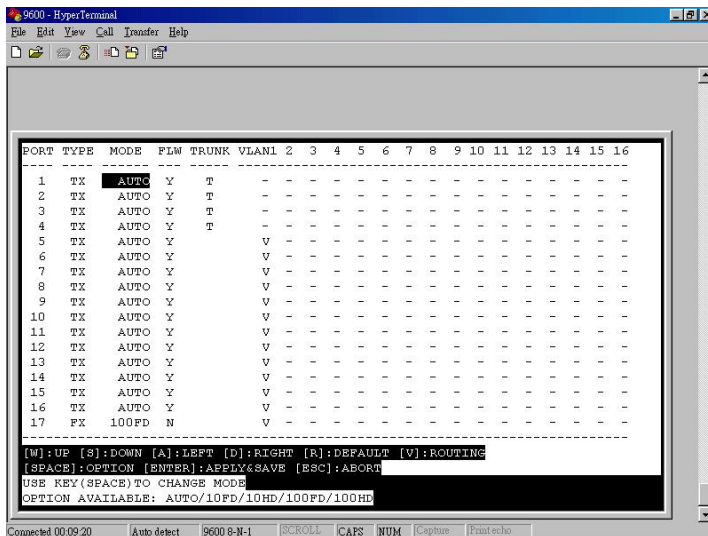As with any electric device, you should place the switch where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

- The ambient temperature should be between 32 and 104 degrees Fahrenheit (0 to 40 degrees Celsius).

- The relative humidity should be less than 90 percent, non-condensing.

- Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards for IEC 801-3, Level 2 (3V/M) field strength.

- Make sure that the switch receives adequate ventilation. Do not block the ventilation holes on each side of the switch or the fan exhaust port on the rear of the switch.

- The power outlet should be within 1.8 meters of the switch.

Connecting to Power

- Connect the supplied AC power cord to the receptacle on the back of the switch, and then plug it into a standard AC outlet with a voltage range from 100 to 240 Vac.
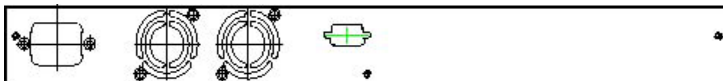
Figure 5: Rear view of the switch

Connecting to Your Network

Cabling

- First, ensure the power of the switch and end devices is turned off.

<NOTE> **Always ensure that the power is off before any installation.**

- Prepare cable with corresponding connectors for each type of port in use.

<NOTE> **To connect two regular RJ-45 ports between switches or hubs, you need a cross-over cable.**

- Consult Table 3 below for cabling requirements based on connectors and speed.

- Connect one end of the cable to the switch and the other end to a desired device.

- Once the connections between two end devices are made successfully, turn on the power and the switch is operational.

Cable Length

The maximum distance between a node and a directly connected switch port on a 100BaseFX network is 75 km using $10/125\mu$m single-mode fiber optic cable. It is capable of spanning at most 2 kilometers when use of $62.5/125\mu$m multi-mode fiber-optic cable.

Table 3: Cable Specifications

Speed	Connector	Port Speed Half/Full Duplex	Cable	Max. Distance
10BaseT	RJ-45	10/20 Mbps	Cat. 3, 4 or 5 UTP/STP	100 m
100BaseTX	RJ-45	100/200 Mbps	Cat. 5 UTP/STP	100 m
100BaseFX	ST, SC, MT-RJ, VF-45, LC	100/200 Mbps	$62.5/125$ µm multi-mode fiber	2 km
100BaseFX	SC	100/200 Mbps	$10/125$ µm single-mode fiber	75 km

Technical Specifications

17-Port 10/100Base-TX/FX: LB9217A-R2	
Applicable Standards	IEEE 802.3 10BaseT, IEEE 802.3u 100BaseTX/FX
Optional 8-port Module Type	10/100BaseT/TX module 100BaseFX module, multi-mode or single-mode
Optional 1-port Module Type	100BaseFX module, multi-mode or single-mode
Speed	10BaseT: 20Mbps for full-duplex; 10Mbps for half-duplex
	100BaseTX/FX: 200Mbps for full-duplex; 100Mbps for half-duplex
Switching Method	Store-and-Forward
Performance	14,880pps forwarding rate per port for 10Mbps
	148,800pps forwarding rate per port for 100Mbps
Chassis LED Indicators	Power
Module LED Indicators	For 8-port module: LNK/ACT; FDX/COL (2 LEDs)
	For 1-port module: 100/TX; 10/RX; FDX/COL (3 LEDs)

Physical Specifications

9217A	17-Port Switch
Dimensions	440 × 285 × 45 mm 19" Rackmount Size, 1U
Weight	3.4kg (7.5lb)
Power Input	100 ~ 240 Vac, 50~60 Hz
Input Fuse	2A
Power Consumption	52W Max.
Operating Temperature	0° ~ 40°C (32° ~ 104°F)
Storage Temperature	-25° ~ 70°C (-13° ~ 158°F)
Humidity	10 ~ 90%, non-condensing
Emissions	FCC part 15 Class A, CE Mark

Trouble-shooting Guide

This trouble-shooting guide describes problems that could occur with the Express Ethernet Switch. The guide states possible reasons for the symptoms, and proper steps to take to solve the problems.

No Power to the Switch

Symptom: Power cord is connected to the switch, but all LEDs, including the Power LED, are off.

Possible Problem	Solution
Loose power connection or faulty power supply	1. Check both ends of the power cord to make certain that they are securely connected to the power receptacle on the switch and to the power outlet. 2. Verify that the power outlet has power.

No Connectivity to the Data Terminal Equipment.

Symptom: An Ethernet switch cannot communicate to the directly connected computers or network segments.

Possible Problem	Solution
Incorrect or faulty cabling	1. Check cables for a secure connection. 2. Verify that the correct type of cable is in use. • For connection to a PC or a network interface card (NIC), use a straight-through cable. • For uplink to another switch or hub, use a cross-wire cable, or use a regular straight-through cable connected to the uplink port with the uplink button activated. • Refer to Table 1 for cable specifications. 1. Verify proper cable preparation. 2. Use a time domain reflectometer (TDR) or other cable-checking device to verify that the cable has no opens, shorts, or other problems. 3. Swap the cable with another of the same kind to see if the cable is bad. • Replace or fix the faulty cable as necessary.
Dysfunctional NIC on a PC or workstation	Run the diagnostic supplied by the vendor on the NIC to determine if it is functioning properly. If it is not, replace it.
Packet Overflow or Hardware problem	Reset the switch by pressing the reset button or turn the switch off, then on again.

No Connectivity to Certain Nodes on the Network

Symptom: Data terminal equipment (DTE) connected to the switch can not send or receive information from certain segments on the same network or across to another LAN or WAN.

Possible Problem	Solution
Hardware problem	Check for a damaged RJ-45 jack, or fiber SC or ST type connector.

Transmission Problems

Symptom: Connections across a LAN switch are slow or unreliable.

Possible Problem	Solution
Incorrect full- or half-duplex settings	Express Ethernet Switches are all equipped with auto-negotiation to communicate with other DTEs on the network for the best available performance. 1. Verify if the connected NIC is equipped with auto-negotiation (this is not the same as auto-sensing). 2. Change the DIP switch setting if available.
Exceeded cabling distance or misused cable	1. Ensure that the proper cable is in use and that the recommended distance is not exceeded. For information, refer to Table 9. 2. Check the cable distance using a cable tester or TDR. Verify that the cable lengths attached to the switch meet Ethernet/IEEE 802.3 specifications. 3. If the distance is out of specification, reduce the length of the cable or add a repeater, ensuring no more than four repeaters are attached.
Bad adapter in attached device	Check the switch port statistics. If excessive errors are found, run the adapter card diagnostic utility to determine the problem.

Trademarks

Any trademarks are acknowledged to be the property of the trademark owners.

Glossary

10BASE-T	Networking standard for twisted-pair cabling capable of carrying data at 10 Mbps.
100BASE-TX	Networking standard for two pairs of high-quality twisted-pair wires carrying data at 100 Mbps.
100BASE-FX	Networking standard for fiber-optic cabling capable of carrying data at 100 Mbps.
auto-negotiation	Two-part process by which a network device automatically senses the speed and duplex capability of another device.
Category 5	Networking standard certifying that a copper wire cable can carry data at up to 100 Mbps.
Collision	Concurrent Ethernet transmissions from two or more devices on the same segment.
Ethernet	Networking standard for transmitting data at 10 Mbps.
Fast Ethernet	Networking standard for transmitting data at 100 Mbps.
fiber-optic cable	Cable made of thin glass threads that carry data in the form of light pulses.
full-duplex	A communications technique that allows bi-directional, simultaneous transmission between two devices on a single segment.
half-duplex	A communications technique in which one device on a segment transmits while the other receives, then the process is reversed.
IEEE 802	Set of Institute of Electrical and Electronic Engineers standards for defining methods of access and control on LANs.
LAN	Local area network. A network where computers are connected in close proximity, such as in the same building or office park. A system of LANs connected at a distance is called a wide-area network (WAN).
MAC address	Media access control address. A hardware address that uniquely identifies each node of a network.
Mbps	Millions of bits per second.
segment	Section of a network bounded by bridges, routers, hubs, or switches. Dividing an Ethernet into multiple segments is a common way to increase bandwidth on a LAN.
store-and-forward	Switching feature where the port receives the entire incoming frame and stores it in the buffers while checking for runts and error frames before forwarding it to the destination port.
switch	Device that filters and forwards packets between LAN segments.
UTP	Unshielded twisted pair; cabling with wires that are twisted around each other. The individual wires are not insulated.
wire speed	The ability to handle the fastest rate of traffic that a generator can deliver without dropping packets. On a 100 Mbps connection, wire-speed traffic is 148,809 packets per second using 64-byte frames or 8,127 packets per second using 1,518-byte frames.