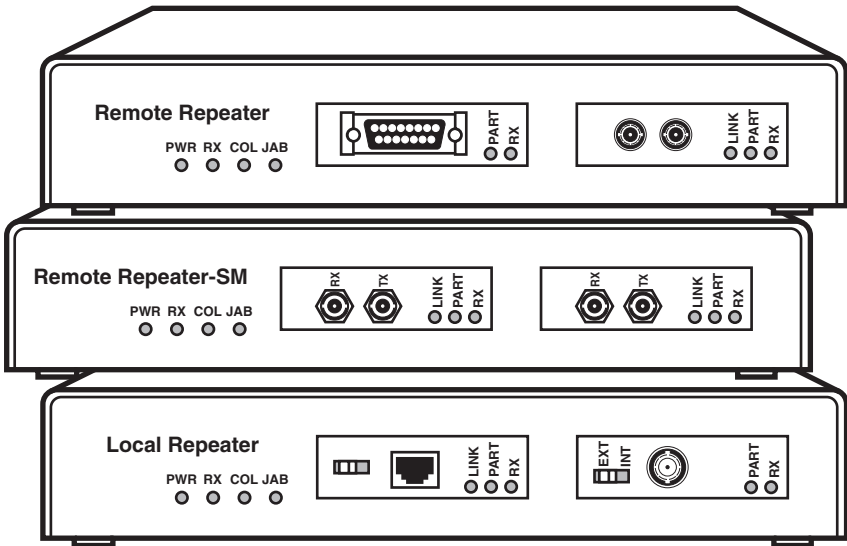




LE601A-R3	LE620A	LE629A
LE602A-R3	LE622A	LE630A
LE603A-R5	LE624A	LE631A
LE604A-R4	LE626A	LE632A
LE605A-R3	LE628A	LE633A

## Local and Remote Repeaters



**CUSTOMER  
SUPPORT  
INFORMATION**

To order or for technical support: Call 724-746-5500 or fax 724-746-0746  
 Technical support and fax orders 24 hours a day, 7 days a week  
 Phone orders 24 hours, 7 A.M. Monday to midnight Friday; Saturday 8 to 4 (Eastern)  
 Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018



## 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 classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

### TRADEMARK USED IN THIS MANUAL

ST is a registered trademark of AT&T.

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

### 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 conectado 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 física 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 líneas de energía.
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 objetos líquidos 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: Objetos 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.

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# 1. Specifications

**Compliance** — FCC Class A, DOC Class/MDC classe A

**Standards** — IEEE 802.3, Ethernet Ver. 1 and 2

The Repeater models all have two front-mounted ports. The types of ports on each model determine the types of **Interfaces** each model supports, the types of **Cable Required**, the **Maximum Distance** attainable, and which (if any) **User Controls**, **Indicators**, and **Connectors** are on each model (see below).

**Ports** —

- LE601A-R3: (2) AUI;
- LE602A-R3: (2) BNC;
- LE603A-R5: (1) AUI, (1) Multimode Fiber ST;
- LE604A-R4: (1) BNC, (1) Multimode Fiber ST;
- LE605A-R3: (1) AUI, (1) BNC;
- LE620A: (1) BNC, (1) 10BASE-T;
- LE622A: (1) AUI, (1) 10BASE-T;
- LE624A: (2) 10BASE-T;
- LE626A: (1) 10-BASE-T, (1) Multimode Fiber ST;
- LE628A: (2) Multimode Fiber ST;
- LE629A: (1) AUI, (1) Single-Mode Fiber ST;
- LE630A: (1) BNC, (1) Single-Mode Fiber ST;
- LE631A: (1) 10BASE-T, (1) Single-Mode Fiber ST;
- LE632A: (1) Multimode Fiber ST, (1) Single-Mode Fiber ST;
- LE633A: (2) Single-Mode Fiber ST

**Interfaces** —

- For each AUI port: 10BASE5 (AUI);
- For each BNC port: 10BASE2;
- For each 10BASE-T port: 10BASE-T;
- For each Multimode Fiber ST port: 10BASE-FL, FOIRL;
- For each Single-Mode Fiber ST port: Single-mode fiberoptic Ethernet

## LOCAL AND REMOTE REPEATERS

- Cable Required** — For AUI ports: AUI transceiver (drop, patch) cable;  
For BNC ports: RG58 coaxial;  
For 10BASE-T ports: Straight-through-pinned shielded or unshielded twisted-pair;  
For Multimode Fiber ST ports: 62.5- $\mu$ m core, 125- $\mu$ m cladding multimode fiberoptic;  
For Single-Mode Fiber ST ports: 9- $\mu$ m core, 125- $\mu$ m cladding single-mode fiberoptic
- Maximum Distance (Segment Length)** — For segments attached to:  
AUI ports: 500 m (1640.4 ft.) of Thick Ethernet backbone (but not more than 50 m [164 ft.] of AUI cable from Repeater to backbone);  
BNC ports: 185 m (607 ft.) of Thin Ethernet cable;  
10BASE-T ports: 100 m (328.1 ft.) of twisted-pair cable;  
Multimode Fiber ST ports:  
1 km (3280.8 ft., 0.6 mi.) of multimode fiberoptic cable if segment is FOIRL;  
2 km (6561.7 ft., 1.2 mi.) of multimode fiberoptic cable if segment is 10BASE-FL;  
Single-Mode Fiber ST ports: 10 km (32,808.4 ft., 6.2 mi.) of single-mode fiberoptic cable
- Data Rate** — 10 Mbps
- Error Handling** — Each port automatically partitions its connected segment after detecting 32 consecutive collisions on that segment; automatically reconnects partitioned segment after receiving 512 consecutive error-free bits from that segment
- User Controls** — On each BNC port: (1) Slide switch to enable/disable internal termination;  
On each 10BASE-T port: (1) Slide switch to enable/disable straight-through interrepeater cabling

<b>Indicators</b> —	All models (on main chassis): (4) LEDs: PWR (power), RX (receive), COL (collision), JAB (jabber); On each port (all types): (2) LEDs: PART (partitioned) and RX (receive); On each 10BASE-T or Fiber ST port: (1) LINK LED
<b>Connectors</b> —	All models (on main chassis): (1) Rear-mounted IEC 320 male power inlet; On each AUI port: (1) DB15 female; On each BNC port: (1) BNC female; On each 10BASE-T port: (1) Shielded RJ-45 female; On each Multimode Fiber ST port: (2) Multimode ST female ([1] TX, [1] RX); On each Single-Mode Fiber ST port: (2) Single-mode ST female ([1] TX, [1] RX)
<b>Power</b> —	Input: 90 to 260 VAC, 47 to 63 Hz into internal autosensing power supply (6-ft. [1.8-m] power cord with NEMA 5-15P plug and IEC 320 female outlet included with shipments to 115-VAC regions <i>only</i> ); Consumption: 15 watts maximum
<b>MTBF</b> —	40,000 hours
<b>Cooling Method</b> —	Convection
<b>Temperature Tolerance</b> —	Operating: 32 to 122° F (0 to 50° C) Storage: -4 to 140° F (-20 to 60° C)
<b>Humidity Tolerance</b> —	10 to 95% noncondensing
<b>Size</b> —	1.8"H x 8.5"W x 5.4"D (4.6 x 21.6 x 13.7 cm)
<b>Weight</b> —	2.5 lb. (1.1 kg)



## 2. Introduction

The Local and Remote Repeaters expand a network by extending individual Ethernet segments. They're ideal when you need to go beyond the standard distance limits, or where you need to bring two different media together in one Ethernet link.

Every Repeater model comes ready to plug in. It's easy to install on a shelf in your wiring closet, vertically on the wall, or on a desktop. The media connectors and the status LEDs are all on the front panel, where they're easy to get at.

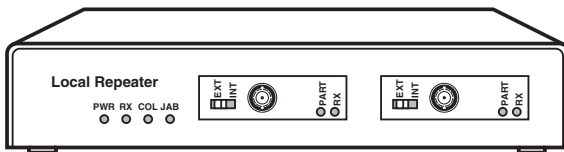
Local and Remote Repeaters meet all the IEEE 802.3 and Ethernet Ver. 1.0 and 2.0 specifications for repeaters. They work either as homogeneous-media repeaters (repeaters that connect two segments of the same medium) or mixed-media repeaters (repeaters that connect segments of two different media).

### 2.1 Unpacking and Inspecting the Repeater

Before you install the Repeater, examine the shipping container for obvious damage. If you see any damage that seems to have occurred during shipment or delivery, notify the carrier.

Next, inspect the contents of the package. Make sure that there is no apparent damage, and make sure you've received all these items:

- (1) Repeater. The unit should look something like this (although the ports might be different):



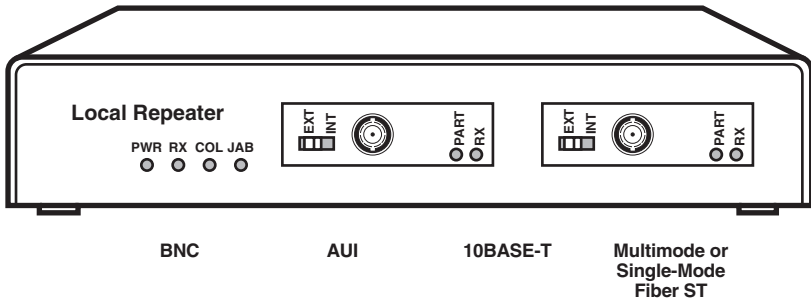
- (1) Copy of this manual.
- [If your local power is 115 VAC,] (1) AC power cord.

Take everything out of the carton. We recommend that you keep the shipping container and the packing materials in case you ever have to ship the Repeater.

If anything is missing or damaged, call Black Box at once. If you need to return the Repeater, see **Chapter 5** for instructions.

## 2.2 What the Repeater Does

The Local and Remote Repeaters work as in-line repeaters. Each repeater has two ports, and each port can connect to one segment of one type of Ethernet medium: 10BASE2, 10BASE5, 10BASE-FL, 10BASE-T, FOIRL, or single-mode. Since the Repeaters have full 802.3 repeater functionality, each port can support a full-length segment. Each kind of port has a single media-interface connector (see Fig. 2-1 below).



**Fig. 2-1. The Repeaters' port types.**

To simplify connections, each port is accessible from the front of the Repeater. All the LEDs are on the front panel as well. You never need access to the rear of the Repeater except to attach its AC power cord.

The Repeaters' internal power supply is autosensing; it can handle any type of AC power normally available worldwide. The power input can range from 90 to 260 VAC at 47 to 60 Hz. (If your local power is 115 VAC, we supply the power cord; otherwise, you must supply your own.) The Repeater is convection-cooled, so you won't hear any fan noise.

Besides the LEDs on each port, there are four status LEDs on the chassis: Power (PWR), Receive (RX), Collision (COL), and Jabber (JAB). Refer to **Section 4.3** for more information about these LEDs.

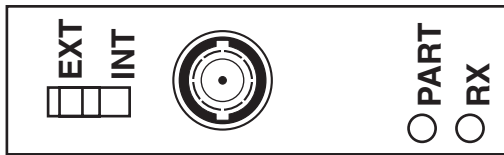
## 2.3 Different Kinds of Ports

Your Local or Remote Repeater comes with two ports. They might be any combination of the available port types; the Repeater’s modular design means we can offer it for any combination of media.

Each port has at least two LEDs: PART (Partition) and RX (Receive). PART flashes yellow to indicate that the segment has been partitioned. (The Repeater partitions a segment automatically when there is jabber on that segment.) RX flashes green intermittently to show that the Repeater is receiving data. In addition, each 10BASE-T port and each Fiber ST port has a LINK LED that lights steadily to show that the cable running from the port to the device at the other end is properly connected.

### 2.3.1 BNC

For those Repeaters that have any, each BNC port has a standard BNC female connector for 10BASE2 (“Thin Ethernet” or “ThinNet”) applications. This is what a Repeater’s BNC port looks like:

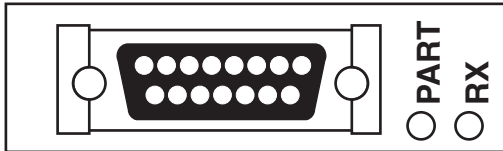


If your Repeater is at the end of a segment, you can use its special switch-selectable internal terminator instead of the normally mandatory external T-connector and terminator. To use the internal terminator, slide the switch to the “INT” position (toward the right). If your Repeater isn’t at the end of the segment, make sure you disable the internal terminator by sliding the switch to the “EXT” position (toward the left). Remember:

- INT (right)—terminated internally
- EXT (left)—T-connector and external termination needed

### 2.3.2 AUI

For those Repeaters that have any, each AUI port has a DB15 female AUI connector and slide lock for standard 10BASE5 (“Thick Ethernet” or “Thicknet”) applications. You’ll need a transceiver with no SQE test (or SQE test disabled) to connect it to a standard Ethernet segment. This is what a Repeater’s AUI port looks like:



You can also connect Ethernet devices to the AUI port with standard AUI cabling. If you do, it is important to consider the length of the AUI segment or the distance to the attached device. The maximum transmission distance between an AUI port and a backbone transceiver with an AUI connector will vary:

- When an AUI cable connects the AUI port directly to a backbone transceiver, the maximum AUI segment length is 50 m (165 ft.).
- If the AUI port is connected to a transceiver that has been cascaded from another transceiver, the maximum AUI segment length is reduced by 6 m (20 ft.) for every additional level of network transceiver cascaded from the original backbone transceiver’s tap.

The AUI connector supports all the standard IEEE 802.3 signals listed in Table 2-1 on the next page.

**Table 2-1. AUI Pin Assignments**

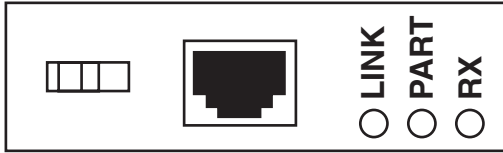
<b>Pin</b>	<b>Function</b>
1	Control In Circuit Shield
2	Control In Circuit A
3	Data Out Circuit A
4	Data In Circuit Shield <sup>1</sup>
5	Data In Circuit A
6	Voltage Common <sup>2</sup>
7	Control Out Circuit A
8	Control Out Circuit Shield (conductive shell) <sup>1</sup>
9	Control In Circuit B
10	Data Out Circuit B
11	Data Out Circuit Shield <sup>®</sup>
12	Data In Circuit B
13	Voltage Plus (+) <sup>2</sup>
14	Voltage Shield <sup>1</sup>
15	Control Out Circuit B
Shell	Protective Ground

<sup>1</sup>Pins 4, 8, 11, and 14 may be connected to Pin 1.

<sup>2</sup>Voltage Plus (Pin 13) and Voltage Common (Pin 6) use a single twisted pair in the AUI cable.

### 2.3.3 10BASE-T

For those Repeaters that have any, each 10BASE-T port has an RJ-45 female connector for attaching twisted-pair Ethernet segments of any standard length. The connector is shielded to minimize emissions, but you can connect to it either unshielded twisted-pair (UTP) or shielded twisted-pair (STP) segments of new or existing 10BASE-T networks. This is what a Repeater's 10BASE-T port looks like:



If you want to connect your Local or Remote Repeater to another Ethernet repeater or to a hub, you don't need a special crossover cable. Just set the Repeater's Media-Dependent Interface—Crossover (MDI-X) switch:

- For cascaded and uplink connections (connections to hubs, concentrators, or other repeaters), set the MDI-X switch in the Up (*left*) position.
- For segments that go to workstations and other user devices, set the MDI-X switch in the Down (*right*) position.

When the MDI-X switch is set Down, the Repeater's RJ-45 connector is pinned normally (to support standard "hub-to-user" runs of straight-through-pinned twisted-pair cable):

- Pin 1 = Receive +
- Pin 2 = Receive –
- Pin 3 = Transmit +
- Pin 6 = Transmit –
- The other pins are not used.

## LOCAL AND REMOTE REPEATERS

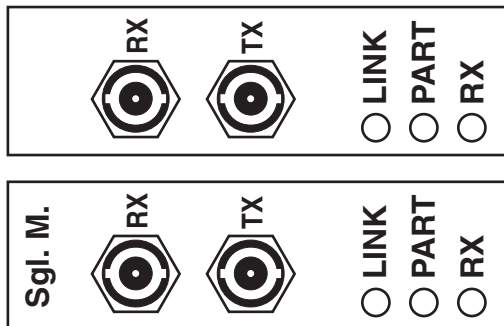
When the MDI-X switch is set Up, the transmit and receive pairs of the Repeater's RJ-45 connector are exchanged so that it can support "uplink" or "hub-to-hub" connections using straight-through-pinned twisted-pair cable:

- 1 = Transmit +
- 2 = Transmit -
- 3 = Receive +
- 6 = Receive -
- The other pins are not used.

The Repeater's 10BASE-T port supports UTP wiring with maximum segment lengths of up to 100 m (328.1 ft.), or STP wiring with maximum segment lengths of up to 150 m (492.1 ft.) You don't need an external transceiver; the transceiver circuitry is built into the port.

### 2.3.4 MULTIMODE OR SINGLE-MODE FIBER ST

For those Repeaters that have any, each Multimode or Single-Mode Fiber ST port has two standard ST® female connectors (one TX, one RX) for fiberoptic Ethernet applications. This is what Repeaters' Multimode (above) and Single-Mode (below) Fiber ST ports look like:

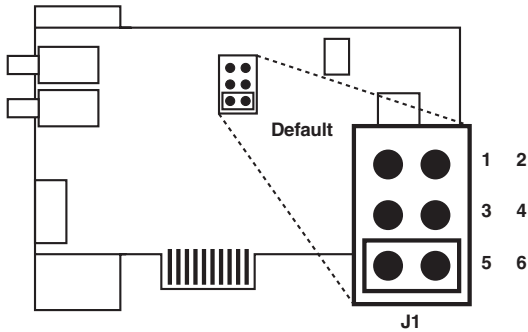


As you can see, the only way to tell the two port types apart is the "Sgl. M." label that appears on the Single-Mode ports but not on the Multimode ports.

The Multimode Fiber ST ports support 10BASE-FL applications and are backward-compatible with FOIRL equipment. The Single-Mode Fiber ST ports support most standard single-mode Ethernet applications.

**NOTE**

The Multimode Fiber ST circuit board contains a six-pin jumper that controls the intensity of the transmitted signal. By default, the jumper is placed across pins 1 and 2. The jumper may be set as shown below, to accommodate distances of up to 4 km.



When distances of less than 2 km are needed, the jumper should be placed across pins 1 and 2.

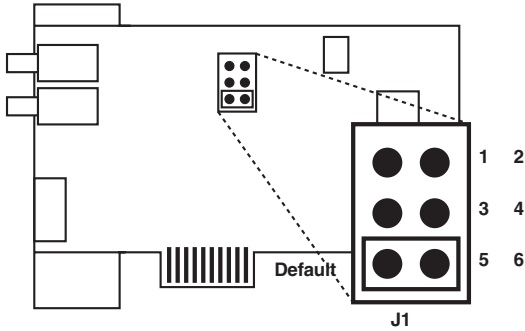
<u>Jumper Across</u>	<u>Distances Supported</u>
1-2	0-2 km
3-4	0.5-3 km*
5-6	1.5-4 km*

\*When fiber cable distances of more than 2 km are selected, the minimum cable length must also be increased, as shown in the table above.



## NOTE

The Single-Mode Fiber ST circuit board contains a six-pin jumper, but the jumper is only to be placed across pins 5 and 6. The others are not used.



<u>Jumper Across</u>	<u>Distances Supported</u>
1-2	Not used
3-4	Not used
5-6	0-10 km

Be sure to use single-mode fiberoptic cable with this module. Single-mode fiber has a smaller diameter than multi-mode fiber (2/15–8/60 microns for single-mode, 50/125 or 62.5/125 microns for multimode, where xx/xx are the diameters of the core and the core plus the cladding respectively).

## 3. Installation

### 3.1 Where to Put the Repeater

Where you put your Local or Remote Repeater will depend on the physical layout of the network and the area to be served. Set up the Repeater in a cool, dry place with easy access to all network connections you plan to make, within about six feet (1.8 m) of a working AC outlet. Also make sure there is enough space around the Repeater for air to circulate, because the unit has no fan and relies on convection for its cooling.

The Repeater's case is suitable for an ordinary workplace setting, but it's also rugged enough for a wiring closet. If you want to set the Repeater on a desk, its four rubber feet will keep its case from scratching the desk's finish. You can even stack Repeaters, because the cases are strong enough to support a stack many units high. This is especially useful in a cramped wiring closet.

#### NOTE

**We do not recommend stacking units in a free-standing column. Make sure your units are adequately supported.**

If you want to mount the Repeaters in a rack, two of them will fit side by side in a standard 19-inch (48.3-cm) equipment rack. Rackmounting hardware is not included; you might want to order one of our rackmount shelves (product code RM001) to mount them in.

You can also mount the Repeater vertically on a wall using wallmount brackets—it works just as well vertically as horizontally. (Call for technical support for information on where to purchase wallmount brackets.)

### 3.2 Connecting Ethernet Media

Depending on which model you ordered, your Repeater might have ports for any combination of the standard Ethernet media. Follow the directions in the appropriate subsection(s) below for the kinds of connections you need to make.

#### 3.2.1 THIN COAXIAL CONNECTIONS

If your Repeater is at the end of a Thin Ethernet segment, plug the Thin Ethernet cable directly into the Repeater's BNC connector. You don't need a T-connector or an external terminator; just set the Repeater's termination switch to enable internal termination (see **Section 2.3.1**).

If the Repeater isn't at the end of a Thin Ethernet segment, connect the Thin Ethernet cables to the Repeater the same way you would connect it to any other node: Plug the "leg" of a T-connector into the Repeater's BNC connector, then plug the cables leading to the previous node and the next node into the "arms" of the T-connector. You must also set the Repeater's termination switch to disable internal termination (see **Section 2.3.1**).

#### 3.2.2 AUI CONNECTIONS

You can attach your Repeater to a Thick Ethernet segment with a standard AUI drop cable:

1. Plug the male end of the cable into the Repeater's female AUI connector.
2. Engage the slide lock on the AUI connector to make sure the cable connection is secure.
3. Connect the other end of the cable to a network AUI port (a backbone transceiver, a hub or fanout with an AUI port, or an AUI port in a concentrator).

You can also use standard AUI cables to connect the Repeater to other Ethernet devices. Keep in mind the distance limits for AUI cabling—see **Section 2.3.2**.

### 3.2.3 TWISTED-PAIR CONNECTIONS

To connect the Repeater to a UTP and STP 10BASE-T segment, take these steps:

1. Plug either end of a standard 10BASE-T cable into the Repeater's female RJ-45 (10BASE-T) connector.
2. Connect the other end of the cable to the 10BASE-T workstation, hub, or other device.

Make sure the Repeater's MDI-X switch is set correctly for your application (see **Section 2.3.3**). Also, when you power up the Repeater (see **Section 4.2**), check the LINK LED on each 10BASE-T port. If it is lit, the network cables should be properly connected. If it isn't lit, then probably either the MDI-X switch is set incorrectly, the network cables aren't securely connected, or the network cables are pinned incorrectly; check these things.

### 3.2.4 MULTIMODE OR SINGLE-MODE FIBER CONNECTIONS

To connect the Repeater to a multimode 10BASE-FL or FOIRL segment or a single-mode Ethernet segment, take these steps:

1. Remove the protective dust caps from the Repeater's ST connectors. Set them aside in a safe place.
2. Wipe the ends of the connectors clean with a soft cloth or lint-free lens tissue dampened with alcohol. Make sure the connectors are clean and dry before you connect fiberoptic cable to them.
3. Use one strand of your fiberoptic cable to connect the Repeater's TX (Transmit) port to the remote device's RX (Receive) port. Use the strand color-coded with bands at regular intervals first, to make sure you don't mix up the connections.
4. Use the cable's other strand to connect the Repeater's RX port to the remote device's TX port.

When you power up the Repeater (see **Section 4.2**), check the LINK LED on each Fiber ST port. If it is lit, the network cables should be properly connected. If it isn't lit, the network cables are probably either crossed or not securely connected; try again.

## 4. Operation

### 4.1 How the Repeater Works

The Local and Remote Repeaters work as mixed-media or homogeneous Ethernet repeaters. Each model complies with IEEE 802.3 specifications and supports one or two of the standard Ethernet interfaces (10BASE2, 10BASE5, 10BASE-T, 10BASE-FL, FOIRL, and single-mode). Each Repeater performs these important communication tasks:

1. **Repeater functions:** Each port operates in conjunction with the controller functions of the base unit as a fully compliant Ethernet repeater. The whole Local or Remote Repeater counts as a single network repeater.
2. **Collision handling:** When a collision is detected on either port of the Repeater, a jam pattern is generated according to IEEE 802.3 repeater rules and propagated out of both Repeater ports.
3. **Partitioning and reconnection:** The Repeater will automatically “partition” (disconnect) any port if 64 consecutive collisions occur on the segment attached to it, or after 6.5 ms of continuous transmission (which means the port is jabbering). Network integrity is checked every 800 ms, and segments are reconnected after a 512-bit packet is transmitted on the network without error.
4. **Indicating link status:** The Fiber ST and 10BASE-T ports indicate link integrity for fiberoptic and twisted-pair segments. If a cable is broken, or if the power is lost at any point on the segment, the LINK indicator on the attached port will go out.

## 4.2 Powering Up the Repeater

The Repeaters' internal power supply is universal—you can use it anywhere the local AC power is between 90 and 260 volts at 47 to 63 Hz. Repeaters shipped to the United States and Canada come with a 6-foot (1.8-m) power cord; elsewhere, you supply your own cord.

First plug the power cord's IEC 320 female outlet into the IEC 320 male power inlet on the Repeater's rear panel. Then plug the other end of the cord into a working AC outlet; the Repeater will power up immediately. The Repeater's PWR LED should light (see the next section), and if the Repeater has any 10BASE-T or Fiber ST ports, their LINK LEDs should light if the network cables between those ports and the attached devices have been connected properly.

To turn the Repeater off, just unplug its power cord. You don't need to unplug the Repeater when you're making Ethernet connections; you can connect segments of any type of medium while the power is on.

## 4.3 Interpreting the Main LED Indicators

Besides the LEDs on the ports (see **Section 2.3**), there are four LEDs on the chassis of the Repeater:

- **PWR** lights green to indicate that the Repeater is receiving power.
- **RX** lights green when data is being received on either or both ports.
- **COL** lights yellow when a collision has occurred.
- **JAB** lights yellow when a jabber condition has occurred.

## 5. Troubleshooting

### 5.1 Things to Try First

Before you call for technical support, there are a few things you can check yourself:

1. If you have trouble while you're installing the Repeater, read **Chapter 3** of this manual again. Make sure all the components of the network are interoperable.
2. Check the cables and connectors to make sure that they have been properly connected, and that they haven't been damaged during installation.
3. Make sure the power cord is properly attached to each unit, and that it is plugged into a working AC outlet. If the cord is connected and plugged in, the PWR indicator should be lit.
4. If the problem seems to be in some other device, replace that device with a known-good device. If the problem goes away, the device you replaced was the cause of it.
5. If you're still having trouble, call for technical support as directed in the next section.

## 5.2 Calling Black Box

If you determine that your Repeater is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Black Box.

Before you do, make a record of the history of the problem. Black Box 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 Repeater:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Repeater for repair, make sure you include its power cord if one was supplied with the unit. If you are returning the Repeater, make sure you include everything you received with the unit. Before you ship, contact Black Box to get a Return Materials Authorization (RMA) number.



## NOTES



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