Allied Telesis

AT-MC13

Ethernet Media Converter

Installation Guide

Electrical Safety and Emission Compliance Statement

Standards: This product meets the following standards.

U.S. Federal Communications Commission

Declaration of Conformity

Manufacturer Name:	**Allied Telesis, Inc.**
Declares that the product:	**Ethernet Media Converter**
Model Numbers:	AT-MC13

This product complies with FCC Part 15B, Class B Limits:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device must not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Radiated Energy

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

	EMI	FCC Part 15 Class B, EN55022 Class B, VCCI Class B, C-TICK
	Immunity	EN55024
	Electrical Safety	UL 60950-1 ($_C$UL$_{US}$), EN60950-1 (TUV), CE
	Laser Safety	EN60825-1

Translated Safety Statements

Important: The ⌇ indicates that a translation of the safety statement is available in a PDF document titled "Translated Safety Statements" (613-000405) posted on the Allied Telesis website at **www.alliedtelesis.com**.

Contents

Preface

This guide contains instructions on how to install an AT-MC13 Ethernet Media Converter.

How This Guide is Organized

This guide contains the following chapters and appendices:

This preface contains the following sections:

Document Conventions

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Where to Find Web-based Guides

The installation and user guides for all Allied Telesis products are available in portable document format (PDF) on our web site at **www.alliedtelesis.com**. You can view the documents online or download them onto a local workstation or server.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support as well as sales or corporate information.

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: **www.alliedtelesis.com/kb**. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support

For technical support via email or telephone, refer to the Support & Services section of the Allied Telesis web site: **www.alliedtelesis.com**.

Returning Products

Products for return or repair must first be assigned a return materials authorization (RMA) number. A product sent to Allied Telesis without an RMA number will be returned to the sender at the sender's expense.

To obtain an RMA number, contact Allied Telesis Technical Support group through the Allied Telesis web site: **www.alliedtelesis.com**.

Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information on our web site: **www.alliedtelesis.com**. To find the contact information for your country, select Contact Us -> Worldwide Contacts.

Chapter 1
Overview

The AT-MC13 Ethernet Media Converter is designed to extend the distance of your network by interconnecting twisted pair cabling to single-mode or multimode fiber optic cabling or thinnet cabling. The AT-MC13 media converter allows you to interconnect LAN devices over large distances.

The AT-MC13 media converter features a 10Base-T twisted pair port and a 10Base-FL fiber optic port. The twisted pair port has an RJ-45 connector and a maximum operating distance of 100 meters (328 feet). The fiber optic port has an ST connector and a maximum operating distance of 2 kilometers (1.2 miles). This media converter operates at 10 Megabits per second (Mbps) and feature half- and full-duplex operation.

The AT-MC13 media converter can be used on a desktop, in an AT-MCR1 or AT-MCR12 chassis. This media converter is easy to install and does not require software configuration or management.

Figure 1 and Figure 2 illustrate the front and rear panels of an AT-MC13 media converter.
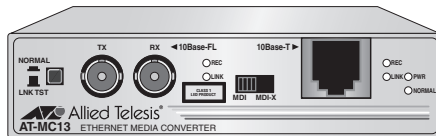
Figure 1. AT-MC13 Media Converter Front Panel
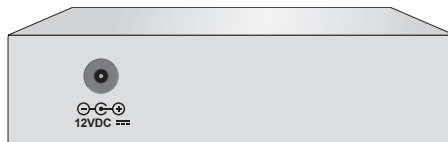
Figure 2. AT-MC13 Media Converter Rear Panel

Key Features

The AT-MC13 media converter has the following key features:

❒ LEDs for unit and port status

❒ Full- or half-duplex mode operation

❒ MissingLink™ notifies end-nodes of link failures (fiber models only)

❒ Link Test feature performs a link test on the media converter's fiber port

❒ MDI/MDI-X switch that eliminates the need for a crossover cable

❒ NORMAL/LNK TST button that performs a link test on the media converter

❒ External AC/DC power adapters (North America, Continental, or Europe)

❒ Standard, compact size for desktop use or in an AT-MCR1 or AT-MCR12 chassis

Status LEDs

Table lists the LEDs for the AT-MC13 media converter.s

Table 1. AT-MC13 LED

LED	Color	Description
PWR	Green	Power is applied to the media converter.
NORMAL	Green OFF	The media converter is operating in normal mode. The media converter is operating in link test mode.
REC	Green OFF	The port is either receiving or transmitting data. The port is not receiving or transmitting data.
LINK	Green	A link has been established at 10 Mbps.

Twisted Pair Port

The AT-MC13 media converter has one 10Base-T twisted pair port. The twisted pair port features a RJ-45 connector. The maximum operating distance for the twisted pair port is 100 meters (328 feet) when operating at 10 Mbps.

Fiber Optic Port

The AT-MC13 media converter has one 10Base-FL port. The fiber optic port features an ST connector. The maximum operating distance for the fiber optic port for both the AT-MC13 is 2 kilometers (1.2 miles) when operating at 10 Mbps.

Auto-negotiation

Port Speed

The twisted pair port is compliant with the 10Base-T standards and is capable of 10 Mbps operation. Since the port is IEEE 802.3u auto-negotiation compliant, the media converter sets the port speed automatically. With auto-negotiation, the speed of the port is set automatically by the media converter after it determines the speed of the end-node connected to the port. Auto-negotiation is designed to ensure that the port on the media converter and the end-node are operating at the same speed and that they are communicating at the highest possible common speed of the devices.

The fiber optic port is compliant with the 10Base-FL standards and can auto-negotiate the operating speed. The end-node connected to the fiber optic port on the media converter must also be able to operate at 10 Mbps or auto-negotiate the operating speed.

> **Note**
> The end-nodes connected to the ports on the media converter must be able to operate at the same speed.

Duplex Mode

Duplex mode refers to the way an end-node sends and receives data on the network. An end-node can operate in either half- or full-duplex mode,

depending on its capabilities. An end-node that is operating in half-duplex mode can either send data or receive data, but it cannot do both at the same time. An end-node that is operating in full-duplex mode can send and receive data simultaneously. The best network performance is achieved when an end-node can operate at full-duplex, since the end-node is able to send and receive data simultaneously.

The twisted pair port and fiber optic port on the media converter can operate in half-duplex, full-duplex, or auto-negotiate the duplex mode. The media converter sets the duplex mode automatically through auto-negotiation. With auto-negotiation, if the end-node is capable of full-duplex, the port is set automatically to full-duplex mode. If the end-node is capable of half-duplex, the port is set automatically to half-duplex mode.

The AT-MC13 media converter can operate in full-duplex, half-duplex, or auto-negotiate the duplex mode. However, the end-nodes connected to the AT-MC13 media converter must operate in the same duplex mode to avoid a duplex mode mismatch, which can result in poor network performance.

Figure 3 shows an example of a duplex mode mismatch. A repeater (Unit 1), capable of operating in half-duplex mode only, is connected to the 10Base-FL port on the media converter, while a switch (Unit 2), capable of either half- or full-duplex mode, is connected to the 10Base-T port on the media converter.

| Unit 1 | | Unit 2 |

| 10/100Base-TX Repeater | Media Converter | 10/100Base-TX Switch |

Figure 3. Example of a Duplex Mode Mismatch

In attempting to auto-negotiate with Unit 1, the media converter will determine that the repeater is capable of half-duplex only and will set the port connected to the unit appropriately. In auto-negotiating with Unit 2, the media converter will determine that the switch can manage full-duplex and will set the port connected to the switch to full-duplex. The result is a duplex mode mismatch, with one unit operating in half-duplex and the other unit operating in full-duplex. You could resolve this duplex mode mismatch by manually configuring Unit 2, if possible, so that the port connected to the media converter is set to half-duplex.

MDI/MDI-X Switch

An RJ-45 port on a 10 Mbps Ethernet network device can have one of two possible wiring configurations: MDI or MDI-X. The RJ-45 port on a PC, router or bridge is typically wired as MDI, while the twisted pair port on a switch or hub is usually MDI-X.

To connect two 10 Mbps network devices together that have dissimilar port wiring configurations, such as MDI to MDI-X, you use a straight-through cable. To connect two network devices that have an RJ-45 port with the same wiring configuration, such as MDI to MDI, you use a crossover cable.

The RJ-45 port on the media converter features an MDI/MDI-X switch, shown in Figure 4. You can use this switch to configure the twisted pair port on the media converter as either MDI or MDI-X. This feature allows you to use a straight-through cable regardless of the type of end-node connected to the port.
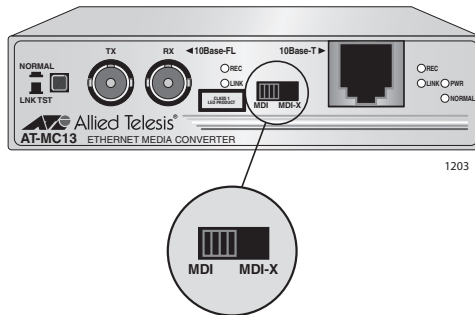

Figure 4. MDI/MDI-X Switch

NORMAL/LNK TST Button

The AT-MC13 media converter features a NORMAL/LNK TST (Normal MissingLink/Link Test) button, shown in Figure 5. The button allows you to perform a link test on the ports on the media converter. This button also allows you to activate the MissingLink feature on the unit. This button sets the fiber port into an artificial link transmission state for testing without the twisted pair port being connected.

When the NORMAL/LNK TST button is in the IN (default) position, the NORMAL LED is green indicating that the media converter is functioning normally. For a link test, set the switch in the OUT position. Be sure to set the switch back to the default position after performing a link test. If the switch is left in the OUT position, the media converter will not function properly..
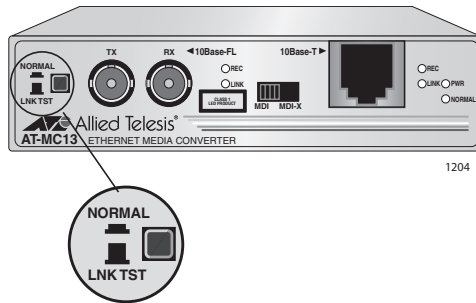

Figure 5. NORMAL/LNK TST Switch

The MissingLink and Link Test features are described below.

MissingLink

The MissingLink feature allows the ports on the media converter to pass the "Link" status of their connections to each other. When the media converter detects a problem with one of the ports, such as the loss of connection to a node, the media converter shuts down the connection to the other port, thus notifying the node that the connection has been lost.

For example, if the twisted pair cable to the AT-MC13 were to fail, the media converter would respond by dropping the link on the fiber optic port. In this way, the AT-MC13 notifies the end-node connected to the fiber optic port that the connection on the twisted pair port has been lost. If the failure had started with the fiber optic cabling, the media converter would drop the link to the twisted pair port.

The value to this type of network monitoring and fault notification is that some hubs and switches can be configured to take a specific action in the event of the loss of connection on a port. In some cases, the unit can be configured to seek a redundant path to a disconnected end-node or send out a trap to a network management station, and so alert the network administrator of the problem.

Note
The MissingLink feature is disabled when you perform a link test with the NORMAL/LNK TST button. Consequently, to ensure that the MissingLink feature is activated on the media converter, always set the button to the NORMAL (IN) position during normal network operations.

Link Test

A link test is a fast and easy way for you to test the connections between the ports on the media converter and the end-nodes that are connected to the ports. If a network problem occurs, you can perform a link test to determine which port is experiencing a problem, so that you can focus your troubleshooting efforts on the cable and end-node where the problem resides.

A link test is performed when the NORMAL/LNK TST button is in the LNK TST (OUT) position.

Note
Performing a link test does not interfere with a media converter's ability to pass network traffic.

External Power Adapter

An external AC/DC power adapter, shown in Figure 6, is provided with the media converter for use on a desktop. The power adapter supplies 12 VDC to the media converter. Allied Telesis supplies an approved safety compliant AC power adapter for the 120 V AC and 240 V AC versions with an unregulated output of 12 VDC at 1 A. The power required for the media converter is 12 VDC, 500 mA.

Note
The power adapter is not used if you install the media converter in an AT-MCR1 or AT-MCR12 chassis.
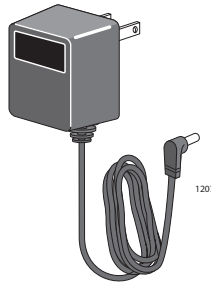

Figure 6. External AC/DC Power Adapter (North American Version)

Network Topologies

The AT-MC13 media converter can be used in two different topologies: Standalone and Back-to-Back. Both types of topologies are described below.

Standalone Topology

A standalone topology uses one media converter between the end-nodes. Figure 7 illustrates a standalone topology that uses an AT-MC13 media converter to connect a workstation and a switch with 10Base-FL uplink port.
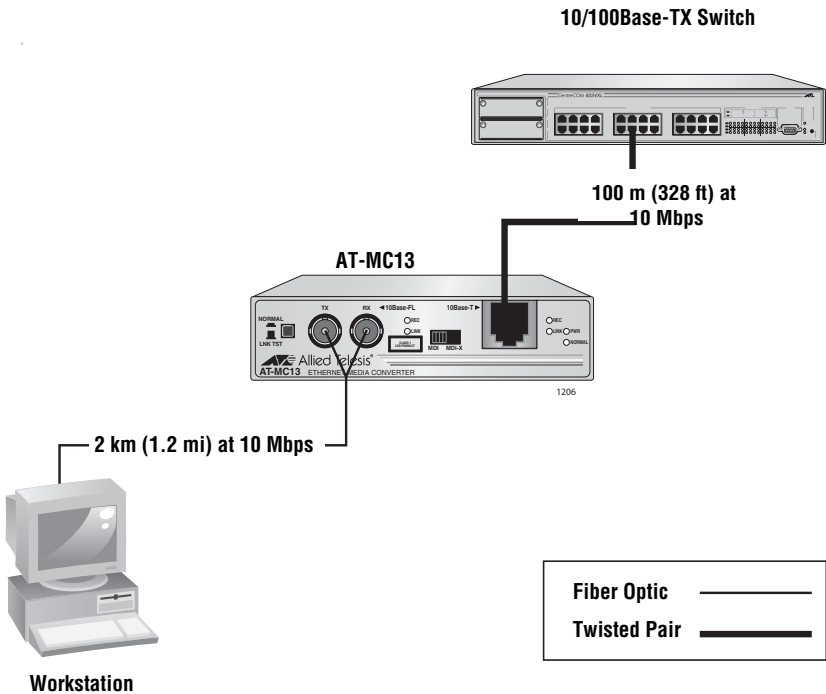
Figure 7. Standalone Topology

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Back-to-Back Topology

In some network configurations you may want to interconnect two media converters in what is referred to as a back-to-back topology. In this topology, the media converters not only extend the distance of your network but also convert the fiber optic cable from twisted pair to fiber optic and back again. Figure 8 illustrates two 10/100Base-TX switches at different campuses interconnected by two AT-MC13 media converters. The 10Base-T ports on the media converters are connected to one 10/100Base-TX port on each switch, while the 10Base-FL ports on the media converters are directly connected together.
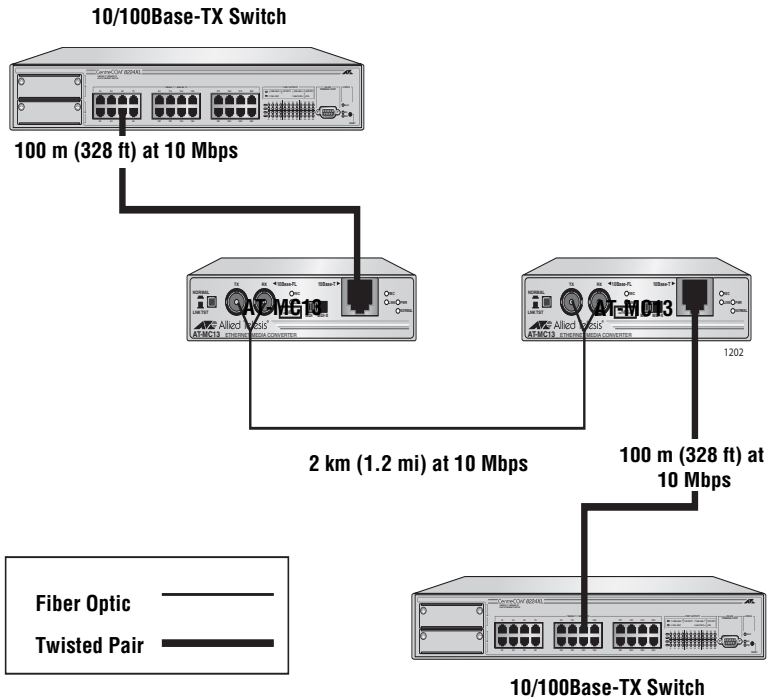

Figure 8. Back-to-Back Topology

Chapter 2
Installation

This chapter explains how to install the AT-MC13 media converter. This media converter can be used on a desktop or installed in an AT-MCR1 or AT-MCR12 chassis. To install an AT-MC13 media converter in an AT-MCR1 or AT-MCR12 chassis, refer to the chassis' installation guides.

Verifying Package Contents

Make sure the following items are included in your package. If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.

❒ One AT-MC13 Media Converter

❒ Four protective feet (for desktop use only)

❒ External AC/DC power adapter (North America, Continental Europe, United Kingdom, or Australia)

❒ This installation guide

❒ Warranty card

> **Note**
> For information on the power supply used with the AT-MC13 media converter, refer to "External Power Adapter" on page 20.

Planning the Installation

Be sure to observe the following guidelines when planning the installation of your media converter.

❏   The end-nodes connected to the twisted pair port or fiber optic port on the media converter must operate at 10 Mbps.

❏   The end-nodes connected to the ports of the media converter must be able to operate in the same duplex mode. These units can operate in either full- or half-duplex mode.

❏   The twisted pair cabling must be kept away from sources of electrical noise, such as radios, transmitters, power lines, broadband amplifiers, electrical motor, and fluorescent fixtures.

Selecting a Site

Be sure to observe the following guidelines when selecting a site for your media converter.

❏   Select a site that is dust-free and moisture-free.

❏   Select a site that will allow you to easily access the data cables and power cord.

❏   Use dedicated power circuits or power conditioners to supply reliable power to the device.

❏   Use the power sources described in "External Power Adapter" on page 20.

> **Note**
> Use only power sources that are UL Listed (QQGQ or EPBU), TUV Licensed or other Safety Agencies approved, and that are suitable for country of use.

Reviewing Safety Precautions

Please review the following safety precautions before you begin to install the switch.

> **Note**
> The ⌇ indicates that a translation of the safety statement is available in a PDF document titled "Translated Safety Statements" (613-000405) on the Allied Telesis website at www.alliedtelesis.com.

Warning
Class 1 laser device. ⌇ **L1**

Warning
Do not stare into the laser beam. ⌇ **L2**

Warning
Class I LED product. ⌇ **L3**

Warning
To prevent electric shock, do not remove the cover. There are no user-serviceable parts inside. The unit contains hazardous voltages and should only be opened by a trained and qualified technician. ⌇ **E1**

Warning
Do not work on this equipment or cables during periods of lightning activity. ⌇ **E2**

Warning
Power cord is used as a disconnection device: To de-energize equipment, disconnect the power cord. ⌇ **E3**

Pluggable Equipment: The socket outlet should be installed near the equipment and should be easily accessible. ᓂ **E5**

⚠ **Caution**

Air vents: The air vents must not be blocked on the unit and must have free access to the room ambient air for cooling. ᓂ **E6**

Warning

Operating Temperature: This product is designed for a maximum ambient temperature of 40°C. ᓂ **E7**

All Countries: Install this product in accordance with local and National Electric Codes. ᓂ **E8**

Installing an AT-MC13 Media Converter

The AT-MC13 media converter can be used on a desktop.

To use an AT-MC13 media converter on a desktop, perform the following procedure:

1. Remove all equipment from the package and store the packaging material in a safe place.

   Note
   Do not remove the dust cover from the fiber optic port until you are ready to connect the fiber optic cable. Dust contamination can adversely impact the operating performance of the port on the media converter.

2. If you are installing the media converter on a desktop, attach the four protective feet (provided) to each corner of the base of the unit. Do not attach the rubber feet if you are installing the unit in an AT-MCR1 or AT-MCR12 chassis.

3. If you are installing the media converter in an AT-MCR1 or AT-MCR12 chassis, refer to the chassis' installation guide for instructions on how to install the unit.

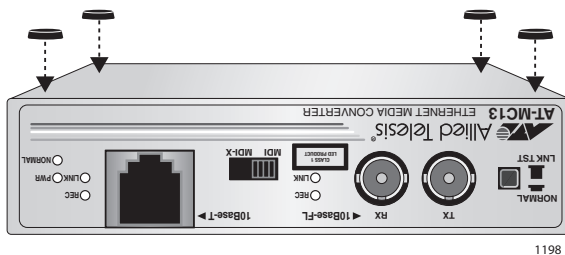4. Attach the four protective rubber feet to the bottom of the media converter, as shown in Figure 9.

Figure 9. Attaching the Protective Feet

5. Place the media converter on a secure, level surface, leaving ample space around the media converter for ventilation.

Cabling an AT-MC13 Media Converter

1. Remove the dust cover from the fiber optic port and connect the fiber optic cable to the 10Base-FL port.

   When attaching a fiber optic cable, be sure to observe the following guidelines:

   ❑ Be sure that the cable connector is firmly locked into place in the port.

   ❑ You should verify that you are using the appropriate type of fiber optic cabling. Refer to Table 4 on page 39 for fiber optic cabling specifications.

   ❑ You should verify that the operating specifications of the converter's fiber optic port are compatible with the fiber optic port on the remote end-node. For example, you cannot connect a fiber optic port with a maximum distance of 2 kilometers and an operating wavelength of 1310 nm to another fiber optic port that has a maximum distance of 40 kilometers (24.8 miles) and an operating wavelength of 1550 nm.

2. Connect the twisted pair cable to the 10Base-T port.

   When connecting a twisted pair cable to a port, observe the following guidelines:

   ❑ An RJ-45 connector should fit snugly into the port on the converter. The tab on the connector should lock the connector into place.

   ❑ You should check to be sure that you are using the appropriate type of twisted pair cabling. Refer to Table 3 on page 38 for twisted pair cable specifications.

   ❑ Since the twisted pair port, when operating in Auto-Negotiation, is Auto MDI/MDI-X, you can use either a straight-through or crossover twisted pair cable to connect any type of network device to a port on the converter. If you disable Auto-Negotiation on the port, the port default to MDI-X.

3. Set the MDI/MDI-X switch as follows:

   ❐ If you are connecting a workstation to the twisted pair port, set the MDI/MDI-X switch to the **MDI-X** position. MDI-X is the deafult position.

   ❐ If you are connecting a hub or switch to the twisted port pair, set the MDI/MDI-X switch to the **MDI** position.

4. Apply power to the media converter.

   ❐ For instructions on how to apply power to an AT-MC13 media converter, refer to "Powering on an AT-MC13 Media Converter" on page 30.

Powering on an AT-MC13 Media Converter

To apply power to an AT-MC13 media converter, perform the following steps:

1. Plug the AC/DC power adapter into an appropriate AC power outlet and insert the power plug into the DC receptacle located on the back of the unit, as shown in Figure 10.

   Note
   This step does not apply if you installed the unit in an AT-MCR1 or AT-MCR12 chassis.
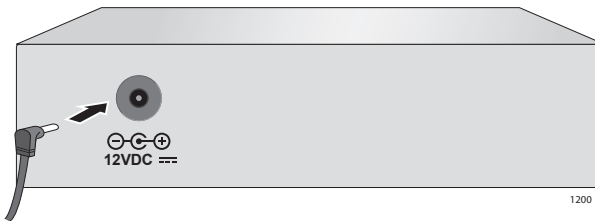
Figure 10. Connecting a 12VDC Powered Unit

2. Plug the AC/DC adapter to a power outlet. Refer to "Technical Specifications" on page 37 for power requirements.

⚠ **Warning**

   Power cord is used as a disconnection device: To de-energize equipment, disconnect the power cord. ⬳ **E3**
   ---

3. Verify that the PWR LED on the front of the unit is green. If the PWR LED is OFF, refer to "Troubleshooting" on page 33.

The media converter is now ready for use.

Warranty Registration

When you finish installing the product, you should register your product by completing the enclosed warranty card and sending it in.

Chapter 3
Troubleshooting

Follow the guidelines below to test and troubleshoot the installation in the event a problem occurs.

If the PWR LED is OFF, do the following:

❏ If the unit is installed on a desktop, check to be sure that the power adapter is securely connected to a power outlet and that the power adapter cable is securely connected to the back of the media converter.

❏ If the unit is installed in an AT-MCR1 or AT-MCR12 chassis, check that the unit is fully seated in the slot.

❏ Verify that the power outlet has power by connecting another device to it.

❏ Try using another power adapter.

If the LINK LED for the twisted pair port is OFF, do the following:

❏ Check that the end-node connected to the port is powered ON and is operating properly.

❏ Check that the twisted pair cable is securely connected to the twisted pair port on the media converter and on the remote end-node.

❏ Make sure that the twisted pair cable does not exceed 100 meters (328 feet) and that you are using Category 3 or better cable.

❏ Verify that the end-node is operating at 10 Mbps and full- or half-duplex mode if connected to an AT-MC13.

If the LINK LED for the fiber optic port is OFF, do the following:

❑ Verify that the end-node connected to the port is ON and is operating properly.

❑ Check that the fiber optic cable is securely connected to the fiber optic port on the media converter and on the remote end-node.

❑ Check to be sure that the end-node connected to the port is operating at 10 Mbps.

❑ Make sure that the fiber optic port on the remote end-node is operating in either full- or half-duplex mode.

❑ Make sure that the cable connected to the fiber optic receiver port on the media converter is connected to the transmitter port on the remote end-node and that the fiber optic transmitter port on the media converter is connected to the receiver port on the end-node.

❑ Test the attenuation on the fiber cable to ensure that it does not exceed acceptable values.

❑ Verify that you are using the appropriate type of fiber optic cable and that you have not exceeded the maximum operating distance. For cable types and operating distances, refer to Table 2 on page 38.

❑ Check that the operating specifications (e.g., wavelength and maximum operating distance) of the fiber optic port on the end-node are compatible with the operating specifications of the fiber optic port on the media converter. Refer to Table 4 on page 39 for fiber optic port specifications.

If the LINK LED for the fiber optic port is ON, but there is a communication problem between the end-nodes connected to the media converter (and you are not running a Fiber Link Test), check the following:

❑ Check that the end-nodes connected to the ports are operating at 10 Mbps.

❑ Check that the end-nodes connected to the AT-MC13 are operating in the same duplex mode. These units can operate in either full- or half-duplex mode.

❑ Check that the NORMAL/LNK TST button on the media converter is in the IN position.

❑ Check that the maximum allowable loss budget for the fiber optic cable has not been exceeded. Refer to Table 4 on page 39 for the fiber optic port specifications.

If the NORMAL LED on the AT-MC13 is OFF, do the following:

❐ Check that the end-nodes connected to the media converter are powered ON.

❐ Check that the fiber optic cable is securely connected to the fiber optic port.

❐ Verify that the appropriate fiber optic cable is being used. Refer to Table 4 on page 39 and Table 5 on page 39 for the fiber optic cable specifications.

❐ Verify that the maximum allowable loss budget for the fiber optic cable has not been exceeded.

If you are still experiencing problems after troubleshooting the installation, contact Allied Telesis Technical Support for assistance. Refer to "Contacting Allied Telesis" on page 12 or visit our web site at **www.alliedtelesis.com** for support information.

Appendix A
Technical Specifications

Physical

Dimensions:	W x D x H 10.5 cm x 9.5 cm x 2.5 cm (4.125 in x 3.75 in x 1.0 in)
Weight:	.295 kg (.65 lbs)

Temperature

Operating Temperature:	0° C to 40° C (32° F to 104° F)
Storage Temperature:	-25° C to 70° C (-13° F to 158° F)
Operating Humidity:	5% to 90% non-condensing
Storage Humidity:	5% to 95% non-condensing
Operating Altitude:	Up to 3,048 meters (10,000 feet)

Electrical Rating

Input Supply Voltage:	9 - 24 VDC
Output Current:	0.5A or 0.13A (maximum)
Power Consumption:	6 Watts (maximum)
Maximum Current:	200 mA

Agency Certifications

EMI	FCC Part 15 Class B, EN55022 Class B, VCCI Class B, C-TICK
Immunity	EN55024
Electrical Safety	UL 60950-1 ($_C$UL$_{US}$), EN60950-1 (TUV), CE
Laser Safety	EN60825-1

Fiber Optic Port Specifications

Table 2 lists the maximum operating distances for the AT-MC13 media converter.

Table 2. Maximum Operating Distance

Speed	Port	Type of Connector	Maximum Operating Distance[1]
10 Mbps	10Base-T	RJ-45	100 m (328 ft)
10 Mbps	10Base-FL	ST	2 km (1.2 mi)

1. Maximum operating distance may be less depending on the duplex mode of the end-node and the type of fiber optic cabling used with the port.

Table 3 lists the cabling specifications for the twisted pair port.

Table 3. 10Base-T Twisted Pair Cabling Specifications

Operating Mode	Cable Type	Maximum Operating Distance
10Base-T	Unshielded Category 3 or better	100 m (328 ft)

Table 4 lists the cabling specifications for the fiber optic port when operating in full-duplex mode.

Table 4. 10Base-FL Fiber Optic Cabling Specifications (Full-duplex)

Model	Cable Type	Maximum Operating Distance[1]	Maximum Allowable Loss Budget
AT-MC13	62.5/125 micron multimode	2 km (1.2 mi)	20dB at 850 nm

1. Maximum distance for 100 Mbps optical datalinks is dependent on the following factors: quality of fiber optic, duplex mode of both end-nodes, and maximum optical loss budget for the optical fiber at each operating optical wavelength.

Table 5 lists the cabling specifications for the fiber optic port when operating in half-duplex.

Table 5. 10Base-FL Fiber Optic Cabling Specifications (Half-duplex)

Number of Media Converters	Connected Devices	Maximum Operating Distance
One Media Converter Inline	Switch to Switch	372 m (1,221 ft)
	Workstation to Switch	372 m (1,221 ft)
	Switch to Class I Repeater	137 m (450 ft)
	Switch to Class II Repeater	185 m (607 ft)
Two Media Converters Inline	Switch to Switch	332 m (1,089 ft)
	Workstation to Switch	332 m (1,089 ft)
	Switch to Class I Repeater	97 m (318 ft)
	Switch to Class II Repeater	145 m (476 ft)

RJ-45 Twisted Pair Port Pinouts

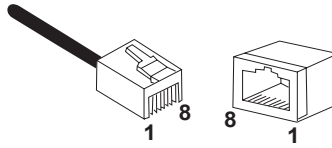Figure 11 shows the pin layout to an RJ-45 connector and port.

Figure 11. RJ-45 Connector and Port Pin Layout

Table 5 lists the pinouts of the RJ-45 ports for both MDI and MDI-X wiring configurations.

Table 6. RJ-45 Pinout

MDI Pinout		MDI-X Pinout	
Pin	**Signal**	**Pin**	**Signal**
1	TD +	1	RD+
2	TD-	2	RD-
3	RD+	3	TD+
6	RD-	6	TD-
4, 5, 7, 8	N/A	4, 5, 7, 8	N/A

ST Connector

The ST connector, shown in Figure 12, is used on the AT-MC13 media converter.

Figure 12. ST Connector

AT-MCR1 Chassis

The AT-MCR1, shown in Figure 13, is a chassis with internal power designed to house one unit of an ATI media converter product. The AT-MCR1 chassis provides convenient installation options. In addition to be desktop usage, it can also be mounted under a table, on the wall, as well as in an industry standard 19" or 23" racks.

Note
For additional information on the AT-MCR1 chassis, refer to the installation guide that comes with the chassis.
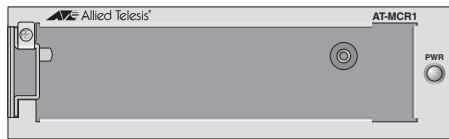

Figure 13. AT-MCR1 Media Converter Chassis

AT-MCR12 Chassis

The AT-MCR12 chassis provides convenient rackmount or desktop installation for up to twelve Allied Telesis 10Base and/or 100Base media converters. Figure 14 shows a fully populated chassis with rackmount ears attached. All products are connected to power through a factory-installed power supply and power backplane.

Note
For additional information on the AT-MCR12 chassis, refer to the installation guide that comes with the chassis.
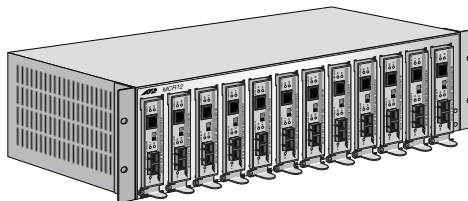

Figure 14. Full Populated AT-MCR12 Chassis

Appendix B
Cleaning Fiber Optic Connectors

This section describes how to clean fiber optic connections. The fiber optic connector consists of a fiber optic plug and its adapter. The end of the fiber optic cable is held in the core of the ferrule in the plug. Light signals are transmitted through the core of the fiber. Even minor smudges, or dirt, on the end face of the fiber (completely invisible to the naked eye) can disrupt light transmission and lead to failure of the component or of the entire system. Therefore, it is of utmost importance to clean all fiber optic connectors before use.

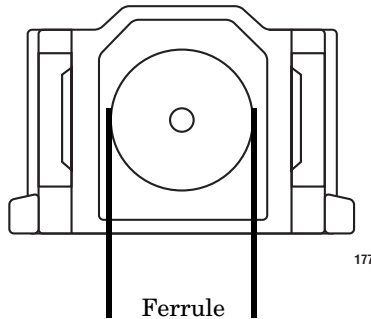Figure 22 shows the ferrule in a dual SC connector.

Ferrule

Figure 22. Ferrule in a Dual SC Connector Plug

The end face of an unclean and clean ferrule is shown in Figure 23.
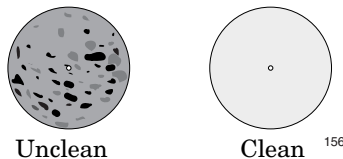

Unclean   Clean

Figure 23. Unclean and Clean Ferrule

This appendix provides the following procedures:

❒ "Using a Cartridge-Type Cleaner" on page 44

❒ "Using a Swab" on page 46

Using a Cartridge-Type Cleaner

Fiber optic cartridge cleaners are available from many vendors and are typically called "cartridge cleaners," as shown inFigure 24.

Figure 24. Cartridge Cleaner

Note
Do not use compressed air or aerosol air to clean a fiber optic connector.

To clean a fiber optic connector using a cartridge cleaner, perform the following procedure.

1. With one hand, hold the cartridge cleaner and push the lever on the cleaning cartridge in the direction of the arrow to expose the cleaning surface, as shown in Figure 25.

2. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 25.
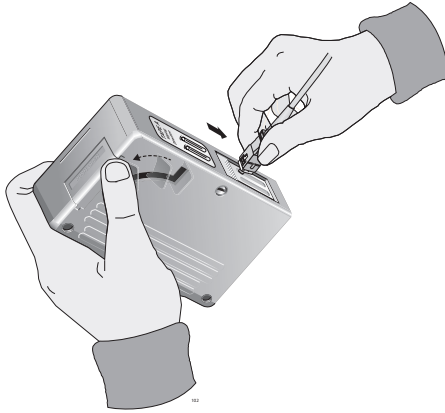

Figure 25. Rubbing the Ferrule Tip on the Cleaning Surface

Note
Rub the ferrule tip on the cleaning surface in one direction only.

3. When you reach the end of the cleaning surface, pick up the ferrule tip, rotate and place it at the top and rub downwards at least two times.

⚠ **Caution**
Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber optic cable.

4. If desired, repeat steps 3 and 4.

5. If a fiber inspection scope is available, use the scope to inspect the ferrule end face to make sure that it is clean.

6. Reconnect the cable to the port or protect the ferrule tip with a dust cap.

Note
Always keep a dust cap on a fiber optic cable when it is not in use.

Note
Do not touch the end face of the ferrule in the connector.

⚠ **Warning**
Do not stare into the laser beam.☞ 2

⚠ **Warning**
Do not look directly at the fiber optic cable ends or inspect the cable ends with an optical lens.☞ 31

Using a Swab

Specially treated swabs, or stick cleaners, are available for cleaning inside connector adapters or hard-to-reach ferrule tips. These swabs, often referred to as "lint free" or "alcohol free" swabs are available from many vendors, as shown in Figure 26 on page 46. Stick cleaners are available in both 2.5 mm and 1.25 mm sizes for use on SC and MU connectors respectively.
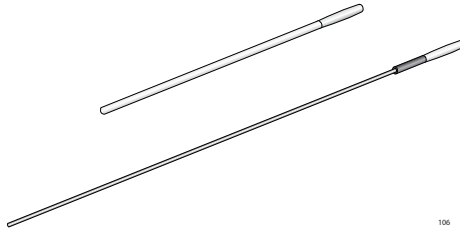

Figure 26. Lint-Free and Alcohol-Free Swabs

Note
Never use a household cotton swab and alcohol to clean a fiber optic connector. This may leave a residue on the ferrule tip.

Note
Do not used compressed air or aerosol air to clean a fiber optic connector.

To clean a recessed ferrule using a swab, perform the following procedure.

1. Insert the swab into the adapter as shown in Figure 27. Rub the ferrule tip with the swab.
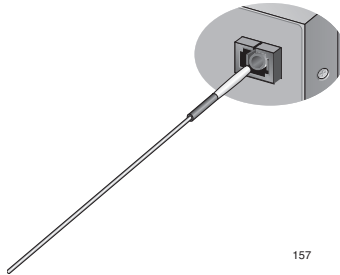

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Figure 27. Cleaning a Recessed Ferrule

2. If desired, repeat step 1.

3. If a fiber inspection scope is available, use the scope to inspect the connector to make sure that it is clean and to check for scratches, pits, or other problems that may affect performance.

Note
Always keep a dust cap on a fiber optic cable when it is not in use.

Warning
Do not stare into the laser beam.&⁄ 2

Warning
Do not look directly at the fiber optic cable ends or inspect the cable ends with an optical lens.&⁄ 31