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Document Number 55-80128BB-00 A1   July 2004

BLACK BOX®
NETWORK SERVICES

100 Mbps Compact Media Converter
Installation Guide

LHC001A-R4 - LHC002A-R4 - LHC005A-R4 - LHC006A-R4
LHC007A-MT-R3 - LHC008A-R3 - LHC009A-R3
LHC5129-R3 - LHC5130A-R3 - LHC5132A-R3 - LHC5133A-R3

About Compact Media Converter

Compact Media Converter is a low-cost, IEEE 802.3 single-conversion media converter that converts between 100 Mbps twisted pair and 100 Mbps multi-mode or single-mode fiber. It is available with one RJ-45 connector for the twisted pair port and several types of fiber connectors, including ST, SC and MT, for the fiber port. Single-strand fiber versions are also available. *Compact Media Converter* is a 1U high, standalone unit that includes diagnostic LEDs for each port and a universal (100/240 VAC) power supply.

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NOTE
All versions of the 100 Mbps Fast Ethernet *Compact Media Converter*, including 1300 nm multi-mode, 1310 nm and 1550 nm single-mode (TX/FX), 850 nm multi-mode fiber (TX/SX) and single-strand versions (TX/SSFX), will be referred to as *Compact Media Converter* throughout this installation guide except where differences need to be indicated.

100B TX - 100B FX MM — 100Base-TX twisted pair/100Base-FX 1300 nm multi-mode fiber; includes one RJ-45 connector and one pair ST (LHC001A-R4) or SC (LHC002A-R4) connectors or one MT (LHC007A-MT-R3) connector.

100B TX - 100B SX MM — 100Base-TX twisted pair/100Base-SX 1850 nm multi-mode fiber; includes one RJ-45 connector and one pair ST (LHC008A-R3) or SC (LHC009A-R3) connectors

100B TX - 100B FX SM/PLUS — 100Base-TX twisted pair/100Base-FX 1310 nm single-mode fiber; includes one pair ST (LHC005A-R4) or SC (LHC006A-R4) connectors

100B TX - 100B SSFX SM — 100Base-TX twisted pair/100Base-FX single-strand, single-mode fiber; includes one RJ-45 connector and one SC connector; 1310xmt/1550rcv module (LHC5129-R3); 1550xmt/1310rcv module (LHC5130A-R3)

100B TX - 100B SSFX SM/PLUS — 100Base-TX twisted pair/100Base-FX single-strand, single-mode fiber with higher power budget; includes one RJ-45 connector and one SC connector; 1310xmt/1550rcv module (LHC5132-R3); 1550xmt/1310rcv module (LHC5133A-R3)

Installing Compact Media Converter

Compact Media Converter comes ready to install; make all configurations after installation. To install *Compact Media Converter*, first make sure that the unit is placed on a suitable flat surface. Attach the cables between the *Compact Media Converter* and each device that will be interconnected, then plug the unit into a reliable, filtered power source.

NOTE
Since single-strand fiber products use optics that transmit and receive on two different wavelengths, you must deploy single-strand fiber products in pairs, or connect two compatible Black Box single-strand fiber products.

Configuring Compact Media Converter

Compact Media Converter features an 8-position DIP switch for configuring the unit after installation. This switch is accessed through a cut-out in the bottom of the unit. After configuring the DIP switch, power down the unit and then power up again for the changes to take effect. Default settings for the following features are shown to the right.

SWITCH #
OFF / ON
1 AN ENABLED
2 RESERVED
3 MDI/MDI-X
4 AUTO MDI/MDI-X
5 TX LL
6 FX LL
7 FA ENABLED
8 FA PULSE
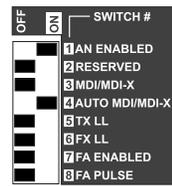
Bottom of converter

- TX LinkLoss
- FX LinkLoss
- FiberAlert (Pulse)
- MDI/MDI-X (Auto)
- Auto-Negotiation

TWISTED PAIR CROSSOVER/PASS-THROUGH CONNECTIONS

Whether you are using crossover or straight-through CAT5 twisted pair cabling, *Compact Media Converter* will support both types of connections by one of the following methods:

AutoCross Switch 4: *Compact Media converter* includes *AutoCross*, a feature which automatically selects between a crossover workstation or pass-through/ repeater hub connection depending on the connected device. To enable *AutoCross*, move the **Auto MDI/MDI-X** switch to the ON position.

MDI/MDI-X Switch 3: To manually configure *Compact Media Converter* for a pass-through (**MDI**) or a crossover (**MDI-X**) connection, move the **Auto MDI/MDI-X** <u>Switch 4</u> to OFF, then move <u>Switch 3</u> to the desired connection type: MDI=OFF and MDI-X=ON. If you are unsure of the type of connection, set the DIP switch to a position that makes the twisted pair LNK (link) LED glow.

About FiberAlert and LinkLoss

Compact Media Converter comes with the following troubleshooting features:

- *FX LinkLoss* (a.k.a. "*Fiber LinkLoss*" or "*LinkLoss*")

- *TX LinkLoss* (a.k.a. "*Twisted Pair LinkLoss*" or "*Reverse LinkLoss*")

- *FiberAlert (including Pulsing FiberAlert)*

LinkLoss and *FiberAlert* are advanced troubleshooting features that can help you locate "silent failures" on your network. However, it is vital that you understand exactly how *FiberAlert* and *LinkLoss* work, and how they will react in your network configuration, before attempting to install the enclosed module(s).

⚠ **Installing modules without understanding the effects of LinkLoss and FiberAlert can cause perfectly functioning units to appear flawed or even dead**.

If you are unfamiliar with *LinkLoss* and *FiberAlert*, Black Box strongly encourages you to read the following information. Contact Black Box technical support for more information/assistance.

FIBER OPTIC CLEANING GUIDELINES

Fiber Optic transmitters and receivers are extremely susceptible to contamination by particles of dirt or dust, which can obstruct the optic path and cause performance degradation. Good system performance requires clean optics and connector ferrules.

1) Use fiber patch cords (or connectors, if you terminate your own fiber) only from a reputable supplier; low-quality components can cause many hard-to-diagnose problems in an installation.

2) Black Box installs dust caps to ensure factory-clean optical devices. These protective caps should not be removed until the moment of connecting the fiber cable to the device. Assure that the fiber is properly terminated, polished and free of any dust or dirt, and that the location is as free from dust and dirt as possible.

3) Store spare caps in a dust-free environment such as a sealed plastic bag or box so that when reinstalled they do not introduce any contamination to the optics.

4) Should it be necessary to disconnect the fiber device, reinstall the protective dust caps.

5) If you suspect that the optics have been contaminated, alternate between blasting with clean, dry, compressed air and flushing with methanol to remove particles of dirt.

ELECTROSTATIC DISCHARGE PRECAUTIONS

Electrostatic discharge (ESD) can cause damage to your add-in modules. Always observe the following precautions when installing or handling an add-in module or any board assembly.

1) Do not remove unit from its protective packaging until you're ready to install it.

2) Wear an ESD wrist grounding strap before handling any module or component. If you do not have a wrist strap, maintain grounded contact with the system unit throughout any procedure requiring ESD protection.

⚠ **WARNING!** Integrated circuits and fiber optic components are extremely susceptible to electrostatic discharge damage. Do not handle these components directly unless you are a qualified service technician and use tools and techniques that conform to accepted industry practices.

3) Hold boards by the edges only; do not touch the electronic components or gold connectors.

4) After removal, always place the boards on a grounded, static-free surface, ESD pad or in a proper ESD bag. Do not slide the board over any surface.

WARRANTY

Contact Black Box for warranty information.

SAFETY CERTIFICATIONS

UL/CUL: Listed to Safety of Information Technology Equipment, Including Electrical Business Equipment.

CE: The products described herein comply with the Council Directive on Electromagnetic Compatibility (89/336/EEC) and the Council Directive on Electrical Equipment Designed for use within Certain Voltage Limits (73/23/EEC). Certified to Safety of Information Technology Equipment, Including Electrical Business Equipment. For further details, contact IMC Networks.

UL LISTED 5M80 ITE E156766   cUL   CE

| Class 1 Laser product, Luokan 1 Laserlaite, Laser Klasse 1, Appareil A'Laser de Classe 1 |

Installation Troubleshooting

- During installation, first test the fiber and twisted pair connections with all troubleshooting features disabled, then enable these features, if desired, just before final installation. This will reduce the features' interference with testing.

- When working with units where the features cannot be disabled, you must establish BOTH your twisted pair and fiber connections before the link LEDs will light!

- To test a media converter by itself, first make sure you have an appropriate fiber patch cable, then follow these steps to test:

  Step 1: Connect the media converter to the twisted pair device with a twisted pair cable.

  Step 2: Loop a single strand of fiber from the transmit port to the receive port of your media converter.

  Step 3: Verify that you have both twisted pair and fiber link (see LEDs, below) on your media converter.

- Make sure to use the appropriate twisted pair cable, and have the crossover/pass-through switch set correctly, if your media converter does not include *AutoCross*.

- If using a high powered device (which is designed for long distance installations) for a short distance installation, the fiber transmitters may overdrive the receivers and cause data loss. If this is the case, you may need to add an optical attenuator to your connection.

  Please contact Black Box for more information.

General Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) FREE technical support, 24 hours a day, 7 days a week:

Call: 724-746-5500 or **Fax:** 724-746-0746

Mail order: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018

Web site: www.blackbox.com

E-mail: info@blackbox.com

SPECIFICATIONS

Environmental
Operating Temperature: 32° - 122° F (0° - 50° C)
Storage Temperature: 0° - 160° F (-20° - 70° C)
Humidity: 5 - 95% (non-condensing)

Power
AC Input Load: 100-240VAC ±10%, 50/60 Hz, 1A
Heat generated: 51 BTU/hr.

ABOUT LINK INTEGRITY

During normal operation, link integrity pulses are transmitted by all point-to-point Ethernet devices. When an Black Box media converter receives valid link pulses, it knows that the device to which it is connected is up and sending pulses, and that the copper or fiber cable coming from that device is intact. The appropriate "LINK" LED is lit to indicate this. The Black Box media converter also sends out link pulses from its copper and fiber transmitters, but normally has no way of knowing whether the cable to the other device is intact and the link pulses are reaching the other end. *FiberAlert* and *LinkLoss* allow this information to be obtained from the fiber, even when physical access to a remote device (and its link integrity LED) is not available.   (See below for explanation of features, see page 4 for using the features in a typical application).
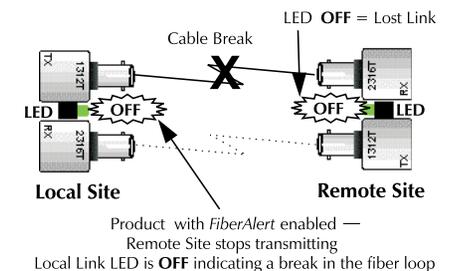
WHAT IS FX LINKLOSS?

FX LinkLoss is a troubleshooting feature. When a fault occurs on the fiber segment of a conversion, *FX LinkLoss* detects the fault and passes this information to the twisted pair segment. If a media converter is not receiving a fiber link, *FX LinkLoss* disables the transmitter on the media converter's twisted pair port. This results in a loss of link on the device connected to the twisted pair port.

WHAT IS TX LINKLOSS?

TX LinkLoss is another troubleshooting feature. When a fault occurs on the twisted pair segment of a conversion, *TX LinkLoss* detects the fault and passes this information to the fiber segment. If a media converter is not receiving a twisted pair link, *TX LinkLoss* disables the transmitter on the media converter's fiber port. This results in a loss of link on the device connected to the fiber port.

WHAT IS FIBERALERT

FiberAlert minimizes the problems associated with the loss of one strand of fiber. If a strand is unavailable, the Black Box device at the receiver end notes the loss of link. The device will then stop transmitting data and the link signal until a signal or link pulse is received. The result is that the link LED on BOTH sides of the fiber connection will go out indicating a fault somewhere in the fiber loop. Using *FiberAlert*, a local site administrator is notified of a fault and can quickly determine where a cable fault is located.

LED **OFF** = Lost Link
Cable Break
Local Site
Remote Site
Product with *FiberAlert* enabled —
Remote Site stops transmitting
Local Link LED is **OFF** indicating a break in the fiber loop

USING FIBERALERT AND LINKLOSS

The following table provides an overview of the troubleshooting features, their functionality and the recommended settings for a pair of media converters in a typical central/main site to remote site application:

LINKLOSS/FIBERALERT COMPARISON TABLE			
Feature	**Fault Location**	**Disabled LEDs**	**Enable At:**
FX LinkLoss	Fiber	Twisted Pair	Main Site Only
TX LinkLoss	Twisted Pair	Fiber	Remote Site Only
FiberAlert	Fiber	Fiber	Remote Site Only*

INSTALLATION TIP!
Enable *FiberAlert* on only ONE side of a media conversion; enabling it on both sides will keep both transmitters off indefinitely. If you want to enable *FiberAlert* on BOTH sides of the conversion, you MUST also enable *Pulsing FiberAlert* on one unit. Black Box recommends enabling *Pulsing FiberAlert* on ONE side (see below).

NOTE
FiberAlert is not available/applicable on single-strand fiber versions of *Compact Media Converter*.

WHAT IS PULSING FIBERALERT?

Use *Pulsing FiberAlert* in the following two situations:

A) When connecting two *Compact Media Converters* (or connecting one to a *100 Mbps Media Conversion* module) with *FiberAlert* enabled.

B) When connecting one *Compact Media Converter* with *FiberAlert* enabled and one *Compact Media Converter 10/100* unit with *Link Fault Detection* (LFD) enabled.

Converter 1	Converter 2
FiberAlert Enabled	FiberAlert and Pulsing FiberAlert Enabled
FiberAlert Enabled	FiberAlert Disabled

NOTE: Pulsing FiberAlert may be useful when connecting Compact Media Converter to another manufacturer's product that has a similar feature to FiberAlert.

NOTE: Please refer to the Compact Media Converter 10/100 Installation Guide for more information on LFD.

Auto-Negotiation on Compact Media Converter

Compact Media Converter includes *Auto-Negotiation*. When *Auto-Negotiation* is enabled (default), the media converter negotiates as a 100 Mbps Full-Duplex device; if the device the *Compact Media Converter* is connected to can operate at 100 Mbps Full-Duplex, a link will be established.

If the twisted pair port on the other device does not have the ability to auto-negotiate, or if a 100 Mbps Half-Duplex connection is desired, *Auto-Negotiation* on *Compact*

Media Converter must be disabled. Half- and Full-Duplex settings must be manually set and match on both devices to which *Compact Media Converter* is connected.

The diagram below shows a typical application, followed by a table with three possible configurations.


End to End Connection	Switch	TX/FX
Half-Duplex	Manually configure HDX	Auto-Negotiation Off
Full-Duplex	Manually configure FDX	Auto-Negotiation Off
Full-Duplex	Auto-Negotiation On	Auto-Negotiation On

If you are unsure of how best to implement this feature in your configuration, please contact Black Box Technical Support.

LED Operation

Compact Media Converter features four diagnostic LEDs. The diagram below shows the location of the unit's LEDs.
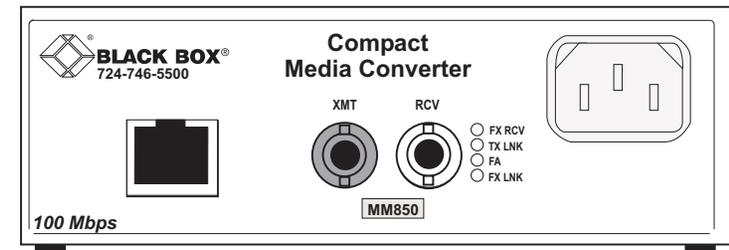
The LED functions are:

FX RCV Glows yellow when module is receiving data.

TX LNK Glows green when a twisted pair link is established.

FA Glows green when *FiberAlert* is enabled.   Blinks green when a *FiberAlert* situation occurs (i.e. the loss of one strand of fiber).

NOTE: FiberAlert is not available/applicable on single-strand fiber versions of Compact Media Converters.

FX LNK Glows green when a fiber link is established.