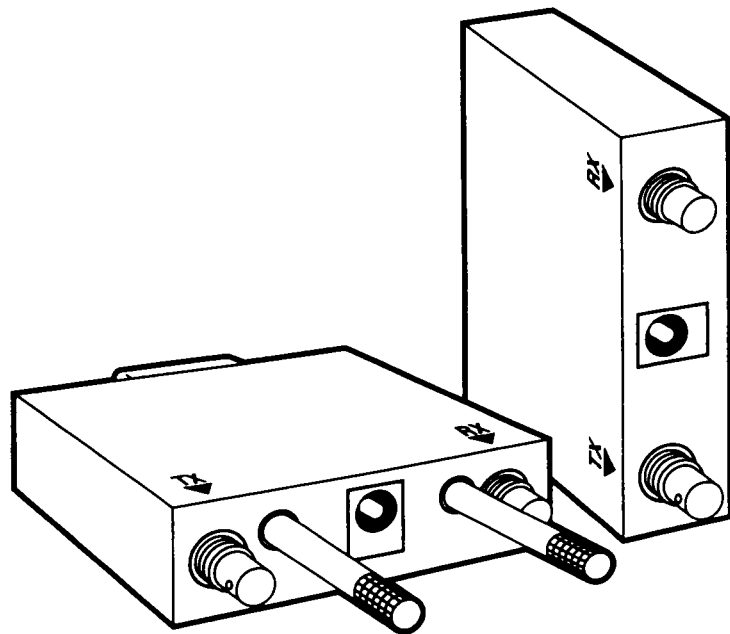




Black Box Corporation
The Source for Connectivity®

MAY 1996
LT038A-SM
LT038A-SMUTP
LT038A-UTP

Token Ring FO Transceiver (SM) Token Ring UTP/FO Transceiver (SM) Token Ring UTP/FO Transceiver



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TOKEN RING FIBEROPTIC TRANSCEIVERS

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TOKEN RING FIBEROPTIC TRANSCEIVERS

FEDERAL COMMUNICATIONS COMMISSION AND CANADIAN DEPARTMENT OF COMMUNICATIONS 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 the Canadian Department of Communications.

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 le ministère des Communications du Canada.

**NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT****INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser 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.

1. Specifications

Compatibility	Complies with IEEE 802.5J Token-Ring standard (last draft)	
Distances	Multimode	Singlemode
	62.5/125 μ m fiberoptic cable	9/125 μ m fiberoptic cable
	6600 ft. (2,000 m)	66,000 ft. (20,000 m)
Optical	Multimode	Singlemode
Wavelength	850 nm	1300 nm
Power Budget		
50/125 fiber	10 dB	
62.5/125 fiber	14 dB	
9/125 fiber		14 dB
Electrical		
Supply Voltage		
RJ-45	9V external only	
DB9	5V from NIC (Network Interface Card)	
	9V external	
Power dissipation		
	9V—approx. 3 watts	
	5V—approx. 1.5 watts	
Power Pins		
DB9	3 (Vcc), 8 (GND)	
External Jack	Center Pin: (+)	
	Outer contact: (-)	

DC Power Supply Connector

	Internal Pin	External Pin
Length	0.43 in. (11 mm)	0.48 in. (12.3 mm)
Diameter	0.078 in. (2 mm)	0.216 in. (5.5 mm)
Diagnostic LEDs		
Power	Green	
F/O OK	Green	
Insert	Green	
Physical	DB9	RJ-45
Weight	Approx. 4 oz. (110 g)	Approx. 4 oz. (110 g)
Size	0.82" x 2.6" x 3.5" (21 x 67 x 90 mm)	1.1" x 2.6" x 2.8" (29 x 67 x 71 mm)
Connectors		
Fiberoptic	ST [®] Type	
DB9	Male	
RJ-45	Jack	
Environmental		
Operating Temperature	32 to 104°F (0 to 40°C)	
Storage Temperature	-4 to 185°F (-20 to 85°C)	
Humidity	90% maximum, noncondensing	

Table 1-1. Cable Types and Pin Connections

RO & LOBE Cables				RI Cable	
DB9 female/Data cross-cable (EHM057)		RJ-45 plug/RJ-45 plug cross cable (EHN138)		DB9 female/Data (EVNTRD9/FA120)	
DATA	DB9	RJ-45	RJ-45	DATA	DB9
Red	9	3	5	Red	1
Green	5	4	6	Green	6
Orange	1	6	4	Orange	9
Black	6	5	3	Black	5

2. Introduction

2.1 Description

The Token Ring Fiberoptic Transceivers are long-distance lobe and ring transceivers that allow remote terminals to communicate with an MSAU via a fiberoptic link, or permit transmitting and receiving between two MSAUs in a ring.

These Transceivers allow a maximum connection distance between MSAU and terminals, or between two MSAUs, of 6600 ft. (2000 m) for Multimode or 66,000 ft. (20,000 m) for Singlemode, using fiberoptic cable.

2.2 Features

- Signal Conversion** Converts a token-ring signal from copper to fiberoptic cable.

- Transmission Distance** Extends maximum lobe-transmission distance between station and MSAU or between two MSAUs to 6600 ft. (2000 m) for Multimode and 66,000 ft. (20,000 m) for Singlemode, subject to optical budget.

- Data Integrity** Bidirectional transmitting and receiving, including reshaping of the data signal.

- Auto-configuration** Auto-configuration for either PC or MSAU side and 4/16 Mbps.

- Standards Compliance** Complies with IEEE 802.5J Token-Ring standard.

- Connection** Workstation: Plugs directly in DB9 version, or through a patch cable in RJ-45 version. MSAU: Plugs through a patch cable.

- Diagnostic Indications** Diagnostic LEDs to help with installation and maintenance.

3. Installation

Figures 3-1 and 3-2 illustrate the two types of Fiberoptic Transceivers: DB9 and RJ-45. Table 3-1 describes the units' components and their functions.

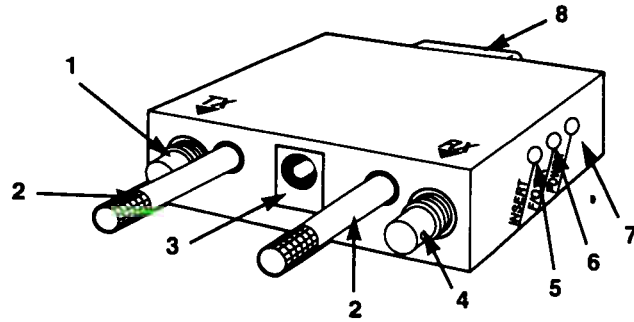


Figure 3-1. DB9 Token Ring Fiberoptic Transceiver.

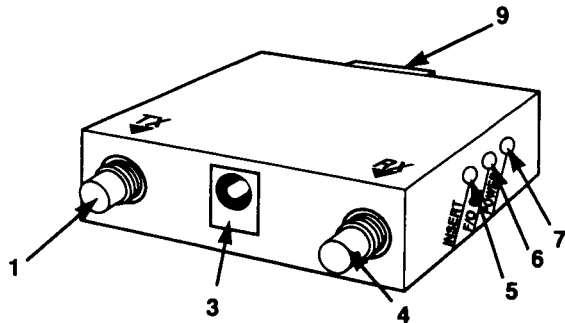


Figure 3-2. RJ-45 Token Ring Fiberoptic Transceiver.

Table 3-1. Components and Functions

No.	Item	Function
1	Tx connector	Fiberoptic transmission connector.
2	Support screws	Secures the Transceiver to the PC.
3	Power-supply socket	Connection to 9V DC, 500-mA power supply.
4	Rx connector	Fiberoptic reception connector.
5	Insert LED indicator	Lit green when properly connected and Insert signal is received. Blinks when properly connected to an MSAU located on either LOBE or RING and no Insert signal is received.
6	F/O OK LED indicator	Lit green on one Fiberoptic Transceiver when its Rx connector receives a signal sent from the Tx connector of the second Fiberoptic Transceiver and vice versa.
7	Power LED indicator	Lit green when voltage is applied via external power supply or from the Network Interface Card. NOTE: The voltage may be sufficient to light the LEDs but not sufficient to power the Fiberoptic Transceivers; see Chapter 1, Specifications.
8	DB9 pin connector	Connection to PC and MSAU—DB9.
9	RJ-45 connector	Connection to PC and MSAU—RJ-45.

3.1 Fiberoptic Lobe Installation

3.1.1 CONNECTION TO THE MSAU SIDE—DB9 VERSION

Connect the Fiberoptic Transceiver to the MSAU using a DB9 female/Data cross-cable (EHM057) as shown in Figure 3-3. Connect the cable to the MSAU.

TOKEN RING FIBEROPTIC TRANSCEIVERS

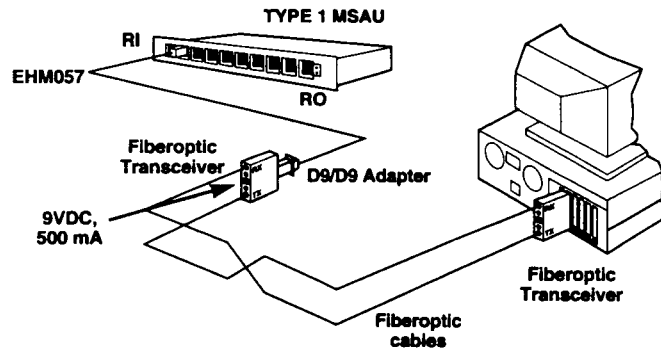


Figure 3-3. Lobe Configuration, DB9 Version.

3.1.2 CONNECTION TO MSAU SIDE—RJ-45 VERSION

Connect the Fiber optic Transceiver to the MSAU using an RJ-45 cross-cable (EHN138) as shown in Figure 3-4. Connect the cable to the MSAU.

Apply 9 volts, 500 mA to the MSAU-side Fiber optic Transceiver using an external power supply. Verify that all the LEDs light for one second, after which they should turn off automatically. The Power LED should remain lit. Connect the fiber optic cable to the MSAU-side Fiber optic Transceiver.

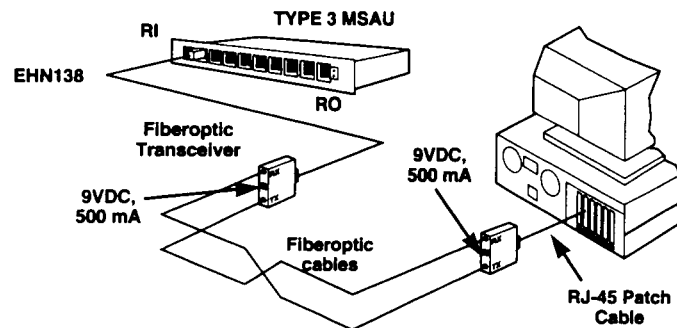


Figure 3-4. Lobe Configuration—RJ-45 Version.

TOKEN RING FIBEROPTIC TRANSCEIVERS

3.1.3 CONNECTION TO PC SIDE

DB9 Version

Turn the PC off. Connect the second Fiber optic Transceiver to the DB9 connector on the PC's Token-Ring (Network Interface) Card. Turn the PC on.

NOTE

Some Token-Ring adapter cards do not supply +5V between pins 3 and 8 of the DB9 connector. In this case, an external 9V, 500-mA power supply (included) should be used.

RJ-45 Version

Connect the second Fiber optic Transceiver to a 9V, 500-mA external power supply.

Both Versions

Verify that all LEDs, except the Power LED, light for one second, after which they should turn off automatically. The Power LED should remain lit.

The Insert LED of the PC-side Fiber optic Transceiver will blink or light when the PC sends test data but does not apply the phantom drive. The Insert LED on the MSAU-side Fiber optic Transceiver will blink when the Fiber optic Transceiver is correctly connected to the MSAU but an Insert signal is not received.

Connect the fiber optic cable between the two Fiber optic Transceivers *crosswise* (Tx to Rx, Rx to Tx). The F/O OK LED should light continuously; the Insert LED should blink or light continuously.

WARNING

Fiber optic connectors contain LEDs which can cause irreversible eye damage if inspected with a magnifying lens or too closely with the naked eye.

Covers must be kept on any fiber optic ports that are not used.

TOKEN RING FIBEROPTIC TRANSCEIVERS

CAUTION

Use only ST connectors on the Fiberoptic Transceiver in all fiberoptic connections. The use of other connectors may damage the F/O OK LEDs.

The F/O OK LEDs on both Fiberoptic Transceivers should blink or light; if they do not, the fiberoptic cables are connected backwards or malfunctioning (see Chapter 4). Verify that the fiberoptic cable is connected *crosswise*.

If the F/O OK LED of only one Fiberoptic Transceiver fails to light, that specific Fiberoptic Transceiver is not receiving a signal from the Tx of its "partner" Fiberoptic Transceiver, or is malfunctioning (see Chapter 4).

Start the Network program. The Insert LEDs of both Fiberoptic Transceivers should light after the program takes effect; this requires several seconds.

NOTE

Each Fiberoptic pair of the DB9 version requires one DB9 female/Data cross-cable (EHM057) or one DB9 female/Data PC adapter cable (EVNTRD9/FA120), both of which need female DB9 connectors.

Each Fiberoptic Transceiver pair of the RJ-45 version requires one RJ-45 cross-cable (EHN138) on the MSAU side and one RJ-45 patch cable (EYN737MS) on the PC side.

3.2 Installation on the Main Ring Path

A pair of Token Ring Fiberoptic Transceivers may be connected in order to extend maximum MSAU to MSAU distance on the RING to 6600 feet (2000 m) for Multimode and 66,000 feet (20,000 m) for Singlemode.

TOKEN RING FIBEROPTIC TRANSCEIVERS

3.2.1 DB9 VERSION

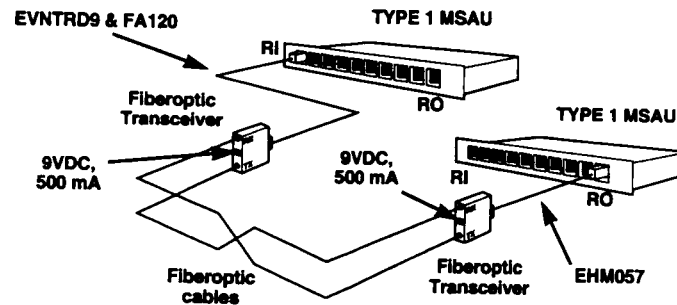


Figure 3-5. Ring Configuration, DB9 Version.

Connect a DB9 female/Data cable (EVNTRD9/FA120) between the RI port of the first MSAU and the Fiberoptic Transceiver attached to it.

Connect a DB9 female/Data cross-cable (EHM057) between the RO port of the second MSAU and the Fiberoptic Transceiver attached to it.

NOTE

The cables must not be interchanged!

The DB9 female/Data cross-cable (EHM057) must be attached to the RO port of the first MSAU; the DB9 female/Data cable (EVNTRD9/FA120) must be attached to the RI port of the second MSAU.

Apply 9 volts, 500 mA from an external power supply to each Fiberoptic Transceiver. Verify that all the LEDs light for one second. The Power LED should remain lit; the Insert LED should blink; the F/O OK LED will turn off automatically.

Connect the fiberoptic cable between the two Fiberoptic Transceivers *crosswise* (Tx to Rx, Rx to Tx). The F/O OK LED should light continuously. The Insert LED should blink.

NOTE

The Fiberoptic Transceiver does not support automatic wrap. Should the fiberoptic cable tear or Fiberoptic Transceiver power be lost, data communication will be discontinued. In order to restore communication within the now-isolated Rings, the RI and RO data connectors should be disconnected from the MSAUs.

3.2.2 RJ-45 VERSION

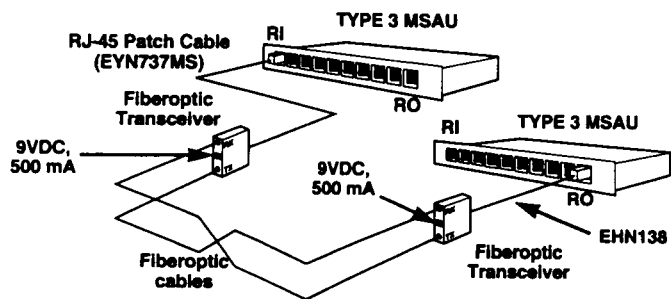


Figure 3-6. Ring Configuration, RJ-45 Version.

Connect an RJ-45 patch cable (EYN737MS) between the RI port of the first MSAU and the Fiberoptic Transceiver attached to it.

Connect an RJ-45 cross-cable (EHN138) between the RO port of the second MSAU and the Fiberoptic Transceiver attached to it.

NOTE

The cables must not be interchanged!

The RJ-45 cross-cable (EHN138) must be attached to the RO port of the first MSAU; the RJ-45 patch cable (EYN737MS) must be attached to the RI port of the second MSAU.

Apply 9 volts, 500 mA from an external power supply to each Fiberoptic Transceiver. Verify that all the LEDs light for one second. The Power LED should remain lit; the Insert LED should blink; the F/O OK LED will turn off automatically.

Connect the fiberoptic cable between the two Fiberoptic Transceivers *crosswise* (Tx to Rx, Rx to Tx). The F/O OK LED should light continuously. The Insert LED should blink.

NOTE

The Fiberoptic Transceiver does not support automatic wrap. Should the fiberoptic cable tear or Fiberoptic Transceiver power be lost, data communication will be discontinued. In order to restore communication within the now-isolated Rings, the RI and RO data connectors should be disconnected from the MSAUs.

4. Troubleshooting

Token Ring Fiberoptic Transceivers are highly reliable. A fault on the network will generally be caused by some other aspect of the network configuration.

If, after following the procedures in this chapter, you believe the Transceiver to be faulty, contact your supplier. Do not attempt to fix the unit yourself—the Token Ring Fiberoptic Transceivers have no user-serviceable parts.

4.1 LEDs

The LEDs provide logical diagnostic indications of network faults. If you have trouble with your Transceiver:

- Record the LED combination indicating a problem.
- Compare the LED combination with the tables on the next page.
- Look up the “Problem #” for that LED combination in **Section 4.3**.

Table 4-1. LED Indicators: Lobe Configuration

MSAU Fiberoptic Transceiver			PC Fiberoptic Transceiver			Problem # (Section 4.3)
Insert	F/O OK	Power	Insert	F/O OK	Power	
ON	ON	ON	ON	ON	ON	Normal
OFF	OFF	OFF	OFF	OFF	OFF	1
BLINKS	ON	ON	OFF	ON	ON	2, 3
OFF	OFF	ON	OFF	ON	ON	4 a
BLINK	ON	ON	OFF	OFF	ON	4 b
OFF	OFF	ON	OFF	OFF	ON	4 c

Table 4-2. LED Indicators: Ring Configuration

Insert	F/O OK	Power	Problem # (Section 4.3)
BLINK	ON	ON	Normal
OFF	OFF	OFF	1
OFF	ON	ON	5
OFF	OFF	ON	4 d

4.2 Problems and Solutions

1) Power is not being supplied to the Transceiver.

Voltage is not being applied or is insufficient.

Connect the Transceiver to a 9V, 500-mA power supply. Check for correct polarity (see **Chapter 1**).

2) *The PC reports a Link failure; all connections are secure and the Transceiver is connected properly.*

Connections to the Transceiver are not tight.

Verify that all connections to and from the Transceiver are secure.

3) *The PC is not sending the Insert command; no data is being sent.*

The station is not yet functioning as a Network. Start the Network program; verify that the DB9 female/Data cross-cable (EHM057), or RJ-45 cross cable (EHN138), is securely connected to the MSAU.

4) *The Transceiver is not receiving a signal from the other Transceiver.*

- a. The fiberoptic cable (either end) attached to the Tx connector of the PC-side Transceiver is either faulty or not securely attached.
- b. The fiberoptic cable (either end) attached to the Tx connector of the MSAU-side Transceiver is either faulty or not securely attached.
- c. The fiberoptic cable attached to the Tx connector of the PC-Transceiver or the MSAU-Transceiver has been switched with that of the Rx connector or is faulty or is not securely attached.
- d. The fiberoptic cable attached to the Tx connector has either been switched with that of the Rx connector on one of the Transceivers, or is not securely attached to one or both of the Transceivers.

Check that the fiberoptic cable is securely connected to both units and is in good condition. Verify that the other unit is operating.

5) *The PC cannot load the Network program or the program has crashed.*

DB9: The DB9 female/Data cable (EVNTRD9/FA120) and the cross-cable (EHM057) have been interchanged, or the Transceiver/DB9 connection is not tight.

RJ-45: The RJ-45 patch cable (EYN737MS) and the RJ-45 cross-cable (EHN138) have been interchanged, or the Transceiver/RJ-45 connection is not tight.

Check that the cross-cable is placed between the Transceiver and the RO Port of the MSAU, *not* the RI Port. Check that the MSAU, network program, and PC are operating properly. Attach the DB9 (RJ-45) connector securely to the Transceiver.