TRFOT-3
TOKEN RING SINGLE MODE
FIBER OPTIC TRANSCEIVER

LOBE CABLE CONVERTER
USER'S GUIDE

CABLETRON SYSTEMS Inc.

The Complete Networking Solution™

CABLETRON SYSTEMS, P. O. Box 5005, Rochester, NH 03867-0505

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

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment uses, generates, and can radiate radio frequency energy and if not installed in accordance with the operator's manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

WARNING: Changes or modifications made to this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

DOC NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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CHAPTER 1

INTRODUCTION

Welcome to the Cabletron Systems **TRFOT-3 Token Ring Single Mode Fiber Optic Transceiver Lobe Cable Converter User's Guide**. This manual explains installation instructions and provides reference information for the TRFOT-3

1.1 USING THIS MANUAL

Read through this manual to gain a full understanding of the features of the TRFOT-3. A general working knowledge of token ring (IEEE 802.5J) networks will be helpful during the installation.

Chapter 1, **Introduction**, describes the features and capabilities of the Cabletron Systems TRFOT-3.

Chapter 2, **Installation Requirements/Specifications**, describes cabling requirements, network guidelines, and operating specifications for the TRFOT-3.

Chapter 3, **Installing the TRFOT-3**, contains instructions for mounting the TRFOT-3 and attaching the cables to your network. It also describes the front panel LANVIEW® LEDs.

1.2 TRFOT-3 OVERVIEW

The TRFOT-3, Token Ring Single Mode Fiber Optic Transceiver, converts single mode fiber lobes to copper and/or copper lobes to single mode fiber. You can use the TRFOT-3 in conjunction with Cabletron Systems' TRFMIM-32/36/38 Single Mode Fiber Media Interface Modules or configure the TRFOT-3 for Ring In/Ring Out (RI/RO) applications. An external plug-in power supply provides power for the TRFOT-3. The TRFOT-3 complies with 802.5J Fiber Optic Token Ring standard (draft 23) over single mode fiber cable and meets FCC Class A, UL and VDE requirement for emissions.

1.3 TRFOT-3 FEATURES

LANVIEW LEDs
Cabletron Systems' LANVIEW Status Monitoring and Diagnostics System is a convenient troubleshooting tool that helps you diagnose physical layer problems. The front panel LANVIEW LEDs alert you to power failures, cable faults, and link problems.

Connectivity
The TRFOT-3 is equipped with single mode ST connectors for fiber links and a DB9 connector for copper links. The TRFOT-3 supports cable distances of up to 10 km over single mode fiber optic cable. You can attach the TRFOT-3 at either end of a fiber link.

Ring Speed Compatibility
The TRFOT-3 supports both 4 and 16 mb/sec ring speeds and senses the ring speed automatically.

1.4 RECOMMENDED READING

We recommend the following publications for more information on implementing a token ring network.

Local Area Networks, Token Ring Access Method, IEEE Standard 802.5

LAN Troubleshooting Handbook, Mark Miller (1989, M&T Publishing, Inc.)

1.5 GETTING HELP

If you need additional support related to the Cabletron Systems TRFOT-3, or if you have any questions, comments, or suggestions concerning this manual, feel free to contact Cabletron Systems Technical Support:

By phone ..... (603) 332-9400
Monday-Friday; 8am - 8pm EST
By CompuServe® ..... GO CTRON from any ! prompt
By Internet mail ..... support@ctron.com

CHAPTER 2

INSTALLATION REQUIREMENTS/SPECIFICATIONS

This chapter describes cabling requirements, network guidelines, and operating specifications for the TRFOT-3. Ensure that you read this chapter before you install the TRFOT-3. Failure to follow these guidelines could result in unsatisfactory network performance.

2.1 FIBER OPTIC CABLE SPECIFICATIONS

Single mode fiber optic link segments must meet the requirements listed below:

Table 2-1. Single Mode Fiber Optic Cable Requirements

Cable Type	Single Mode 8.3/125 µm fiber optic
Wavelength	1300 nm Typical 1270 nm Minimum 1330 nm Maximum
Maximum Cable Length	10 km
Fiber Optic Budget Loss	10 db

Attenuation
The fiber optic cable must be tested with a fiber optic attenuation test set that is adjusted for a 1300 nm wavelength. This test verifies that the signal loss in a cable is within an acceptable level of 10.0 dB or less for any given fiber optic cable segment.

Fiber Optic Budget and Propagation Delay
Fiber optic budget is the combination of the optical loss due to the fiber optic cable, in-line splices, and fiber optic connectors. Propagation delay is the amount of time it takes data to travel from the sending device to the receiving device. When determining the maximum fiber optic cable length, the fiber optic budget (total loss of 10.0 dB or less between stations) and total network propagation delay should be calculated and considered before fiber optic cable runs are incorporated in any network design.

2.2 COPPER CABLE SPECIFICATIONS

Cabletron includes a DB9 to DB9 Shielded Twisted Pair cable with the TRFOT-3. Use this cable to connect the TRFOT-3 to the token ring station adapter card or concentrator. To attach the TRFOT-3 to a token ring device that does not have a DB9 connector, you need an adapter cable. Cabletron offers adapter cables for RJ45 or MIC style connectors. Copper cable must meet the following requirements:

Maximum Cable Length
The maximum allowable length for copper cable is 10 feet.

Connector Pinouts
Table 2-2 provides a cross reference of copper cable connector pinouts.

Table 2-2. Connector pinout Cross reference

Signal Name	DB9 9-pin D-shell	RJ45 8-pin Modular	Data Connector (MIC)
TX+	9	6	O (Orange)
TX-	5	3	B (Black)
RX+	1	4	R (Red)
RX-	6	5	G (Green)

Media Filters
To connect an Unshielded Twisted Pair (UTP) segment from a token ring concentrator to the TRFOT-3, you need to install a Type 3 media filter such as the Cabletron Systems TRMF-2. Use the TRMF-2 at the concentrator end of the connection as shown in Figure 2-1.

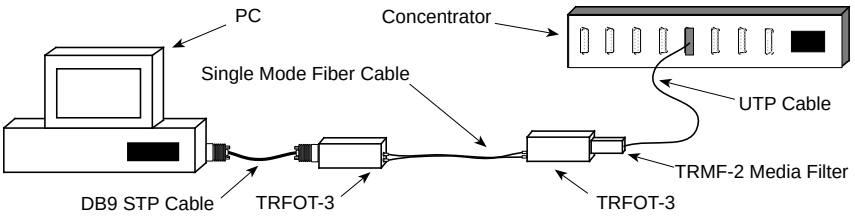

Figure 2-1. UTP Cable Connections

2.3 OPERATING SPECIFICATIONS

This section lists power supply requirements, safety and environmental guidelines, and physical specifications for the TRFOT-3. Cabletron Systems reserves the right to change these specifications at any time without notice.

POWER REQUIREMENTS

Input Voltage: 9-12 VDC

Input Current: 700 ma, Maximum

FIBER OPTIC TRANSMIT/RECEIVE SPECIFICATIONS

Transmit Power: -15.1 dBm

Receive Sensitivity: -32 dBm

Maximum Receive Power: -6.99 dBm

SAFETY AND ENVIRONMENTAL APPROVALS

This device meets FCC Class A, UL and VDE requirement for emissions.

PHYSICAL

Dimensions:	2.875 H x 5.250 W x .875 D inches (7.18 H x 13.12 W x 2.18 D centimeters)
Weight:	.40 lbs

CHAPTER 3

INSTALLING THE TRFOT-3

This chapter outlines how to install the TRFOT-3 to your network. Ensure that your network meets all the requirements listed in Chapter 2, **Installation Requirements/Specifications**, before installing and operating the TRFOT-3.

3.1 UNPACKING THE TRFOT-3

Unpack the TRFOT-3 as follows:

1. Carefully remove the TRFOT-3 from the shipping box.

2. Remove the TRFOT-3 from its protective plastic bag.

3. Visually inspect the TRFOT-3. If there are any signs of damage, contact Cabletron Systems Technical Support immediately.

3.2 SETTING THE CONFIGURATION SWITCHES

Figure 3-1 shows the location of the TRFOT-3's four configuration switches. Cabletron sets the switches for Station applications. If you need to change the switches for other applications, follow steps 1-3.

Figure 3-1. TRFOT-3 Configuration Switches

1. Disconnect the TRFOT-3 from the network and remove the power.

2. Set the switches for the desired application (refer to Table 3-1).

3. Reconnect the TRFOT-3 to the network, then re-apply the power.

Table 3-1 provides a quick reference for the switch settings for Station, Lobe Concentrator/Trunk Coupling Unit (TCU), Ring In (RI), and Ring Out (RO) applications. A description of each switch is also listed below.

Table 3-1. Switch Settings

Switch	Station	Lobe (TCU)	Ring In	Ring Out
A	On	Off	On	Off
B	Off	Off	On	On
C	Off	Off	On - Disables phantom drive. Off - Enables phantom drive (for use with Cabletron proprietary devices only).	
D	Off	Off	On - Cabletron proprietary devices. Off - 802.5J compatible device.	

Switch A
This switch selects Station/RI or Lobe/RO applications for the TRFOT-3's copper connector. Select ON to attach the TRFOT-3's copper connector to a Station adapter or Ring In port. Select OFF to connect the copper connector to a concentrator lobe port or Ring Out port.

Switch B
This switch selects RI/RO or Station/Lobe applications for the TRFOT-3. Select ON for RI/RO applications. Select OFF for Station/Lobe applications.

Switch C
This switch enables/disables the phantom drive for RI/RO applications with other Cabletron products. Select ON to disable the phantom drive. Select OFF to enable the phantom drive.

Switch D
This switch selects modes on the TRFOT-3's fiber optic connector. Select ON to attach the TRFOT-3's fiber optic connector to a Cabletron fiber RI/RO port, for example the TRRMIM-A/2A/4A. Select OFF to attach the fiber optic connector to an IEEE 802.5J compatible RI/RO

port.

3.3 ATTACHING THE TOKEN RING CABLE TO A CONCENTRATOR

To attach the TRFOT-3 to a token ring concentrator that supports Shielded Twisted Pair (STP), use the DB9 to DB9 cable supplied with the unit. If you want to attach the TRFOT-3 to a concentrator that does not have a DB9 connector, you need an adapter cable. Cabletron offers cables that adapt to RJ45 and MIC style connectors. The maximum supported length for the copper cable is 10 feet.

To attach the TRFOT-3 to a token ring concentrator that supports Unshielded Twisted Pair (UTP) cable, you need to install a Type 3 media filter such as the Cabletron Systems TRMF-2. Figure 3-2 shows how to attach a UTP segment to the TRFOT-3 using the TRMF-2.

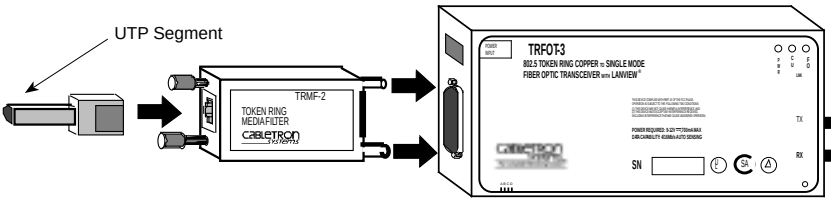

Figure 3-2. Attaching a UTP Segment to the TRFOT-3

3.4 ATTACHING FIBER OPTIC CABLES

***Note**: The fiber optic cables must be crossed over (i.e. TX on one end to RX on the other end) when connected. To facilitate hookup, label the fiber optic strands 1 and 2.*

To connect a fiber optic link segment to a TRFOT-3:

1. Remove the protective plastic covers from the fiber optic ports on the applicable port on the module and from the ends of the connectors on each fiber strand.

2. Attach the fiber labeled 1 to the applicable receive port, labeled **RX**, on the TRFOT-3. See Figure 3-3.

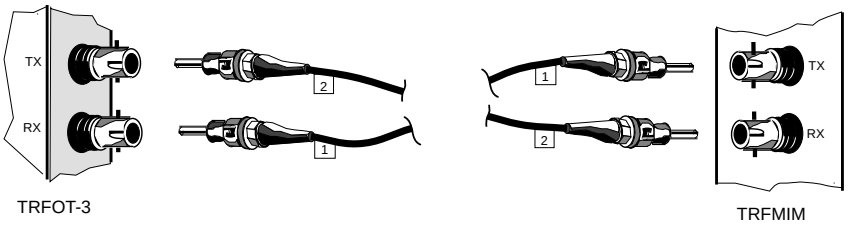

Figure 3-3. Connecting Fiber Cables

3. Attach the fiber labeled 2 to the applicable transmit port, labeled **TX**, on the TRFOT-3.

4. At the other end of the fiber optic cable, attach the fiber labeled 1 to the transmit port of the device.

5. Attach the fiber optic cable labeled 2 to the receive port of the device.

6. Check that the **FO** Link LED is lit. If the LED is not lit, perform each of the following steps until it is:

***Note**: Perform the following steps only if the device attached to the TRFOT-3 is a Cabletron device, for example the TRFMIM-32/36/38. If you attach a non-Cabletron device to the TRFOT-3, the **FO** Link LED may not light, even though a good link may exist.*

   a. Check that the power is turned on for the device at the other end of the link.

   b. Verify that the fiber strands are properly "crossed-over" between the applicable port on the module and the fiber optic device at the other end of the fiber optic link segment.

c. Reset the TRFOT-3 by cycling the power.

d. Verify that the fiber connection meets the dB loss specifications outlined in Fiber Optic Network Requirements.

***Note**: If after proper insertion to the ring, one of the fiber cables is disconnected, the other fiber cable should also be disconnected before reconnecting. The TX cable must be reconnected first on the station TRFOT-3, then the RX cable.*

3.5 CONNECTING POWER

The TRFOT-3 is equipped with an external power supply. Plug the power supply connector into the **Power Input** port on the TRFOT-3, then plug the power supply into a standard wall outlet.

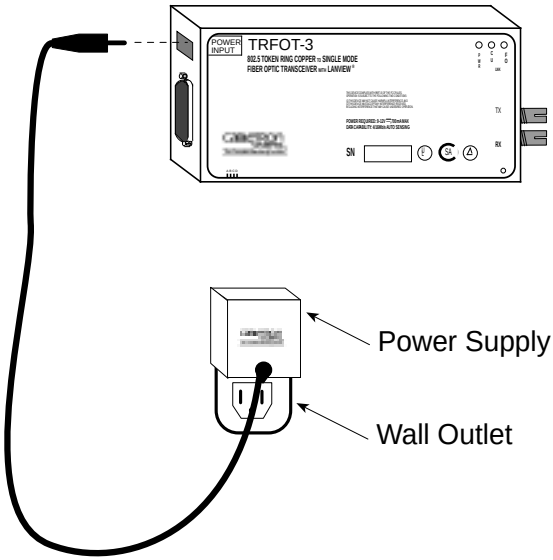

Figure 3-4. Attaching the Power Supply

3.6 MOUNTING THE TRFOT-3

Use the cable mounts, Tie Wraps, and Velcro Strips included with the TRFOT-3 to wall-mount the unit.

1. Remove the tape from the adhesive backing on the Velcro strips.

2. Place one Velcro half on the TRFOT-3 and the other half on the mounting surface.

3. Press firmly on each Velcro strip, then press the TRFOT-3 onto the mounting surface.

4. Secure the TRFOT-3's cables to the wall using the adhesive backed cable mounts and tie wraps as shown in Figure 3-5.

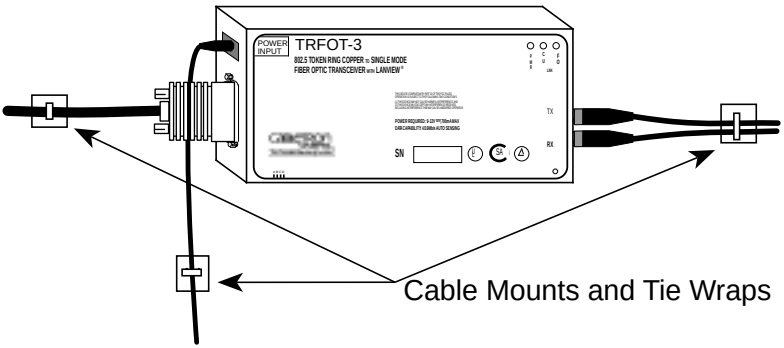

Figure 3-5. Mounting the TRFOT-3

3.7 USING LANVIEW LEDS

The front panel LEDs help you diagnose power and link problems associated with the TRFOT-3. Table 3-2 explains each LED.

Table 3-2. LANVIEW LEDS

LED	LED Color	Definition
PWR	Green	TRFOT-3 is receiving power.
	Off	TRFOT-3 is not receiving power.
CU	Green	Phantom detected/valid copper link.
	Flashing Green	Phantom detected/valid copper link, no data present.
	Red	Phantom not detected/No Copper link.
FO	Green	Fiber optic link is correctly connected to RX port and signal is present.
	Red	Fiber optic link is not connected correctly or signal is not present.

If the **CU** LED is red, follow these steps until it changes to green:

1. Verify that the proper adapter card software is loaded on the host machine.

2. Check the **FO** LED. If it is not lit, check the fiber optic connections as detailed in Section 3.4.

3. Check the copper cable connecting the TRFOT-3 to the device. Verify that it is installed correctly, see Section 3.3.

4. Reset the TRFOT-3 by cycling power.

5. Reboot the PC containing the station adapter card and reload the adapter card software.