Token Ring Multi-Media Repeater Technical Specifications

Standards

IEEE 802.5

Physical Dimensions

1.7" x10.2" x 9.3" (42 mm x 259 mm x 235 mm)

Input Power

Universal Power Supply

Input Range:	85 to 265 VAC at 47 to 63 Hz. (Rated at 40 watts maximum.)

MTBF:

135,000 hours

Environment

Temperature:	0-50°C (32° to 122° F)
Humidity	10-90%, non condensing
Altitude	0-10,000 feet

Warranty

5 years

Token Ring 2-Port Multi-Media Repeater

(TR-MMR-2)

7363.C

For assistance in installing, using, or maintaining the TRANSITION Networks Token Ring Multi-Media Repeater, contact TRANSITION Networks Technical Support at:

(800) 260-1312

or contact your local distributor.

CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EG-Mitgliedstaaten verstösst gegen die jeweligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Compliance Information
UL Listed
C-UL Listed (Canada)
CISPR/EN55022 Class A

FCC Regulations

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 generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

European Regulations
Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Copyright Restrictions

Trademark Notice

All registered trademarks and trademarks are the property of their respective owners.

IBM Type 1 Cable and Connector Specifications

Cable Characteristics:

Type 1 cable consists of two twisted pairs in a foil braid shield.

Gauge	22 AWG
Differential Characteristic Impedance	150 Ω

Cable Type	IBM PN or equivalent
Type 1 Plenum	4716748
Type 1 PVC	4716749

Connector Characteristics:

Data Connectors (IBM PN 8310574 or equivalent) can be connected to IBM Type 1 cable.

Twisted Pair Cable and Connector Specifications

The physical characteristics of the twisted pair cable must meet or exceed the following:

Cable Characteristics:

Category 3 wire or better is required; category 5 wire is recommended. Either shielded twisted pair (STP) or unshielded twisted pair (UTP) can be used.

Gauge	26 to 22 AWG
Attenuation	Less than 11.5 dB @ 5-10 MHz
Differential Characteristic Impedance	85 -110 Ω @ 10 MHz

DO NOT USE FLAT OR "SILVER SATIN" WIRE.

Connector Characteristics:

10BaseT twisted pair connection requires two active pairs minimum. Use only dedicated wire pairs (such as blue/white & white/blue, orange/white & white/orange) for the active pins.

In the Token Ring network, twisted pair cable must be configured as straight through.

Token Ring Cable Specifications

Maximum Cable Distance (Determined by Cable and Token Ring Speed)

SPEED: 16Mbps

Cable	Max-Lobe Length*	Max-RI\RO Length*
UTP Category 3	150 meters (500 feet)	150 meters (500 feet)
UTP Category 5	350 meters (1140 feet)	350 meters (1140 feet)
STP Category 5	400 meters (1310 feet)	400 meters (1310 feet)
IBM Type 1	600 meters (1960 feet)	600 meters (1960 feet)
Fiber	2000 meters (6600 feet)	2000 meters (6600 feet)

SPEED: 4Mbps

Cable	Max-Lobe Length*	Max-RI\RO Length*
UTP Category 3	200 meters (660 feet)	200 meters (660 feet)
UTP Category 5	600 meters (1960 feet)	600 meters (1960 feet)
STP Category 5	700 meters (2290 feet	700 meters (2290 feet)
IBM Type 1	800 meters (2620 feet)	800 meters (2620 feet)
Fiber	2000 meters (6600 feet)	2000 meters (6600 feet)

*Distances as tested with IBM Token Ring and SMC Token Elite Cards. Other cards guaranteed to 100 meters per 802.5 specification.

Fiber Cable and Connector Specifications

The physical characteristics of the fiber cable must meet or exceed IEEE 802.3 10BaseFL specifications.

Cable Characteristics:

Fiber Optic Cable Recommended:	62.5 / 125 µm multimode fiber
Optional:	100 / 140 µm multimode fiber
	85 / 125 µm multimode fiber
	50 / 125 µm multimode fiber
Fiber Optic Transmitter Power:	Average power: -15.0 dBm
	Peak power: -12.0 dBm ±1dBm
Fiber Optic Receiver Sensitivity:	Average sensitivity: -27.4 dBm
	Bit error rate: $\leq 10^{-10}$

Connector Characteristics:

ST type connectors (SMA type available upon request)

Table of Contents

1. INTRODUCTION

This guide is intended for the system or network administrator responsible for installing and monitoring a TRANSITION Networks Token Ring 2-Port Multi-Media Repeater. A working knowledge of local area network (LAN) operations, including familiarity with communications protocols used on interconnected LANs, is assumed.

The Token Ring Multi-Media Repeater

The TRANSITION Networks Token Ring 2-Port Multi-Media Repeater (TR-MMR-2), is a small, multi-purpose active retiming Token Ring repeater that is site-configurable, using Slide In Card (SIC) connections, for ring extension and/or for port extension over selectable media.

- Reduces network jitter, particularly network jitter introduced by passive MAUs, by regenerating and reshaping Token Ring signals.
- Data Connector (IBM Type 1) SICs allow connection to a shielded 150 ohm Token Ring network.
- Fiber optic SICs allow extension of Token Ring ring or lobe connection up to 2000 meters (6600 feet).
- RJ-45 connector SICs allow cost-effective installation of shielded and unshielded Token Ring twisted pair.

The sole purpose of this remedy shall be provided the customer with the replacement or repair of non-conforming goods in the manner described in this Warranty statement. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as TN is willing and able to repair or replace the defective item(s) or refund the purchase price.

TN reserves the right to inspect products claimed to be defective under warranty either at the customer's location or at TN's plant. TN assumes no liability for liability charges incidental to the adjustment, service, repairing, removal or replacement of the product, or other costs, or the expense of repairs made outside of its factory, except when made with TN's prior written consent. Additionally, Transition Networks reserves the right to charge for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found".

TN's total liability in connection with the products and their installation to all persons and from all causes in the aggregate, whether in contract, tort, or strict liability, shall not exceed the amount paid to TN for the product directly related to the alleged damage. However, in no event shall TN have any liability to a customer or any third party for products manufactures according to the customer's specifications.

C. Return Procedure

The customer must follow this procedure for the return of defective items:

1. Locate the serial number(s) of the item(s) to be returned.
2. Determine the date the item(s) was received.
3. Contact Transition Networks Technical Support to determine if the problem can be corrected on site.

If not, and the product is covered by warranty, then:

- Call the distributor directly or contact TN.
- Request a Return Material Authorization (RMA).
- Ship the item, prepaid in original packaging to Transition Networks at the above address.
- Include the RMA number on the outside of the carton and/or on the Packing List.
- Include a copy of the RMA form.
- Include a copy of the original invoice or packing list (if possible) to expedite processing.
- The item(s) may be shipped by the customer or the distributor.
- Transition Networks will repair or replace the unit, at TN's discretion, and cover the cost of the return freight to the distributor or to the customer, whichever requested the RMA number.

If the item(s) was received **more than five years ago**, or if the item(s) is **no longer covered by warranty** for other reasons, then:

- Call the distributor or contact TN.
- Request a Material Repair Authorization number (MRA).
- Ship the item(s), prepaid, in the original packaging to Transition Networks at the above address.
- Include the MRA number on the outside of the carton add/or on the Packing List.
- Include a copy of the MRA form.
- Include a copy of the original invoice or packing list (if possible) to expedite processing.
- Only the customer (end-user) may send the items(s) to TN.
- TN will contact the customer after the item(s) have been received, inspected, and a cost estimate of the repair determined.
- The repair charges may be billed, with customer's approval, though the distributor, or on a prepaid or C.O.D. basis directly to the customer. The charges will include the cost of shipping.

The return authorization numbers are valid only for 90 days from the date issued.

Warranty Statement

A. Five Year Warranty

Transition Networks, Inc. (TN) warrants, for a period of five years, that TN products (with the exception of power supplies and fans that TN warrants for two years) will be free from defects in materials and workmanship, and will be in conformity with TN's specifications.

TN's warranty on products manufactured by or assembled for TN in accordance with a customer's specifications, is a five-year warranty that the goods conform to such specifications.

The warranty is invalidated if the goods have been subject to alterations, misuse, accident, Acts of God (e.g., damage by floods, lightning strikes, Etc.), tampering, improper maintenance, improper installation, or abuse. If the user is unsure about the proper means of installing or using the equipment, contact TN's free Technical Support or Network Design Services, which can be reached by:

Telephone	**1.800.LAN.WANS or 612.941.7600**
Fax	**612.941.2322**
E-mail	**techsupport@transition.com**
Internet	**http://www.transition.com**

THE ABOVE WARRANTY IS EXCLUSIVE AND EXTENDS ONLY TO PRODUCTS ASSEMBLED BY TRANSITION NETWORKS, INC. TO THE EXTENT PERMITTED BY LAW, TN DOES NOT MAKE AND DISCLAIMS ALL OTHER WARRANTIES, EXCEPT TITLE, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF DESCRIPTION, MERCHANTIBILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, AND ANY WARRANTY BASED UPON PRIOR WRITTEN OR ORAL REPRESENTATIONS REGARDING SUCH PRODUCTS MADE BY TN, ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES.

B. Limitations and Exclusions

If the customer believes any goods sold by TN are defective and within the warranty period, the following general procedure will be followed:

1. Locate the serial number and delivery date of the item(s).
2. Notify TN within the warranty period.
3. TN will promptly issue a return authorization form for the goods.
4. Upon receiving the form, the customer will promptly return the item(s) at customers own expense, shipped prepaid, to the distributor from which it was purchased, or directly to TN.

TN will only accept goods for return if the following conditions have been met:

1. A return form is obtained from TN.
2. The freight charges have been prepaid by the customer.
3. Goods are re-packed in their original packaging.

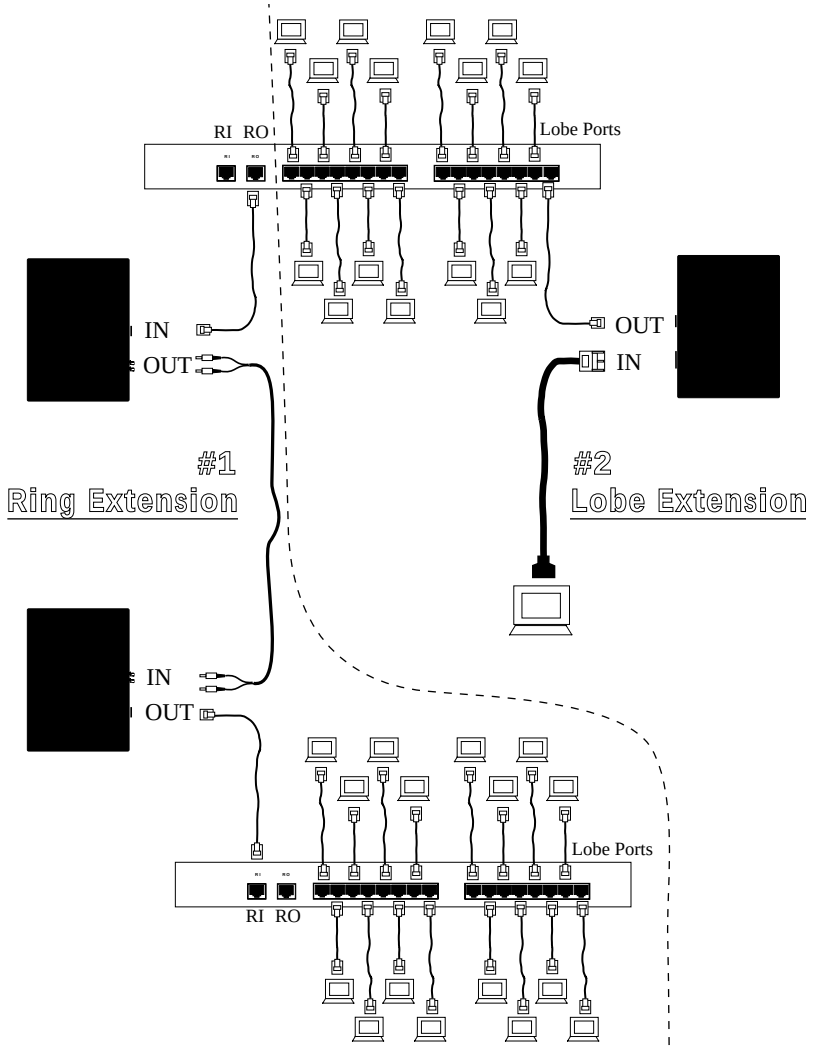
If under warranty TN shall, at its option, (1) repair the goods free of charge (2) replace the goods free of charge, or (3) accept the return of the item(s) and credit the current price to the reseller (within 90 days of purchase), or (4) if the goods are not under warranty, will repair the item(s) at a minimum charge of USD $200 (two hundred U.S. dollars) per item.

THIS IS THE EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY. IN NO EVENT SHALL TRANSITION NETWORKS BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, WHETHER FOR BREACH OF ANY CONDITION OF SALE, FOR NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, CONTRACT, OR OTHERWISE AND IRRESPECTIVE OF WHETHER TN IS INFORMED BY CUSTOMER OF THE POSSIBILITY OF SUCH DAMAGES IN ADVANCE OF THIS SALE.

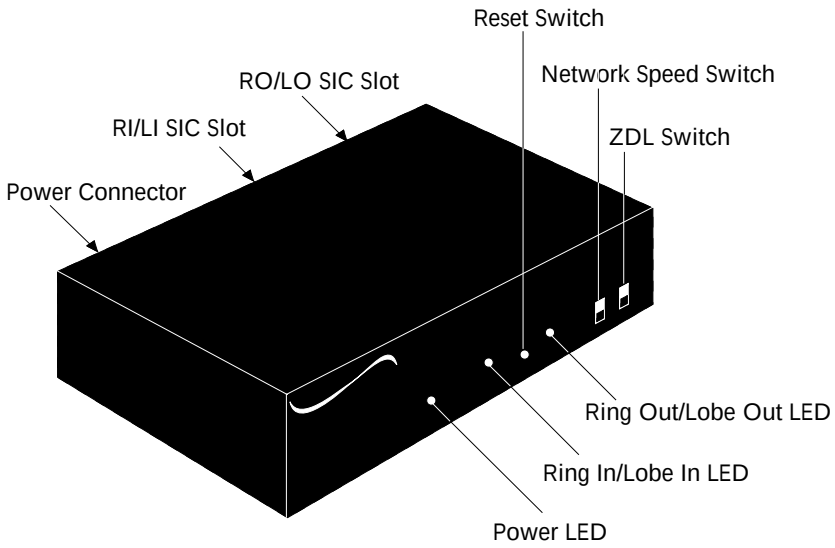
Networking the Token Ring Multi-Media Repeater

Token Ring Multi-Media Repeater SIC cards connect two like or two unlike media cables, selected from among IBM Type 1, multimode fiber, and standard 100 ohm shielded twisted pair (STP) or unshielded twisted pair (UTP).

As shown, the Token Ring Multi-Media Repeaters with installed cable can be used both for ring extension (#1) and for lobe extension (#2).



Connectors, Switches and Status Indicators



Connectors

(AT BACK) Slide-In cards (SICs), when installed, provide IBM Data Connectors, fiber connectors, and/or RJ-45 connectors.

An external **power** connector also is located at the Token Ring Multi-Media Repeater back.

5. MAINTENANCE

WARNING: DO NOT, UNDER ANY CIRCUMSTANCES, open and attempt to repair the Token Ring Multi-Media Repeater. Failure to observe this warning could result in personal injury or death from electrical shock.

NOTE: Failure to observe the above warning will immediately void the warranty.

Fault Isolation

If two network devices fail to communicate through the Token Ring Multi-Media Repeater, consider the following:

- Are the LEDs functioning properly?
- Do network devices communicate when the Token Ring Multi-Media Repeater is not installed between them?
- Is flat or “silver satin” wire used in site internal wiring?
- Are internal wiring patch cords, punch down blocks, and wall jacks properly pinned or configured?
- Are network interface cards properly configured?

Technical Support Contact

For assistance in fault isolation and in maintaining the Token Ring Multi-Media Repeater, contact:

Technical Support **(800) 260-1312**

or your local distributor.

4. OPERATION

The Multi-Media Repeater requires no intervention beyond occasionally monitoring the Power and Status LEDs.

Monitoring Power LED

When the green **Power** LED is illuminated, the Token Ring Multi-Media Repeater is connected to power.

Monitoring Status LEDs

When the **Ring In/Lobe In** LED is illuminated, the Token Ring Multi-Media Repeater is connected to an active ring or lobe *input*.

When the **Ring Out/Lobe Out** LED is illuminated, the Token Ring Multi-Media Repeater is connected to an active ring or lobe *output*.

Switches

The **Reset** switch reinitializes the Token Ring Multi-Media Repeater.

The **ZDL** switch selects the Zero Delay Lockout feature.

The **Speed** switch selects between 16 Mbps and 4 Mbps network speed.

Status Indicators (LEDs)

The **Ring In/Lobe In** LED indicates an active *input* connection to the Token Ring Multi-Media Repeater.

The **Ring Out/Lobe Out** LED indicates an active *output* connection to the Token Ring Multi-Media Repeater.

The **Power** LED monitors connection to external power.

2. SITE CONSIDERATIONS

The site for the Token Ring Multi-Media Repeater must provide:

- AC power outlet for each Token Ring Multi-Media Repeater
- Adequate ventilation
- Standard environmental conditions
- Isolation from electrical noise, including radio transmitters and broadband amplifiers, motors, high power electrical lines, or fluorescent light fixtures.

And, if using twisted pair cable:

- The twisted pair cables should not run in the same conduit with power line cables,
- Phone lines should be separated from data cables,
- Flat or “silver satin” wires should not be used,
- All Token Ring twisted pair cable should be configured as straight through.

Powering the Multi-Media Repeater

To power ON the Token Ring Multi-Media Repeater:

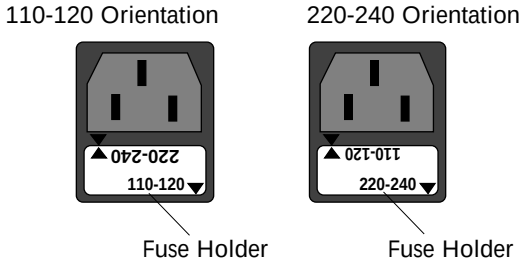
1. At Token Ring Multi-Media Repeater back, locate the power receptacle and associated fuse.

   NOTE: Fuse must be installed at correct setting for power source voltage before connecting to AC outlet.

2. Verify that fuse is installed at correct setting for power source voltage.

   NOTE: The installed fuse rating is indicated by the reading at lower right corner of fuse holder.

   If not installed at correct setting for power source voltage:



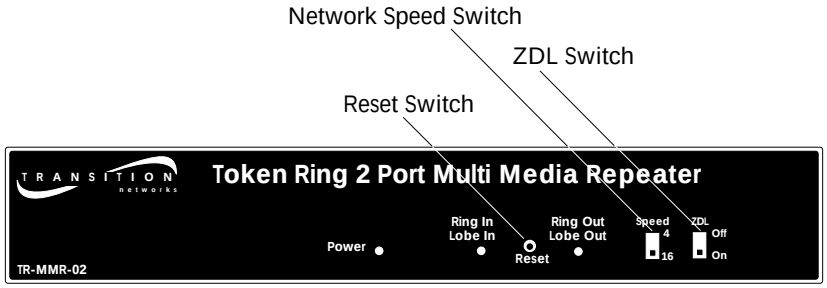
   - Carefully open fuse receptacle, using a small flat blade screwdriver.
   - Rotate fuse holder 180° to the correct rating orientation.
   - Install fuse holder in correct rating orientation.
   - Close fuse receptacle.

3. Plug unit end (female) of power cord into Token Ring Multi-Media Repeater power receptacle.

4. Plug outlet end (male) of power cord into correct voltage AC wall socket.

5. At Token Ring Multi-Media Repeater front, verify that POWER LED is illuminated.

Setting Configuration Switches

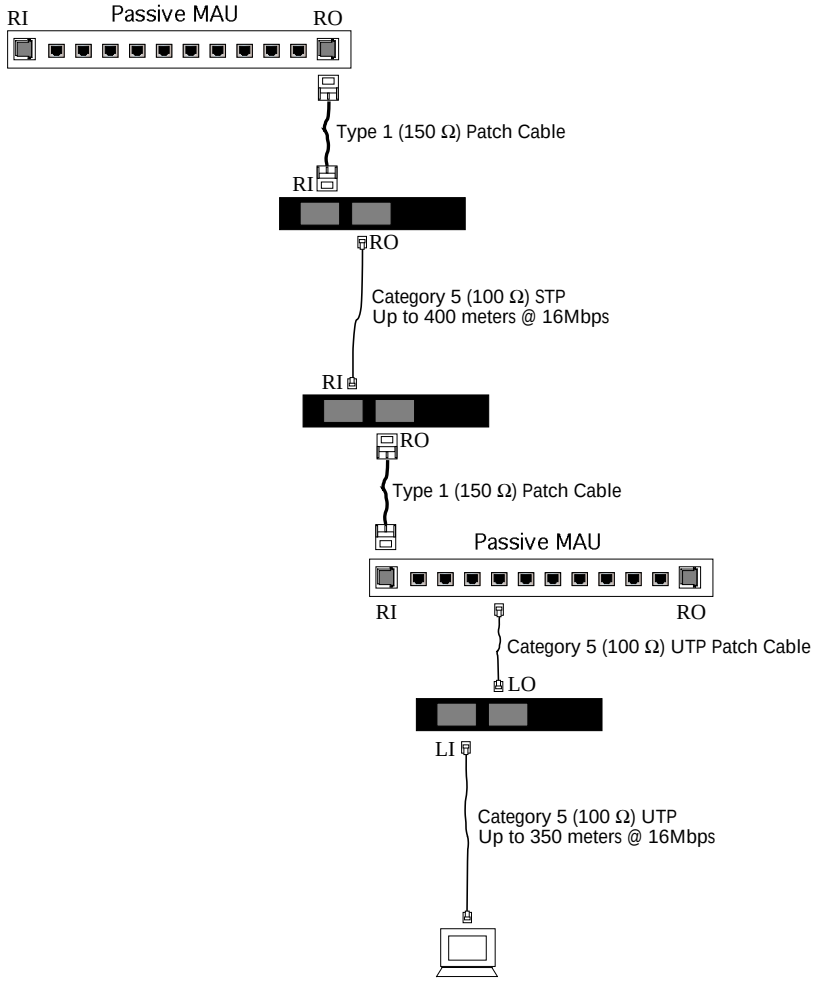


1. Set the Token Ring Multi-Media Repeater network **Speed** switch to match the network speed (4 Mbps or 16 Mbps).
2. Set the Token Ring Multi-Media Repeater **ZDL** switch to ON to enable automatic speed detection (unless connecting non-802.5 compliant test equipment such as Hewlett Packard Token Ring tester).
3. Press the reset button.

Token Ring Twisted Pair Network Considerations

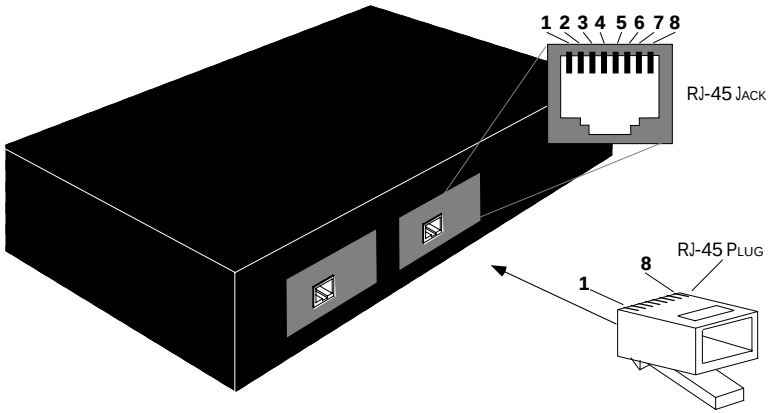
Twisted pair cables between passive MAUs and Token Ring Multi-Media Repeaters must be short (patch cables). The patch cables can be either Type 1 (150 Ω) twisted pair or Category 5 (100 Ω) twisted pair.

At 16Mbps network speed, shielded twisted pair (STP) cables between Token Ring Multi-Media Repeaters or between Token Ring Multi-Media Repeaters and terminal equipment can be up to 400 meters (1310 feet); unshielded twisted pair (UTP) cables can be up to 350 meters (1140 feet).



Token Ring RJ-45 Twisted Pair Configuration

If twisted pair cable is used, the twisted pair cable and RJ-45 jacks must be configured as **straight through**.



The two active pairs in a Token Ring network are pins 4 & 5 and pins 3 & 6. Use only dedicated wire pairs (such as blue/white & white/blue, orange/white & white/orange) for the active pins.

Straight Through Cable at RJ-45 Plug

RJ-45 Male	RJ-45 Male
3	3
4	4
5	5
6	6

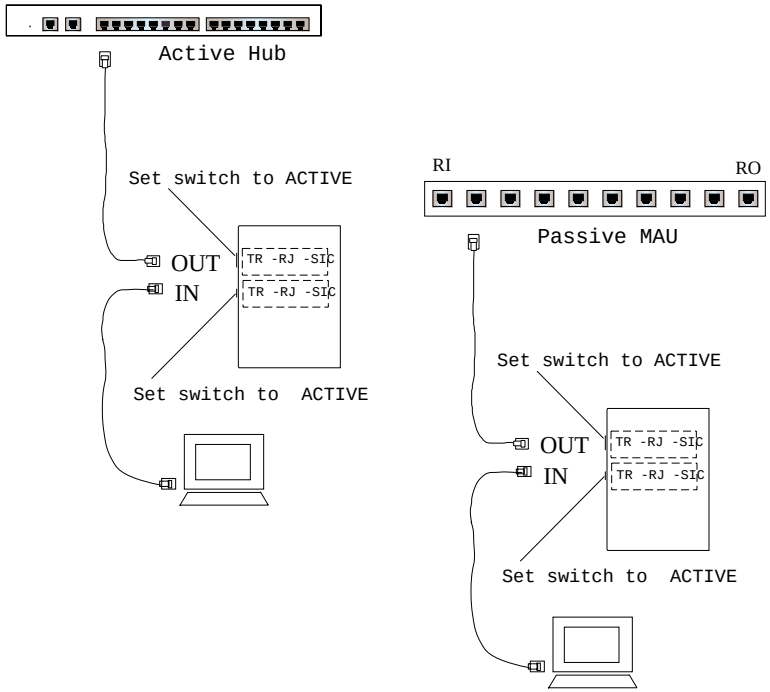
NOTE: Category 3 wire or better is required. Category 5 wire is recommended for long distances. See page 23 for wiring distances.

Either shielded twisted pair (STP) or unshielded twisted pair (UTP) can be used.

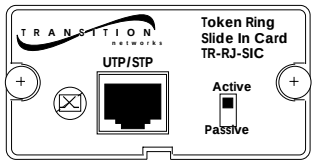
DO NOT USE FLAT OR "SILVER SATIN" WIRE.

RJ CONNECTOR LOBE EXTENSION

If the twisted pair slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a lobe extension installation* to *an active hub or MAU* ***OR*** *to a passive MAU*, set **Active/Passive** switch on the twisted pair SIC to ***Active***.



RJ-45 Connection

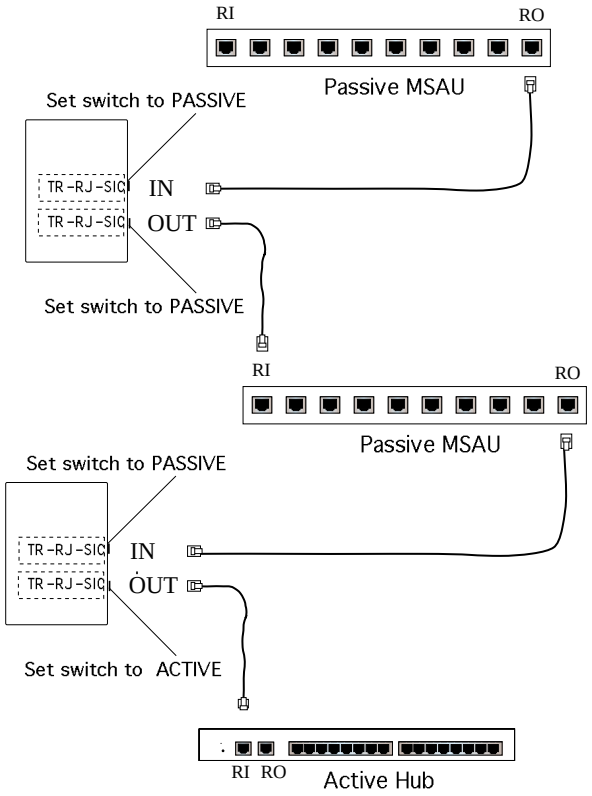


The twisted pair slide-in card TR-RJ-SIC can provide a cost-effective method for eliminating jitter by connecting passive hubs with active hubs and/or with terminal equipment.

RJ CONNECTOR ACTIVE/PASSIVE RING EXTENSION

If the twisted pair slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a ring extension installation* to an *active hub*, set **Active/Passive** switch on the twisted pair SIC to ***Active***.

If the twisted pair slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a ring extension installation* to a *passive hub*, set **Active/Passive** switch on the twisted pair SIC to



3. INSTALLATION

To install the Token Ring Multi-Media Repeater:

- Unpack the Token Ring Multi-Media Repeater
- Install Multi-Media Repeater on flat surface
- Install Slide In Cards (SICs)
- Connect cable to SIC connectors
- Set configuration switches
- Power the Multi-Media Repeater.

Direction is provided in the pages that follow.

Unpacking the Token Ring Multi-Media Repeater

The Token Ring Multi-Media Repeater packing contents should include the following:

Item	**Part Number**
Token Ring Multi-Media Repeater	TR-MMR-2
Power Cord	3344, 3347, 3348, 3349, or 3523, (depending upon power configuration in country where installed)
User's Guide	7363

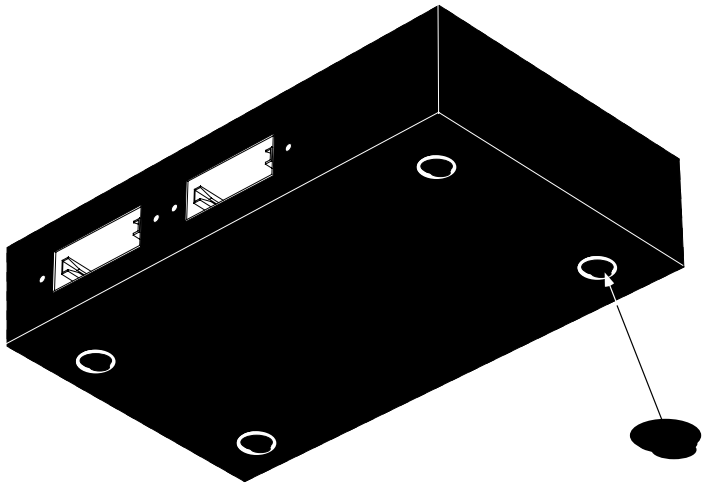
In addition, any of the following optional SICs may be included:

Item	**Part Number**
Data Connector SIC	TR-DC-SIC
Fiber Optic *Ring In/Lobe In* SIC	TR-FI-SIC
Fiber Optic *Ring Out/Lobe Out* SIC	TR-FO-SIC
RJ-45 SIC	TR-RJ-SIC

Installing Multi-Media Repeater on Flat Surface

To install the Multi-Media Repeater on a table, shelf, or other flat surface:

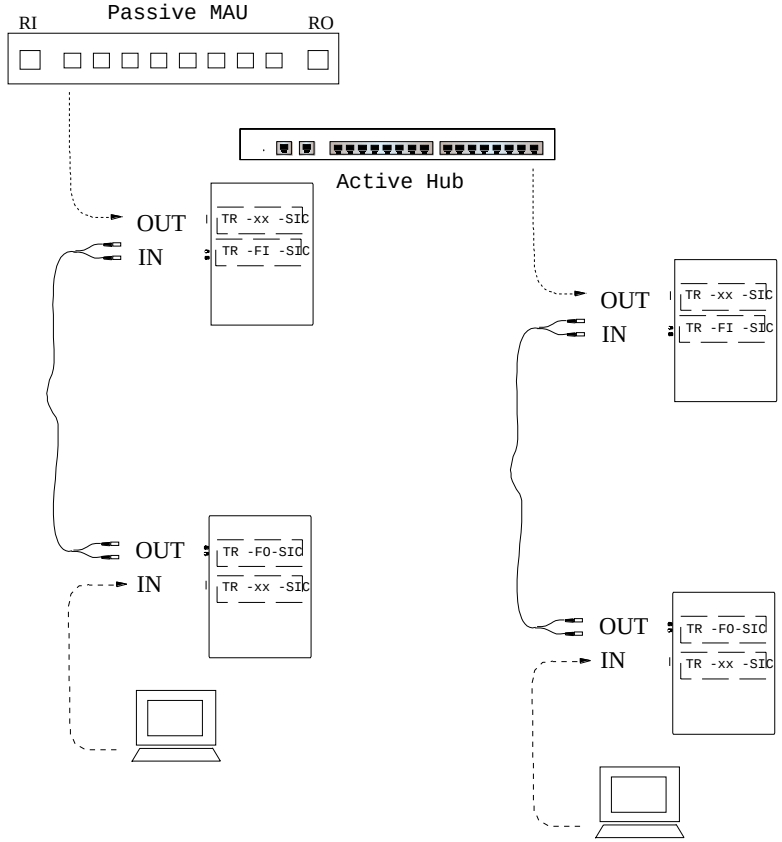
1. Carefully turn Token Ring Multi-Media Repeater to side.
2. Install four (4) rubber feet:



- Remove protective paper from adhesive surface of rubber foot.
- Position rubber foot at bottom corner of Token Ring Multi-Media Repeater.
- Secure rubber foot to Token Ring Multi-Media Repeater surface.
- Repeat for remaining rubber feet.

3. Return Token Ring Multi-Media Repeater to upright position.

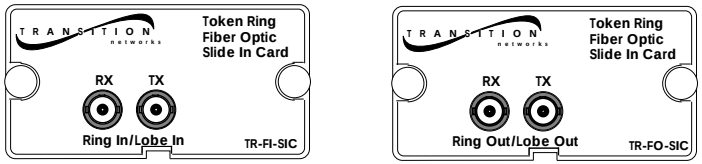
FIBER CONNECTOR LOBE EXTENSION



NOTE: Fiber Ring In/Lobe In SIC card MUST BE INSTALLED in the *RI/LI* SIC card location. Fiber Ring Out/Lobe Out SIC card MUST BE INSTALLED in the *RO/LO* SIC card location.

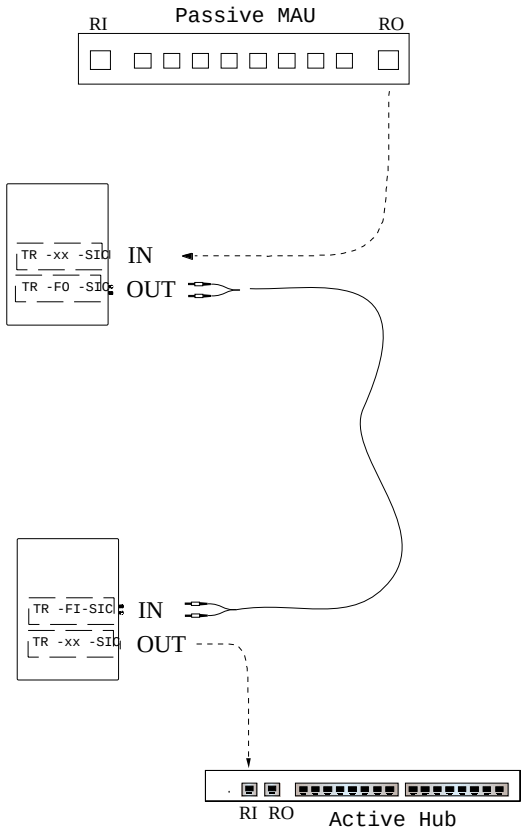
Install two-stranded fiber cable by connecting *Ring In/Lobe In* **TX** to *Ring Out/Lobe Out* **RX** and *Ring In/Lobe In* **RX** to *Ring Out/Lobe Out* **TX**.

Fiber Connection



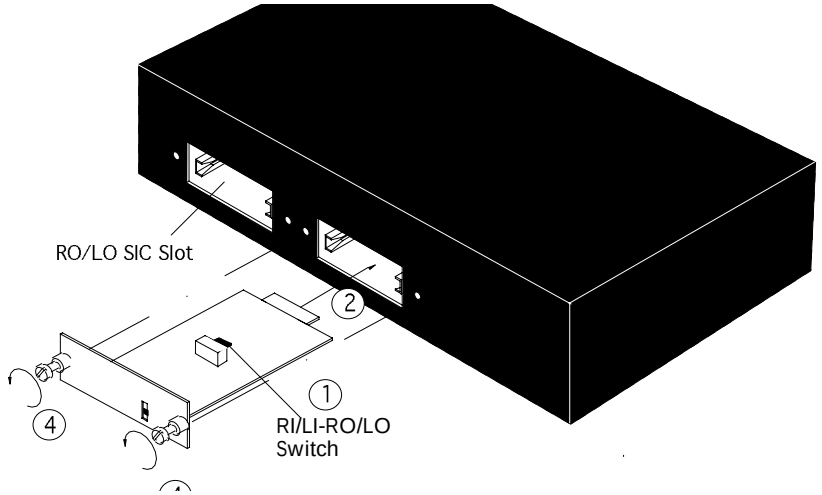
The fiber slide-in cards TR-FI-SIC and TR-FO-SIC can be installed in two separate Token Ring Multi-Media Repeaters and used in pairs to extend the Token Ring network by 2000 meters (6600 feet).

FIBER CONNECTOR RING EXTENSION



Installing Slide-In Cards (SICs)

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when installing Slide-In Cards. Failure to observe this caution could result in circuit board failure.



NOTE: SIC card configured RI/LI MUST be installed in RI/LI SIC slot; SIC card configured RO/LO MUST be installed in RO/LO SIC slot.

To install a Slide-In Card:

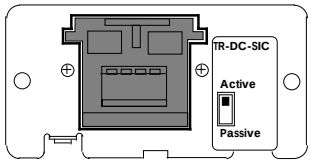
1. Determine if Slide-In Card has RI/LI-RO/LO switch and, if so, determine if RI/LI-RO/LO switch is in correct position for the installation. If necessary, reset RI/LI-RO/LO Switch.

   NOTE: RI/LI-RO/LO switch settings are marked on Slide-In Card component surface.

   NOTE: Fiber SIC does NOT have RI/LI-RO/LO switch.
2. With Slide-In Card components facing up, carefully guide Slide-In Card along card guides until Slide-In Card connector meets Token Ring Multi-Media Repeater backplane.
3. Firmly seat Slide-In Card against internal connector until Slide-In Card faceplate is flat against Token Ring Multi-Media Repeater frame.
4. Rotate Slide-In Card thumbscrews into Token Ring Multi-Media Repeater threaded holes.

Connecting Cable to SIC Connectors

Data Connector Connection

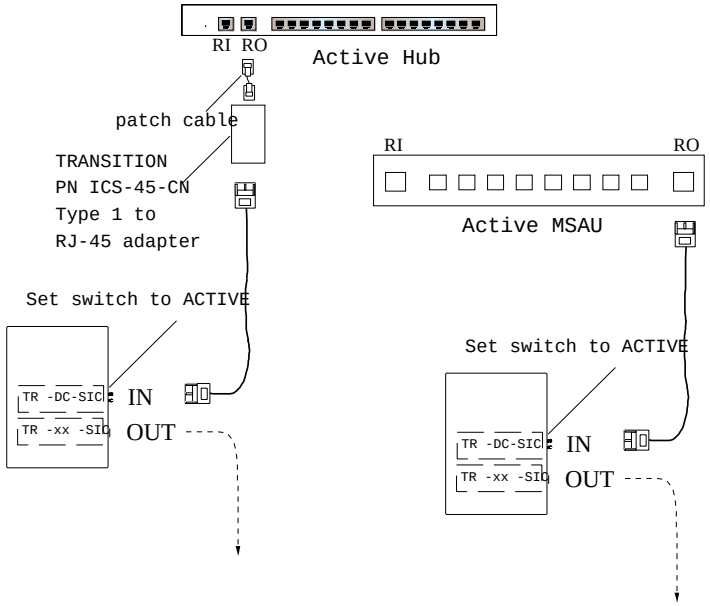


The slide-in card TR-DC-SIC can be used for connecting the Token Ring Multi-Media Repeater to a shielded 150 ohm Token Ring network, using Data Connectors.

The TR-DC-SIC data connector installation can be used for active or passive ring extension and/or for lobe extension

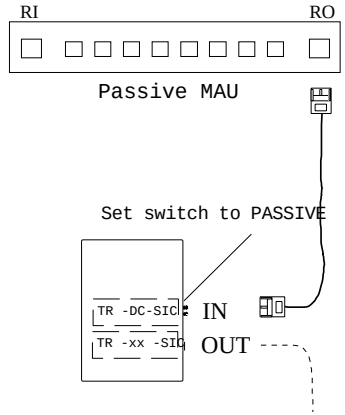
DATA CONNECTOR ACTIVE RING EXTENSION

If the data connector slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a ring extension installation* to an *active hub or MAU*, set **Active/Passive** switch on the Data Connector SIC to ***Active***.



DATA CONNECTOR PASSIVE RING EXTENSION

If the data connector slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a ring extension installation* to a *passive hub or MAU*, set **Active/Passive** switch to ***Passive***.



DATA CONNECTOR LOBE EXTENSION

If the data connector slide-in card is installed in a Token Ring Multi-Media Repeater which is connected *in a lobe extension installation* to an *active hub or MAU OR to a passive MAU*, set **Active/Passive** switch to ***Active***.