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.

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.

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.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in weichen Fällen der Benutzer für entsprechende Gegenmaßnahmen werantwortlich ist.

Attention !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées

VCCI Class 1 Compliance

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas. When used in a residential area or in an adjacent area thereto, interference may be caused to radio and TV receivers, etc. Read the instructions for correct handling.

この装置は、第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。
従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。
取扱説明書に従って正しい取り扱いをして下さい。

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.

Trademark Notice

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

Copyright Restrictions

Printed in the U.S.A. 33140.B

TRANSITION networks

Minneapolis, MN 55344 USA

10BASE-T/10BASE-FL

Multi-Port Media Converter

E-TBT-FRL-1200, E-TEL-FRL-1200, E-TBT-FRL-0600

USER'S GUIDE

The rack-mountable E-TBT-FRL-1200, E-TEL-FRL-1200, and E-TBT-FRL-0600 series multi-port media converters with *LinkAlert*™* allow the network administrator of a large and complex network to extend the distances between *multiple sets* of 10BASE-T and 10BASE-FL devices.

E-TBT-FRL-1200 *(shown)* Provides twelve (12) independent media converter connections between Ethernet™ over twisted-pair copper (twelve RJ-45 connectors) and Ethernet™ over singlemode OR multimode fiber (twelve fiber connectors of one type – selected, according to network requirements).

E-TEL-FRL-1200 *(not shown)* Provides twelve (12) independent media converter connections between Ethernet™ over twisted-pair copper (one 50-pin Telco connector) and Ethernet™ over singlemode OR multimode fiber (twelve fiber connectors of one type – selected, according to network requirements).

E-TBT-FRL-0600 *(not shown)* Provides six (6) independent media converter connections between Ethernet™ over twisted-pair copper (six RJ-45 connectors) and Ethernet™ over singlemode OR multimode fiber (six fiber connectors of one type – selected, according to network requirements).

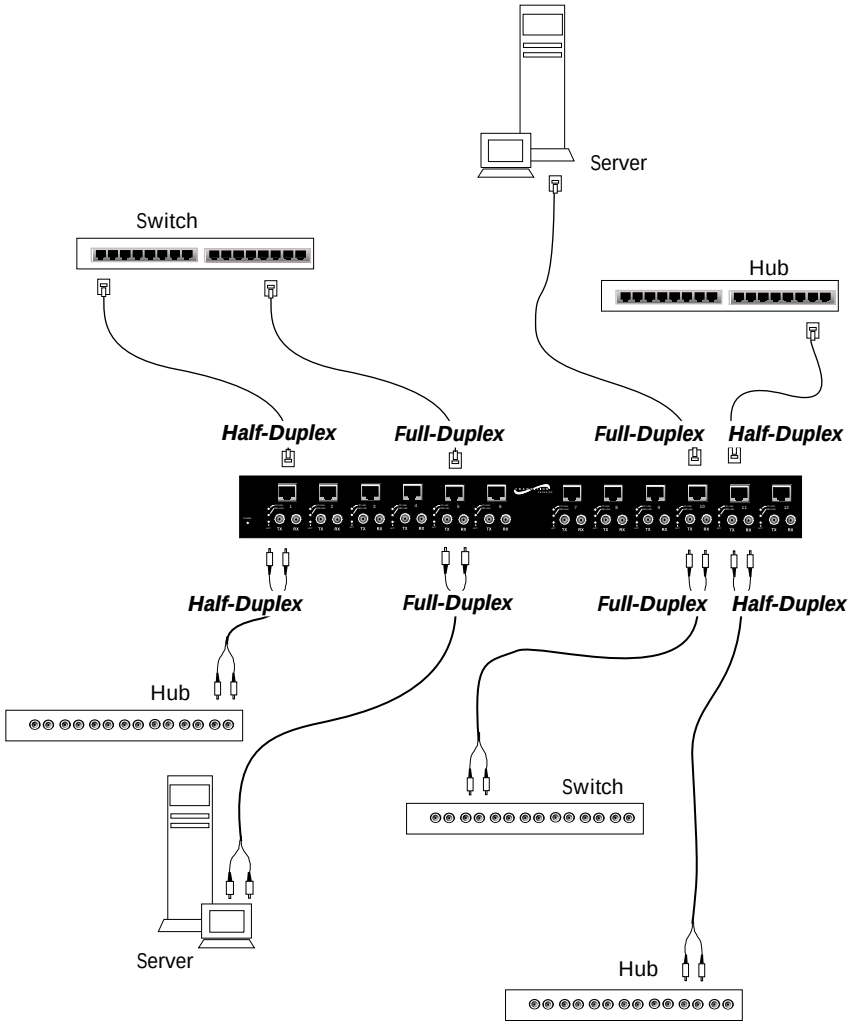
Fiber Cable/Connector Options* by Model:

*E-TBT-FRL-xx00/E-TEL-FRL-1200: **multimode** fiber, **ST** connectors*
*E-TBT-FRL-xx00(**SC**)/E-TEL-FRL-1200(**SC**): **multimode** fiber, **SC** connectors*
*E-TBT-FRL-xx00(**MT**)/E-TEL-FRL-1200(**MT**): **multimode** fiber, **MT-RJ** connectors*
*E-TBT-FRL-xx00(**SM**)/E-TEL-FRL-1200(**SM**): **singlemode** fiber, **SC** connectors*
*E-TBT-FRL-xx00(**L**)/E-TEL-FRL-1200(**L**): **singlemode** fiber, **SC** connectors*

*See page 9 for detailed specifications.

The LinkAlert™ feature, enabled and disabled using switches on the front of the multi-port media converter, allows each media converter port to pass link faults between connected 10BASE-T and 10BASE-FL devices.

E-TBT-FRL-xx00 IN THE NETWORK

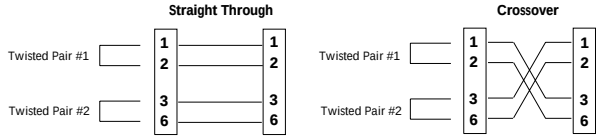


Each media converter port in the multi-port media converter operates independently over one isolated twisted-pair copper/fiber-optic cable link. The media converter port receives and transmits network signals in either full-duplex or half-duplex, depending upon the network devices to which the media converter port is attached.

NOTE: In Telco option (not shown), the 50-pin Telco connector concentrates up to 12 UTP connections onto one connector. This concentration of UTP ports is then broken out for connection to fiber.

RJ-45 CONNECTOR

Twisted pair connection requires two active pairs configured as straight through and/or crossover. The two active pairs in an Ethernet™ network are pins 1 & 2 and pins 3 & 6. Use only dedicated wire pairs (such as blue/white & white/blue, orange/white & white/orange) for the active pins.



NOTE: The multi-port media converter ***AutoCross™*** feature allows either straight-through or crossover twisted-pair copper cable to be used when connecting to 10BASE-T devices. AutoCross™ determines the characteristics of cable connections to the media converter port and then automatically configures the port to link up.

TECHNICAL SPECIFICATIONS

Standards	IEEE 802.3 1998 Edition	
Case Dimensions	19.0" x 8.5" x 1.5"	(483 mm x 216 mm x 38 mm)
Environment	Temperature:	0-50°C (32° to 122° F)
	Storage Temperature:	-15° to 65°C (5° to 149° F)
	Humidity	10-95%, non condensing
	Altitude	0-10,000 feet
Power	100-240 VAC, 50/60 Hz., 1 Amp (maximum)	
Warranty	Lifetime	

TRANSITION networks

DECLARATION OF CONFORMITY

Name of Mfg: **Transition Networks**
6475 City West Parkway, Minneapolis MN 55344 USA

Model: **E-TBT-FRL-xx00, E-TEL-FRL-1200 Series Multi-Port Media Converter**

Part Number(s): **E-TBT-FRL-0600, E-TBT-FRL-0600(SC), E-TBT-FRL-0600(SM), E-TBT-FRL-0600(L), E-TBT-FRL-0600(MT), E-TBT-FRL-1200, E-TBT-FRL-1200(SC), E-TBT-FRL-1200(SM), E-TBT-FRL-1200(L), E-TBT-FRL-1200(MT), E-TEL-FRL-1200, E-TEL-FRL-1200(SC), E-TEL-FRL-1200(SM), E-TEL-FRL-1200(L), E-TEL-FRL-1200(MT)**

Regulation: **EMC Directive 89/336/EEC**

Purpose: To declare that the ***E-TBT-FRL-0600, E-TBT-FRL-1200*** or ***E-TEL-FRL-1200*** to which this declaration refers is in conformity with the following standards.

EMC-CISPR 22: 1985 Class A; EN 55022: 1988 Class A; EN 50082-1:1992; EN 60950 A4:1997; IEC 801.2, IE C 801.3, and IEC 801.4; IEC 950

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Stephen Anderson, Vice-President of Engineering

November 3, 1999
Date

CABLE SPECIFICATIONS (continued)

COPPER CABLE

Each RJ-45 connector requires 2 pairs of Category 5 rated cable.

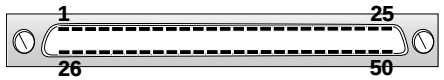
The 50-pin Telco connector requires 24 pairs of Category 5 rated cable.

Either shielded twisted-pair (STP) or unshielded twisted-pair (UTP) can be used. DO NOT USE FLAT OR SILVER SATIN WIRE.

CATEGORY 5:

Gauge	24 to 22 AWG	
Attenuation	22.0 dB /100m @ 100 MHz	
Maximum Cable Distance:	Telco	75 meters
	RJ-45	100 meters

TELCO CONNECTOR



TELCO SIGNALS

Pin #	Signal	Pin #	Signal
1	Port 1 Transmit -	26	Port 1 Transmit +
2	Port 1 Receive -	27	Port 1 Receive +
3	Port 2 Transmit -	28	Port 2 Transmit +
4	Port 2 Receive -	29	Port 2 Receive +
5	Port 3 Transmit -	30	Port 3 Transmit +
6	Port 3 Receive -	31	Port 3 Receive +
7	Port 4 Transmit -	32	Port 4 Transmit +
8	Port 4 Receive -	33	Port 4 Receive +
9	Port 5 Transmit -	34	Port 5 Transmit +
10	Port 5 Receive -	35	Port 5 Receive +
11	Port 6 Transmit -	36	Port 6 Transmit +
12	Port 6 Receive -	37	Port 6 Receive +
13	Port 7 Transmit -	38	Port 7 Transmit +
14	Port 7 Receive -	39	Port 7 Receive +
15	Port 8 Transmit -	40	Port 8 Transmit +
16	Port 8 Receive -	41	Port 8 Receive +
17	Port 9 Transmit -	42	Port 9 Transmit +
18	Port 9 Receive -	43	Port 9 Receive +
19	Port 10 Transmit -	44	Port 10 Transmit +
20	Port 10 Receive -	45	Port 10 Receive +
21	Port 11 Transmit -	46	Port 11 Transmit +
22	Port 11 Receive -	47	Port 11 Receive +
23	Port 12 Transmit -	48	Port 12 Transmit +
24	Port 12 Receive -	49	Port 12 Receive +
25	N.C.	50	N.C.

Media Converter Port in Full-Duplex Network

In a full-duplex network, maximum cable lengths are determined by the cables used. See page 10 for cable specifications.

NOTE: The 5-Segment Rule described below does NOT apply in a full-duplex network.

Media Converter Port in Half-Duplex Network

The 5-Segment Rule applies separately to each collision domain.

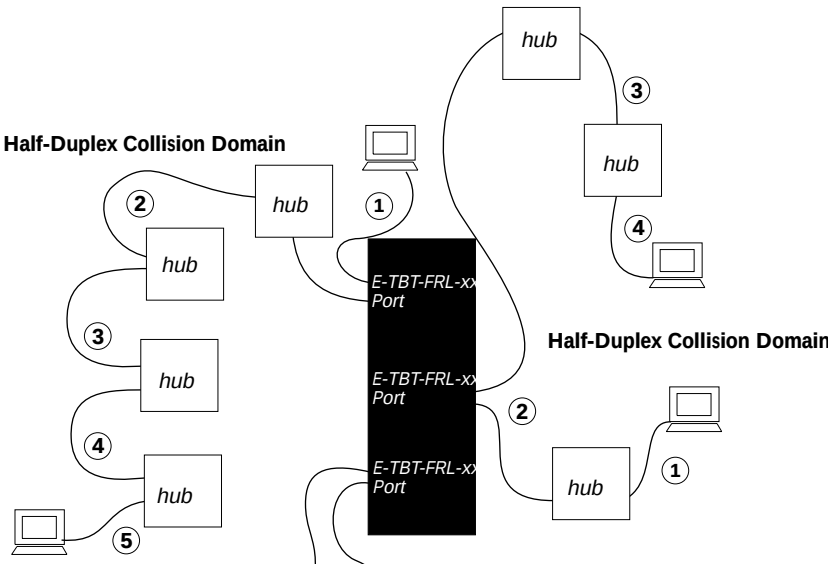
USING THE 5-SEGMENT (5-4-3) RULE:

NOTE: A segment is the cable connection between network interfaces.

In any 10-Mbit/sec Ethernet collision domain, the 5-Segment Rule allows no more than five segments. The 5-4-3 Rule version of the 5-Segment Rule allows no more than five segments and also allows no more than four repeaters (hubs) and three populated segments (10Base-2 coaxial-cable installations).

To determine the size of the collision domain by assigning segment numbers to cable connections, determine the two network devices in a transmission path that are separated by the greatest number of segments. Define a segment path between the network devices by labeling the cable connection to the first device “segment 1” and numbering each segment in the path to the last network device, up to “segment n” (n = total number of segments ≤ 5). Verify that no segment path in the entire collision domain contains more than n ≤ 5 segments.

10BASE-T/10BASE-FL Half-Duplex Collision Domain
5-Segment Rule



Full-Duplex - NO Collision Domain

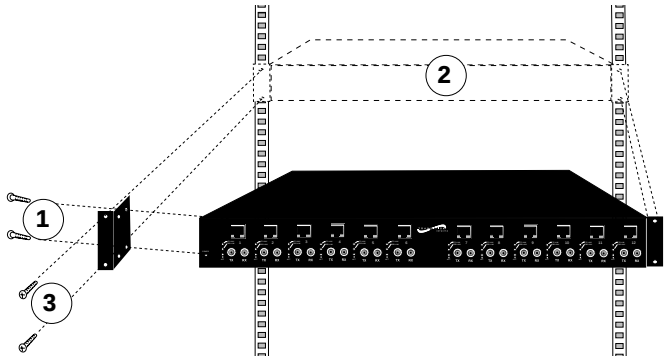
INSTALLATION

Install E-TBT-FRL-xx00 at Site

WARNING: During the site installation, handle the E-TBT-FRL-xx00 in such a way that the E-TBT-FRL-xx00 does not fall. Failure to observe this warning could result in injury to personnel and/or equipment damage.

To install the E-TBT-FRL-xx00 in 19-inch rack cabinet:

NOTE: Brackets and screws are provided.

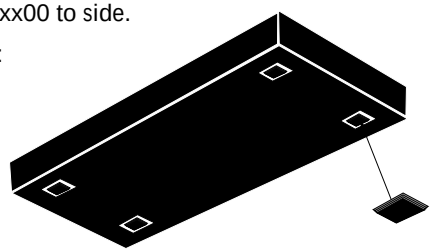


1. Install right and left mounting brackets to E-TBT-FRL-xx00 chassis by removing two (2) screws from each side of E-TBT-FRL-xx00 chassis and then installing those screws through mounting bracket into E-TBT-FRL-xx00 chassis.
2. Carefully align the E-TBT-FRL-xx00 between rack mounting rails.
3. Install E-TBT-FRL-xx00 in rack by installing two (2) screws through right front bracket into rack and two (2) screws through left front bracket into rack, using clip nuts (NOT provided) if necessary.

To install the E-TBT-FRL-xx00 on table or other flat surface:

NOTE: Rubber feet are provided.

1. Carefully turn E-TBT-FRL-xx00 to side.
2. Install four (4) rubber feet:
   - Separate rubber feet.
   - Remove protective paper from adhesive surface on rubber foot.
   - Position and secure each rubber foot as shown.



3. Return E-TBT-FRL-xx00 to upright position.

CABLE SPECIFICATIONS

The physical characteristics of the media cable must meet or exceed IEEE 802.3 specifications, 1998 Edition.

Fiber Cable

MULTIMODE

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	
Bit error rate:	$\leq 10^{-11}$	
E-TBT-FRL-xx00, E-TEL-FRL-1200	1300 nM	
Fiber-optic Transmitter Power:	min: -16.0 dBm	max: -7.0 dBm
Fiber-optic Receiver Sensitivity:	min: -29.5 dBm	max: -9.0 dBm
Link Budget	13.5 dB	
Typical Maximum Cable Distance:*	2 kilometers	
E-TBT-FRL-xx00(SC), E-TEL-FRL-1200(SC)	1300 nM	
Fiber-optic Transmitter Power:	min: -16.0 dBm	max: -7.0 dBm
Fiber-optic Receiver Sensitivity:	min: -29.5 dBm	max: -9.0 dBm
Link Budget	13.5 dB	
Typical Maximum Cable Distance:*	2 kilometers	
E-TBT-FRL-xx00(MT), E-TEL-FRL-1200(MT)	1300 nM	
Fiber-optic Transmitter Power:	min: -16.0 dBm	max: -10.0 dBm
Fiber-optic Receiver Sensitivity:	min: -29.5 dBm	max: -7.2 dBm
Link Budget	13.5 dB	
Typical Maximum Cable Distance:*	2 kilometers	

SINGLEMODE

Fiber Optic Cable Recommended:	9 µm singlemode fiber	
Bit error rate:	$\leq 10^{-11}$	
E-TBT-FRL-xx00(SM), E-TEL-FRL-1200(SM)	1300 nM	
Fiber-optic Transmitter Power:	min: -27.0 dBm	max: -14.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm	max: -14.0 dBm
Link Budget	7.0 dB	
Typical Maximum Cable Distance:*	20 kilometers	
E-TBT-FRL-xx00(L), E-TEL-FRL-1200(L)****	1300 nM	
Fiber-optic Transmitter Power:	min: -19.0 dBm	max: -15.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm	max: -14.0 dBm
Link Budget	15.0 dB	
Typical Maximum Cable Distance:*	40 kilometers	

*Actual distance dependent upon physical characteristics of network installation.

**Requires a minimum loss of 5 dB over cable or damage to receiver may occur.

FAULT ISOLATION and CORRECTION

If the multi-port media converter fails, isolate and correct the fault by determining the answers to the following questions and then taking the indicated action:

1. Is the *POWER* LED on the multi-port media converter illuminated?

NO
- Is the power cord properly installed in the media converter and in the grounded AC outlet?
- Does the grounded AC outlet provide power?
- Contact Technical Support: (800) 260-1312.

YES
- Proceed to step 2.

2. Are any of the 10BASE-T *T(wisted)P(air)* LEDs illuminated?

NO
- Check twisted pair cables for proper connection.
- Contact Technical Support: (800) 260-1312.

YES
- Proceed to step 3.

3. Are any of the 10BASE-FL *F(i)B(e)R* LEDs illuminated?

NO
- Check fiber cables for proper connection.
- Verify that TX and RX cables on media converter are connected to RX and TX ports, respectively, on other device.
- Contact Technical Support: (800) 260-1312.

YES
- Proceed to step 4.

4. Are any of the *ACT(ivity)* LEDs illuminated?

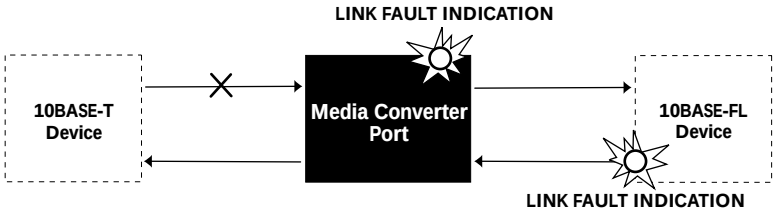
NO
- Disconnect and reconnect the cable to restart the initialization process.
- Restart the workstation to restart the initialization process.
- Contact Technical Support: (800) 260-1312.

YES
- Contact Technical Support: (800) 260-1312.

Set LinkAlert™ Switches

USING LINKALERT™

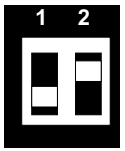
NOTE: The E-TBT-FRL-xx00 series multi-port media converter *LinkAlert™* feature allows each media converter port to pass 10BASE-T side link faults over the port link to the 10BASE-FL side and to pass 10BASE-FL side link faults over the port link to the 10BASE-T side.



If the port does not detect a good link on the 10BASE-T side, the port disables all transmission (including active-idle) on the 10BASE-FL side.

SWITCH SETTINGS

Use the 2-position switches at the front of the E-TBT-FRL-xx00 to enable/disable *LinkALERT™* for three contiguous media converter ports.



SWITCH 1 enables or disables *LinkAlert™* for ports 1 - 3, SWITCH 2 for ports 4 - 6. SWITCH 3 enables or disables *LinkAlert™* for ports 7 -9 in a 12-port unit and SWITCH 4 for ports 10 -12.

(UP) Enables the *LinkAlert™* function. *(DOWN)* Enables standard Link Integrity Test. *Default is LinkAlert™ enabled (UP).*

Install Cable

NOTE: Refer to page 10 for cable and connector specifications.

COPPER

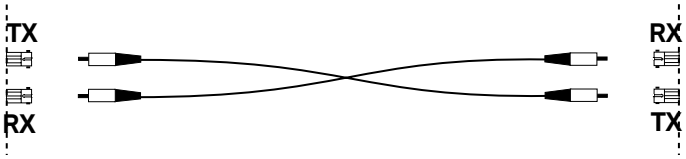
1. Locate or build 10BASE-T compliant cables with male RJ-45 plug connectors at both ends.
2. Connect male RJ-45 plug connector at one end of cable to media converter port RJ-45 jack connector.
3. Connect male RJ-45 plug connector at other end of cable to 10BASE-T device RJ-45 jack connector.

INSTALLATION (continued)

Install Cable (continued)

FIBER

1. Locate or build 10BASE-FL compliant fiber cable with male two-stranded TX to RX connectors at both ends.

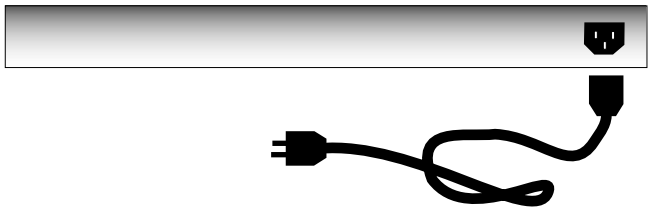


2. Connect male TX and RX cable connectors at one end of cable to TX and RX female connectors, respectively, on media converter port.
3. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors, respectively, on 802.3 compliant fiber device.

Connect to Power

NOTE: When the multi-port media converter is connected to an AC outlet supplying 100-240VAC at 50-60 Hz, the hub automatically powers ON

To power ON the multi-port media converter:

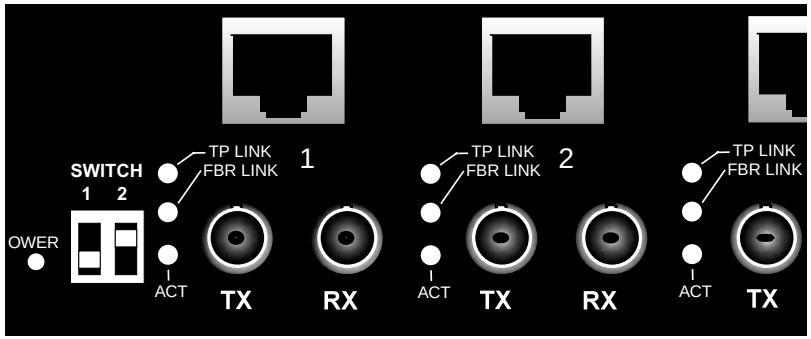


1. At multi-port media converter back, locate male power receptacle.
2. Plug female media converter end of power cord into multi-port media converter power receptacle.
3. Plug male outlet end of power cord into correct voltage, properly grounded, AC rack or wall power source.
4. Verify that multi-port media converter is powered by observing illuminated power and status LED(s).

OPERATION

Use the status LEDs to monitor multi-port media converter operation in the network.

NOTE: Each 10BASE-T/10BASE-FL media converter port is identified by a number located just above the fiber connector(s) for that 10BASE-T /10BASE-FL port connection. The LEDs that apply to each 10BASE-T or 10BASE-FL port connector(s) are located, when facing the multi-port media converter, at the left of the connector(s) for that 10BASE-T or 10BASE-FL port connection.



T(wisted) P(air) LINK	Steady LED indicates good link on 10BASE-T copper.
F(i)B(e)R LINK	Steady LED indicates good link on 10BASE-FL fiber.
ACT(ivity)	Steady LED indicates 10BASE-T OR 10BASE-FL activity. Dark LED indicates NO 10BASE-T or 10BASE-FL activity.
POWER	Steady LED indicates connection to external AC power.