# 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

**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

© 1999 TRANSITION Networks.
All rights reserved. No part of this work may be reproduced or used in any form or by any means – graphic, electronic, or mechanical – without written permission from TRANSITION Networks.

Printed in the U.S.A. 33030.E

TRANSITION networks

Minneapolis, MN 55344 USA

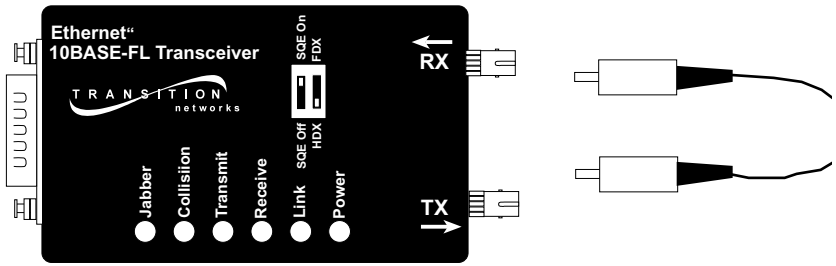
# AUI/10BASE-FL

## *Transceiver*

## E-FRL-MC04, E-FRL-MC04(SC), E-FRL-MC04(SM), E-FRL-MC04(L)

# USER'S GUIDE

The TRANSITION Networks E-FRL-MC04 transceiver is a media access unit (MAU) that connects the AUI port of any DTE, repeater, or other network device, either directly or through an AUI cable, to an Ethernet™ 10BASE-FL device through either unshielded or shielded twisted-pair copper cable and an RJ-45 connector.




### E-FRL-MC04

*Provides an AUI connector and a set of RX (receive) and TX (transmit) **ST** 10BASE-FL connectors to **850mn multimode** fiber cable.*

### E-FRL-MC04(SC)

*Provides an AUI connector and a set of RX (receive) and TX (transmit) **SC** 10BASE-FL connectors to **850mn multimode** fiber cable.*

### E-FRL-MC04(SM)

*Provides an AUI connector and a set of RX (receive) and TX (transmit) **ST** 10BASE-FL connectors to **1300mn singlemode** fiber cable.*

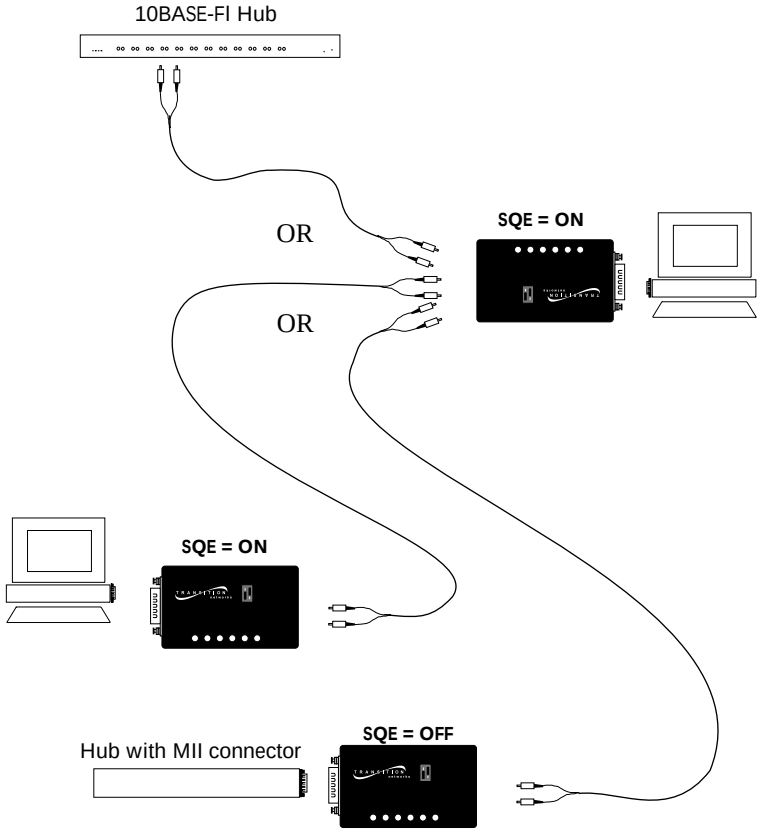
### E-FRL-MC04(L)

*Provides an AUI connector and a set of RX (receive) and TX (transmit) **ST** 10BASE-FL connectors to **1300mn multimode** fiber cable.*

E-FRL-MC04 in the Network . . . . . .2
Installation . . . . . .3
Operation . . . . . .4
Fault Isolation and Correction . . . . .5
Cable Specifications . . . . . .6
Technical Specifications . . . . . .7
Compliance Information . . . . . .8

# E-FRL-MC04 IN THE NETWORK

NOTE: AUI cable can be used to connect to the transceiver.




# TECHNICAL SPECIFICATIONS

| | | |
|---|---|---|
| **Standards** | IEEE 802.3 | |
| **Case Dimensions** | 2.8" x 1.75" x 0.75" | (71mm x 43mm x 18mm) |
| **Environment** | Temperature: | 0-40°C (32° to 104° F ) |
| | Humidity | 10-90%, non condensing |
| | Altitude | 0-10,000 feet |
| **Warranty** | Lifetime | |

## DECLARATION OF CONFORMITY

TRANSITION networks

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

Model: **AUI/10BASE-FL Transceiver**

Part Number: **E-FRL-MC04, E-FRL-MC04(SC),E-FRL-MC04(SM), E-FRL-MC04(L)**

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

Purpose: To declare that the ***E-FRL-MC04*** 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, IEC 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

August 11, 1999
Date

# CABLE SPECIFICATIONS

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

## *Fiber-Optic Interface*

**850nm MULTIMODE**

| | | |
|---|---|---|
| Fiber Optic Cable Recommended: | 62.5 / 125 µm multimode fiber | |
| Fiber Optic Transmitter Power: | Average: | -15 dBm |
| Fiber Optic Receiver Sensitivity: | Average : | -33 dBm |
| Bit error rate: | $\leq 10^{-10}$ | |
| Maximum Cable Distance: | 2 kilometers (6,600 feet) | |

**1300nm MULTIMODE**

| | | |
|---|---|---|
| Fiber Optic Cable Recommended: | 62.5 / 125 µm multimode fiber | |
| Fiber Optic Transmitter Power: | Average: | -17 dBm |
| Fiber Optic Receiver Sensitivity: | Average: | -35 dBm |
| Bit error rate: | $\leq 10^{-9}$ | |
| Maximum Cable Distance: | 5 kilometers (16,500 feet) | |

**1300nm SINGLEMODE**

| | | |
|---|---|---|
| Fiber Optic Cable Recommended: | 9/125 micron single mode fiber | |
| Fiber Optic Transmitter Power: | Average: | -16 dBm |
| Fiber Optic Receiver Sensitivity: | Average: | -33 dBm |
| Bit error rate: | $\leq 10^{-10}$ | |
| Maximum Cable Distance: | 20 kilometers (66,000 feet) | |

## *AUI (DB-15) Interface*

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| **Transmit** | | | |
| Transmit threshold voltage level: | -140mV | -170mV | -190mV |
| Transmit turn on delay: | | | 100ns |
| Transmit steady propagation delay: | | 15ns | 50ns |
| Transmit loop back start up delay: | | | 500ns |
| Transmit turn off to data idle: | 400ns | | 2100ns |
| SQE test delay: | 0.6 µ sec | | 1.6 µ sec |
| SQE test duration: | 0.5 µ sec | 1.0 µ sec | 1.5 µ sec |
| **Receive** | | | |
| Receive turn on delay: | | | 350ns |
| Receive steady propagation delay: | 15ns | 50ns | |
| Differential output voltage (RX(-/+)): | (+/-)550mV | | (+/-)1200 |
| Differential output voltage (col(-/+)): | (+/-)550mV | | (+-)1200 |
| Differential output rise time (RX(-/+), col(-/+)): | 4ns | | |
| Differential output fall time (RX(-/+), col(-/+)): | 4ns | | |
| **Collision** | | | |
| Time for SQE to deact. after collision: | 450ns | | 700ns |
| Collision frequency: | 8.5MHz | | 11.5MHz |
| Collision pulse duty cycle: | 40% | 50% | 60% |
| SQE test delay: | 0.6 µ sec | | 1.6 µ sec |
| Jabber activation delay: | 20ms | 70ms | 150ms |

# INSTALLATION

## *Set Switches*

Two (2) switches are located on the top of the transceiver.

***SQE Off/SQE On***: Selects SQE test function. Set to *SQE On* when connecting to IEEE 802.3 compliant repeaters. Set to *SQE Off* when connecting to other devices.

***HDX/FDX***: Selects either half-duplex *(HDX)* or full-duplex *(FDX)* data transmission. Set according to network installation.

## *Install Cable*

NOTE: See page 6 for cable specifications.

1. Locate or build 10BASE-FL compliant cables 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 transceiver.
3. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors of 802.3 compliant fiber device..

## *Connect to Power*

The E-FRL-MC04 is powered through the AUI connection.

# OPERATION

After installation, the transceiver should function without operator intervention.

## *Status LEDs*

Use the status LEDs to monitor transceiver operation in the network.

**Jabber** : Illuminated red LED indicates that unit is disabled.

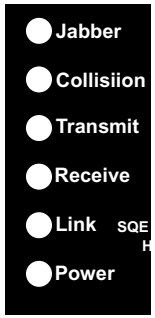
**Collision**: Flashing or illuminated red LED indicates collisions.

**Transmit:** Flashing or illuminated green LED indicates packet(s) are being transmitted.

**Receive:** Flashing or illuminated green LED indicates packet(s) are being received.

**Link** Illuminated green LED indicates the unit is receiving link pulses from a compliant device.

**Power:** Illuminated green LED indicates connection to external power.




# FAULT ISOLATION and CORRECTION

If the transceiver fails, determine the answers to the following questions:

**1. Is the power LED on the transceiver illuminated?**

**NO**

- Verify that the transceiver is installed properly in the AUI port and that the device is powered ON.
- Contact Technical Support at (800) 260-1312 or at (800) LAN-WANS.

**YES**

- Proceed to step 2.

**2. Is the Link LED illuminated?**

**NO**

- Check the fiber cables for proper connection. (If possible, try a different pair of fiber cables.)
- Contact Technical Support at (800) 260-1312 or at (800) LAN-WANS.

**YES**

- Proceed to step 3.

**3. Is the fiber cable connected properly?**

**NO**

- Verify that TX and RX cables on transceiver are connected to RX and TX ports, respectively, on each device.
- Contact Technical Support at (800) 260-1312 or at (800) LAN-WANS.

**YES**

- Contact Technical Support at (800) 260-1312 or at (800) LAN-WANS.