BLACK BOX
NETWORK SERVICES

SEPTEMBER 2000
ME615A
ME615AE
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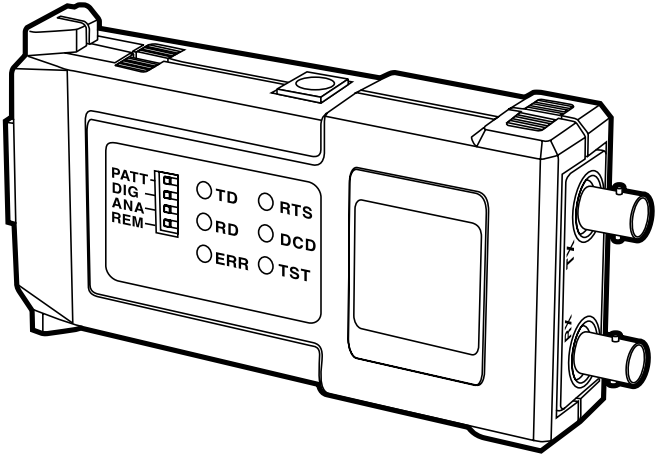
Async Mini Fiber Optic Modem



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FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
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 Industry Canada.

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 Industrie Canada.

DECLARATION OF CONFORMITY

The Async Mini Fiber Optic Modem conforms to the following standard(s) or other normative documents:

EMC:

EN55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN50082-1 (1992): Electromagnetic compatibility—Generic immunity standards for residential, commercial, and light industry.

Supplementary information: The Async Mini Fiber Optic Modem complies with the requirements of the EMC Directive 89/336/EEC. It was tested in a typical configuration.

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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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.

TRADEMARKS USED IN THIS MANUAL

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1. Specifications

DTE Link

Data Rate—Up to 115.2 kbps

Pulse Width Distortion—Less than 25%

Transmission Mode—Full or half-duplex, switch-selectable

Interface Type—RS-485 over 2-wire or 4-wire, switch-selectable

DTE Connector—(1) 5-screw terminal block

Fiber Optic Link

Transmission Line—Optical duplex cable

Transmission Mode—Full or half-duplex

Optical Output Level— -18 dBm over 62.5/125 fiber, -18 dBm over 9/125-µm fiber

Optical Wavelength—ME615A, ME615AE: 850 nm, multimode; ME616A, ME616AE: 1300 nm, single-mode

Fiber Optic Connectors—(1) pair of ST®

General

Operating Budget—ME615A, ME615AE: Up to 22 dB in full duplex; ME616A, ME616AE: Up to 24 dB in full duplex

Temperature Tolerance—32 to 122°F (0 to 50°C)

Humidity—Up to 90%, non-condensing

Power—9 volts, 300 mA

Size—0.9"H x 2.1"W x 3.9"D (2.3 x 5.3 x 9.9 cm)

Weight—4.9 oz. (139 g)

2. Introduction

2.1 Description

The Async Mini Fiber Optic Modem lets you transmit an RS-485 or V.11 signal via a fiber optic link. It's used mainly for data transmission in utility applications. The asynchronous data rate can be up to 115.2 kbps in full- or half-duplex mode.

The Modem performs diagnostic loops in compliance with the ITU V.54 standard. Two V.54 loops are available: local analog loop (loop 3) and remote digital loop (loop 2). The loops are activated by external DIP switches on the top of the modem. Local digital loop is also available. The loops are available in ITU V.11 only.

The Modem includes a built-in V.52 standard BER tester for testing link integrity. The internal BER tester is activated by an external DIP switch (PATT) on the top of the modem. The ERR LED blinks when an error is detected in the data transmission.

Power needed for the Async Mini Fiber Optic Modem is derived from a standard, wall-mounted power supply DC adapter. The DC voltage range is 300 mA to 9 V.

The Async Mini Fiber Optic Modem incorporates all the advantages of a fiberoptic system, including:

- Lower attenuation than with copper wire.
- EMI/RFI immunity, saving the cost of expensive and heavy shielding, and complex error-checking routines.
- Almost absolute security and reduction in the cost of data encryption.
- Eavesdropping is virtually impossible since negligible power radiates from the fiber.
- Safety and electrical isolation: no spark hazard and no ground-loop noise problems.

2.2 Features

- Provides asynchronous transmission up to 115.2 kbps.
- Operates full duplex over 4-wire or half-duplex over 2-wire or 4-wire.
- Meets ITU RS-485 and ITU V.11 requirements.

- Operates over multimode or single-mode fiber optic cable.
- Six LED indicators.
- Miniature, lightweight, and easy to install.
- Operates with an external, wall-mounted power supply.
- Point-to-point or multipoint applications up to 32 units in RS-485.

2.3 Application

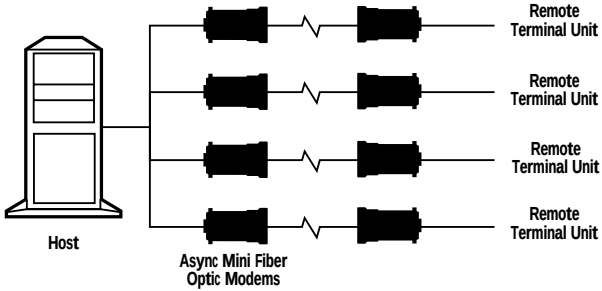

Figure 2-1. Application.

3. Installation

CAUTION

This is delicate equipment. Be careful when setting jumpers that you do not break or shake any components.

Installing the Async Mini Fiber Optic Modem is simple. Follow these instructions:

1. To access the switches, open the modem by pressing the places marked on the sides.

2. Configure the modem according to the strapping diagram (see **Figure 3-1**) and the DIP-switch selection table (see **Table 3-1**).

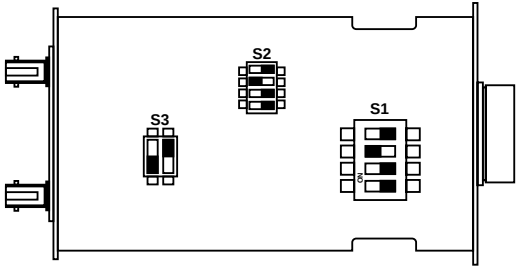

Figure 3-1. Strapping diagram.

Table 3-1. DIP-switch selection

Switch	Function—General	Function—Specific	Strap Identity	Possible Settings	Factory Setting
S3-1	Full duplex/ mode	Selects the transmission on DTE side. Half-duplex: RS-485 mode	RS-485	H. D.	H. D.
S3-2	2/4W	Selects 2-wire or 4-wire operation on RS-485 DTE. For RS-485: 2-wire or 4-wire	2-wire or 4-wire	2-wire	2-wire
S2-1 S2-2 S2-3 S2-4	Carrier Delay	Selects the length of time that the carrier maintains the transmission rate when received data from RS-485 interface becomes mark or idle. High data rate: use 1.1 msec Low data rate: use 17.7 msec	Carr Dly	1.1 msec 4.4 msec 8.8 msec 17.7 msec	4.4 ms
S1-1 S1-2 S1-3 S1-4	Front Panel Switches	Selects BERT Test mode Selects Local Digital Loop Selects Local Analog Loopback Selects Remote Digital Loopback	PATT DIG ANA REM	 See See	OFF OFF OFF OFF

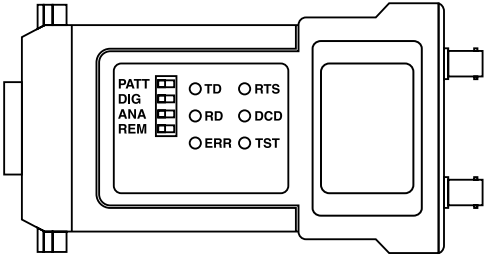

Figure 3-2. Modem front panel with testing and diagnostics switches.

3.1 V.11 Mode (4-Wire, Full Duplex)

3a. Set the full/half-duplex switch to half-duplex.

4a. Set the 4-wire/2-wire switch to 4-wire.

5a. Set the Carrier Delay to 4.4 msec.

6a. Connect the wires according to **Figure 3-3**.

3.2 RS-485 (4-Wire, Full Duplex)

3b. Set the full/half-duplex switch to half-duplex.

4b. Set the 4-wire/2-wire switch to 4-wire.

5b. Set the Carrier Delay to 4.4 msec.

6b. Connect the wires according to **Figure 3-3**.

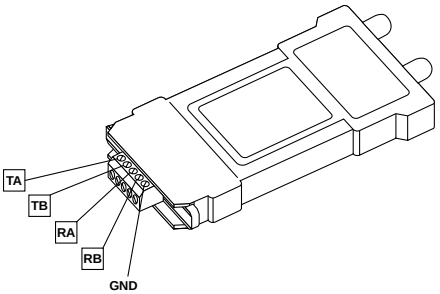

Figure 3-3. Rear panel of Modem with terminal block.

NOTES

4-wire: TDA and TDB are data input to the Modem. RDA and RDB are data output from the Modem.

2-wire: TDA and TDB are data input/output to and from the Modem.

3.3 RS-485 (2-Wire, Half-Duplex)

3c. Set the full/half-duplex switch to half-duplex.

4c. Set the 4-wire/2-wire switch to 2-wire.

5c. Set the Carrier Delay according to **Table 3-1**.

6c. Connect the wires according to **Figure 3-3**.

7. To close the modem, press the two halves of the modem together.

8. Connect the external wall-mounted power supply to the modem. Plug the power supply into the mains.

9. Remove the plastic dust caps from the fiber optic connectors and connect the cable to the modem. Observe the following polarities:

   - TX on the local modem should be connected to RX on the remote modem;

   - RX on the local modem should be connected to TX on the remote modem.

10. Connect the 4-wire or 2-wire UTP or STP line to the clip-screw terminal block (see **Figure 3-3**).

The Async Mini Fiber Optic Modem is now ready for operation.

4. Operation

4.1 General

For normal operation, make sure that the tests and diagnostic switches are set to OFF.

4.2 Tests and Diagnostics (in V.11 Only)

The Async Mini Fiber Optic Modem features diagnostic tests that are easily initiated via front-panel switches.

4.2.1 BERT Test Mode V.52

BERT enables testing of local modem and communication lines. The modem generates and transmits standard V.52 511-bit pseudo-random pattern and checks its response when the PATT external switch is activated. If errors are detected, the ERR indicator LED will light. The test can be carried out in local analog loopback, in remote digital loop, or in normal point-to-point operation, opposite a remote modem.

4.2.2 V.54 Diagnostics

The modem features diagnostic loops according to ITU V.54. The modem performs local analog loopback

(ANA) and local and remote digital loopback (DIG, REM). All tests are controlled by switches. The TST LED lights when performing diagnostics.

ANA V.54 (Loop 3)

This loop tests the local modem only. The XMT signal is returned to the receive (see **Figure 4-1**).

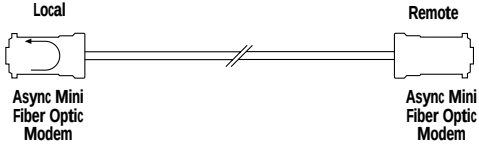

Figure 4-1. Analog loop (ANA).

REM V.54 (Loop 2)

This loop tests the remote modem and the communication link (see **Figure 4-2**).

NOTE

To return to normal operation, set the test switches to OFF.

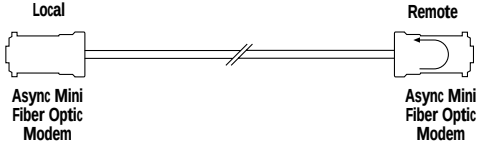

Figure 4-2. Remote digital loop (REM).

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