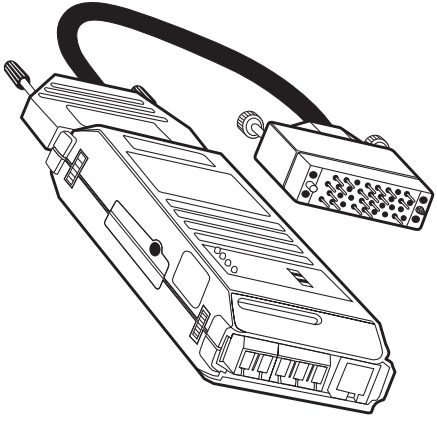
BLACK BOX®
NETWORK SERVICES

JULY 1998

ME560A-V35-F	ME561A-V35-M
ME560AE-V35-F	ME561AE-V35-M
ME560A-V35-M	ME562A
ME560AE-V35-M	ME562AE
ME561A-V35-F	ME563A
ME561AE-V35-F	ME563AE

Limited-Distance Modem 56/64



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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.

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.

IMPORTANT

North American Users: The Limited-Distance Modem 56/64 is powered by an external power supply. To reduce the risk of electric shock, fire, and injury to persons:

- Use only with a UL listed and CSA Certified Class 2 power supply rated 9 VDC, 400 mA.

IMPORTANT

Pour les utilisateurs Nord Americains: Le Limited-Distance Modem 56/64 est renforcé par un transformateur exterieur. Afin de réduire le risque d'electrocution, de feux ou de blessure:

- Utilisier seulement avec le UL listé et le CSA Certifié Classe 2 de le transformateur de 9 VDC, 400 mA.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

CONTENTS

1. Specifications

Data Rates—56 or 64 kbps, selectable

Number of Data Bits (Async Mode)—8, 9, 10, or 11, including 1 start and 1 stop bit, with or without parity

Frequency Allowance (Async Mode)—Shortening of the stop bit on the receive end is selectable:

- 12.5% allows a frequency difference between the async DTE and the Modem of -2.5% to +1.0%

- 25% allows a frequency difference of -2.5% to +2.3%

Transmission Line—4-wire unconditioned dedicated line (two twisted pairs)

Transmission Mode—Sync or Async, full-duplex

Transmission Controls—

- DCD (Circuit 109) turns ON after recognizing a receive signal from the line.

- CTS (Circuit 106) turns ON 8 msec after DTE raises RTS (Circuit 105).

- DSR (Circuit 107) turns ON when the modem is powered and is in normal mode or in analog loop state. DSR turns OFF when the modem is in digital loopback state.

- TEST Mode (Circuit 142) turns ON when the modem is in a diagnostic loop.

Transmission Level—0 dBm

Maximum Distance—19 AWG: 6 mi. (10 km); 24 AWG: 2.8 mi. (4.5 km); 26 AWG: 2 mi. (3.2 km)

Terminal Interface—EIA RS-232 V.24 integral DB25 female connector; V.35 interface is provided via a mating cable, 17.5" (45 cm) long, terminated with a 34-pin male or female connector for V.35

Line Interface—5-screw (4-wire and ground) terminal block together with RJ-11 or RJ-45 jack, mounted directly

Controls—Control loopback activity: Normal, ANA (analog), and REM (remote digital loopback)

Indicators—(4) LEDs: Power, TST (Test), CD (Carrier Detect), TD (Transmit Data)

Interface—ME560A-ME561A: V.35;
ME562A-ME563A: RS-232

Connectors—All models: (1) DB25, (1) terminal block;
ME560A-F: (1) RJ-45 female, pigtail cable with M/34 female;
ME560A-M: (1) RJ-45 female, pigtail cable with M/34 male;
ME561A-F: (1) RJ-11 female, pigtail cable with M/34 female;
ME561A-M: (1) RJ-11 female, pigtail cable with M/34 male;
ME562A: (1) RJ-11 female;
ME563A: (1) RJ-45 female

Temperature—32 to 122°F (0 to 50°C)

Humidity—Up to 90%, noncondensing

CE Approval—220-VAC versions;
ME560AE-ME563AE

Power— -A versions: wall-mounted 9-VDC, 115-VAC power supply; -AE versions: wall-mounted 9-VDC, 230-VAC power supply

Size—1.2"H x 2.1"W x 5.1"D (3 x 5.3 x 13 cm)

Weight—3.3 oz. (90 g)

2. Introduction

2.1 Description

The Limited-Distance Modem is used for local data distribution, connecting full-duplex sync or async DTEs, computers, or controllers over unconditioned 4-wire dedicated lines. The Modem operates at data rates of 56 or 64 kbps, at distances of up to 6 miles (10 km), according to the wire gauge and data rate (see **Table 2-1**).

Table 2-1. Approximate Range.

Data Rate	19 AWG (0.9 mm)		24 AWG (0.5 mm)		26 AWG (0.4 mm)	
kbps	km	miles	km	miles	km	miles
56/64	10	6	4.5	2.8	3.2	2

Six models are available in both 115-VAC and 220-VAC versions:

- Limited-Distance Modem 56/64, V.35, RJ-45 female, M/34 female (ME560A-V35-F)
- Limited-Distance Modem 56/64 V.35, RJ-45 female, M/34 male (ME560A-V35-M)

- Limited-Distance Modem 56/64 V.35, RJ-11 female, M/34 female (ME561A-V35-F)
- Limited-Distance Modem 56/64 V.35, RJ-11 female, M/34 male (ME561A-V35-M)
- Limited-Distance Modem 56/64 RS-232, RJ-11 female (ME562A)
- Limited-Distance Modem 56/64 RS-232 RJ-45 female (ME563A)

Each model has a DB25 connector for the DTE interface. For the V.35 interface, a 17.7-in. (45-cm) cable is supplied, with a DB25 female connector on one side and a 34-pin male or female connector on the other side.

Four LED indicators are available to facilitate diagnostics: Power, Test, Data Carrier Detect, and Transmit Data.

Transmit timing is provided via three sources: an internal oscillator, an external clock, or a loopback clock derived from the receive signal.

The Modem's carrier is strap-selectable for either continuous operation, or switched operation for passing control signals end-to-end. Switched operation is controlled by the RTS signal.

The Modem performs diagnostic loops in compliance with the ITU V.54 standard. Two V.54 loops are available: local analog loop (V.54, loop 3) and remote digital loop (V.54, loop 2). The loops are activated by a 3-position switch in all models or by the DTE interface Circuit 141 (Pin 18) and Circuit 140 (Pin 21). The Test LED lights when any diagnostic loop is active.

The low transmit level minimizes crosstalk onto adjacent circuits within the same cable. Data is transmitted and received using a balanced interface, ensuring high immunity to circuit noise. And the Modem is coupled to the dedicated line through isolation transformers which, in conjunction with other circuitry, protect against AC or DC overvoltages.

The line interface consists of two independent connectors: a 5-screw terminal block, and a selectable RJ-11 or RJ-45 connector.

Power is supplied from a standard, wall-mounted wall-mounted power supply, 300-mA (center: positive; sleeve: negative).

2.2 Features

- Synchronous or asynchronous
- Data rates of 56 or 64 kbps, selectable
- V.54 diagnostics, including local and remote test
- Internal, external, or receive clock
- Transmission range of up to 6 miles (10 km)
- Controlled or continuous carrier
- Isolation transformers
- V.35 or V.24/RS-232 interfaces
- LED indicators
- Miniature, lightweight, easy to install
- Operates with an external, wall-mounted power supply

2.3 Application

Figure 2-1 shows a typical application of the Limited-Distance Modem 56/64.

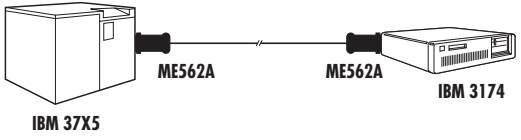

Figure 2-1. Typical Application.

3. Installation

CAUTION

This is a delicate instrument. Be careful not to break or shake any components whenever you have the Modem's case open.

Installing the Modem is simple and straightforward. Follow these steps:

1. Open the unit by separating the two parts of the plastic cover. Press the marked points indicated on the sides.

2. Strap the modem according to the Strapping Diagram (see **Figure 3-1**) and the Strap Selection table (see **Table 3-1**).

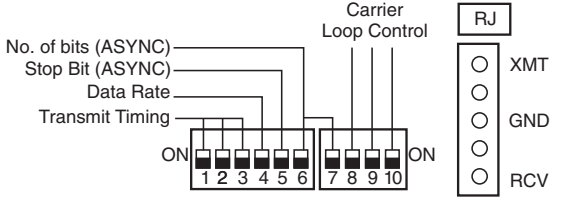

Figure 3-1. Strapping Diagram.

Table 3-1. Strap Selection.

Strap Identity	Function	Position	Factory Setting
XMT Timing	Selects timing clock and Async mode	S1 S2 S3 ON OFF OFF OFF OFF OFF OFF OFF ON OFF ON OFF	External Internal* Receive Async
Baud Rates	Selects data transmit rate (kbps)	S4 ON—56 kbps OFF-64 kbps	64
Async Length	Selects the amount of stop bit shortening to be used in Async mode	S5 ON—12.5% OFF—25%	25%
	Selects character length in Async mode	S6 S7 No. Bits OFF OFF 8 OFF ON 9 ON OFF 10 10 bits ON ON 11	
Carrier	Selects carrier constantly on, or controlled by RTS	S8 ON ON OFF CNT	ON
Loop Activation from DTE interface	ANA Enables DTE control of analog loop	S9 ON Enable OFF Disable	Disable
	REM Enables DTE control of remote digital loop	S10 ON Enable OFF Disable	Disable

*The factory setting for XMT Timing is Internal.

3. Connect the 4-wire dedicated line to the modem line connector.

- If you're using the terminal block, connect each lead of the 4-wire dedicated line to the appropriate screw connector on the terminal block.

- If you're using the RJ-11 or RJ-45 connector, plug the cable into the RJ jack.

- Verify that the connection between the local modem and the remote modem is as follows:

- Local XMT connected to remote RCV

- Local RCV connected to remote XMT

NOTE

When operating in a noisy environment, we recommend that you use shielded cables, and connect the cable shield to "Ground." Ground is provided on the line connector (terminal block or RJ-11/RJ-45 connectors) for this purpose. If you're connecting to the RJ-11 and RJ-45 jack, refer to **Figures 3-2** and **3-3** for connector pinouts.

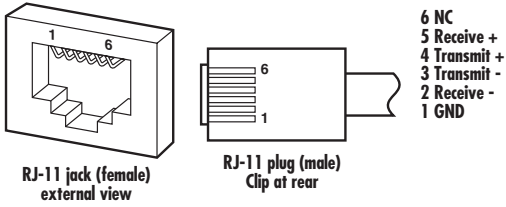

Figure 3-2. RJ-11 Pin Assignment.

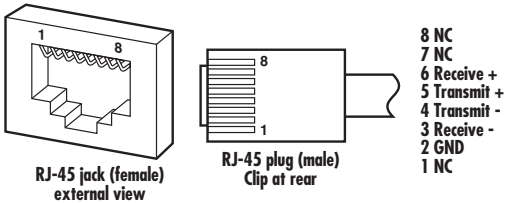

Figure 3-3. RJ-45 Pin Assignment.

4. Close the unit by pressing the two parts of the cover together.

5. Plug the modem directly into the computer port (for the RS-232 version) or via the mating cable (for the V.35 version), and fasten with the screws.

6. Connect the external wall-mount power supply to the Modem and then plug it into the main power.

4. Operation

4.1 General

The Limited-Distance Modem has ten DIP switches and a 3-position loop activation switch. A table is attached to the inside of the plastic cover showing the setup options of the DIP switches.

NOTE

The ten switches are mounted on two blocks (as shown in **Figure 3-1**). The first block has six switches and the second has four. **Table 3-1** relates to these switches as one group, numbered 1 to 10.

4.2 Sync Mode

1. Set the XMT timing (INT, EXT, RCV) using S1, S2, and S3.

2. Set the data rate to 56 kbps or 64 kbps using S4.

3. Set the carrier to be controlled constantly ON or controlled by RTS (CNT) using S8.

NOTE

Switches 5, 6, and 7 are not relevant for sync operation.

4.3 Async Mode

1. Set the XMT TIMING to async mode, using S1, S2, S3.

2. Set the data rate using S4.

3. Set the frequency allowance and the character length according to **Table 3-1** and **Table 4-1**, using S5, S6, and S7.

4. Set the carrier to be constantly ON or controlled by RTS (CNT) using S8.

NOTE

Personal computers working at high speed in async mode operate at 57.6 kbps (instead of 56 kbps). In such cases, set the PC to **two** stop bits and strap the Modem for a character length with **one** stop bit. Strap the rate of the Modem to 56 kbps.

Table 4-1. Asynchronous Character Length Setting.

Start Bit	Data Bits	Parity	Stop Bit	No. of Bits
1	5	NONE	2	8
1	6	NONE	1, 1.5, 2	8
1	6	ODD, EVEN	1, 1.5, 2	9
1	7	NONE	1, 1.5, 2	9
1	7	ODD, EVEN	1, 1.5, 2	10
1	8	NONE	1, 1.5, 2	10
1	8	ODD, EVEN	1, 1.5, 2	11

4.4 Test Mode

The Limited-Distance Modem performs two V.54 test loops: analog loop (ANA) (V.54, loop 3) and remote digital loop (REM) (V.54, loop 2) (see **Figures 4-1** and **4-2**). Both loops can be controlled either by a manual switch, or by the DTE interface Pin 18 (ANA), and Pin 21 (REM). When using the Modem (V.35 version) with the mating cable (DB25 to 34-pin), the loop-activating pins are JJ for ANA and HH for REM. The TEST LED lights, and Pin 25 (Circuit 142) turns ON when the modem is in one of the diagnostic loops. (When using the V.35 model with the mating cable, Circuit 142 uses Pin KK.) Activation of both loops from the DTE interface is controlled by S9 and S10 (see **Table 3-1**).

NOTES

To return to normal operation, move the switch to the center position, or if using the DTE interface (Pins 18 and 21), switch to OFF. The TEST LED and Pin 25 will turn off automatically.

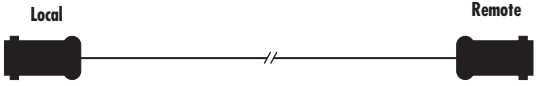

Figure 4-1. Analog Loop (ANA).

ANA tests the local modem only. The XMT signal to the line is returned to the receiver.

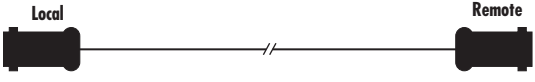

Figure 4-2. Remote Digital Loop (REM).

REM tests the local modem, the line, and the remote modem.

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