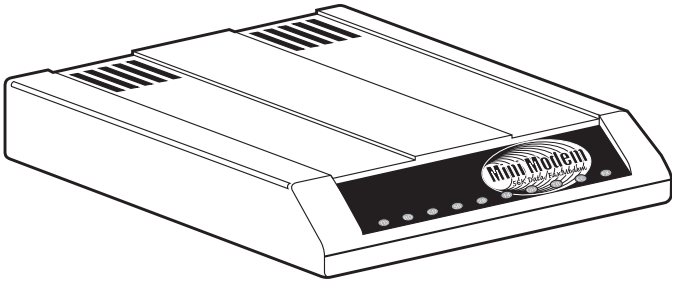
BLACK BOX®
NETWORK SERVICES

JUNE 2001
MD1621A

Mini-Modem
(33.6 kbps Data/Fax Modem)



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: **877-877-BBOX**
FREE technical support, 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
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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.

TRADEMARKS

The trademarks mentioned in this manual are the sole property of their owners.

NAMING CONVENTIONS USED IN THIS MANUAL

In the software you received, the Mini-Modem is called the Multi-Modem or the MT2834ADX. This is the correct software for your Mini-Modem.

CONTENTS

1. Specifications

Data Rates (Modem) — 33.6 kbps and 31.2 kbps, 28.8, 26.4, 24, 19.2, 16.8, 14.4, and 12 kbps, 9600 bps, 7200, 4800, 2400, 1200 and 0-300 bps

Data Rates (Fax) — 14,400, 9600, 4800 and 2400 bps

Data Format (Modem) — Serial, Binary, Asynchronous

Compatibility (Modem) — ITU-T V.34, AT&T V.32terbo, ITU-T V.32bis, V.32, Bell 212A and 103/113, ITU-T V.22, V.22bis, V.29, V.42, V.42bis

Compatibility (Fax) — ITU-T Group 3, T.4, T.30, V.21, V.27ter, V.29, V.17, and EIA TR29.2

Error Correction — ITU-T V.42 (LAP-M or MNP 2, 3 or 4)

Data Compression — ITU-T V.42bis (4:1 throughput) or MNP 5 (2:1 throughput)

Speed Conversion — Serial-port data rates adjustable to 300, 1200, 2400, 4800, and 9600 bps, 19.2 kbps, 38.4, 57.6, and 115.2 kbps

Mode of Operation — Half- or full-duplex over dial-up lines; automatic or manual dialing, automatic or manual answer

Flow Control — XON/XOFF, hardware (RTS/CTS), HP (ENQ/ACK)

Intelligent Features — Fully AT command compatible, autodial, redial, repeat dial, pulse or tone dial, dial pauses, call status display, auto parity and data-rate selections, keyboard-controlled modem options, on-screen displays for modem option parameters, command lines of up to 60 characters each, and help menus

Command Buffer — 60 characters

Modem Modulations — FSK at 300 bps, PSK at 1200 bps, QAM at 2400, 4800, and 9600 bps (non-trellis), QAM with trellis-coded modulation (TCM) at 9600 bps, 12 kbps, 14.4, 16.8, 19.2, 21.6, 24, 26.4, 28.8, 31.2, and 33.6 kbps

Fax Modulations — V.21 CH2 FSK at 300 bps, V.27ter DPSK at 2400 and 4800 bps, V.29 QAM at 7200 and 9600 bps, V.17 TCM at 7200 bps, 9600 bps, 12 kbps, and 14.4 kbps

Carrier Frequencies, ITU-T V.34 — 1600, 1646, 1680, 1800, 1829, 1867, 1920, 1959, 2000 Hz

Carrier Frequencies, AT&T V.32 terbo/ITU-T V.32bis/V.32 — 1800 Hz

Carrier Frequencies, V.22bis/V.22 or Bell 212A Standard (2400 & 1200 bps) —Transmit originate: 1200 Hz; Transmit answer: 2400 Hz; Receive originate: 2400 Hz; Receive answer: 1200 Hz

Carrier Frequencies, Bell 103/113 (300 bps)— Transmit originate: 1270 Hz mark, 1070 Hz space; Receive originate: 2225 Hz mark, 2025 Hz space; Transmit answer: 2225 Hz mark, 2025 Hz space; Receive answer: 1270 Hz mark, 1070 Hz space

Fax Carrier Frequencies — V.21 Ch2 (half duplex): 1650 Hz mark, 1850 Hz space for transmit originate; 1650 Hz mark, 1850 Hz space for transmit answer; V.27ter: 1800 Hz originate/answer; V.29 QAM: 1700 Hz originate/answer; V.17 TCM 1800 Hz originate/answer

Transmit Level — -13 dBm

Frequency Stability — ±-0.01%

Receiver Sensitivity — -43dBm under worst-case conditions

AGC Dynamic Range — 43 dB

Interface Connectors — EIA RS-232C/ITU-T V.24/V.28 DB25 RS-232C connector; two RJ-11 phone jacks (one RJ-11 jack on UK and international modems), power jack

Cables — One 14-foot (4.3-m) RJ-11 phone cable (USA); external power transformer and cord

NOTE

Any cables connected to the computer should be shielded to reduce interference.

Diagnostics — Power-on self test, local analog loop, local digital loop, remote digital loop

Indicators — LEDs for Transmit Data, Receive Data, Carrier Detect, 33.6 kbps, 14.4 kbps, 9600 bps, Off Hook, Terminal Ready, Error Correction, Fax

Speaker — Command-controlled speaker for call progress monitoring

Manual Control — Power switch

Enviromental — Temperature range 0 to 50 °C (32 to 120 °F); Humidity range 20 to 90% (non-condensing)

Power Requirements — 100-130 VAC, 50/60 Hz, 0.1A/5W; two-prong outlet-mounted transformer (included); 230V/50 Hz optional (international)

Regulatory Compliance — UL, CUL, CSA, FCC

Size — 1.15"H x 4.25"W x 5.8"D (2.9 x 10.8 x 14.8 cm)

Weight — 0.5 lb. (0.3 kg)

2. Introduction

2.1 General

The Mini-Modem (MD1621A) complies with the enhanced V.34 standard for a top speed of 33,600 bps. It's downward-compatible with all previous standards, including V.32terbo (19,600 bps), V.32bis (14,400 bps), V.32 (9600 bps), V.22bis (2400 bps), and V.22 (1200 bps)—and it's a full-duplex intelligent modem with V.42 error correction, V.42bis data compression, and V.17 (14,400 bps), Class 2, Group 3 fax capabilities.

2.2 What the Package Includes

Make sure you have all of the following components before trying to operate your modem:

- One Mini-Modem (MD1621A)
- One DC power supply
- One set of four plastic feet
- One telephone cable

- This User manual
- Communications (datacomm) software

If any of these items are missing, please contact Black Box immediately at 724-746-5500.

3. Quick Start

3.1 Introduction

We know you're eager to get your Mini-Modem up and running, so we'll skip the features for now, and show you step-by-step how to set it up, check it out, and make your first calls.

3.2 Safety Warnings

- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm; there may be a remote risk of electrical shock from lightning.

- Do not use a telephone in the vicinity of a gas leak.

3.3 What You'll Need

Before starting, please make sure you have everything you need:

We supply:

- The Mini-Modem (MD1621A)
- A DC power supply module
- One set of four plastic feet
- One telephone cable
- Communications (datacomm) software
- This user manual

You supply:

- A computer with an unused external serial port
- A shielded RS-232 serial cable with a male DB25 connector on one end and a connector to match your computer's serial port on the other end

- A nearby AC power outlet
- A nearby telephone line jack

If you are unfamiliar with computers, please see **Chapter 4, Features**, for more information on the required equipment before you proceed.

3.4 Step 1: Assemble the Modem

The only assembly required is to mount the feet on the bottom of the modem. Simply peel the four self-adhesive plastic feet off the backing strip and press them into the recesses on the bottom of the modem. You can also use self-adhesive Velcro patches (not included) to mount the modem on a vertical surface or to keep it from being dislodged on a horizontal surface. If you use Velcro patches, we recommend that you mount them where they will not obscure the labels on the bottom of the modem.

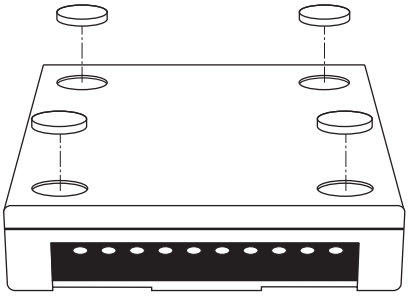

Figure 3-1. Mounting the feet.

3.5 Step 2: Connect the Modem to Your System

Placing the Mini-Modem in a convenient location, connect it to your computer's serial port, to the telephone line, to AC power, and, optionally, to your telephone.

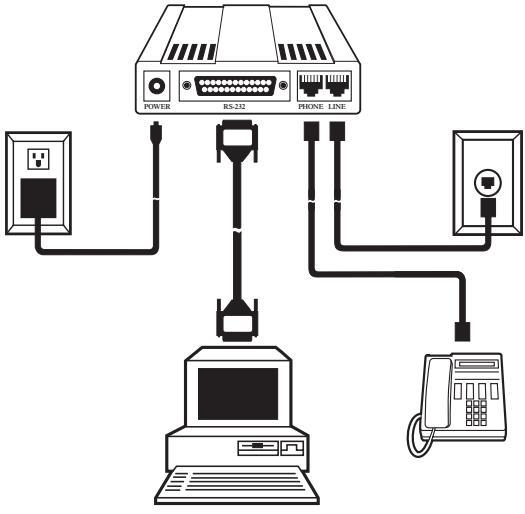

Figure 2-2. Mini-Modem connections.

3.5.1 RS-232 Connection

Plug one end of the serial cable into the RS-232 connector on the modem, and the other end into a serial port on your computer, such as COM1 or COM2.

3.5.2 LINE Connection

Plug one end of the phone cable into the Mini-Modem's LINE jack, and the other end into a phone-line wall jack.

NOTE

The Mini-Modem's LINE jack is not interchangeable with the PHONE jack. Do not plug the phone into the LINE jack or the line cable into the PHONE jack.

NOTE

The Federal Communications Commission (FCC), Industry Canada, and the British Approvals Board for Telecommunications (BABT) impose certain restrictions on equipment connected to public telephone systems. See **Appendix A** for more information.

3.5.3 PHONE Connection

You may optionally plug a telephone into the Mini-Modem's PHONE jack. This jack is provided as a convenience; you may also plug a telephone into a duplex jack inserted into your wall jack.

3.5.4 POWER CONNECTION

Plug the power-supply module into an AC power outlet or power strip. Plug the power supply's cable into the POWER jack on the modem.

NOTE

Use only the power supply supplied with the Mini-Modem. Using any other power supply could damage the modem.

3.5.5 POWER-ON TEST

Test the modem by turning it on (a power on/off switch is located on the right side). When you apply power, the modem performs a diagnostic self-test, indicated by the speed indicators flashing in sequence for a second or two, after which the 33 indicator should light. If this does not happen, check that the power switch is on, the power supply is solidly connected, and the AC outlet is live. If these measures do not work, see **Chapter 7, Troubleshooting**.

3.6 Step 3: Install the Modem in Windows 95 or 98

If you are using Windows 95 or 98, you must install the modem in the operating system. (If you are using another operating system, you may skip this step.)

3.6.1 Adding the Mini-Modem to Windows 95 or 98

1. Click the Start button, point to Settings, and click Control Panel.

2. Double-click the Modems icon. If no modem is currently installed, the Install New Modem wizard appears. If a modem is already installed, the Modems Properties sheet appears; click Add to go to the Install New Modem wizard.

3. Click Next in the Install New Modem wizard. Windows searches for your new modem and asks you to verify its selection.

NOTE

If Windows cannot find a modem, your modem may be turned off, it may be plugged into the wrong connector on your computer, or the serial cable may be faulty. See **Sections 5.2** and **5.3**.

4. If Windows identifies your modem correctly as a MultiModem MT2834ZDX, click Next to install the modem. After the modem is installed, click Finish to exit.

5. If Windows cannot identify your modem (for instance, if it identifies your modem as a “Standard

Modem"), click Change. A dialog box with a list of manufacturers and a list of modems appears.

6. Select "MultiTech Systems" from the Manufacturers list box, then select "MultiModem MT2834ZDX" from the Models list box.

7. Click Next. Windows installs and configures the modem.

8. Click Finish to exit.

3.6.2 Removing Your Old Modem from Windows 95 or 98

When your Mini-Modem replaces another modem, the old modem installation remains in Windows after you install the new modem, and the old modem is still selected in HyperTerminal and other Windows 95 or 98 applications. Although you can change the application connection descriptions one at a time, it is easier to force Windows 95 or 98 applications to use the Mini-Modem by removing the old modem from Windows.

1. Click the Start button, point to Settings, and click Control Panel.

2. Double-click the Modems icon to open the Modems Properties sheet.

3. In the list box, select the old modem.

4. Click Remove, then click Close.

5. The next time you dial a HyperTerminal connection, it will select your new modem and ask you to confirm the selection.

3.7 Step 4: Install and Configure Your Software

You must have communications software installed in your computer to use the Mini-Modem. If you wish to use communications software that is already installed, you should reconfigure it for the Mini-Modem; otherwise, install the data and fax communications software provided with the Mini-Modem.

Third-Party Communications Software

1. Turn on your computer and run your communications software.

2. Find the dialog box or menu that lets you specify your modem. (In Windows Terminal, select Settings, Modem Commands; in HyperTerminal, select File, Properties, Phone Number; in ProComm Plus for Windows, select Window,

Setup, Advanced; and in MultiExpress Terminal for Windows, select Setup, Terminal, Modem.)

3. Choose the MultiModemZDX or MT2834ZDX from the software's modem list.

4. Change the modem initialization string, if necessary. In most circumstances, AT&FX4S0=0 works best for a PC, and AT&FX4&E13&D0S0=0 works best for a Macintosh. For CompuServe, include &E0&E14S7=60 in the string; if you use WinCIM, include &E5 for WinCIM's software flow control. If you want the modem to always answer the phone, delete S0=0 from the string. Depending on the software, you may have to end the string with a carriage return (^M).

NOTE

To change the modem's default initialization string, type the new commands in the software's terminal window, adding the command &W to store it in the modem's nonvolatile memory; e.g., AT&FX4S0=0&W.

5. Select the port the modem is connected to (normally COM1 or COM2).

6. Ideally, if you use data compression, you should set your serial-port baud rate to four times the

modem's maximum transmission speed or faster; however, not all serial ports can handle speeds that high. Set the serial-port baud rate to 115,200 bps if your computer has a high-speed serial port with a 16550AFN UART or equivalent and Windows 95 or 98; set it to 57,600 bps if it has Windows 3.1x. If you have an older computer with a 14550 UART, set it to 19,200 bps. Older Macintosh computers can use a serial-port baud rate of 57,600 bps, and newer ones, 115,200 bps.

To see what UART is in your serial port if you have Windows 3.1x, select File, Run in Program Manager, type MSD, and press RETURN. Select COM Ports to see the UART type. If you have Windows 95 or 98, select Start, Settings, Control Panel, and double-click on the Modems icon. In the Modems Properties dialog box, click the Diagnostics tab, click the port the modem is connected to, and click More Info to see the UART type. Note: Both programs may identify a 14550 UART as an 8250A UART. If you have an 80386 or later computer, your UART is most likely a 14550 or 16550AFN.

7. If the software has an autobaud selection, make sure it is disabled. Autobaud applies only to older modems, and can cause problems if enabled.

8. If the software allows you to edit the no-connect messages (NO CARRIER, BUSY, NO ANSWER, NO DIALTONE), make sure there is no space between DIAL and TONE in NO DIALTONE.

9. Refer to the software manual or online Help for other configuration choices; in most cases you can accept the default values.

4. Features

4.1 What Can I Do with My Mini-Modem?

You can use your Mini-Modem to access commercial online information services such as CompuServe, America Online, Genie, and Prodigy. These services provide access to databases, encyclopedias, stock reports, news, weather, and shopping. They provide electronic mail (e-mail) links to subscribers of the same and other services. Public message areas called forums allow subscribers to trade information and opinions on a vast array of topics from A to Z, while vendor forums provide hardware and software support from manufacturers. Online services also allow you to upload and download computer programs, data files, and updated software such as video and printer drivers.

The Mini-Modem can also connect you to the Internet, an international computer network of universities, libraries, businesses, and government agencies. Like the commercial online services, the Internet provides e-mail services, public message areas, and access to information and software, much of it easily accessed through the World-Wide Web.

You can also use the Mini-Modem to dial into bulletin-board services (BBSs). BBSs offer some of the services provided by online information services—usually email, public message areas, and file transfers. Most are run as hobbies by individuals, but some are services provided by companies. Though some charge an annual fee, many are free.

Other uses include direct links to friends with modems, to banks, and to service bureaus. You can also telecommute with your fax modem—work at home while communicating with the office by modem or fax.

And, of course, you can use your Mini-Modem to send and receive faxes anywhere in the world, enabling you to communicate quickly with businesses and other organizations that do not maintain BBSs.

The Mini-Modem automatically adjusts to line conditions and to the capabilities of the modem it connects to, resulting in the highest transmission speed, the most accurate error correction, and the most efficient data compression possible for each connection. The Mini-Modem follows the most recent revision of the V.34 specification for data rates up to 33,600 bps.

The Mini-Modem's features include:

- Support of data rates of 33,600 and 31,200 bps, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, and 300 bps for communicating with older modems as well as with other V.34 modems.

- Automatic fallback to slower speeds in noisy line conditions, and fall-forward to faster speeds as conditions improve.

- ITU-T V.42 LAP-M and MNP Classes 2–4 error correction.

- Data-transfer rates up to 115,200 bps with V.42bis data compression.

- Serial-port data rates adjustable to 115,200 bps.

- Autodial, redial, pulse (rotary), dial, and touch-tone dial.

- Dial-tone and busy-signal detection for reliable call-progress reporting.

- Compatibility with the standard AT command set used by most communication programs.

- On-screen help menus.
- Nonvolatile memory for storage of custom settings and two telephone numbers.
- Sends and receives faxes from your computer at 14,400, 9600, 4800, and 2400 bps.
- Responds to EIA TR29.2 Class 2 fax commands.

4.2 Required Equipment

In addition to the contents of the Mini-Modem package, you need the following equipment.

- Computer: You can connect the Mini-Modem to any computer with an RS-232C/V.24 serial port, such as the IBM PC, XT, AT, and PS/2 computers, and most PC compatibles. It can also be connected to the RS-422 serial ports on Apple Macintosh computers. To use your Mini-Modem at its highest speeds, a PC must have a serial port with a 16550AFN UART, which can safely handle data at rates up to 115,200 bps. Almost all Macintoshe computers can handle data rates up to 57,000 bps, while the newer ones can handle data rates up to 115,000 bps.

- Serial Cable: To connect the Mini-Modem to your computer, you must provide a serial cable, obtainable at computer stores and many office supply stores. The cable should have a male DB25 connector at the modem end. For IBM and compatible computers, the other end may have a female DB25 connector or a female DB9 connector, depending on your computer. Most Macintosh computers require a round, 8-pin, mini-DIN connector. The Macintosh serial cable should be wired for hardware flow control. To reduce electrical interference, the FCC requires that the cable be shielded.

- Telephone Line: You must have a telephone line with a jack (connector) that accepts the cable that comes with the Mini-Modem. If you do not have a telephone jack near your computer, you should install one before proceeding.

  In North America, do-it-yourself telephone extension kits and accessories are available wherever telephones are sold. You may also hire an independent contractor or your local telephone company to do the work. If you want a separate line for your fax modem, you must contact your telephone company.

- Communications Software: To operate the Mini-Modem, you must have data-communications (datacomm) and fax-communications software. The Mini-Modem comes with a data and fax communications package. You must have Microsoft Windows 3.1 or later to run this software. If you require software for DOS or for the Macintosh operating system, please contact Technical Support at 724-746-5500. The Mini-Modem is also compatible with other datacomm and fax programs.

4.3 Connections

All models connect to your computer ("RS-232"), to a telephone line ("LINE"), and to a power source ("POWER").

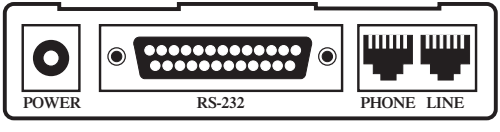

Figure 4-1. Connectors.

4.3.1 Connecting to the Computer ("RS-232")

Using a matching serial cable, connect the RS-232 connector on the modem to one of the serial ports on the back of your computer. On an IBM PC or compatible, there are usually two serial ports named "COM1" and "COM2." COM1 typically uses a DB9 male connector, whereas COM2 may use a DB25 male connector. Most Apple Macintosh computers use round mini-DIN-8 connectors for the serial ports. Choose the one marked with the icon of a telephone; the Macintosh gives priority to that port and will not interrupt your communications link. Be sure to tighten the mounting screws on the DB connectors.

4.3.2 Connecting to the Telephone Line ("LINE")

Plug one end of the cable provided with the Mini-Modem into the telephone jack in your home or office. Plug the other end into the LINE jack on the Mini-Modem.

4.3.3 Connecting a Telephone Set ("PHONE")

If you wish to connect a telephone to the same line as the Mini-Modem, you may plug it into the latter's PHONE jack. This connector is provided as a

convenience; you may also connect your telephone to a duplex jack inserted into your wall jack.

NOTE

The PHONE jack is not interchangeable with the LINE jack; do not plug the telephone into the LINE jack or vice-versa.

4.3.4 Connecting to Power ("POWER")

Low voltage DC power is supplied to the Mini-Modem through a modular power supply included with the modem. Plug the power supply module into a convenient AC power outlet or surge protector. Plug the connector on the other end of the power cord into the POWER jack on the modem. A power on/off switch is located on the right side of the modem.

NOTE

Use only the power supply supplied with the Mini-Modem. Using any other power supply could damage the modem.

As soon as you apply power to the modem, it will perform a diagnostic self-test, indicated by the speed LEDs flashing in sequence for approximately two seconds, after which the 33 indicator should light. If this does not happen, check that the power switch is on, the power supply is solidly connected, and the AC outlet is live.

4.3.5 Surge Protectors and Lightning

Power surges and other transient voltages on power lines, such as those caused by lightning strikes, can damage or destroy your modem. Damaging voltages can also enter your modem through the telephone line, especially during an electrical storm. Therefore, we recommend that you plug the Mini-Modem into a surge protector rather than directly into a wall outlet, preferably a surge protector that provides protection against electrical spikes on the telephone line as well as on the power line. Note that not even a surge protector can guard against damage from a nearby lightning strike. During an electrical storm, your safest course is to unplug your computer equipment from both the power outlet and the telephone line.

4.4 Front Panel

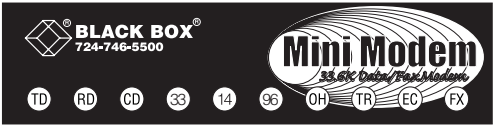

Figure 4-2. Mini-Modem front panel.

The Mini-Modem has ten LED indicators on the front panel that indicate status, configuration, and activity:

- TD: Transmit Data. The TD LED lights when the modem is transmitting data to another modem. The state of the LED matches the TD circuit on pin 2 of the RS-232C/V.24 interface.

- RD: Receive Data. The RD LED lights when the modem is receiving data from another modem. The state of the LED matches that of the RD circuit on pin 3 of the RS-232C/V.24 interface.

- CD: Carrier Detect. The CD LED lights when the modem detects a valid carrier signal from another modem. It is on when the modem is communicating with the other modem and off when the link is broken.

- 33: 28,800–33,600 bps. The 33 LED lights by itself when the modem connects at 28,800 bps, blinks slowly to indicate 31,200 bps, and blinks fast to indicate 33,600 bps operation. This LED also lights or blinks in combination with the 14 LED to indicate speeds between 16,800 and 26,400 bps (see the table on **page 41**).

- 14: 14,400 bps. The 14 LED lights by itself when the modem connects at 14,400 bps. The 14 LED lights or blinks in combination with the 28 LED to indicate speeds between 16,800 and 26,400 bps (see the table on **page 41**). It lights together with the 96 LED to indicate a speed of 12,000 bps.

- 96: 9600 bps. The 96 LED lights when the modem connects at 9600 bps. If no speed LED lights, the modem is operating at less than 9600 bps.

- OH: Off-Hook. The OH LED lights when the modem is off-hook, which occurs when the modem is dialing, online, or answering a call. The LED flashes when the modem pulse-dials.

- TR: Terminal Ready. The TR LED lights when a datacomm program initializes the modem. It means the modem is ready for an outgoing or incoming call. It goes off when the datacomm program disconnects the COM port. When it goes off, a connected modem will disconnect. The state of the TR LED matches that of the DTR circuit on pin 20 of the RS-232C/V.24 interface.

- EC: Error Correction (V.42). The EC LED lights continuously when the modem is in error-

correction mode, and blinks when compression is activated.

- FX: Fax. The FX LED lights when the modem is in fax mode.

NOTE

When you turn on the Mini-Modem, the speed lights flash briefly as the modem does a self-test, then the LED for the default modem baud rate lights. The default rate for the Mini-Modem is 33,600 bps unless you select and store another baud rate. After a call, the LEDs for the connection's baud rate remain lit until another call is made or the modem is reset. If you connect at a rate under 9600 bps, all speed LEDs remain off after the connection is broken, even though the modem is still turned on.

4.5 Speed Indicator Blink Rates

The 33, 14, and 96 speed indicators light singly or in combination to indicate data rates. Data rates for the Mini-Modem are shown in the following table.

Mini-Modem Data Rates.

Data Rate (bps)	33 LED	14 LED	96 LED
<9.6K	●	●	●
9.6K	●	●	○
12.0K	●	○	○
14.4K	●	○	●
16.8K (V.32terbo)	●	☼	●
19.2K (V.32terbo)	●	☼	●
16.8K (V.34)	○	☼	●
19.2K (V.34)	○	☼	●
21.6K	○	○	●
24.0K	☼	○	●
26.4K	☼	○	●
28.8K	○	●	●
31.2K	☼	●	●
33.6K	☼	●	●

● Off ☼ Slow blink (1/sec.)
○ On ☼ Fast blink (5/sec.)

5. AT Commands, S-Registers, and Result Codes

5.1 AT Commands

This section summarizes your modem's AT commands.

Command: AT **Attention Code**
Values: n/a
Description: The attention code precedes all command lines except A/, A:, and escape codes.

Command: RETURN Key
Values: n/a
Description: Press the RETURN (ENTER) key to execute most commands.

Command: A **Force Answer Mode**
Values: n/a
Description: Answer call before final ring.

Command: A/ **Repeat Last Command**
Values: n/a
Description: Do not precede this command

with AT. Do not press RETURN to execute.

Command:	**A:**	**Continuous Redial**
Values:		n/a
Description:		Redial last number until answered. Do not precede this command with AT or press RETURN to execute.

Command:	**&An**	**Answerback**
Values:		n = 0 or 1
Default:		0
Description:	&A0	Disables answerback.
	&A1	Enables answerback reply to an ID request.

Command:	**$An**	**Auto-Reliable Buffering**
Values:		n = 0 or 1
Default:		0
Description:	$A0	Discard data received during establishment of a reliable connection.

	$A1	Buffer data received during establishment of a reliable connection.
Command:	**#An**	**Auto Speed Detection in Answer Mode**
Values:		n = 0–3
Default:		0
Description:	#A0	Start at maximum speed and fall back to a lower speed (26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, or 300 bps) as line conditions warrant.
	#A1	Maximum speed only.
	#A2	Start at maximum speed and fall back decrementally to 4800 bps only.
	#A3	Start at 2400 bps and fall back to 1200 to 300 bps only.
Command:	**Bn**	**Answer Tone**
Values:		n = 1
Default:		1

Description:	B1	Select Bell answer tones, including Bell 103.

Command:	**&BSn**	**Maximum Reliable Block Size**
Values:		n = 0 or 1
Default:		1
Description:	&BS0	Maximum transmit block size of 64 characters.
	&BS1	Maximum transmit block size of 256 characters.

Command:	**$BAn**	**Baud Adjust**
Values:		n = 0 or 1
Default:		0
Description:	$BA0	Set baud adjust off, speed conversion on. (Serial-port speed is independent of modem data rate.)
	$BA1	Set baud adjust on, speed conversion off. (Serial-port speed is same as modem data rate.)

Command:	**&Cn**	**Carrier-Detect Control**
Values:		n = 0, 1, 2, or 4
Default:		1

Description:	&C0	Force Carrier Detect high.
	&C1	Let Carrier Detect follow carrier signal.
	&C2	Let Carrier Detect drop on disconnect, then go high again (for some CBX phone systems).
	&C4	Reset modem when Carrier Detect drops.

Command:	**&CDn**	**Cleardown at Disconnect**
Values:		n = 0, 1
Default:		0
Description:	&CD0	Execute a cleardown at disconnect.
	&CD1	Do not execute a cleardown at disconnect.

Command:	**Ds**	**Dial**
Values:	s = dial string (phone number and dial modifiers)	
Default:		none
Description:		Dial telephone number s, where s may include up to 60 digits and T, P, R, comma, colon, and semicolon characters.

Command:	**DsNd**	**Store Telephone Number**
Values:	s = dial string (phone number and dial modifiers) d = 0 or 1	
Default:		none
Description:		To store, enter D followed by dial string s, then N followed by directory number d.

Example: ATDT9,5551212N1.

Command:	**&Dn**	**Data Terminal Ready Control**
Values:		n = 0–3
Default:		2
Description:	&D0	Modem ignores DTR signal.
	&D1	When DTR drops, the modem hangs up. While DTR is low, the modem accepts commands but will not dial or auto-answer until DTR goes high again.
	&D2	Same as &D1.
	&D3	When DTR drops, the modem hangs up and resets as if an ATZ command were issued.

Command: **$Dn** **DTR Dialing**
Values: n = 0 or 1
Default: 0
Description: $D0 Do not dial when DTR goes high.
$D1 Dial stored number N0 when DTR goes high.

Command: **%DCn** **AT Command Control**
Values: n = 0 or 1
Default: 0
Description: %DC0 The modem responds to AT commands.
%DC1 The modem ignores AT commands.

NOTE
The modem will respond to AT%DC for 10 seconds after powerup.

Command: **%DFn** **Format Line Probe Data**
Values: n = 0 or 1
Default: 0
Description: %DF0 Display data in graph format. Y axis is gain shown in dBm.
%DF1 Display data in table format. Gain is shown numerically in dBm at

75Hz increments from 150Hz to 3750Hz.

Command:	**%DPn**	**Read Line Probe Data**
Values:		n = 0 or 1
Default:		0
Description:	%DP0	Do not read and store line probe information from DSP during handshake.
	%DP1	Read and store line probe information from DSP during handshake.

Command:	**>DTn**	**DTMF Detection**
Values:		n = 0 or 1
Default:		0
Description:	>DT0	The modem will not detect DTMF tones.
	>DT1	The modem will detect and report DTMF tones when it is off-hook.

Command:	**En**	**Echo Command-Mode Characters**
Values:		n = 0 or 1
Default:		1

Description:	E0	Do not echo keyboard input to the terminal.
	E1	Do echo keyboard input to the terminal.

Command:	**&En**	**V.42 Error-Correction Modes**
Values:		n = 0, 1, or 2
Default:		1
Description:	&E0	V.42 non-error-correction mode (V.42 disabled).
	&E1	V.42 auto-reliable mode.
	&E2	V.42 reliable mode (V.42 enabled).

Command:	**&En**	**Modem-Initiated Flow Control**
Values:		n = 3, 4, or 5
Defaults:		4
Description:	&E3	Flow control disabled.
	&E4	CTS/RTS hardware flow control.
	&E5	XON/XOFF software flow control.

Command:	**&En**	**XON/XOFF Pass-Through**
Values:		n = 6 or 7
Defaults:		6

Description:	&E6	Respond to and discard XON/XOFF characters when &E5 is selected.
	&E7	Respond to and pass through XON/XOFF characters when &E5 is selected.

Command:	**&En**	**Hewlett-Packard ENQ/ACK** Pacing
Values:		n = 8 or 9
Default:		8
Description:	&E8	Ignore ENQ/ACK pacing characters.
	&E9	Respond to ENQ/ACK pacing characters.
Command:	&En	Non-Error-Correction Mode Flow Control
Values:		n = 10 or 11
Default:		10
Description:	&E10	Disable non-error-correction mode flow control.
	&E11	Enable non-error-correction mode flow control.

Command:	**&En**	**Pacing (Computer-Initiated Flow Control)**
Values:		n = 12 or 13
Default:		13
Description:	&E12	Pacing disabled.
	&E13	Pacing enabled.

Command:	**&En**	**Data Compression**
Values:		n = 14 or 15
Default:		15
Description:	&E14	Data compression disabled.
	&E15	Data compression enabled.

Command:	**$En**	**V.42 Error Correction at 300 bps**
Values:		n = 0 or 1
Default:		0
Description:	$E0	V.42 error correction at 300 bps disabled.
	$E1	V.42 error correction at 300 bps enabled.

Command:	**$EBn**	**Asynchronous Word Length**
Values:		n = 0 or 1
Default:		0
Description:	$EB0	10-bit mode enabled.

	$EB1	11-bit mode enabled.

Command:	**%En**	**Escape Sequence Options**
Values:		n = 0–5
Defaults:		1 and 4
Description:	%E0	Modem won't escape.
	%E1	+++AT<CR> method.
	%E2	<BREAK>AT<CR> method.
	%E3	Both +++AT<CR> and <BREAK>AT<CR> methods.
	%E4	No OK response to +++AT<CR>.
	%E5	OK response to +++AT<CR>.

Command:	**&Fn**	**Load Default Configurations**
Values:		n = 0, 8, or 9
Default:		8
Description:	&F0	Load factory-default values from ROM if &F8 was previously stored; load user default values from non-volatile memory if &F9 was previously stored.
	&F8	Read factory-default values when &F is issued (effective only if you store &F8 using &W0).

	&F9	Read values stored in non-volatile memory when &F is issued (effective only if you store &F9 using &W0).

Command:	**$Fn**	**Enable/Disable Auto-Reliable Fallback Character**
Values:		n = 0 or 1
Default:		0
Description:	$F0	Do not fall back to non-error-correction mode connect if <CR> is received during handshake.
	$F1	Fall back to non-error-correction mode connect if <CR> is received during handshake.

Command:	**%Fn**	**Echo-Canceller Frequency-Offset Compensation**
Values:		n = 0 or 1
Default:		0
Description:	%F0	Disable echo-canceller frequency-offset compensation.
	%F1	Enable echo-canceller frequency-offset compensation.

Command:	**#Fn**	**Fallback Modes When On Line**
Values:		n = 0, 1, or 2
Default:		2
Description:	#F0	No fallback when on line.
	#F1	Fall back decrementally from maximum speed to 4800 bps as line conditions deteriorate.
	#F2	Fall back decrementally to 4800 bps; fall forward when line conditions improve.

Command:	**&Gn**	**Guard Tones**
Values:		n = 0, 1, or 2
Default:		0
Description:	&G0	Turn off ITU-T guard tones.
	&G1	Turn on ITU-T 550-Hz guard tone.
	&G2	Turn on ITU-T 1800-Hz guard tone.

Command:	**Hn**	**On Hook/Off Hook**
Values:		n = 0 or 1
Default:		None
Description:	H0	Go on hook (hang up).
	H1	Go off hook.

Command:	**$Hn**	**Help Screens**
Values:		n = 1, 2, or 3
Default:		None
Description:	$H1	Display Help Screen #1.
	$H2	Display Help Screen #2.
	$H3	Display Help Screen #3.

Command:	**In**	**Inquire Product Codes**
Values:		n = 0, 1, or 2
Default:		None
Description:	I0	Display modem ID number.
	I1	Display firmware version number.
	I2	Display modem description.

Command:	**#Ix**	**Enter Login Password**
Values:		x = password (6 to 10 characters)
Default:		MULTI-TECH
Description:		Enters the remote-configuration login password.

Command:	**#I=x**	**Store Login Password**
Values:		x = password (6–10 characters)
Default:		MULTI-TECH

Description:		Stores a new remote-configuration login password.
Command:	**Ln**	**List Commands**
Values:		n = 0, 5–8
Default:		None
Description:	L	List stored telephone numbers.
	L5	List current operating parameters.
	L6	List current S-register values.
	L7	List additional current operating parameters.
	L8	List DSP code version number, processor speed, and online diagnostic parameters.
	L9	List signal-strength information.
	L10	List signal-to-noise ratio information (SNR).
	L11	List noise information. Note: For L9, L10, and L11, you must first type +++AT<CR> (on-line escape command while maintaining command mode), then type the command prefixed by an AT (e.g., ATL10).

Command:	**#Ln**	**V.42 Mode Selection in Originate Mode**
Values:		n = 0, 1, 2, or 3
Default:		0
Description:	#L0	Modems negotiate V.42 mode.
	#L1	MNP on & LAP-M off.
	#L2	LAP-M on & MNP off.
	#L3	Disable detection phase and go directly to LAP-M.

Command:	**Mn**	**Modem Speaker Control**
Values:		n = 0, 1, 2, or 3
Default:		1
Description:	M0	Speaker always off.
	M1	Speaker on until carrier signal detected.
	M2	Speaker always on.
	M3	Speaker on during dialing, off during handshaking.

Command:	**$MBn**	**Modem Baud Rate**
Values:		n = speed
Default:		33600
Description:	$MB75	Originate call in ITU-T V.23 mode
	$MB300	Originate call at 300 bps.

$MB1200	Originate call at 1200 bps.
$MB2400	Originate call at 2400 bps.
$MB4800	Originate call at 4800 bps.
$MB7200	Originate call at 7200 bps.
$MB9600	Originate call at 9600 bps.
$MB14400	Originate call at 14,400 bps.
$MB16800	Originate call at 16, 800 bps.
$MB19200	Originate call at 19,200 bps.
$MB28800	Originate call at 28,800 bps.
$MB33600	Originate call at 33,600 bps.

Command: **Nd** **Dial a Stored Number**
Values: d = 0 or 1
Default: None
Description: Dial stored telephone number d.

Command: **NdNe...** **Number Linking**
Values: d = 0 or 1; e = 1 or 0
Default: None
Description: Dial stored number d; if it is busy, dial stored number e.

Command: **O** **Go Back On Line**
Values: n/a

Description:		Return to online mode after you have used an escape sequence to go from online mode to command mode.

Command:	**P**	**Pulse Dial**
Values:		n/a
Default:		Yes
Description:		The modem pulse-dials numbers that follow P in the dialing command.

Command:	**&Pn**	**Set Pulse-Dial Ratios**
Values:		n = 0 or 1
Default:		0
Description:	&P0	60:40 break/make pulse ratio.
	&P1	67:33 break/make pulse ratio.

Command:	**Qn**	**Result Codes Enable/Disable**
Values:		n = 0, 1, or 2
Default:		0
Description:	Q0	Enable result codes.
	Q1	Disable result codes (quiet).
	Q2	Enable no-response answer mode, which leaves originate mode

intelligent while turning off answer-mode responses and echo.

Command:	**&Qn**	**Multi-Tech or Standard Result Codes**
Values:		n = 0 or 1
Default:		0
Description:	&Q0	Multi-Tech responses with modifiers.
	&Q1	Standard AT responses with no modifiers.

Command:	**Rn**	**Reverse Originate/Answer Modes**
Values:		n = 0 or 1
Default:		0
Description:	R0	Modem will not reverse modes.
	R1	Modem will reverse modes when R is added to the dial string.

Command:	**&Rn**	**Clear to Send Control**
Values:		n = 0, 1, or 2
Default:		1
Description:	&R0	Let CTS state follow RTS state when on line.
	&R1	Force CTS high (on).

	&R2	Let CTS drop on disconnect for time set by S24, then go high again.

Command:	**&RAn**	**Asymmetrical Bit Rate**
Values:		n = 0 or 1
Default:		0
Description:	&RA0	Enable asymmetrical bit rate in V.34 mode.
	&RA1	Disable asymmetrical bit rate in V.34 mode.

Command:	**&RDn**	**Square-Wave Ring Detect**
Values:		n = 0 or 1
Default:		1
Description:	&RD0	Modem detects only sine-wave rings.
	&RD1	Modem detects both sine- and square-wave rings.

Command:	**&RFn**	**CTS/RTS Interaction Control**
Values:		n = 0 or 1
Default:		1
Description:	&RF0	Let CTS follow RTS.

	&RF1	Let CTS act independently (use with &R).

Command: **&RN** **Rate Negotiation**
Values: n/a
Description: Forces the modem to perform a rate renegotiation while on line. You must escape to command mode to issue this command.

Command: **&RP** **Immediate Line Probe**
Values: n/a
Description: Initiates a retrain that makes the processor read line-probe information if %DP1 is selected. Valid only when on line in V.34 mode.

Command: **&RR** **Immediate Retrain**
Values: n/a
Description: Forces the modem to perform an immediate retrain while on line. You must escape to command mode to issue this command.

Command:	**$Rn**	**Retransmit Count**
Values:		n = 0 or 1
Default:		0
Description:	$R0	Disconnect after 50 retransmits of a data block.
	$R1	Do not disconnect after 50 retransmits.

Command:	**Sr=n**	**Set Register Value**
Values:		r = S-register number; n varies
Default:		None
Description:		Set value of register Sr to value of n, where n is entered in decimal format.

Command:	**Sr?**	**Read Register Value**
Values:		r = S-register number
Default:		None
Description:		Read value of register Sr and display value in 3-digit decimal form.

Command:	**&Sn**	**Data Set Ready Control**
Values:		n = 0, 1, or 2
Default:		1

Description:	&S0	Force DSR high (on).
	&S1	Let DSR follow CD.
	&S2	DSR drops on disconnect, then goes high again. (Used by some CBX phone systems.)

Command:	**&SFn**	**DSR/CD Interaction Control**
Values:		n = 0 or 1
Default:		0
Description:	&SF0	Select DSR to follow CD.
	&SF1	Select DSR to be independent.

Command:	**$SBn**	**Serial-Port Baud Rate**
Values:		n = speed
Default:		57600
Description:	$SB300	Set serial port to 300 bps.
	$SB1200	Set serial port to 1200 bps.
	$SB2400	Set serial port to 2400 bps.
	$SB4800	Set serial port to 4800 bps.
	$SB9600	Set serial port to 9600 bps.
	$SB19200	Set serial port to 19200 bps.
	$SB38400	Set serial port to 38400 bps.
	$SB57600	Set serial port to 57600 bps.
	$SB115200	Set serial port to 115200 bps.

NOTE: Baud adjust must be off ($BA0) to enable fixed baud rate.

Command: **#Sy** **Enter Setup Password**
Values: y= password (6–10 characters)
Default: MODEMSETUP
Description: Enters the remote configuration setup password.

Command: **#S=y** **Store Setup Password**
Values: y= password (6–10 characters)
Default: MODEMSETUP
Description: Stores a new remote configuration setup password.

Command: **T** **Tone-Dial**
Values: n/a
Default: P command
Description: Modem will tone-dial numbers following a T in the dialing command.

Command: **&Tn** **Respond to Remote Digital Loopback Signal**
Values: n = 4 or 5

Default:		5
Description:	&T4	Enable response to remote digital loopback signal.
	&T5	Disable response to remote digital loopback signal.

Command:	**#Tn**	**Trellis-Coded Modulation**
Values:		n = 0 or 1
Default:		1
Description:	#T0	Disable trellis-coded modulation.
	#T1	Enable trellis-coded modulation.

Command:	**Un**	**Loopback Test Modes**
Values:		n = 0, 1, 2, or 3
Default:	None	
Description:	U0	Enable local analog loopback originate mode.
	U1	Enable local analog loopback answer mode.
	U2	Enable remote digital loopback mode.
	U3	Enable local digital loopback mode.

Command:	**Vn**	**Result Codes (Verbose/Terse)**
Values:		n = 0 or 1
Default:		1
Description:	V0	Result codes sent as digits (terse response).
	V1	Result codes sent as words (verbose response).

Command:	**#Vn**	**V.32terbo Handshake Tones**
Values:		n = 0 or 1
Default:		1
Description:	#V0	Include V.32terbo tones in handshake.
	#V1	Exclude V.32terbo tones from handshake.

Command:	**W**	**Wait for New Dial Tone**
Values:		n/a
Description:		Inserted in dialing command, causes modem to wait for a new dial tone. (X2 or X4 must be selected.)

Command:	**&Wn**	**Store Configuration**
Values:		n = 0 or 1

Default:		1
Description:	&W0	Store current settings in NVRAM; load them at power-on or following the ATZ command instead of loading the factory defaults from ROM.
	&W1	Clear user default settings from NVRAM.

Command:	**Xn**	**Result Codes and Call-Progress Selection**
Values:		n = 0–4
Default:		0
Description:	X0	Basic result codes (CONNECT only); does not look for dial tone or busy signal.
	X1	Extended result codes (CONNECT 28800, CONNECT 33600, etc.); does not look for dial tone or busy signal.
	X2	Extended result codes with NO DIALTONE; does not look for busy signal.
	X3	Extended result codes with BUSY; does not look for dial tone.

	X4	Extended result codes with NO DIALTONE and BUSY.

Command:	**#Xn**	**Number of XOFF Characters Sent**
Values:		n = 0 or 1
Default:		0
Description:	#X0	Single XOFF character sent after buffer is full.
	#X1	Multiple XOFF characters sent (one for every character received after buffer is full).

Command:	**Yn**	**Long Space Disconnect**
Values:		n = 0 or 1
Default:		0
Description:	Y0	Disable sending or responding to long-space break signal on disconnect.
	Y1	Enable sending or responding to long-space break signal on disconnect. (Both modems must have Y1 set.)

Command:	**Z**	**Modem Reset**
Values:	n/a	

Description: Reset modem to default values. Defaults come from user NVRAM if &W0 is set, from factory ROM if &W1 is set.

Command: , **Dialing Pause**
Values: n/a
Description: Placed in dialing command, comma causes dialing pause for time set by S8.

Command: : **Continuous Redial**
Values: n/a
Description: Placed at end of dial command, a colon causes continuous redial of a number until answered.

Command: ; **Return to Command Mode**
Values: n/a
Description: Placed at end of dial command, a semicolon causes an immediate return to command mode after dialing.

Command: **!** **Flash On-Hook**
Values: n/a
Description: Placed in dial command, exclamation point causes modem to flash on-hook.

Command: **@** **Quiet Answer**
Values: n/a
Description: Placed in dial command, @ causes modem to wait for a ringback, then 5 seconds of silence, before processing next part of command.

Command: **$** **Call-Card Tone Detect**
Values: n/a
Description: Placed in dial command, causes modem to wait for a call-card tone before processing next part of command (such as a call-card number).

Command: **%%%AT<CR> Remote-Configuration Escape Sequence**
Values: n/a

Description: Initiates remote-configuration mode while online with remote modem. The remote-configuration escape character (%) is defined in register S13.

Command: +++AT<CR> Escape Code
Values: n/a
Description: Puts modem in command mode (and optionally issues a command) while remaining on line. Enter +++AT, up to ten command characters (or as defined by S34), and a RETURN. Used mostly to issue hang-up command: +++ATH<CR>.

Command: <BREAK>AT<CR> Escape Sequence
Values: n/a
Description: Alternate escape method. Puts modem in command mode while remaining on line. Send a <BREAK> signal followed by AT, then up to sixty command characters, and a RETURN. You

must set the modem to %E2 or %E3 before you can use this escape method.

4.2 S-Registers

Certain modem values, or parameters, are stored in memory locations called S-registers. Use the S command to read or to alter the contents of S-registers (see previous section).

Register	Unit	Range	Default	Description
S0	1 ring	0, 1–255	1	Sets the number of rings until the modem answers. ATS0=0 disables autoanswer completely.
S1	1 ring	0–255	0	Counts the rings that have occurred.
S2	decimal	0–127	43 (+)	Sets ASCII code for the escape-code character.
S3	decimal	0–127	13 (^M)	Sets ASCII code for the RETURN character.
S4	decimal	0–127	10 (^J)	Sets ASCII code for the LINE FEED character.
S5	decimal	0–127	8 (^H)	Sets ASCII code for the BACKSPACE character.
S6	1 sec.	2–255 4–255	2 4	Sets the time the modem will wait for a dial tone before aborting a call.

Register	Unit	Range	Default	Description
S7	1 sec.	1–255 1–45	45 45	Sets the time the modem will wait for a carrier signal before aborting a call.
S8	1 sec.	0–255 4–255	2 4	Sets the length of a pause caused by a comma character in a dialing command.
S9	100 ms	1–255	6	Sets delay between when the modem detects a valid carrier signal and when it turns on its CD circuit.
S10	100 ms	1–254, 255	7	Sets how long a carrier signal must be lost before the modem disconnects. S10=255 causes the modem to not disconnect with loss of carrier.
S11	1 ms	1–255 80–255	70 80	Sets spacing and duration of dialing tones. 50 ms is the recommended minimum.
S13	decimal	0, 1–127	37 (%)	Sets ASCII code for remote configuration escape character. S13=0 disables remote configuration.
S17	10 ms	1–255	25	Sets the length of the break time (space) sent to the local PC when the modem receives a remote break.

Register	Unit	Range	Default	Description
S24	50 ms	0–255	20	Sets the time the DSR, CTS, and CD signals drop before going high again. Used for some PBX and CBX phone systems.
S25	100 ms	0, 1–255	0	Sets the time the DTR signal must be dropped before the modem disconnects. The 0 default equals 50 ms.
S30	1 min.	0, 1–255	0	Sets how long the modem waits after the last character is received or transmitted before it disconnects. The 0 default disables the timer.
S32	100 ms	0–255	20	Sets the time the modem will wait for a RETURN to be entered during escape-sequence execution.
S34	1 character	0–60	10	Sets the number of command characters allowed after +++AT.
S36	1 sec.	0, 1-255	5	Sets the time between DTR inactive and modem off-hook. S36=0 disables DTR busy-out.
S37	1 sec.	0-255	5	Sets the time between DTR active and modem on-hook.

Register	Unit	Range	Default	Description
S43	decimal	28, 26, 24, 21, 19, 16, 14, 12, 96, or 48	0	Sets fixed V.34 connect speed. 28 = 28800 bps; 26 = 26400 bps;. . . 48 = 4800 bps. 0 default disables this feature.
S48	decimal	33, 31, 28, 26, 24, 21, 19, 16, 14, 12, 96, or 48	0	Sets maximum V.34 connect speed. 33 = 33600 bps; 31 = 31200 bps;. . . 48 = 4800 bps. 0 default disables feature (same as S48=33).

4.3 Result Codes

In command mode the Mini-Modem can send responses, or result codes, to your computer. Result codes are used by communications programs and can also appear on your monitor.

AT&Q0 selects result codes with RELIABLE, LAPM, and COMPRESSED modifiers (default).

AT&Q1 selects standard AT result codes without modifiers.

&Q0 Mini-Modem Result Codes

Terse	Verbose
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	*CONNECT 1200
6	NO DIALTONE
7	BUSY
8	NO ANSWER
9	CONNECT 2400
11	*CONNECT 4800
12	*CONNECT 9600
13	*CONNECT 14400
19	*CONNECT 19200
21	*CONNECT 21600
24	*CONNECT 24000
26	*CONNECT 26400
28	*CONNECT 28800
31	*CONNECT 31200
33	*CONNECT 33600

&Q1 Standard AT Result Codes

Terse	Verbose
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 9600
13	CONNECT 14400
19	CONNECT 19200
21	CONNECT 21600
24	CONNECT 24000
26	CONNECT 26400
28	CONNECT 28800
31	CONNECT 31200
33	CONNECT 33600

* With error correction on, RELIABLE (or R) or LAPM (or L) is added to these result codes. With data compression on, COMPRESSED (or C) is added.

6. Troubleshooting

6.1 Introduction

Your Mini-Modem was thoroughly tested at the factory before it was shipped. If you are unable to make a successful connection, or if you experience data loss or garbled characters during your connection, it is possible that the modem is defective. However, it is more likely that the source of your problem lies elsewhere. The following symptoms are typical of problems you may encounter:

- None of the LEDs light when the modem is on.
- The modem does not respond to commands.
- The modem dials but is unable to make a connection.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer is slower than it should be.
- You are losing data.

- You are getting garbage characters on the monitor.

- You can't run your fax and communications software at the same time.

If you experience problems, please check the following possibilities before calling Tech Support (see Appendix B).

6.2 None of the LEDs Light When the Modem Is On

When you turn on the Mini-Modem, the LED indicators on the front panel should flash briefly as the modem runs a self-test. If the LEDs remain off, the modem is probably not receiving power.

- Make sure the modem's power switch is on, especially if you normally turn on the modem by turning on a power strip.

- If the power supply is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.

- Make sure the power-supply module is firmly connected to the modem and to the wall outlet or power strip.

- If the power strip is on and the modem switch is on, try moving the modem power supply to another outlet on the power strip.

- Test that the outlet is live by plugging a lamp into it.

- The modem or power supply may be defective. If you have another modem, try swapping modems. If the problem goes away, the first modem or power supply may be defective. Call Tech Support for assistance.

CAUTION

Do not under any circumstances replace the power-supply module with one designed for another product, as it may damage the modem.

6.3 The Modem Does Not Respond to Commands

- Make sure the modem is plugged in and turned on. (See **Section 6.2**.)

- Make sure you are issuing the modem commands from the data-communications software, either manually in terminal mode (you cannot send commands to the modem from the DOS prompt).

- Make sure you are in terminal mode in your data comm software. Type AT and press ENTER. If you get an OK response, your connections are good and the problem likely is in your phonebook entry or session settings.

- Try resetting your modem by turning it off and on. Make sure there is a reset command (&F) in your initialization string, or your modem may not initialize correctly.

- If you don't get an OK, the problem may still be in the communications software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communications programs connect to the COM port automatically. Some connect when the software loads and remain connected until the program terminates. Others can disconnect without exiting the program or allow multiple terminals to be open, but only one can access the modem at a time. If the terminal reports that it cannot make a connection, yet the modem's TR indicator is on, click on the Window menu to see if more than one terminal is open. The modem's TR indicator shows that the software has made a connection with the modem through the COM port.

- Your communications-software settings may not match the physical port the modem is connected to. The serial cable may be plugged into the wrong connector—check your computer documentation to make sure. Or you may have selected a COM port in your software other than the one the modem is physically connected to—compare the settings in your software to the physical connection.

- If the modem is on, the cable is plugged into the correct port, the communications software is configured correctly, and you still don't get an OK, the fault may be in the serial cable. Make sure it is firmly connected at both ends.

- Is this the first time you have used the cable? If so, it may not be correct. Check the cable description on the packaging to make sure the cable is the right one for your computer.

- Peripheral expansion cards, such as bus-mouse and sound cards, may include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communications port. Be sure to disable any unused ports.

To look for address or IRQ conflicts if you use Windows 3.1x, select File, Run in Program Manager, type MSD, and press ENTER. Then select Mouse, COM Ports, and IRQ Status and note the addresses and IRQs that are in use. If you find an IRQ conflict, note which IRQs are not being used, then change one of the conflicting devices to use one of the unused IRQs. If you find an address conflict, change the address of one of the conflicting devices.

To change a port address or IRQ in Windows 3.1x, double-click the Control Panel icon, then the Ports icon. Click on the port you want to change, click Settings, click Advanced, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

If you use Windows 95 or 98, right-click on My Computer, select Properties from the menu, click on the Device Manager tab, double-click on Ports, then double-click on the Communications Port your modem is connected to. In the port's Properties sheet, click on the Resources tab to see the port's Input/Output range and

Interrupt Request. If another device is using the same address range or IRQ, it will appear in the Conflicting Device List. Uncheck Use Automatic Settings to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device; refer to the device's documentation.

- The serial port may be defective. If you have another serial port, install the modem on it, change the COM-port setting in your software, and try again.

- The modem may be defective. If you have another identical modem, try swapping modems. If the problem goes away, the first modem is possibly defective. Call Tech Support for assistance (see **Appendix B**).

6.4 The Modem Dials But Cannot Make a Connection

There can be several reasons the Mini-Modem fails to make a connection:

- lack of a physical connection to the telephone line

- a wrong dial tone.
- a busy signal.
- a wrong number.
- no modem at the other end.
- a faulty modem, computer, or software at the other end.
- incompatibility between modems.

You can narrow the list of possibilities by using extended result codes. To enable them, enter ATV1X4 and press ENTER while in terminal mode, or include V1X4 in the modem's initialization string.

- If the modem reports NO DIALTONE, check that the modem's telephone line cable is connected to both the modem's LINE jack (not the PHONE jack) and the telephone wall jack. If the cable looks secure, try replacing it. If that doesn't work, the problem may be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone jack and listen for a dial tone. If you hear a dial tone, your modem may be installed behind a company

phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem may not recognize the dial tone and may treat it as an error. Make sure your modem's square wave ring detection is turned on (&RD1). Check your PBX manual to see if you can change the internal dial tone; if you can't, change your modem's initialization string to replace X4 with X3, which will cause the modem to ignore dial tones (note, however, that X3 is not allowed in some countries, such as France and Spain).

- If the modem reports BUSY, the other number may be busy, in which case you should try again later, or it may indicate that you have failed to add a 9, prefix to the phone number if you must dial 9 for an outside line.

- If you must dial 9 to get an outside line, the easiest way to dial it automatically is to include it in the modem's dial prefix—for example, ATDT9,. Note the comma, which inserts a pause before the number is dialed. By inserting 9 and a comma into the dial prefix, you do not have to include it in each directory entry.

To change the dial prefix in Windows Terminal, select Settings, Modem Commands. To change it in Windows 95 or 98 HyperTerminal, select Call, Connect from the menu bar, click Dialing Properties, and type 9 in the local and long-distance boxes in How I Dial from This Location.

- If the modem reports NO ANSWER, the other system has failed to go off-hook, or you might have dialed a wrong number. Check the number.

- If the modem reports NO CARRIER, the phone was answered at the other end, but no connection was made. You might have dialed a wrong number, and a person answered instead of a computer, or you might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call, and the modems may be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.

6.5 The Modem Disconnects While Online

- If you have call waiting on the same phone line as your modem, it may interrupt your connection when someone tries to call you. If you have call waiting, disable it before each call. In most telephone areas, you can disable call waiting by preceding the telephone number with *70 (check with your local telephone company).

  You can automatically disable call waiting by including the disabling code in the modem's dial prefix (for example, ATDT*70,—note the comma, which inserts a pause before the number is dialed). To change the dial prefix in Windows Terminal, select Settings, Modem Commands. To change it in Windows 95 or 98 HyperTerminal, select Call, Connect from the menu bar, click Dialing Properties, check This Location Has Call Waiting, and select the correct code for your phone service.

- If you have extension phones on the same line as your modem, you or someone else can interrupt the connection by picking up another phone. If this is a frequent problem, disconnect the extension phones before using the modem, or install another phone line especially for the modem. Or

you can install a device that prevents extensions from accidentally interrupting your transmission—for example, The Eliminator (product code FA100).

- Check for loose connections between the modem and the computer, the telephone jack, and AC power.

- You may have had a poor connection because of line conditions, or the problem may have originated on the other end of the line. Try again.

- If you were online with a BBS, it may have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

6.6 The Modem Cannot Connect When Answering

- Auto-answer may be disabled. Turn on auto-answer in your datacomm program or send the command ATS0=1 to your modem in terminal mode.

6.7 File Transfer Is Slower Than It Should Be

- You may have an older UART. For best throughput, install a 16550AFN UART or an ISI serial port card. See the "Quick Start" chapter for information on how to identify your UART.

- If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, COMM.DRV, to take full advantage of the UART's speed.

- If you are using a slow transfer protocol, such as Xmodem or Kermit, try Zmodem or Ymodem/G instead.

- Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.

- Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.

- Try entering the L8 (List Online Diagnostics) command in online mode, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable (number of retrains, round-trip delay, etc.).

6.8 I Am Losing Data

- If you are using data compression and a high speed serial port, set the serial port baud rate to four times the data rate.

- Your UART may not be reliable at serial port speeds over 9600 bps or 19,200 bps. Turn off data compression, reset your serial-port speed to a lower rate, or replace your serial port with a faster one.

- Make sure the flow-control method you selected in software matches the method selected in the modem.

- If you are running under Windows 3.1 and have a 16550AFN UART, you may need to turn on the 16550's data buffers and/or replace the Windows serial driver, COMM.DRV.

- Try entering the L8 (List Online Diagnostics)

command in online mode, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable (number of retrains, round trip delay, etc.).

6.9 I Am Getting Garbage Characters on the Monitor

- Your computer and the remote computer may be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communications software.

- You may be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you may get a better connection.

- At speeds above 2400 bps, the remote modem might not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)

- Try entering the L8 (List Online Diagnostics) command in online mode, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable (number of retrains, round trip delay, etc.).

6.10 My Fax and Communications Software Won't Run at the Same Time

Communications devices can be accessed by only one application at a time. Under DOS or Windows 3.1x, you can run either your fax software or your datacomm software, but not both at the same time. In Windows 95 or 98, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.

Appendix A: Regulatory Information

A.1 Single-User Software License Agreement

Black Box grants Customer the right to use one copy of the software on a single computer (the Licensed System). You may not network the software or otherwise use it on more than one computer or computer terminal at the same time. Customer must treat the software like any copyrighted material. The software may not be assigned, sublicensed, translated or otherwise transferred by Customer.

A.2 FCC Regulations for Telephone Line Interconnection

See **page 1**.

Model Number:	Black Box part number MD1621A
FCC Registration Number:	AU7USA-20673-MM-E
Ringer Equivalence:	0.3B
Modular Jack (USOC):	RJ11C or RJ11W (single line)

A.3 Canadian Limitations Notice

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada label does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment; or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. The Load Number for this product is 3.

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in ICES-003 of Industry Canada.

Appendix B. Service and Technical Support

B.1 Calling for Technical Support

If you have any questions about the operation of this unit, please call Black Box Technical Support at 724-746-5500.

B.2 About the Internet

You can also email questions to Black Box at this address:

info@blackbox.com

Visit the Black Box Web site at:

http://www.blackbox.com

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