Mini-Modem V.92

FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENT

Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult an experienced radio/TV technician for help.

CAUTION
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

This digital apparatus does not exceed the Class B 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 B prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

CERTIFICATION NOTICE FOR EQUIPMENT USED IN CANADA

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada 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 (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 maintenance facility—in this case, Black Box. 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.

FCC REQUIREMENTS FOR TELEPHONE-LINE EQUIPMENT

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.

2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.

3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.

4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.

5. If the telephone company requests information on what equipment is connected to their lines, inform them of:

    a. The telephone number that this unit is connected to.

    b. The ringer equivalence number.

    c. The USOC jack required: RJ-11C.

    d. The FCC registration number.

    Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5). If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

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.

EUROPEAN UNION DECLARATION OF CONFORMITY

This equipment complies with the requirements of the European EMC Directive 89/336/EEC.

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1. Specifications

**AGC Dynamic
Range:** 43 dB

Command Buffer: 40 characters

Compatibility: Modem: V.92, V.90, V.34 enhanced, V.34, V.32 bis, V.32, V.22 bis, V.22; Bell 212A and 103/113; V.21 and V.23; V.42, V.42 bis, V.44;
Fax: "Super" Group 3; Class 1.0, 2.0, 2.1; T.4; T.30; V.21; V.27ter; V.29; V.34; V.17; and TIA/EIA Class 1, 2; TR29.2;
Video: V.80 for H.324 videoconferencing

Compliance: FCC Class B

Compression: V.44 (6:1 throughput), V.42 bis (4:1 throughput), MNP 5 (2:1 throughput)

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

Error Correction: V.42

Flow Control: XON/XOFF (software); RTS/CTS (hardware)

Fax Standards: V.34, Class 2.1 and Class 1.0 commands; V.17 and Group III, Class 1 and Class 2 commands; Error Correction Mode (ECM)

Frequency Stability: ±0.01%

Indicators: LEDs for Transmit Data, Receive Data, Carrier Detect, 56 kbps, 33.6 kbps, 14.4 kbps, Off Hook, Terminal Ready, Error Correction, Fax

**Intelligent
Features:**   Plug and play; fully AT command compatible; autodial,
                         redial, repeat dial; pulse or tone dial; dial pauses; auto
                         answer; adaptive answer; EIA extended automode;
                         adaptive line probing; automatic symbol and carrier
                         frequency during startup, retrain, and rate renegotiation;
                         DTMF detection; call status display, auto-parity and data
                         rate selections; keyboard-controlled modem options;
                         non-volatile memory; remote configuration; DTR dialing;
                         callback security; A-law support in 56K modes; 11-bit
                         support; real-time fax compression conversion; U.S.
                         Caller ID reporting; quick-connect startup; Modem on
                         Hold (only when connected to a V.92 server)

Interface: TIA/EIA RS-232C/ITU-T V.24/V.28

**Lightning
Protection:**   FCC Part 68 A/B surge

Line Type: Dial-up or 2-wire leased

Manual Control: Power switch

Maximum Speeds: Uploads (client to server): Up to 48 kbps when
                         connecting to V.92 servers, up to 33.6 kbps when
                         connecting to other server;
                         Downloads (server to client): Up to 56 kbps;
                         Fax: Up to 33.6 kbps

NOTE

**Actual data rates depend on server capabilities and/or line conditions.
Though this modem is capable of 56-kbps download performance, line
impairments, public telephone infrastructure, and other external
technological factors may prevent maximum 56-kbps connections.**

**Mode of
Operation:**   Fax online modes; full-duplex over dial-up lines

Receiver Sensitivity: -43 dBm under worst-case conditions

**Operating Systems
Supported:**   Windows® 3.1x/95/98/Me, Windows 2000, Windows
                         NT®; Linux®; SCO OpenServer®

Operation: Asynchronous, serial, binary

Speaker: Internal speaker for call progress monitoring

Speed Conversion: Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200, and 230,400 bps

Transmit Level: -11 dBm (North America)—varies by country setting

Interface: RS-232

Connectors: (1) DB25 F (RS-232C), (2) RJ-11 (phone jacks)

**Temperature
Tolerance:**   Operating: 32 to 120°F (0 to 49°C)

**Humidity
Tolerance:**   20 to 90% noncondensing

Power: 110–240 VAC, 47–63 Hz, 9 VDC

Size: 1"H x 4.3"W x 5.7"D (2.5 x 10.9 x 14.5 cm)

Weight: 0.5 lb. (0.2 kg)

2. Introduction

The Mini-Modem V.92 is one of the finest intelligent data/fax modems available today. This user guide will help you to install, configure, test, and use your modem.

This external modem provides high-speed data transfer and fax capabilities for small businesses, telecommuters, and SOHO users. Its support of the ITU-T V.92 protocol enables downstream transmissions at speeds up to 56 kbps (see the NOTE below) and upstream transmissions at speeds up to 48 kbps when connected to V.92-compatible Internet service providers (ISPs). Transmissions between the Mini-Modem V.92 and other client modems are limited to 33.6 kbps, as are upstream transmissions to non-V.92-compatible ISPs and downstream transmissions that are converted more than once on the telephone network. The MD1626A also supports "Super G3" ITU-T V.34 fax communications at speeds up to 33.6 kbps with Class 2.1 fax commands.

With the modem, you get intelligent features, such as plug-and-play operation, callback security, and remote configuration. In standard mode, the modem can store up to four command lines or telephone numbers of up to 40 characters each in nonvolatile memory. In callback security mode, it can store up to 30 passwords and dialing strings. Other modem capabilities include modem-on-hold, AT&T® calling card tone detection, pulse and tone dialing, adaptive answer, DTR dialing, and U.S. Caller ID reporting. It also offers two-wire leased-line operation, 11-bit operation, V.42 error correction, V.42 bis and V.44 data compression, and self-resetting lightning protection.

Please note that some V.92 features are turned off in the factory-default configuration and may need to be turned on, depending on your needs. For more information, see **Section 4.5**.

NOTE
Though the Mini-Modem V.92 is capable of 56-kbps download performance, actual connection speeds may be lower. Line impairments, public telephone infrastructure, and other external technological factors may prevent maximum 56-kbps connections.

3. Installation

This chapter shows you step by step how to set up your Mini-Modem V.92 and make your first calls.

3.1 Package Contents and What You Will Need

Before starting, please make sure you have everything you need. In addition to this manual, we supply:

- the modem,

- an autosensing universal power supply,

- (1) power cord,

- (1) RJ-11/RJ-11 phone cable,

- (1) DB9 female/DB25 male cable

- (4) self-adhesive, plastic feet,

- a registration card,

- a setup CD, and

- a PhoneTools/winphone CD.

You will also need to supply:

- a computer with an unused serial port,

- a nearby AC power outlet,

- a nearby telephone line jack, and

- a nearby leased-line jack or terminals (optional).

SAFETY WARNINGS

- **Use this product only with UL® and CUL listed computers (U.S. and Canada).**
- **To reduce the risk of fire, use only 26 AWG (0.41-mm) or larger telephone wiring.**
- **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 during an electrical storm; there is a risk of electrical shock from lightning.**
- **Do not use a telephone in the vicinity of a gas leak.**

3.2 Step 1: Affix the Modem's Feet (Optional)

The modem comes with a strip of self-adhesive plastic feet, which you can mount on the modem. To install the feet, simply peel them from their paper strip and press them into the recesses on the bottom of the modem.
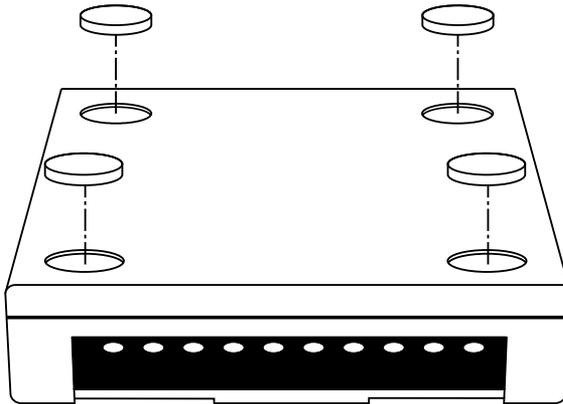
Figure 3-1. Mounting the feet.

3.3 Step 2: Change the Internal Jumpers (Optional)

This step is required only if you intend to use the modem on a leased line. It requires you to open the modem and move one or more jumpers on the modem's printed circuit board.

WARNING

The following procedure must be performed by authorized service personnel.

CAUTION

The circuit board can be harmed by static electricity. Before you open the case, touch a grounded object (such as the metal chassis of your computer) to discharge any static electricity in your body. Then touch the metal shell of the modem's RS-232 connector to ensure that there is no voltage difference between you and the modem.

3.3.1 OPENING THE MODEM

1. If the modem is connected, turn it off and remove all connecting cables, including the power and line cables.

2. Turn the modem upside down.

3. On the bottom of the modem are two screws, which hold the case together. Remove both screws and set them aside.

4. Turn the modem right side up.

5. Remove the top part of the modem case.

6. To close the modem, reverse steps 1 through 5.

3.3.2 CHANGING THE DIAL-UP/LEASED-LINE JUMPERS

As shipped from the factory, your modem is configured for normal dial-up operation. That is, the modem must dial a phone number to connect to another modem. To use the modem on a leased line, you must change jumper J10 to select leased-line operation, and J11 to select whether it will be the originating or the answering modem. (If dial-up operation is selected, J11 has no effect.)
See Figure 3-2 for jumper locations and positions. See **Chapter 4** for additional information about leased lines.

• To use the modem on a leased line, move the J10 jumper plug from the default dial-up position to the leased line position.

• To make the modem the originating modem on the leased line, move the J11 jumper plug to the originate position.

• To make the modem the answering modem on the leased line, leave the J11 jumper plug in the factory-default answer position.
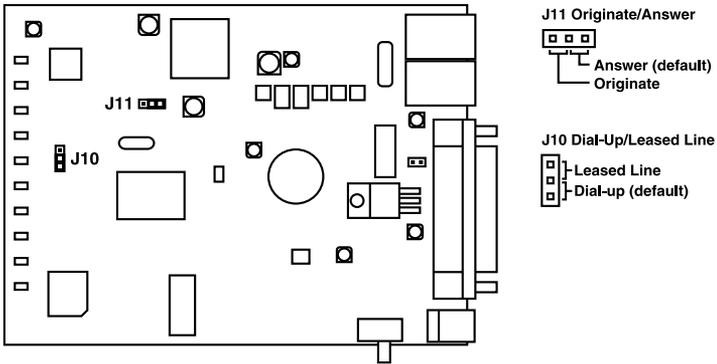
Figure 3-2. Internal jumpers.

3.4 Step 3: Connect the Modem to Your System

Turn off your computer. After placing the modem in a convenient location, connect it to your computer's serial port, to the telephone line or leased line, to AC power, and, optionally, to your telephone.
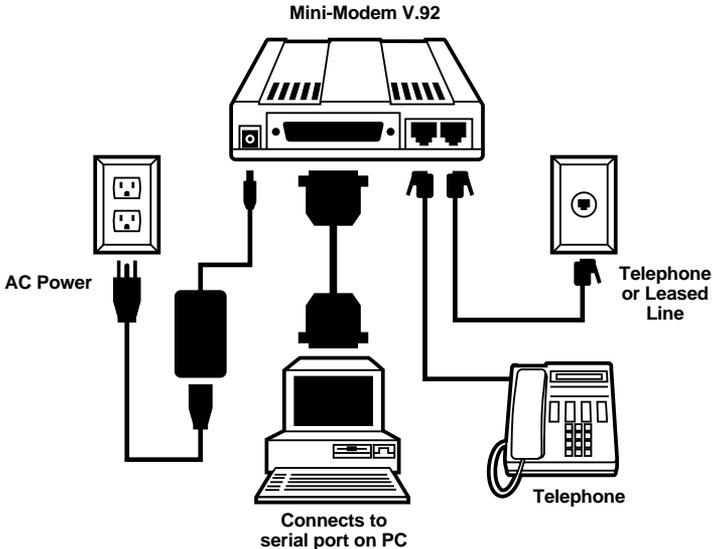
Figure 3-3. Making the proper connections.

3.4.1 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 connector on your computer (such as COM1 or COM2).

3.4.2 DIAL-UP CONNECTION

Plug one end of the modular telephone cable into the modem's LINE jack, and the other end into a standard telephone wall jack.

NOTE

- **The LINE jack is not interchangeable with the PHONE jack. Do not plug the telephone into the LINE jack or the line cable into the PHONE jack.**

- **Regulatory agencies may impose certain restrictions on equipment connected to public telephone systems. For more information, see pages 2–5.**

3.4.3 TWO-WIRE LEASED-LINE CONNECTION

To use the Mini-Modem V.92 on a two-wire leased line, plug one end of a two-wire telephone cable into the modem's LINE jack. Connect the other end to a two-wire leased-line wall jack or terminals.

NOTE

Before you can use the modem on a leased line, you must first change the internal jumpers. See Section 3.3.

3.4.4 TELEPHONE CONNECTION

If you want to connect a telephone to the same line as the modem, you can optionally plug it into the modem's PHONE jack.

NOTE

The PHONE jack is not interchangeable with the LINE jack. Do not plug the telephone into the LINE jack or the line cable into the PHONE jack.

3.4.5 POWER CONNECTION

The power switch is located on the right side of the modem. Make sure it is set to OFF. Plug the the universal power supply into the PWR jack on the modem. Then plug one end of the country-specific power-supply cord into the universal power supply and the other end into a power outlet or power strip.

NOTE

Use only the power supply supplied with the modem. Use of any other power supply voids the warranty and can damage the modem.

3.4.6 POWER-ON TEST

Test the modem by turning it on. When you turn it on, the modem performs a diagnostic self-test, after which the 56 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 9**.

3.4.7 USE SURGE PROTECTORS

Your modem has automatic, self-resetting protection to protect it from lightning-induced electrical spikes on the telephone line. Nonetheless, large power surges and nearby lightning strikes can damage or destroy your modem. Therefore, we recommend that you plug the 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, it is safest to unplug your computer equipment from both the power outlet and the telephone line.

3.5 Step 4: Install the Modem Driver

If you use Windows 95 or above, you must install the modem driver. The modem driver tells Windows how to control the modem. In Windows 95, 98, and Me, the MTMoh Modem on Hold program is installed at the same time (see **Chapter 8**). If you use a Linux operating system, please see **Appendix B**. If you use another operating system, please refer to its documentation for modem installation information.

3.5.1 STEP-BY-STEP INSTRUCTIONS FOR INSTALLING THE MODEM DRIVER

1. Make sure your modem is connected properly, and then turn on your computer. Windows should detect your new modem and open the Install New Modem wizard.

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 9.1.1 and 9.1.2.

2. In the Install New Modem wizard, select "Don't detect my modem; I will select it from a list," and then click **Next**. A dialog box with a list of manufacturers and a list of modem models appears.

3. Insert the Mini-Modem V.92 compact disc into your CD-ROM drive, and then click **Have Disk**. (If the disc menu appears, you may either close it or ignore it for now.)

4. In the Install from Disk dialog box, select the drive the CD is in, and then click **OK**.

5. A list of modems appears. Select your modem from the list, and then click **Next**.

6. Select the port the modem is connected to, and then click **Next**.

7. Windows installs the driver and MTMoh program.

8. Click **Finish** to exit.

3.5.2 REMOVING AN OLD MODEM DRIVER

When a new modem replaces another modem, the old modem driver remains in Windows, and the old modem driver is still selected in HyperTerminal and other Windows applications. Though you can change the application connection descriptions one at a time, it is easier to force Windows applications to use the new modem by removing the old modem driver 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 dialog box.

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

4. Click **Remove**, and 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.

3.6 Step 5: Configure the Mini-Modem V.92 for Your Country

Before you use your modem, you must configure it for the country in which it will be used. You must also do this if you move the modem to another country after it has been configured for the first country. You can use one of two configuration methods: The Global Wizard Utility or AT commands.

3.6.1 THE GLOBAL WIZARD UTILITY

The Global Wizard configuration utility is recommended for computers running Windows 95 or newer. To do this:

1. Insert the Mini-Modem V.92 CD into the CD-ROM drive. The Autorun menu should appear.

2. Click **Initial Setup and Country Selection**.

3. In the Global Wizard dialog box, select either **Run from CD** or **Install on your PC**. Choose the former to configure your modem without installing the Global Wizard on your computer. Choose the latter to install the Global Wizard on your computer and Start menu.

4. Click **Next**. The Global Wizard searches for your modem and identifies it.

5. Click **Next**.

6. Select the country in which the modem will be used, and then click **Next**.

7. Review your choice of country. If it is correct, click **Next** to configure the modem.

8. When Global Wizard announces that the parameters have been set, click **Finish** to exit.

3.6.2 AT COMMANDS

Non Windows users can configure the modem using AT commands. You must enter these commands in your communication program's terminal window.

1. Run your favorite communication program, and open the program's terminal window.

2. To configure the modem for a specific country, type **AT%T19,0,*nn***, where *nn* is the country code in hexadecimal notation, and then press **ENTER**.

3. To verify the change, type **ATI9**, and then press **ENTER**. The country code is displayed in decimal format.

Table 3-1. Example of country, command, and result codes.

Country	AT command (hexadecimal)	Result code (decimal)
Euro/NAM	AT%T19,0,34 (default)	52
Japan	AT%T19,0,10	16

NOTE

See Appendix D for a complete list of country codes.

3.7 Step 6: Install and Configure Your Software

You may use either the communication program included with your modem or a third-party program. Communication programs designed for Windows 95 and above normally do not need to be manually configured, because they obtain configuration information from Windows. Communication programs designed for DOS and other operating systems, however, may need to be manually configured to work with your modem. Though each communication program is different, the following procedure should work with most of them.

1. Install and run your communication program.

2. Find the dialog box or menu that lets you select your modem. (In Windows Terminal select **Settings** | **Modem Commands**; in HyperTerminal select **File** | **Properties** | **Phone Number**; and in PhoneTools select **Configure** | **General Configuration** | **Communication** | **Change Modem**.

3. Choose your modem from the program's modem list. If it isn't listed, choose a generic modem and modify the settings as necessary.

4. Change the modem initialization string, if necessary. The factory-default configuration works well for most purposes. To load the factory-default configuration, use **AT&F**. To load a custom configuration that was saved using the **&W** command, use **ATZ**. For a Macintosh® computer, the initialization string should include the **&D0** command. If you do not want the modem to always answer the phone, add **S0=0** to the string. To use Caller ID with the modem, add **S0=2** to the string. (Caller ID information is sent between the first and second rings, so the phone must ring at least twice before the modem picks up the line.) Depending on the software, you might have to end the string with a carriage return character (**^M**).

NOTE

To change the modem's default configuration, type new commands in the communication program's terminal window, adding the &W command to store them in the modem's nonvolatile memory. For instance, to create a default configuration that turns off autoanswer, type AT&FS0=0&W. The new configuration loads automatically whenever the modem is turned on or receives the ATZ command.

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

6. Select your serial port speed. This can be labeled "maximum speed," "DTE bps," or "baud rate." 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, few files can be compressed enough to require speeds that high, and not all serial ports can handle speeds that high.

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

8. If the program 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 program manual or on-line help for other configuration choices. In most cases you can accept the default values.

4. Operation

Your Mini-Modem V.92 operates under the control of a communication program, such as the PhoneTools program included with the modem. It also can operate under other general-purpose data communication programs, such as Windows HyperTerminal. For information on how to use the modem with the communication program of your choice, please refer to the program's documentation.

4.1 Front-Panel Indicators

TD   RD   CD   56   33   14   OH   TR   EC   FX

Figure 4-1. Front panel.

The Mini-Modem V.92 has 10 LED indicators on the front panel, which indicate status, configuration, and activity:

TR (Transmit Data): The TD indicator flashes when the modem is transmitting data to another modem.

RD (Receive Data): The RD indicator flashes when the modem is receiving data from another modem.

CD (Carrier Detect): The CD indicator 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.

56 (56K Mode [56,000–28,000 bps]):

> The 56 indicator lights whenever the modem is set for or connects using the V.90 or V.92 protocol. The actual connection speed depends on ISP server capabilities and line conditions.

33 (V.34 Mode [33,600–16,800 bps]):

> The 33 indicator lights whenever the modem connects using the V.34 protocol.

14 (V.32 bis Mode [14,400–12,000 bps]):

> The 14 indicator lights whenever the modem connects using the V.32 bis protocol.

NOTE

Though the modem can connect at lower than V.32 bis speeds, no speed indicator lights during the connection.

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

TR (Terminal Ready):   The TR indicator lights when a communications program is using the modem. It means the modem is ready for an outgoing or incoming call. It goes off when the communications program disconnects the serial port. When it goes off, a connected modem will also disconnect.

EC (Error Correction [V.42]):

> The EC indicator lights continuously when the modem is in V.42 error correction mode, and flashes when compression is activated.

FX (Fax)   The FX indicator lights when the modem is in fax mode.

NOTE

When you turn on the modem, the protocol indicators flash briefly as the modem does a self-test, after which the 56 indicator lights. After a call, the indicator for the protocol used in the connection remains lit until another call is made or the modem is reset. If you connect at a rate under 14,400 bps, all protocol indicators remain off after the connection is broken, even though the modem is still turned on.

4.2 Configuring the Modem

Your modem normally is configured either through Windows or through the communication program you are using. The default settings work best for most purposes. See **Section 3.7** for help in setting up your communication program.

You can also configure your modem directly by typing AT commands in the terminal window of a communication program. See **Chapters 3** and **5** for descriptions of the modem's AT commands.

4.3 PhoneTools Features

Using the PhoneTools communications program included with your modem, you can:

- Upload and download data files.

- Send faxes at preset times.

- Store incoming voice messages and faxes.

- Retrieve stored messages, faxes, and telephone numbers (telephone number retrieval requires Caller ID service from your telephone company).

- Print a received fax.

For detailed information about operating your modem under PhoneTools, please refer to the PhoneTools on-line documentation, which is on the included CD-ROM.

4.4 Leased-Line Operation

The Mini-Modem V.92 can be used on a two-wire leased line. A leased line is a private, permanent telephone connection between two points. Unlike normal dial-up connections, a leased line is always active. The modems automatically connect when they are attached to the line and are turned on. Because a leased line is always active, one of the two modems on the line must be configured as the originate modem and the other as the answer modem; however, it does not matter

which is which. In the event of an interruption, leased-line modems automatically reconnect when the data line or power is restored.

4.4.1 SETUP

1. Open the modem and change jumper J10 to select leased-line operation. Then change jumper J11 to select either originate or answer mode. See **Chapter 3** for the full procedure.

2. Connect a modular telephone cable to the LINE jack on the modem. Connect the other end of the cable to a two-wire leased-line jack or terminals supplied by the telephone company.

3. Turn on the modem. The modem immediately attempts to connect to the modem at the other end of the leased line. If the remote modem has not yet been configured for leased-line operation, you may turn off the local modem until the remote one is ready.

4. Leased-line setup is complete.

4.4.2 OPERATING DISTANCES

Data rate (bps)	American Wire Gauge (AWG)				
	19	22	24	28	
2400	22	15	12	9.5	miles
4800	19	13	10	8	miles
9600	15	10	7	5.5	miles
19,200	11.9	7	5	4	miles
33,600	10	6	4.2	3	miles

Data rate (bps)	Wire Diameter (mm)				
	0.9	0.65	0.5	0.32	
2400	35.4	24.1	19.3	15.2	km
4800	30.5	20.9	16	12.8	km
9600	24.1	16	11.2	8.8	km
19,200	19.1	11.2	8	6.4	km
33,600	16	9.6	6.7	4.8	km

These figures apply only to "dry" lines unamplified by the telephone company. Among other things, leased-line operating distances depend upon data rate, wire diameter, impairments, cable type, manufacturer, m-splices, bridge taps, etc. If you have any additional questions about distances, please contact your telephone company representative.

4.5 V.92 Operation

Because the V.92 protocol is relatively new and still largely unsupported by central servers, some features are disabled by default in the initial release of the Mini-Modem V.92. This section describes the status of the V.92 features in the initial release. Please note that the V.92 special features require connection to a V.92-capable server.

- **General**. The V.92 protocol is enabled by default. If the Mini-Modem V.92 detects another V.92 modem during the handshake phase, they will connect in V.92 mode; otherwise, they will connect in V.90 mode or the highest mutually acceptable mode. The AT command that controls this is **+MS**=.

- **Commands**. AT commands specific to the V.92 protocol and the new V.44 compression protocol begin with the plus character (+). These commands are described beginning in **Chapter 5**. Also, the S109 register has been modified to support V.92.

- **PCM Upstream**. This is disabled by default. To upload files at speeds above 33.6 kbps, you must enable PCM Upstream using the command **+PIG=1**. Please note that this requires connection to a V.92-capable server. Also, please note that since upload speeds are affected by line conditions, meeting the previous requirements cannot guarantee speeds above 33.6 kbps.

- **Quick Connect**. This shortens the handshake time with another V.92 modem and is disabled by default. To enable Quick Connect, use the command **+PQC=0**. Quick Connect speeds connect times by skipping the line test during the handshake and using the configuration from the last data connection. Therefore, Quick Connect works best when line conditions are consistent from call to call. If line conditions are variable, enabling Quick Connect can actually increase the connect time slightly.

- **Modem on Hold**. With this function, you can put a V.92-capable server on hold while you take another call (see **Chapter 8**). Modem on Hold operation is possible only with the MTMoh Modem on Hold program included with the Mini-Modem V.92. MTMoh is initially supported only on Windows 95, 98, and Me. However, Windows NT, 2000, and XP support is expected soon, and may be available by the time you receive your modem (for details, please call Black Box Tech Support).

NOTE

For firmware updates for the Mini-Modem V.92, call Black Box Technical Support at 724-746-5500.

4.6 Connecting to the Internet

Your Mini-Modem V.92 is your gateway to the Internet and the World Wide Web. To access the Internet and Web via your modem, you must establish a dial-up account with an Internet service provider (ISP). To locate an ISP near you, look in a local directory or computer publication. Your ISP should provide you with the following information:

- User name (also called user ID)

- Password

- Access number (the number you call to connect to the server)

- Host name and/or domain name

- Domain Name Server (DNS) server address

If, besides the Web, you use the Internet for e-mail and newsgroups, your ISP should also provide you with the following information:

- E-mail or POP mail address

- POP server address

- Mail or SMTP address

- News or NNT server address

4.7 Dial-Up Networking

Before you can connect to the Internet, you must set up a remote-node client program on your computer. The Windows version is called Dial-Up Networking. Dial-Up Networking establishes your connection to the ISP's server, which is the shared computer that manages calls from clients (your computer) to the Internet. Most, if not all, Windows browsers start Dial-Up Networking automatically when you open them.

For instructions on how to set up Dial-Up Networking, consult your ISP or your operating system's on-line help or printed documentation. Many ISPs include with their service a program that will install and configure Dial-Up Networking automatically for you.

4.8 Sending a Fax

You can use the PhoneTools program included with your modem to send and receive faxes directly from your computer. The following procedure uses print capture, which enables you to fax a document directly from the Windows application in which you created it without opening PhoneTools.

1. Install PhoneTools if it isn't already installed.

2. Create a document in a Windows application, such as a word processor, graphic editor, or spreadsheet. To fax the document, keep the document open and select the Print command from the File menu.

3. Select CAPTURE FAX BVRP as the printer driver, and then click **OK**. The Send Fax wizard appears.

4. In the Recipient section, type the required information or extract it from the Phone Book by clicking   .

5. In the Template section, as an option, select a cover page and type a cover message.

6. Select the document to be sent. The default file when sending from within a Windows application is Capture.dgr.

7. Select the date and time to send the document, if you do not want to send it immediately.

8. Click **Finish** to start the transmission.

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

AT commands are used to control the operation of your modem. They are so called because each command must be preceded by the characters AT to get the ATtention of the modem.

These commands can be issued only when the modem is in command mode or on-line command mode. The modem is in *command mode* whenever it is not connected to another modem. It is in *data mode* whenever it is connected to another modem and ready to exchange data. *On-line command mode* is a temporary state in which you can issue commands to the modem while connected to another modem.

To put the modem into on-line command mode from data mode, you must issue an escape sequence (+++) followed immediately by the AT characters and the command (for example, +++**ATH** to hang up the modem). To return to data mode from on-line command mode, you must issue the command **ATO**. To send AT commands to the modem you must use a communications program, such as HyperTerminal or PhoneTools.

You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem (for example, to turn autoanswer on or off).

The format for entering an AT command is AT*Xn*, where *X* is the command and *n* is the value for the command, sometimes called the command parameter. The value is always a number. If the value is zero, you can omit it from the command; thus, **AT&W** is equivalent to **AT&W0**. Most commands have a default value, which is the value that is set at the factory. The default values are shown in **Section 5.1**.

You must press **ENTER** to send the command to the modem. Any time the modem receives a command, it sends a response known as a result code. The most common result codes are OK, ERROR, and the CONNECT messages that the modem sends to the computer when it is connecting to another modem. For a table of valid result codes, see **Section 5.3**.

You can issue several commands in one line, in what is called a command string. The command string begins with AT and ends when you press **ENTER**. Spaces to separate the commands are optional; they are ignored by the command interpreter. The most-familiar command string is the initialization string, which is used to configure the modem when it is turned on or reset, or when your communications software calls another modem.

5.1 AT Commands

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

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

Command:	**A**	**Answer**
Values:		n/a
Description:		Answers an incoming call before the final ring.

Command:	**A/**	**Repeat Last Command**
Values:		n/a
Description:		Repeats the last command string. Do not precede this command with AT. Do not press **ENTER** to execute.

Command:	**B***n*	**Communication Standard Setting**
Values:		*n* = 0–3, 15, 16
Default:		1 and 16
Description:	B0	Select ITU-T V.22 mode when modem is at 1200 bps.
	B1	Select Bell 212A when modem is at 1200 bps.
	B2	Deselect V.23 reverse channel (same as B3).
	B3	Deselect V.23 reverse channel (same as B2).
	B15	Select V.21 when the modem is at 300 bps.

		B16	Select Bell 103J when the modem is at 300 bps.

Command:	**D**_s_	**Dial**
Values:		_s_ = dial string (phone number and dial modifiers)
Default:		none
Description:		Dial telephone number _s_, where _s_ may up to 40 characters long and include the _0–9, *, #, A, B, C,_ and _D_ characters, and the **L**, **P**, **T**, **W**, **S**, comma (**,**), semicolon (**;**), **!**, **@**, **^**, and **S** dial string modifiers.

Dial string modifiers:

L   Redial last number. (Must be placed immediately after **ATD**.)

P   Select pulse-dialing until a **T** is encountered. Affects current and subsequent dialing.

T   Select tone-dialing until a **P** is encountered. Affects current and subsequent dialing.

W   Wait for a new dial tone before continuing to dial. (**X2**, **X4**, **X5**, **X6**, or **X7** must be selected.)

,   Pause during dialing for time set in register **S8**.

;   Return to command mode after dialing. Place at end of dial string.

!   Hook flash. Causes the modem to go on-hook for one-half second, then off-hook again.

@   Wait for quiet answer. Causes modem to wait for a ring back, then 5 seconds of silence, before processing next part of command. If silence is not detected, the mode returns a NO ANSWER code.

^   Disable data calling tone transmission.

S   Detect AT&T call card "bong" tone. The character should follow the phone number and precede the user's call card number: **ATDT1028806127853500$123456789**.

Command:	**DS**= *n*	**Dial Stored Telephone Number**
Values:		*n* = 0–3
Default:		none
Description:		Dials a number previously stored in directory number *y* by the **&Z*n=x*** command. Example: **ATDS=3**.

Command:	**E*n***	**Echo Command Mode Characters**
Values:		*n* = 0 or 1
Default:		1
Description:	E0	Does not echo keyboard input to the terminal.
	E1	Does echo keyboard input to the terminal.

Command:	**F*n***	**Echo On-line Data Characters**
Values:		*n* = 1
Default:		1
Description:	F0	Enables on-line data character echo. (Not supported.)
	F1	Disables on-line data character echo (included for backward compatibility with some software).

Command:	**H*n***	**Hook Control**
Values:		*n* = 0 or 1
Default:		0
Description:	H0	Goes on-hook (hangs up).
	H1	Goes off-hook (makes the phone line busy).

Command:	**I*n***	**Information Request**
Values:		*n* = 0–5, 9, 11
Default:		None
Description:	I0	Displays default speed and controller firmware version.
	I1	Calculates and displays ROM checksum (for example, *B399*).
	I2	Checks ROM and verifies the checksum, displaying *OK* or *ERROR*.
	I3	Displays default speed and controller firmware version.
	I4	Displays firmware version for data pump (for example, *17*).
	I5	Displays the board ID: software version, hardware version, and the country ID in hexadecimal format (for example, *s0503a01V, 0, 34*).

	I9	Displays the country code in decimal format (for example, *52*).
	I11	Displays diagnostic information for the last modem connection, such as DSP and firmware version, link type, line speed, serial speed, type of error correction/data compression, number of past retrains, etc.

Command:	**M*n***	**Monitor Speaker Mode**
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 when modem is off-hook.
	M3	Speaker on until carrier is detected, except while dialing.

Command:	**N*n***	**Modulation Handshake**
Values:		*n* = 0 or 1
Default:		1
Description:	N0	Modem performs handshake only at communication standard specified by **S37** and the **B** command.
	N1	Modem begins handshake at communication standard specified by **S37** and the **B** command. During handshake, fallback to a lower speed can occur.

Command:	**O*n***	**Return On-line to Data Mode**
Values:		0, 1, 3
Default:		None
Description:	O0	Exits on-line command mode and returns to data mode (see +++**AT**<**CR**> escape sequence).
	O1	Issues a retrain and returns to on-line data mode.
	O3	Issues a rate renegotiation and returns to data mode.

Command:	**P**	**Pulse Dialing**
Values:		P, T
Default:		T
Description:		Configures the modem for pulse (non-touchtone) dialing. Dialed digits are pulsed until a **T** command or dial modifier is received.

Command:	**Q*n***	**Result Codes Enable/Disable**
Values:		*n* = 0 or 1
Default:		0
Description:	Q0	Enables result codes.
	Q1	Disables result codes.
	Q2	Returns an OK for backward compatibility with some software.

Command:	**S*r*= *n***	**Set Register Value**
Values:		*r* = S-register number; *n* varies
Default:		None
Description:		Sets the value of register *Sr* to the value of *n*, where *n* is entered in decimal format. Example: **S0=1**.

Command:	**S*r*?**	**Read Register Value**
Values:		*r* = S-register number
Default:		None
Description:		Reads the value of register *Sr* and displays it in 3-digit decimal form. For example, **S2?** gives the response *043*.

Command:	**T**	**Tone Dialing**
Values:		P, T
Default:		T
Description:		Configures the modem for DTMF (touchtone) dialing. Dialed digits are tone dialed until a **P** command or dial modifier is received.

Command:	**V*n***	**Result Code Format**
Values:		*n* = 0 or 1
Default:		1
Description:	V0	Displays result codes as digits (terse response).
	V1	Displays result codes as words (verbose response).

Command:	**W*n***	**Result Code Options**
Values:		*n* = 0, 1, or 2
Default:		2
Description:	W0	*CONNECT* result code reports serial port speed, disables protocol result codes.
	W1	*CONNECT* result code reports serial port speed, enables protocol result codes.
	W2	*CONNECT* result code reports line speed, enables protocol result codes.

Command:	**X*n***	**Result Code Selection**
Values:		*n* = 0–7
Default:		4
Description:	X0	Basic result codes (for example, *CONNECT*); does not look for dial tone or busy signal.
	X1	Extended result codes (for example, *CONNECT 46000 V42bis*); 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*.
	X5	Extended result codes with *NO DIALTONE* and *BUSY*.
	X6	Extended result codes with *NO DIALTONE* and *BUSY*.
	X7	Basic result codes with *NO DIALTONE* and *BUSY*.

Command:	**Z*n***	**Modem Reset**
Values:		*n* = 0 or 1
Default:		None
Description:	Z0	Resets modem to profile saved by the last **&W** command.
	Z1	Same as **Z0**.

Command:	**&C*n***	**Data Carrier Detect (DCD) Control**
Values:		*n* = 0, 1, or 2
Default:		1
Description:	&C0	Forces the DCD circuit to be always high.
	&C1	DCD goes high when the remote modem's carrier signal is detected, and goes low when the carrier signal is not detected.
	&C2	DCD drops on disconnect for time set by **S18**, then goes high again (for some CBX phone systems).

Command:	**&D***n*	**Data Terminal Ready (DTR) Control**
Values:		*n* = 0, 1, 2, or 3
Default:		2
Description:	&D0	Modem ignores the true status of the DTR signal and responds as if it is always on.
	&D1	If DTR drops while in on-line data mode, the modem enters command mode, issues an OK, and remains connected.
	&D2	If DTR drops while in on-line data mode, the modem hangs up. If the signal is not present, the modem will not answer or dial.
	&D3	If DTR drops, the modem hangs up and resets as if an **ATZ** command were issued.

Command:	**&E***n*	**XON/XOFF Pacing Control**
Values:		*n* = 12 or 13
Default:		12
Description:	&E12	Disables XON/XOFF pacing.
	&E13	Enables XON/XOFF pacing. (**&K4** must also be set.) **&E13** has no effect if hardware control (**&K3**) is selected.

Command:	**&F***n*	**Load Factory Settings**
Values:		*n* = 0
Default:		None
Description:	&F0	Loads factory settings as active configuration. (See also the **Z** command.)

Command:	**&G***n*	**V.22 bis Guard Tone Control**
Values:		*n* = 0, 1, or 2
Default:		0
Description:	&G0	Disables guard tone.
	&G1	Sets guard tone to 550 Hz.
	&G2	Sets guard tone to 1800 Hz.
		Note that the **&G** command is not used in North America.

Command:	**&K***n*	**Flow Control Selection**
Values:		*n* = 0, 3, or 4
Defaults:		3
Description:	&K0	Disables flow control.
	&K3	Enables CTS/RTS hardware flow control.
	&K4	Enables XON/XOFF software flow control.

Command:	**&Q***n*		**Asynchronous Communications Mode**
Values:			*n* = 0, 5, 6, 8, or 9
Default:			5
Description:	&Q0		Asynchronous with data buffering. Same as **\N0**.
	&Q5		Error control with data buffering. Same as **\N3**.
	&Q6		Asynchronous with data buffering. Same as **\N0**.
	&Q8		MNP error control mode. If MNP error control is not established, the modem falls back according to the setting in **S36**.
	&Q9		V.42 or MNP error control mode. If neither error control is established, the modem falls back according to the setting in **S36**.

Command:	**&S***n*		**Data Set Ready (DSR) Control**
Values:			*n* = 0 or 1
Default:			0
Description:	&S0		DSR is always high (on).
	&S1		DSR goes high only during a connection.

Command:	**&T***n*		**V.54 Test Commands**
Values:			*n* = 0, 1, 3 or 6
Default:			None
Description:	&T0		Abort. Stops any test in progress.
	&T1		Initiates local analog loopback test.
	&T3		Initiates local digital loopback test.
	&T6		Initiates remote digital loopback test.
			Note that to stop a test, you must use the escape sequence (+++**AT**) before typing **&T0**.

Command:	**&V**		**Display Current Settings**
Values:			n/a
Description:			Displays the active modem settings, including the callback security settings if callback security is enabled. If the setup password has been entered, it also displays the callback security passwords.

Command:	**&W***n*		**Store Current Configuration**
Values:			*n* = 0
Default:			None
Description:	&W0		Stores current modem settings in nonvolatile memory and causes them to be loaded in place of the factory defaults at power-on or following the **ATZ** command. See also the **&F** command.

	&W1	Clears user default settings from nonvolatile memory and causes the factory defaults to be loaded at power-on or following the **ATZ** command.

Command:	**&Z** *n=x*	**Store Dialing Command**
Values:		*n* = 0–3 (callback security disabled) or 0–29 (callback security enabled); *x* = Dialing command string
Default:		None
Description:		Stores dialing command *x* in memory location *y*. Dial the stored number using the command **ATDS=*n***. See also the **#CBS*n*** command. For callback security options, see **Chapter 7**.

Command:	**\A*n***	**Select Maximum MNP Block Size**
Values:		*n* = 0, 1, 2, or 3
Default:		3
Description:	\A0	64-character maximum.
	\A1	128-character maximum.
	\A2	192-character maximum.
	\A3	256-character maximum.

Command:	**\B*n***	**Transmit Break**
Values:		*n* = 0–9 in 100-ms units
Default:		3
Description:		In non-error-correction mode only, sends a break signal of the specified length to a remote modem. Works in conjunction with the **\K** command.

Command:	**\J*n***	**Data Buffer Control**
Values:		*n* = 0
Default:		0
Description:	\J0	Enables data buffer—serial port speed is independent of connect speed.
	\J1	Disables data buffer—serial port speed is forced to the line speed.

Command:	**\K*n***	**Break Control**
Values:		*n* = 0–5
Default:		5
Description:		Controls the response of the modem to a break received from the computer, the remote modem, or the **\B** command. The response is different for each of three different states.

Data mode. The modem receives the break from the computer:

\K0	Enters on-line command mode, no break sent to the remote modem.
\K1	Clears data buffers and send break to the remote modem.
\K2	Same as **\K0**.
\K3	Sends break immediately to the remote modem.
\K4	Same as **\K0**.
\K5	Sends break to the remote modem in sequence with the transmitted data.

Data mode. The modem receives the break from the remote modem:

\K0	Clears data buffers and sends break to the computer.
\K1	Same as **\K0**.
\K2	Sends break immediately to the computer.
\K3	Same as **\K2**.
\K4	Sends break to the computer in sequence with the received data.
\K5	Same as **\K4**.

On-line command mode. The modem receives a **\B***n* command from the computer:

\K0	Clears data buffers and sends break to the remote modem.
\K1	Same as **\K0**.
\K2	Sends break immediately to the remote modem.
\K3	Same as **\K2**.
\K4	Sends break to the remote modem in sequence with the transmitted data.
\K5	Same as **\K4**.

Command:	**\N***n*	**Error Correction Mode Selection**
Values:		*n* = 0–5, or 7
Default:		3
Description:	\N0	Non-error correction mode with data buffering (buffer mode; same as **&Q6**).
	\N1	Direct mode.
	\N2	MNP reliable mode. If the modem cannot make an MNP connection, it disconnects.
	\N3	V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 error correction mode, then in MNP mode, and finally in non-error-correction (buffer) mode with continued operation.

	\N4	V.42 reliable mode. If the modem cannot make a V.42 connection, it disconnects.
	\N5	V.42, MNP, or non-error correction (same as \N3).
	\N7	V.42, MNP, or non-error correction (same as \N3).

Command:	\Q*n*	**Flow Control Selection**
Values:		*n* = 0, 1, or 3
Default:		3
Description:	\Q0	Disables flow control (same as &K0).
	\Q1	XON/XOFF software flow control (same as &K4).
	\Q2	CTS-only flow control. Not supported.
	\Q3	RTS/CTS hardware flow control (same as &K3).

Command:	\T*n*	**Inactivity Timer**
Values:		*n* = 0, 1–255
Default:		0
Description:	\Tn	Sets the time (in minutes) that the modem waits after the last character is sent or received before it disconnects. A value of zero disables the timer. Applies only in buffer mode. You can also set the inactivity timer by changing the value of **S30**.

Command:	\V*n*	**Protocol Result Code**
Values:		*n* = 0, 1, or 2
Default:		1
Description:	\V0	Disables the appending of the protocol result code to the DCE speed.
	\V1	Enables the appending of the protocol result code to the DCE speed.
	\V2	Same as \V1.

Command:	\X*n*	**XON/XOFF Pass-Through**
Values:		*n* = 0 or 1
Defaults:		0
Description:	\X0	Modem responds to and discards XON/XOFF characters.
	\X1	Modem responds to and passes XON/XOFF characters.

Command:	-C*n*	**Data Calling Tone**
Values:		*n* = 0 or 1
Defaults:		0

| Description: | -C0 | Disables V.25 data calling tone to deny remote data/fax/voice discrimination. |
| | -C1 | Enables V.25 data calling tone to allow remote data/fax/voice discrimination. |

Command:	**%A**	**Adaptive Answer Result Code Enable**
Values:		n = 0 or 1
Default:		0
Description:		The **%A** command controls whether the DATA and FAX result codes will be sent by the modem. The modem must be in fax mode for this command to work. Also, the modem must be set to +**FAA=1**, which enables the modem to distinguish between a fax and a data call. When these commands are enabled, the modem sends DATA to the computer when it detects data tones, and FAX when it detects fax tones. These strings are used by some servers to select the appropriate communication program.
	%A0	Disables adaptive answer result codes.
	%A1	Enables adaptive answer result codes.

Command:	**%B**	**View Numbers in Blacklist**
Values:		n/a
Description:		If blacklisting is in effect, **AT%B** displays the numbers for which the last call attempted in the previous two hours failed. In countries that do not require blacklisting, the *ERROR* result code appears.

Command:	**%C*n***	**Data Compression Control**
Values:		n = 0 or 1
Default:		1
Description:	%C0	Disables V.42 bis/MNP 5 data compression.
	%C1	Enables V.42 bis/MNP 5 data compression.

Command:	**%DC*n***	**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 that the modem will respond to **AT%DC** for 10 seconds after it is turned on.

Command:	**%E***n*	**Fallback and Fall Forward Control**
Values:		*n* = 0, 1, or 2
Default:		2
Description:	%E0	Disables fallback and fall-forward.
	%E1	Enables fallback, disables fall-forward.
	%E2	Enables fallback and fall-forward.

Command:	**%H***n*	**Direct Connect Enable**
Values:		*n* = 0, 1
Default:		0
Description:	%H0	Sets callback security to normal operation.
	%H1	All callback security calls will be direct connect regardless of whether the password or phone number has the - character.

Command:	**%R***n*	**Cisco Configuration**
Values:		*n* = 0, 1
Default:		0
Description:	%R0	Disables Cisco configuration.
	%R1	Sets **E0**, **Q1**, **&D0**, **\N0**, **$SB9600**, and **%S1** for operation with a Cisco router.

Command:	**%S***n*	**Command Speed Response**
Values:		*n* = 0, 1
Default:		0
Description:	%S0	Sets modem to respond to AT commands at all normal speeds.
	%S1	AT commands accepted at 115,200 bps only. AT commands at other speeds are ignored.

Command:	**$D***n*	**DTR Dialing**
Values:		*n* = 0 or 1
Default:		0
Description:	$D0	Disables DTR dialing.
	$D1	Dials the number in memory location 0 when DTR goes high.

Command:	**$EB***n*	**Asynchronous Word Length**
Values:		*n* = 0 or 1
Default:		0
Description:	$EB0	Enables 10-bit mode.
	$EB1	Enables 11-bit mode.

Command:	**$SB*n***	**Serial Port Baud Rate**
Values:		*n* = speed in bits per second
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 19,200 bps.
	$SB38400	Set serial port to 38,400 bps.
	$SB57600	Set serial port to 57,600 bps.
	$SB115200	Set serial port to 115,200 bps.
	$SB230400	Set serial port to 230,400 bps.

Command:	+**DCS=*x,y***	**Select V.44 Data Compression**
Values:		*x* = 0 or 1 (V.42 bis);
		y = 0, 1, or 2 (V.44)
Default:		1,2
Description:		Selects V.42 bis/V.44 data compression.
	+DCS=0,0	V.42 bis and V.44 data compression are both disabled.
	+DCS=0,1	V.42 bis is disabled; V.44 data compression is acceptable.
	+DCS=0,2	V.42 bis is disabled; V.44 only when connected to a V.92 server.
	+DCS=1,0	V.42 bis is acceptable; V.44 data compression is disabled.
	+DCS=1,1	V.42 bis is acceptable; V.44 data compression is acceptable.
	+DCS=1,2	V.42 bis is acceptable; V.44 only when connected to a V.92 server.
	+DCS=?	Displays the allowed values.
	+DCS?	Displays the current value.

Command:	**+DR=*n***	**V.44 Data Compression Reporting**
Values:		*n* = 0 or 1
Default:		0
Description:		Enables or disables the V.44 data compression report. If the compression report is enabled, the **+DR:*<type>*** intermediate result code reports the current DCE-DCE data compression type. It is issued after the Error Control Report (**+ER**) and before the final result code (for example, *CONNECT*). The intermediate result code descriptions are shown after the command descriptions.
	+DR=0	Disables the V.44 compression report.
	+DR=1	Enables the V.44 compression report.
	+DR=?	Displays the allowed values.
	+DR?	Displays the current value.
	+DR: NONE	
		Data compression not in use.
	+DR: V42B	V.42 bis is in use in both directions.
	+DR: V44	V.44 is in use in both directions.

Command:	**+DS44=*n***	**V.44 Data Compression**
Values:		See description
Default:		See description
Description:		Controls the V.44 data compression function. The command syntax is **+DS44=**[*direction*][,[0][,[0] [,[*max_codewords_tx*][,[*max_codewords_rx*] [,[*max_string_tx*] [,[*max_string_rx*] [,[*max_history_tx*][,[*max_history_rx*]]]]]]]]]<CR> Subparameters that are not entered retain their current value. Commas separate optional subparameters, and must be inserted to skip a subparameter. Example: **+DS44=,,,2048,2048<CR>** changes the maximum number of code words in both directions, and keeps all other settings at their current values.

+DS44=?   Reports supported options in the format (list of supported *direction* values), (0), (0), (list of supported *max_codewords_tx* values), (list of supported *max_codewords_rx* values), (list of supported *max_string_tx* values), (list of supported *max_string_rx* values), (list of supported *max_history_tx* values), (list of supported *max_history_rx* values). Example: *+DS44: (3, 0), (0), (0), (256-2048), (256-2048), (31-255), (31-255), (512-11008), (512-11008).*

+DS44?   Reports current options in the following format: *direction, 0, 0, max_codewords_tx, max_codewords_rx, max_string_tx, max_string_rx, max_history_tx, max_history_rx.*
Example: *+DS44: 3, 0, 0, 1024, 1024, 255, 255, 5120, 4096.*

Subparameters

direction   Specifies the DTE direction of the data compression.
0   No compression.
3   Compression in both directions (default).

max_codewords_tx   Specifies the maximum number of code words to be negotiated in the transmit direction.

1024   Default.
256–2048   Maximum number of code words in transmit direction.

max_codewords_rx   Specifies the maximum number of code words to be negotiated in the receive direction.

1024   Default.
256–2048   Maximum number of code words in receive direction.

max_string_tx   Specifies the maximum string length to be negotiated in the transmit direction.

255   Default.
31–255   Maximum string length in transmit direction.

max_string_rx		Specifies the maximum string length to be negotiated in the receive direction.
	255	Default.
	31–255	Maximum string length in receive direction.
max_history_tx		Specifies the maximum length of the history buffer to be negotiated in the transmit direction.
	5120	Default.
	512–11008	History buffer size in transmit direction.
max_history_rx		Specifies the maximum length of the history buffer to be negotiated in the receive direction.
	4096	Default.
	512–11008	History buffer size in receive direction.

Command:	**+ES=*n***	**Enable Synchronous Buffered Mode**
Values:		*n* = 6
Default:		None
Description:		Allows an H.324 video application direct access to the synchronous data channel. On underflow, the modem sends HDLC flag idle (0x7E) to the remote modem. This special error control mode is overridden by any of the following commands: **&F**, **&M**, **&Q**, or **\N**.
	+ES=6	Enables direct access to the synchronous data channel.
	+ES=?	Displays the allowed values.
	+ES?	Displays the current value.

Command:	+MS=	Modulation Selection
Values:		See description.
Defaults:		See description.
Description:		This extended-format command selects modulation, enables or disables automode, and specifies the highest downstream and upstream connection rates using one to four subparameters.

The command syntax is

+MS=[*mod*][,[*automode*][,[0][,[*max_rate*][,[0][,[*max_rx_rate*]]]]]]<CR>

Subparameters that are not entered retain their current value. Commas separate optional subparameters, and must be inserted to skip a subparameter. Example: **+MS=,0<CR>** disables automode and keeps all other settings at their current values.

+MS=?	Reports supported options in the format (list of supported *mod* values), (list of supported *automode* values), (0), (list of supported *max_rate* values), (0), (list of supported *max_rx_rate* values). Example: *+MS: (BELL103, V21, BELL212A, V22, V22B, V23C, V32, V32B, V34, V90, V92), (0, 1), (0), (0-33600), (0), (0-56000)*
+MS?	Reports current options in the format *mod, automode, 0, max_rate, 0, max_rx_rate*. Example: *+MS: V92, 1, 0, 31200, 0, 56000*.

Subparameters

mod   Specifies the preferred modulation (automode enabled) or modulation to use in originating or answering a connection (automode disabled). The default is V92.

mod	Modulation	Possible rates (bps)[1]
V92[2]	V.92	56,000, 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 44,000, 42,667, 41,333, 40,000, 38667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, or 28,000
V90[3]	V.90	56,000, 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 44,000, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, or 28,000
V34	V.34	33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, or 2400
V32B	V.32 bis	14,400, 12,000, 9600, 7200, or 4800
V32	V.32	9600 or 4800
V22B	V.22 bis	2400 or 1200
V22	V.22	1200
V23C	V.23	1200
V21	V.21	300
Bell 212A	Bell 212A	1200
Bell 103	Bell 103	300

[1]See optional <automode>, <max_rate>, and <max_RX_rate> subparameters.

[2]Selects V.92 modulation as first priority. If a V.92 connection cannot be established, the modem attempts V.90, V.34, V.32 bis, etc.

[3]Selects V.90 modulation as first priority. If a V.90 connection cannot be established, the modem attempts V.34, V.32 bis, etc.

automode	An optional numeric value that enables or disables automatic modulation negotiation using V.8 bis/V.8 or V.32 bis Annex A. Automode is disabled if values are specified for the *max_rate* and *max_rx_rate* parameters. The options are:

0   Disable automode
1   Enable automode (default)

max_rate	An optional number that specifies the highest rate at which the modem may establish an upstream (transmit) connection. The value is decimal coded in units of bps, for example, 33600 specifies the highest rate to be 33,600 bps.
0	Maximum rate determined by the modulation selected in *mod* (default).
300–33600	Maximum rate value limited by the modulation selected in *mod.* For valid *max_rate* values for each mod value, see the following table.

mod value	Valid *max_rate* values (bps)
V92, V90, V34	33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400
V32B	19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800
V32	14,400, 12,000, 9600, 7200, 4800
V22B	2400
V22, V23C, Bell 212A	1200
V21, Bell 103	300

max_rx_rate	An optional number that specifies the highest rate at which the modem may establish a downstream (receive) connection. The value is decimal coded in units of bps. For example, 28800 specifies the highest rate to be 28,800 bps.

0	Maximum rate determined by the modulation selected in *mod* (default).
300–56000	Maximum rate value limited by the modulation selected in *mod*. See "Possible rates" in the *mod* table.

Command:	**+PCW=*n***	**Call Waiting Enable**
Values:		*n* = 0, 1, or 2
Default:		2
Description:		Controls the action to be taken upon detection of a call waiting tone in V.92 mode. Values specified by this command are not modified when an **AT&F** command is issued.
	+PCW=0	Toggles V.24 Circuit 125 and collects Caller ID if enabled by +VCID
	+PCW=1	Hangs up
	+PCW=2	Ignores V.92 call waiting
	+PCW=?	Displays the allowed values
	+PCW?	Displays the current value

Command:	**+PIG=*n***	**PCM Upstream Ignore**
Values:		*n* = 0 or 1
Default:		1
Description:		Controls the use of PCM upstream during V.92 operation. PCM upstream allows faster upload speeds to a V.92 server.
	+PIG=0	Disables PCM upstream
	+PIG=1	Enables PCM upstream
	+PIG=?	Displays the allowed values
	+PIG?	Displays the current value

Command:	**+PMH=*n***	**Modem on Hold Enable**
Values:		*n* = 0 or 1
Default:		1
Description:		Controls if modem on hold procedures are enabled during V.92 operation. Normally controlled by a modem on hold program. Values specified by this command are not modified when an **AT&F** command is issued.
	+PMH=0	Enables V.92 modem on hold
	+PMH=1	Disables V.92 modem on hold
	+PMH=?	Displays the allowed values
	+PMH?	Displays the current value

Command:	**+PMHF**	**V.92 Modem Hook Flash**
Values:		n/a
Default:		n/a
Description:		Causes the DCE to go on-hook for a specified period of time, and then return off-hook for at least a specified period of time. The specified period of time is normally one-half second, but may be governed by national regulations. *ERROR* is returned if MOH is not enabled.

Command:	**+PMHR=*n***	**Modem on Hold Initiate**
Values:		*n* = 0–13
Default:		0
Description:		**+PMHR** is an action command that causes the modem to initiate MOH with the central site modem. It returns the following values to indicate what has been negotiated. Valid only if MOH is enabled and the modem is off-hook or in data mode. Otherwise, *ERROR* will be returned.

+PMHR=0	Deny MOH request
+PMHR=1	Grant MOH request with 10-second timeout
+PMHR=2	Grant MOH request with 20-second timeout
+PMHR=3	Grant MOH request with 30-second timeout
+PMHR=4	Grant MOH request with 40-second timeout
+PMHR=5	Grant MOH request with 1-minute timeout
+PMHR=6	Grant MOH request with 2-minute timeout
+PMHR=7	Grant MOH request with 3-minute timeout
+PMHR=8	Grant MOH request with 4-minute timeout
+PMHR=9	Grant MOH request with 6-minute timeout
+PMHR=10	Grant MOH request with 8-minute timeout
+PMHR=11	Grant MOH request with 12-minute timeout
+PMHR=12	Grant MOH request with 16-minute timeout
+PMHR=13	Grant MOH request with indefinite timeout
+PMHR=?	Displays the allowed values
+PMHR?	Displays the current value

Command:	**+PMHT=*n***	**Modem on Hold Timer**
Values:		*n* = 0–13
Default:		0
Description:		Determines if the modem will accept a V.92 Modem on Hold (MOH) request and will set the MoH timeout.

+PMHT=0	Deny MOH request
+PMHT=1	Grant MOH request with 10-second timeout
+PMHT=2	Grant MOH request with 20-second timeout
+PMHT=3	Grant MOH request with 30-second timeout
+PMHT=4	Grant MOH request with 40-second timeout
+PMHT=5	Grant MOH request with 1-minute timeout
+PMHT=6	Grant MOH request with 2-minute timeout
+PMHT=7	Grant MOH request with 3-minute timeout
+PMHT=8	Grant MOH request with 4-minute timeout
+PMHT=9	Grant MOH request with 6-minute timeout
+PMHT=10	Grant MOH request with 8-minute timeout
+PMHT=11	Grant MOH request with 12-minute timeout
+PMHT=12	Grant MOH request with 16-minute timeout
+PMHT=13	Grant MOH request with indefinite timeout
+PMHT=?	Displays the allowed values
+PMHT?	Displays the current value

Command:	**+PQC=*n***	**Quick Connect Control**
Values:		*n* = 0, 1, 2, or 3
Default:		3
Description:		Controls the V.92 shortened Phase 1 and Phase 2 startup procedures (Quick Connect). When line conditions are stable, quick connect results in shortened connect times; however, significant fluctuation in line conditions from call to call can result in longer connect times, in which case it may be advisable to disable quick connect. The **+PQC** command is interactive with **S109**.

+PQC=0	Enables Short Phase 1 and Short Phase 2 (Quick Connect)
+PQC=1	Enables Short Phase 1
+PQC=2	Enables Short Phase 2
+PQC=3	Disables Short Phase 1 and Short Phase 2
+PQC=?	Displays the allowed values
+PQC?	Displays the current value

Command:	**+VCID=*n***	**Caller ID Selection**
Values:		*n* = 0, 1, or 2
Default:		0
Description:		Enables Caller ID detection and configures the reporting and presentation of the Caller ID data that is detected after the first ring. The reported data includes the date and time of the call, the caller's name and number, and a message. Set **S0=2**.

	+VCID=0	Disables Caller ID
	+VCID=1	Enables Caller ID with formatted data
	+VCID=2	Enables Caller ID with unformatted data
	+VCID=?	Displays the allowed values
	+VCID?	Displays the current value

Command:	**+VDR=*x,y***	**Distinctive Ring Report**
Values:		*x* = 0, 1 Distinctive Ring Report control. See description.
		y = 0–255 Minimum ring interval in 100-ms units. See description.
Default:		0, 0
Description:		Enables reporting of ring cadence information to the DTE and specifies the minimum ring cadence that will be reported. The report format is one line per silence period and one line per ring period. The length of the silence period is in the form *DROF=number in units of 100 ms<CR><LF>*, and the length of the ring is in the form *DRON=number in units of 100 ms<CR> <LF>*. The modem may produce a Ring event code after the DRON message if enabled by the *y* parameter. The *y* parameter must be set to a value equal to or smaller than the expected ring cadence in order to pass the report to the DTE.

	+VDR=0, n/a	
		Disables Distinctive Ring cadence reporting.
	+VDR=1, 0	Enables Distinctive Ring cadence reporting. Other call progress result codes (including *RING*) are reported as normal.

	+VDR=1, >0	Enables Distinctive Ring cadence reporting. The *RING* result code is reported after the falling edge of the ring pulse (that is, after the DRON report).
	+VDR=?	Displays the allowed values.
	+VDR?	Displays the current value.

Command:	**#CBA*n***	**Callback Attempts**
Values:		*n* = 1–255
Default:		4
Description:		Sets the number of callback attempts that are allowed after passwords have been exchanged between modems.

Command:	**#CBD*n***	**Callback Delay**
Values:		*n* = 0–255
Default:		15
Description:		Sets the length of time (in seconds) that the modem waits before calling back the remote modem.

Command:	**#CBF?**	**Callback Failed Attempts Display**
Values:		n/a
Default:		n/a
Description:		Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command.

Command:	**#CBFR**	**Callback Failed Attempts Reset**
Values:		n/a
Default:		n/a
Description:		Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory.

Command:	**#CBI*n***	**Local Callback Inactivity Timer**
Values:		*n* = 1–255
Default:		20
Description:		Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again.

Command:	**#CBN*y*=*x***	**Store Callback Password**
Values:		*y* = 0–29
		x = password

Defaults:		None
Description:		Sets the callback security password for the *y* memory location. The password must have 6 to 10 characters, and cannot include the + or - characters.

Command:	**#CBP*n***	**Callback Parity**
Values:		*n* = 0, 1, or 2
Default:		0
Description:		Sets parity for the callback security messages.
	#CBP0	No parity.
	#CBP1	Odd parity.
	#CBP2	Even parity.

Command:	**#CBR*y***	**Callback Security Reset**
Values:		*y* = 0–29
Default:		None
Description:		Clears the password and phone number in the *y* memory location.

Command:	**#CBS*n***	**Callback Enable/Disable**
Values:		*n* = 0, 1, 2, or 3
Default:		0
Description:	#CBS0	Disables callback security.
	#CBS1	Enables local and remote callback security.
	#CBS2	Enables remote callback security only.
	#CBS3	Disables callback security until local hangup or reset.

Command:	**#P*n***	**Set 11-bit Parity**
Values:		*n* = 0 or 1
Default:		2
Description:	#P0	No parity.
	#P1	Odd parity.
	#P2	Even parity.

Command:	**#S*x***	**Enter Setup Password**
Values:		*x* = password (1–8 characters, case-sensitive)
Default:		MTSMODEM
Description:		Enters the callback security setup password.

Command:	**#S=*x***	**Store Setup Password**
Values:		*x* = password (1–8 characters, case-sensitive)
Default:		MTSMODEM

Description:		Stores a new callback security and remote configuration setup password.

Command:	**+++AT<CR>**	**Escape Sequence**
Values:		n/a
Description:		Puts the modem in command mode (and optionally issues a command) while remaining on-line. Type **+++AT** and up to 10 command characters, then press **ENTER**. Used mostly to issue the hang-up command: **+++ATH<CR>**.

Command:	**%%%AT<CR>**	
		Remote Configuration Escape Sequence
Values:		n/a
Description:		Initiates remote configuration mode while on-line with remote modem. The remote configuration escape character (%) is defined in register **S13**.

5.2 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 **Section 5.1**).

Register	Unit	Range	Default	Description
S0	1 ring	0–255	1	Sets the number of rings until the modem answers. **ATS0=0** disables autoanswer completely. Range varies by country. Set **S0=2** for Caller ID.
S1	1 ring	0–255	0	Counts the rings that have occurred.
S2	decimal	0–255	43 (+)	Sets ASCII code for the escape sequence character. Values greater than 127 disable escape.
S3	decimal	0–127	13 (^M)	Sets the ASCII code for the carriage return character.
S4	decimal	0–127	10 (^J)	Sets the ASCII code for the line feed character.
S5	decimal	0–127	8 (^H)	Sets the ASCII code for the backspace character. Values over 32 disable backspace.

S6	seconds	2–65*	2*	Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number.
				* These values may be different outside North America.
S7	seconds	1–255*	50*	Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait-for-silence time for the @ dial modifier.
				* These values may be different outside North America.
S8	seconds	2–65	2	Sets the length of a pause caused by a comma character in a dialing command.
S9	decimal	0–127	37 (%)	Sets ASCII code for remote configuration escape character. **S9=0** disables remote configuration.
S10	100 ms	1–255	20	Sets how long a carrier signal must be lost before the modem disconnects.
S11	1 ms	50–150*	95*	Sets spacing and duration of dialing tones.
				* These values may be different outside North America.
S18	50 ms	0–255	20	Sets the time the CD signal drops before going high again. Used for some PBX and CBX phone systems. See **&C2** command.
S28	decimal	0, 1–255	1	0 disables, 1–255 enables V.34 modulation.
S30	1 minute	0, 1–255	0	Sets the time the modem waits before it disconnects when no data is sent or received. A value of zero disables the timer. See also the **\T** command
S35	decimal	0–1	0	0 disables, 1 enables the V.25 data calling tone, which allows remote data/fax/voice discrimination.
S36	decimal	0–7	7	Specifies the action to take in the event of a negotiation failure when error control is selected. (See **S48**.)
S37	decimal	0–19	0	Sets the maximum V.34 "upstream" speed at which the modem attempts to connect.

Value	Speed
0	maximum modem speed
1	reserved
2	1200/75 bps
3	300 bps

			4	reserved
			5	1200 bps
			6	2400 bps
			7	4800 bps
			8	7200 bps
			9	9600 bps
			10	12,000 bps
			11	14,400 bps
			12	16,800 bps
			13	19,200 bps
			14	21,600 bps
			15	24,000 bps
			16	26,400 bps
			17	28,800 bps
			18	31,200 bps
			19	33,600 bps

S38   decimal   0–23   1   Sets the maximum 56K "downstream" speed at which the modem attempts to connect. The default maximum speed is 56 kbps. When using V.34 or V.32 client-to-client connections in poor conditions, setting **S38=0** may result in better performance.

Value	Rate
0	56K disabled
1	56K autorate
2	28,000 bps
3	29,333 bps
4	30,666 bps
5	32,000 bps
6	33,333 bps
7	34,666 bps
8	36,000 bps
9	37,333 bps
10	38,666 bps
11	40,000 bps
12	41,333 bps
13	42,666 bps
14	44,000 bps
15	45,333 bps
16	46,666 bps
17	48,000 bps

				18	49,333 bps
				19	50,666 bps
				20	52,000 bps
				21	53,333 bps
				22	54,666 bps
				23	56,000 bps
S42	decimal	0–1	1	Enables/disables the 56K auto rate. When 56K auto is disabled, fallback to V.34 is also disabled. 0 = disable; 1 = enable.	
S48	decimal	7 or 128	7	Enables (7) or disables (128) LAPM negotiation. The following table lists the **S36** and **S48** configuration settings for certain types of connections.	

	S48=7	**S48=128**
S36=0, 2	LAPM or hangup	Do not use
S36=1, 3	LAPM or async	Async
S36=4, 6	LAPM, MNP, or hangup	MNP or hangup
S36=5, 7	LAPM, MNP, or async	MNP or async

S89	seconds	0, 5–255	0	Sets the length of time in the off-line command mode before the modem goes into standby mode. A value of zero prevents standby mode; a value of 1–4 sets the value to 5.

| S108 | decimal | 0–3, 6, 7 | 6 | Selects the 56K digital loss if using the modem through a PBX line. The default value is -6 dB loss, the value used when calling from a typical POTS line long distance. |

Value	Digital loss
0	-0 dB digital loss, no robbed-bit signaling
1	-3 dB PBX digital loss
2	-2 dB digital loss
3	-3 dB digital loss
6	-6 dB digital loss
7	-0 dB digital loss with robbed-bit signaling

| S109 | decimal | 0–62 (even numbers) | 18 | Selects the PCM (56K) operating mode. Interactive with the +PQC= command. |

Bit	56K mode
0	Reserved—always 0
1	Enable V.90
2	Enable quick connect (phase 1)
3	Enable PCM upstream
4	Enable V.92
5	Enable quick connect (phase 2)

5.3 Result Codes

In command mode, your modem can send responses called result codes to your computer. Result codes are used by communications programs and can also appear on your monitor.

Terse	Verbose	Description
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5	CONNECT 1200*	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10	CONNECT 2400*	Connected at 2400 bps

11	CONNECT 4800*	Connected at 4800 bps
12	CONNECT 9600*	Connected at 9600 bps
13	CONNECT 14400*	Connected at 14,400 bps
14	CONNECT 19200*	Connected at 19,200 bps
24	CONNECT 7200*	Connected at 7200 bps
25	CONNECT 12000*	Connected at 12,000 bps
26	CONNECT 16800*	Connected at 16,800 bps
40	CONNECT 300*	Connected at 300 bps
55	CONNECT 21600*	Connected at 21,600 bps
56	CONNECT 24000*	Connected at 24,000 bps
57	CONNECT 26400*	Connected at 26,400 bps
58	CONNECT 28800*	Connected at 28,800 bps
59	CONNECT 31200*	Connected at 31,200 bps
60	CONNECT 33600*	Connected at 33,600 bps
70	CONNECT 32000*	Connected at 32,000 bps, 56K rate
71	CONNECT 34000*	Connected at 34,000 bps, 56K rate
72	CONNECT 36000*	Connected at 36,000 bps, 56K rate
73	CONNECT 38000*	Connected at 38,000 bps, 56K rate
74	CONNECT 40000*	Connected at 40,000 bps, 56K rate
75	CONNECT 42000*	Connected at 42,000 bps, 56K rate
76	CONNECT 44000*	Connected at 44,000 bps, 56K rate
77	CONNECT 46000*	Connected at 46,000 bps, 56K rate
78	CONNECT 48000*	Connected at 48,000 bps, 56K rate
79	CONNECT 50000*	Connected at 50,000 bps, 56K rate
80	CONNECT 52000*	Connected at 52,000 bps, 56K rate
81	CONNECT 54000*	Connected at 54,000 bps, 56K rate
82	CONNECT 56000*	Connected at 56,000 bps, 56K rate
88	DELAYED	Delay is in effect for dialed number

* When the extended result code configuration option is enabled, one of the following codes is appended to the result code, depending on the type of error control connection:

> V42bis — V.42 error control (LAP-M) and V.42 bis data compression;
> V42 — V.42 error control (LAP-M) only;
> MNP5 — MNP® 4 error control and MNP 5 data compression;
> MNP4 — MNP 4 error control only;
> NoEC — No error control protocol.

6. Remote Configuration

Remote configuration is a network management tool that allows you to configure modems anywhere in your network from one location. With password-protected remote configuration, you can issue AT commands to a remote modem for maintenance or troubleshooting as if you were on-site.

6.1 Basic Procedure

The following steps are valid regardless of whether the connection is established by the local or the remote modem.

NOTE

For this procedure, the remote computer must be running, and a communication program must be ready for a data connection, which will be indicated by a lighted TR indicator on the front of the modem.

1. Establish a data connection with a remote Mini-Modem V.92.

2. Send three remote configuration escape characters followed by **AT** and the setup password, and press **ENTER**. Example: **%%%ATMTSMODEM**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with OK.

3. Type AT commands to configure the remote modem.

4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0** and pressing **ENTER**.

5. Type **ATO** and press **ENTER** to exit remote configuration. You can now break the connection in the normal way.

6.2 Setup

The Mini-Modem V.92 is shipped with a default setup password (MTSMODEM). Because anyone who has the user guide knows the default setup password, you should change the password and possibly also the remote configuration escape character.

TO CHANGE THE SETUP PASSWORD

1. Open a data communications program such as HyperTerminal or PhoneTools.

2. In the terminal window, type **AT#SMTSMODEM** (or **AT#S***xxxxxxxx* if you have replaced the MTSMODEM password with *xxxxxxxx*) and press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong.

3. To change the password, type **AT#S=***xxxxxxxx*, where *xxxxxxxx* stands for the password, and then press **ENTER**. The password can include any keyboard character, and can be up to eight characters long. The modem responds with OK.

CAUTION

Passwords are case-sensitive. The next time you enter the password, it must be in the same case as you set it up.

4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.

TO CHANGE THE REMOTE ESCAPE CHARACTER

To further improve security, you can change a remote modem's remote configuration escape character either locally or remotely. The remote configuration escape character is stored in register *S9*. The factory default is 37, which is the ASCII code for the percent character (%). Setting *S9* to 0 (zero) disables remote configuration entirely.

CAUTION

If you do this remotely, you won't be able to change it back remotely.

1. Establish a remote configuration link with the remote modem as described in **Section 6.1**.

2. Type **ATS9=***n*, where *n* is the ASCII code for the new remote configuration escape character, and then press **ENTER**.

3. Save the new value by typing **AT&W** and pressing **ENTER**.

4. Type **ATO** and press **ENTER** to exit remote configuration.

7. Callback Security

This chapter describes how to use callback security with your modem.

Callback security protects your network from unauthorized access and helps control long-distance costs. When callback security is enabled, all callers are requested to enter a password. If a valid password is received, the modem hangs up and returns the call by dialing a phone number that is stored with the password. The person being called back must then enter the password a second time to establish a connection.

Up to 30 callback passwords and dialing strings can be stored in the modem. Each dialing string can be up to 34 or 35 characters long and can contain commands as well as phone numbers. For mobile callers, the dialing string can be programmed to allow the caller to bypass the stored callback number by entering a temporary callback number, to enter an extension at the callback number, or to make a direct connection without callback.

For local security, the passwords and dialing strings that are stored in the modem are protected from tampering by a setup password, which you should change during modem setup. You can further protect the modem by disabling its ability to respond to most AT commands. To check for attempted break-ins, you can request the modem to display the number of failed password attempts.

7.1 Setup

Your modem was shipped with a default setup password (MTSMODEM). The same password is used for both callback security and remote configuration (**Chapter 6**). Because anyone who has access to this guide has access to the default password, you should change the password during your initial setup.

7.1.1 TO CHANGE THE SETUP PASSWORD

1. Open a data communications program such as HyperTerminal or PhoneTools.

2. In the terminal window, type **AT#SMTSMODEM** (or **AT#S***xxxxxxxx* if you have replaced the MTSMODEM password with *xxxxxxxx*) and press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong.

3. To change the password, type **AT#S=*xxxxxxx*,** where *xxxxxxx* stands for the password, and then press **ENTER**. The password can include any keyboard character, and can be up to eight characters long. The modem responds with OK.

4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.

CAUTION

Passwords are case-sensitive. The next time you enter the password, it must be in the same case as you set it up.

7.1.2 TO TURN CALLBACK SECURITY ON AND OFF

Callback security must be turned on to enter many callback security commands.

1. Open a data communications program such as HyperTerminal or PhoneTools.

2. In the terminal window, type **AT#S*xxxxxxx*,** where *xxxxxxx* is your password, and press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong.

3. Type one of the following commands:

   • To turn off callback security, type **AT#CBS0** and press **ENTER**. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and the stored dialing command locations 0–3 become available.

   • To turn on both local and remote callback security, type **AT#CBS1** and press **ENTER**. With local security turned on, you must enter the setup password before you can enter any AT command except the **AT**, **ATI*n*,** and **AT#S*xxxxxxx*** commands. For a description of remote callback security, see the following paragraph.

   • To turn on remote callback security only, type **AT#CBS2** and press **ENTER**. With remote callback security turned on, each caller is asked to enter a password, is called back, and then is asked to enter the password again before a connection can be made. Also, dialing command locations 0–3, for use with the **DS=*y*** dialing command, are replaced by callback dialing command locations 0–29.

- To temporarily disable callback security if the modem is set to **#CBS1** or **#CBS2** (for instance, to call another modem), type **AT#CBS3** and press **ENTER**. The modem returns to its original setting when you issue the hangup command (+++**ATH**) or the modem is reset. Note that if a remote modem breaks the connection, callback security remains disabled.

7.1.3 TO SET THE PARITY OF THE CALLBACK SECURITY MESSAGES

The parity of the modem's password prompt and messages must match the parity of the computer the modem is connected to.

1. Open a data communications program such as HyperTerminal or PhoneTools.

2. In the terminal window, type **AT#S***xxxxxxxx*, where *xxxxxxxx* is your password, and then press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong.

3. The default parity value for your modem is no parity (**AT#CBP0**). To change the modem's prompt messages to use even parity, type **AT#CBP2** and press **ENTER**. For odd parity, type **AT#CBP1** and press **ENTER**.

4. To store the new parity value, type **AT&W**, and press **ENTER**.

7.1.4 TO ASSIGN CALLBACK PASSWORDS AND PHONE NUMBERS

1. Open a data communications program such as HyperTerminal or PhoneTools.

2. In the terminal window, type **AT#S***xxxxxxxx*, where *xxxxxxxx* is your password, and press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong.

3. Enable callback security by typing **AT#CBS1** or **AT#CBS2** and pressing **ENTER**.

4. To store a callback password for the first callback memory location, type **AT#CBN0=***xxxxxxxx*, where *xxxxxxxx* is the first password, and press **ENTER**. The password must be unique, must be six to eight characters, in length, and must not contain a + or - character.

5. To store a callback password for the second callback memory location, type **AT#CBN1=***xxxxxxxx*, where *xxxxxxxx* is the second password, and press **ENTER**. Note that the memory location number in the command is incremented by one.

6. Repeat as many times as necessary, up to memory location 29, until all passwords have been entered.

7. To store a callback phone number in the first memory location, type **AT&Z0=[+][-]AT***xxxxxxx*[**,???**], where *xxxxxxx* is the dialing string, and press **ENTER**. The phone number must be preceded by DT, for tone dialing, or DP, for pulse dialing. The dialing string can also include other AT commands. Example: **AT&Z0**=+-**ATM0DT5551212**. Up to 35 characters can be used. The +, -, and **???** characters are optional:

   + Number entry. Add if you want a mobile caller to be able to enter his current phone number for callback.

   - Direct connection. Add if you want a caller to be able to choose to connect directly without being called back.

   ,??? Extension entry. Must be used with the + command. Add if you want a caller to be able to enter an extension number for callback. The number of **?** characters should equal the number of digits in the extension.

8. To store a callback phone number in the second memory location, type **AT&Z1=[+][-]AT***xxxxxxx*[**,???**], where *xxxxxxx* is the dialing string, and press **ENTER**. Note that the memory location number in the command is incremented by one.

9. Repeat as many times as necessary, through memory location 29, until all dialing strings have been entered.

10. To review your entries, type **AT&V** and press **ENTER**.

NOTE

A form is provided on the last page of this chapter to help you plan or keep track of password and phone number assignments.

7.2 Calling Procedures

Use the following procedures to call a modem that has callback security enabled.

NOTE

Autoanswer must be enabled on the calling modem (S0=1).

7.2.1 PASSWORD-ONLY CALLBACK

Use this procedure when calling from a fixed location.

1. Using a data communications program such as HyperTerminal or PhoneTools, dial the number of the callback modem.

2. When the connection is established, the callback modem responds with the following message: `Password>`

3. Type the password corresponding to the phone number for your modem, and press **ENTER**. You have three attempts or one minute to enter a valid password.

4. If the password is valid, the following message appears, and the modems disconnect: `OK Disconnecting`

5. After the delay specified by the **#CBDn** command, the callback modem calls the number associated with the password. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.

6. After the modems reconnect, the following message reappears: `Password>`.

7. Type the same password that you used to initiate the call. You have three attempts to enter the password or be disconnected.

8. If the password is valid, the following message appears and the modems establish a working connection: `OK Connecting`.

7.2.2 NUMBER-ENTRY CALLBACK

Mobile callers should use this procedure when calling from a phone number different from that stored with the password. The password that is used must be set up for optional number-entry callback.

1. Using a data communications program such as HyperTerminal or PhoneTools, dial the number of the callback modem.

2. When the connection is established, the callback modem responds with the following message: `Password>`

3. Type a number-entry password, press the plus key (+), type **ATDT** and the number to call back to, and press **ENTER**. You have three attempts or one minute to enter a valid password.

NOTE

When you type your phone number, be sure to include the long distance and area codes if they are needed.

4. If the password is valid, the following message appears, and the modems disconnect: **OK Disconnecting**.

5. After the delay specified by the **#CBD*n*** command, the callback modem calls the number that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBA*n*** command.

6. After the modems reconnect, the following message reappears: **Password>**.

7. Type the same password that you used to initiate the call. You have three attempts to enter the password or be disconnected.

8. If the password is valid, the following message appears and the modems establish a working connection: **OK Connecting**.

7.2.3 EXTENSION-ENTRY CALLBACK

Use this procedure when calling from an extension at the callback number. The password that you use must be set up for an optional extension-entry callback.

1. Using a data communications program such as HyperTerminal or PhoneTools, dial the number of the callback modem.

2. When the connection is established, the callback modem responds with the following message: **Password>**

3. Type an extension-entry password, press the plus key (+), type the extension to call back to, and press **ENTER**. You have three attempts or one minute to enter a valid password.

4. If the password is valid, the following message appears, and the modems disconnect: **OK Disconnecting**.

5. After the delay specified by the **#CBD*n*** command, the callback modem calls the extension that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBA*n*** command.

6. After the modems reconnect, the following message reappears: **Password>**.

7. Type the same password you used to initiate the call. You have three attempts to enter the password or be disconnected.

8. If the password is valid, the following message appears, and the modems establish a working connection: **OK Connecting**.

7.2.4 DIRECT CONNECTION

Use this procedure when you want to connect without first being called back. The password that you use must be set up for an optional direct connection.

1. Using a data communications program such as HyperTerminal or PhoneTools, dial the number of the callback modem.

2. When the connection is established, the callback modem responds with the following message: **Password>**.

3. Type a direct connection password, press the - key, and then press **ENTER**. You have three attempts or one minute to enter a valid password.

4. If the password is valid, the following message appears and the modems establish a working connection: **OK Connecting**.

NOTE

You can make all calls direct connect regardless of whether the password or phone number has the - character by using the %H1 command

7.3 Callback Security Commands

The following AT commands are used with callback security. Most can be entered only after the setup password has been entered.

Command:	**#CBA**n	**Callback Attempts**
Values:		$n = 1$–255
Default:		4
Description:		Sets the number of callback attempts that are allowed after passwords have been exchanged between modems. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBD**n	**Callback Delay**
Values:		$n = 0$–255
Default:		15
Description:		Sets the length of time (in seconds) that the modem waits before calling back the remote modem. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBF?**	**Callback Failed Attempts Display**
Values:		n/a
Default:		n/a
Description:		Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBFR**	**Callback Failed Attempts Reset**
Values:		n/a
Default:		n/a
Description:		Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBI*n***	**Local Callback Inactivity Timer**
Values:		*n* = 1–255
Default:		20
Description:		Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again. This command can be used only after the setup password has been entered and callback security has been enabled for local/remote operation (**#CBS1**).

Command:	**#CBN*y=x***	**Store Callback Password**
Values:		*y* = 0–29; *x* = password (6–10 characters)
Defaults:		None
Description:		Sets the callback security password for the *y* memory location. The password must contain 6 to 10 characters, and cannot include the + or - characters. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBP*n***	**Callback Parity**
Values:		*n* = 0, 1, or 2
Default:		0
Description:		Sets parity for the callback security messages. The parity of the messages should match the parity of the computer the modem is attached to. This command can be used only after the setup password has been entered and callback security enabled.
	#CBP0	No parity.
	#CBP1	Odd parity.
	#CBP2	Even parity.

Command:	**#CBR*y***	**Callback Security Reset**
Values:		*y* = 0–29
Default:		None
Description:		Clears the password and phone number in the *y* memory location. This command can be used only after the setup password has been entered and callback security enabled.

Command:	**#CBS*n***	**Callback Enable/Disable**
Values:		*n* = 0, 1, 2, or 3
Default:		0
Description:		Enables or disables callback security options. When callback security is enabled, phone number memory locations 0–4, used for quick dialing and DTR dialing, become unavailable and are replaced by callback security memory locations 0–29. The phone number memory locations and their contents are restored when callback security is disabled.
	#CBS0	Disables callback security. With this command, the modem connects as if it did not have callback security. This command can be used only after the setup password has been entered.
	#CBS1	Enables local and remote callback security. Local callback security requires that the setup password be entered to use the AT command set. The only AT commands that are available without the setup password are **AT**, **ATI**, and **AT#S*x*** For the remote callback security description, see the **#CBS2** description. This command can be used only after the setup password has been entered.

#CBS2		Enables remote callback security only. When remote callback security is enabled, the modem waits for a call, challenges the remote modem, calls back the remote modem, and challenges the remote modem again. Local security is disabled, allowing calls to be made from the modem without entering the setup password. This command can be used only after the setup password has been entered.
#CBS3		Temporarily disables callback security if either **#CBS1** or **#CBS2** is enabled. Callback security remains disabled until the hangup command (+++**ATH**) is executed locally or the modem is reset. This command can be used only after the setup password has been entered.

Command:	**#S***x*	**Enter Setup Password**
Values:		*x* = password (1–8 characters, case-sensitive)
Default:		MTSMODEM
Description:		Enters the password used for callback security and remote configuration setup. This command allows the use of all callback security commands.

Command:	**#S=***x*	**Store Setup Password**
Values:		*x* = password (1–8 characters, case-sensitive)
Default:		MTSMODEM
Description:		Stores a new password for callback security and remote configuration setup.

Command:	**&V**	**Display Current Settings**
Values:		n/a
Description:		Displays the modem's active settings, including the telephone numbers stored in nonvolatile memory and the security settings, if enabled. If the setup password has been entered, the passwords are also displayed.

Command:	***&Z y=[+][-]x[,???]***	
	Store Dialing Command	
Values:	*y* = 0–29 (callback security enabled);	
	x = Dialing command string	
Default:	None	
Description:	Stores dialing command *x* in memory location *y*. The command string must begin with **AT**, and can have up to 35 characters. The telephone number in the command must be preceded by **D**, **DT**, or **DP**. Example: **AT&Z0=+-ATM0D5551212,???**. During a call, if the + or - character is not entered after the password, the modem will call back the stored number. This command can be used only after the setup password has been entered and callback security enabled.	

Options:	+	Number entry. Enables the caller to enter a new callback number during password entry. The + character must be the first or second character in the command string.
	-	Direct connection. Enables the caller to choose a direct connection (no callback) during password entry. The - character must be the first or second character in the command string.
	,???	Extension entry. Enables the caller to enter an extension number during password entry. The + character must be the first or second character in the command string. The **?** characters must follow a comma at the end of the string, and there must be one for each digit in the extension. If the **?** characters are included in the dialing command, it is not possible for the caller to enter a new callback number, only an extension for the programmed callback number.

Command:	**%H*n***	**Direct Connect Enable**
Values:	*n* = 0, 1	
Default:	0	
Description:	%H0	Sets callback security to normal operation.
	%H1	All callback security calls will be direct connect regardless of whether the password or phone number has the - character.

CALLBACK ASSIGNMENTS FORM

Location	Password	Telephone Number
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		

8. Modem on Hold Operation

Your modem supports a feature called Modem on Hold when it is in V.92 mode. Modem on Hold works with your telephone company's Call Waiting service to put a remote modem "on hold" while you answer a voice call. When you finish your conversation and hang up, the previous connection resumes, providing you have not exceeded the time limit. Among other things, this feature eliminates the problem of the modem disconnecting if someone calls you while Call Waiting is enabled.

For this feature to work, you must have Call Waiting service from your telephone company. Also, the remote modem (for example, the modem used by your Internet service provider) must support V.92 and Modem on Hold. The duration of the hold time is controlled by your ISP.

NOTE

MTMoh, the Modem on Hold program included with your modem, currently supports only Windows 95/98/Me. Future versions are expected to support Windows NT, Windows 2000, and Windows XP. Please call Black Box Technical Support at 724-746-5500 for updates.

8.1 The Modem on Hold Program

Modem on Hold operation is controlled through the MTMoh program, which is automatically installed when you install the modem driver. A shortcut icon for MTMoh is placed on the Windows desktop. You can start MTMoh by double-clicking this icon, or you can make MTMoh start each time Windows starts by moving the icon to the Windows StartUp folder.

To move the MTMoh icon to the StartUp folder, right-click on the **Start** button, choose **Explore**, expand the Programs folder to reveal the StartUp folder, and then drag the MTMoh icon onto the StartUp folder.

When MTMoh is running, the MTMoh icon appears in the Windows system tray:


Figure 8-1. MTMoh icon.

Right-click on the icon to open the MTMoh menu:

| V.92 Modem On Hold Settings... |
| Check Modem Status |
| About MTMoh... |
| Exit MTMoh |
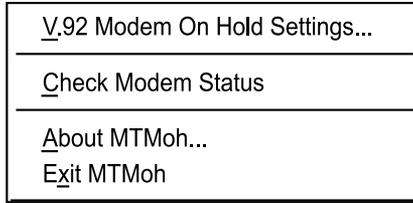
Figure 8-2. MTMoh menu.

8.2 V.92 Modem on Hold Settings

Select this option to open the V.92 Modem on Hold Settings dialog box. (You can also open this dialog box by double-clicking the MTMoh icon.) Use the V.92 Modem on Hold Settings dialog box to configure Modem on Hold operations.
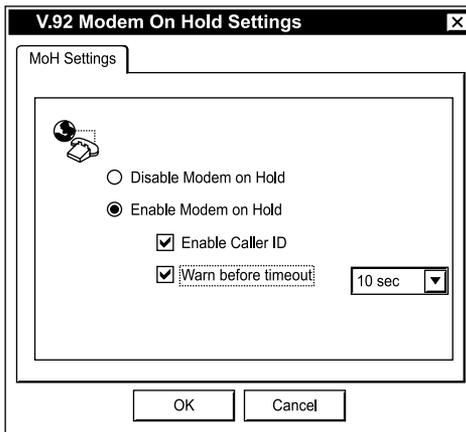
Figure 8-3. V.92 Modem on Hold settings dialog box.

Disable Modem on Hold
Select if you do not want to use Modem on Hold.

Enable Modem on Hold
Select if you want the remote modem to be put on hold when you receive a voice call. The Call Status dialog box will notify you of an incoming voice call and display Caller ID information, if it is available.

Enable Caller ID
Select if you have Caller ID service and want MTMoh to display information about the caller.

NOTE
For Caller ID, you must set S0 to 2 or greater.

Warn before timeout
Select to have MTMoh warn you when the hold time is about to expire. Click the down arrow to select how far in advance you want to be warned.

8.3 Check Modem Status

The Call Status dialog box opens automatically when you receive a call. If you close it, you can reopen it by selecting this command. The Call Status dialog box displays information about the current call, including Caller ID information, if it is available.

For more on using the Call Status dialog box, see **Section 8.4**.
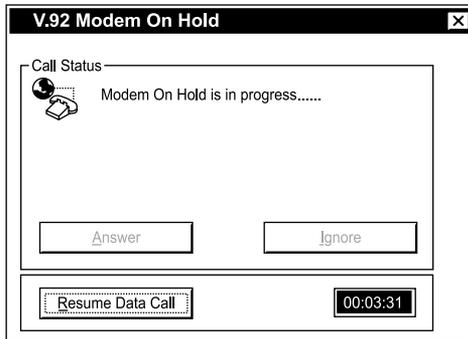
Figure 8-4. Using Modem on Hold screen.

ABOUT MTMOH

Select to display MTMoh version information.

EXIT MTMOH

Select to quit the MTMoh program. If you do this, Modem on Hold operation will be disabled.

8.4 Using Modem on Hold

To use Modem on Hold:

- You must have Call Waiting service from your telephone company.

- Your computer must be running Windows 95, 98, or Me.

- Your modem must be set to V.92 mode.

- The MTMoh program must be running.

- Enable Modem on Hold must be selected in the V.92 Modem on Hold Settings dialog box.

- Your modem must be connected to a remote server that supports V.92 and Modem on Hold.

8.5 Answering a Voice Call

When Modem on Hold is enabled, the Call Status dialog box appears on your screen whenever you have an incoming call. If Caller ID is enabled, information about the caller is displayed in the dialog box.

If the remote server is not V.92-capable, the message *Modem on Hold denied* appears instead.
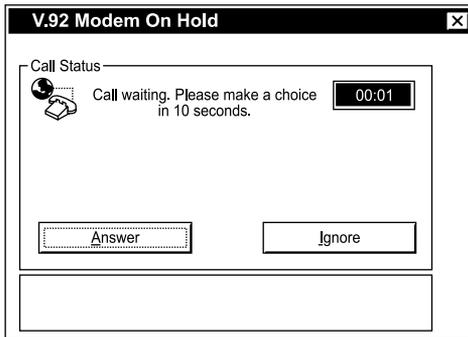
Figure 8-5. Answer or ignore call screen.

You have 10 seconds to choose whether to answer a call or ignore it. Click **Answer** to answer a call, or **Ignore** to ignore it.

If you click **Ignore** or let the timer time out, the incoming call is ignored, and you can continue your on-line connection. If you click **Answer**, you can pick up your telephone and talk to your caller while the remote modem is on hold. When you click **Answer**, the display changes to indicate that the remote modem is on hold. A count-down timer shows how long the remote modem will remain on hold before it automatically disconnects.
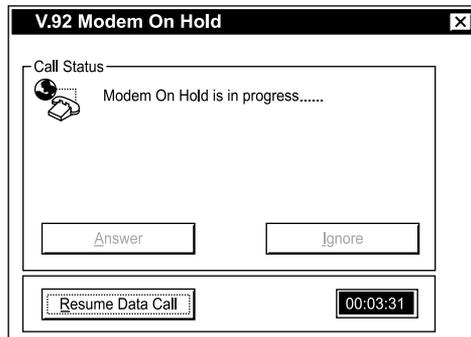
Figure 8-6. Ignore the incoming call screen.

8.6 Resuming a Data Call

You can complete a voice call at any time and resume your on-line connection by hanging up the telephone and clicking the **Resume Data Call** button. If "Warn before timeout" is selected in the V.92 Modem on Hold Settings dialog box, a warning that the hold time is about to expire appears at the specified time. If you do not click the **Resume Data Call** button, the remote modem automatically disconnects when the time is up.
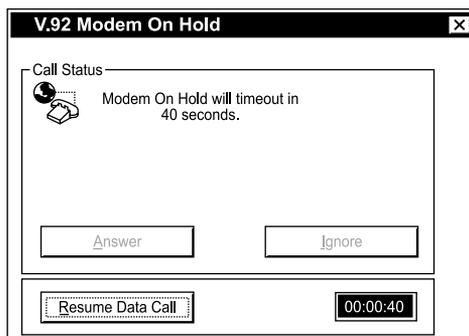
Figure 8-7. Resuming a data call screen.

9. Troubleshooting

9.1 Possible Problems

Your 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 might encounter:

• None of the LEDs light when the modem is on.

• The modem does not respond to commands.

• The modem cannot connect when dialing.

• The modem disconnects while on-line.

• The modem cannot connect when answering.

• File transfer is slower than it should be.

• Data is being lost.

• There are garbage characters on the monitor.

• The modem doesn't work with Caller ID.

• Fax and data software can't run at the same time.

If you experience problems, please check the following possibilities before calling Tech Support (see **Section 9.2**).

9.1.1 NONE OF THE INDICATORS LIGHT

When you turn on the 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 the modem on by turning on a power strip.

✔ If the modem 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 is firmly connected to the modem and the power supply's power cord is firmly connected to both the power supply and the wall outlet or power strip.

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

✔ Test that the outlet is live by plugging another device, such as a lamp, into it.

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

CAUTION

Do not under any circumstances replace the power supply with one designed for another product; doing so can damage the modem and void your warranty.

9.1.2 THE MODEM DOES NOT RESPOND TO COMMANDS

✔ Make sure the modem is plugged in and turned on. (See **Section 9.1.1**.)

✔ Make sure you are issuing the modem commands from data communication software, either manually in terminal mode or automatically by configuring the software. (You cannot send commands to the modem from the DOS prompt.)

✔ Make sure you are in terminal mode in your data communication program, then type **AT** and press **ENTER**. If you get an OK response from your modem, your connections are good and the problem likely is in the connection setup in your communication software.

✔ Try resetting your modem by turning it off and on. If you are using DOS or Windows 3.1 communication software, make sure the initialization string includes **&F** as the first command, to cancel any "leftover" command that could affect the modem's operation.

✔ If you don't get an OK, the problem may still be in the communication software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communication 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. The modem's TR indicator lights to show that the software has taken control of the modem through the COM port.

✔ Your communication software settings may not match the physical port the modem is connected to. The serial cable might be plugged into the wrong connector—check your computer documentation to make sure. Or you might 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 communication software is configured correctly, and you still don't get an OK, the fault might 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 wired correctly. Check the cable description on the packaging to make sure the cable is the right one for your computer.

✔ Peripheral expansion cards, such as sound and game cards, might 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 communication port. Be sure to disable any unused ports.
For **Windows 9x**: 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 communication 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 appears 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.
For **Windows NT 4.0**: To look for address or IRQ conflicts, click **Start**, **Programs**, **Administrative Tools (Common)**, and **Windows NT Diagnostics**. In the Windows NT Diagnostics dialog box, click the **Resources** tab to see which input/output ranges and interrupt requests are in use. 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 might 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 might have a problem beyond the scope of this user guide. If you have another BLACK BOX® modem, try swapping modems. If the problem goes away, call Tech Support for assistance.

9.1.3 THE MODEM CANNOT CONNECT WHEN DIALING

There can be several reasons the modem fails to make a connection. Possibilities include

- 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.

- poor line conditions.

You can narrow the list of possibilities by using extended result codes. Extended result codes are enabled by default. If they have been disabled, include **V1X4** in the modem's initialization string, or in terminal mode enter **ATV1X4** and press **ENTER**. When you dial again, the modem reports the call's progress.

✔ 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 might be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a corporate phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone and might treat it as an error. 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 might be busy, in which case you should try again later, or it might 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, into the dial prefix,

you do not have to include it in each directory entry. To change the dial prefix in Windows HyperTerminal, select **Connect** from the Call menu, 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 might be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.

✔ Poor line conditions can affect the connection. When using V.34 or V.32 client-to-client connections in poor conditions, setting **S38=0** may result in better performance.

9.1.4 THE MODEM DISCONNECTS WHILE ONLINE

✔ If you are not using Modem on Hold, Call Waiting can interrupt your connection when someone tries to call you. If you have Call Waiting service, disable it before each call. In most telephone areas in North America, you can disable Call Waiting by preceding the telephone number with ***70** (but first 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 HyperTerminal, select **Connect** from the Call menu, click **Dialing Properties**, check "This location has Call Waiting," and select the correct code for your phone service. To learn more about Modem on Hold, see **Chapter 8**.

✔ 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.

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

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

✔ Your ISP might 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.

9.1.5 THE MODEM CANNOT CONNECT WHEN ANSWERING

✔ The default DTR Control command (**&D2**) inhibits autoanswer. To enable autoanswer, change DTR Control to **&D0**, and make sure **&Q0**, **&Q5**, or **&Q6** is also set. For more information, see the **&D** command in **Chapter 5**. For information on changing the modem's default configuration, see **Section 3.7**.

✔ Autoanswer might be disabled. Turn on autoanswer in your communications program or send the command **ATS0=1** (**ATS0=2** if you have Caller ID service) to your modem in terminal mode.

9.1.6 FILE TRANSFER IS SLOWER THAN IT SHOULD BE

✔ If you are using a slow transfer protocol, such as Xmodem, 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 ensure 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.

✔ Does your Internet service provider (ISP) use the same 56K protocol as your modem? The default setting of your modem is to connect using either the V.92 or the V.90 protocol, depending on which one the ISP's modem is using. If your ISP uses the V.90 protocol, the maximum speed you will be able to upload at is 33,600 bps. Check with your ISP to see which protocols it supports.

✔ Are you trying to send a file to another client modem? If so, then your maximum possible connect speed is 33,600 bps. You can upload at speeds up to 48,000 bps only when connected to an ISP that supports the V.92 protocol.

✔ Try entering the **I11** command in on-line mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

9.1.7 DATA IS BEING LOST

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

✔ Make sure the flow control method you selected in software matches the method selected in the modem. If you are using the modem with a Macintosh, you might have the wrong cable for hardware flow control.

✔ Try entering the **I11** command in on-line mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

9.1.8 THERE ARE GARBAGE CHARACTERS ON THE MONITOR

✔ Your computer and the remote computer might 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 communication software.

✔ You might be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you might get a better connection the second time.

✔ 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 **I11** command in on-line mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

9.1.9 THE MODEM DOESN'T WORK WITH CALLER ID

✔ Caller ID information is transmitted between the first and second rings, so if autoanswer is turned off (**S0=0**) or if the modem is set to answer after only one ring (**S0=1**), the modem will not receive Caller ID information. Check your initialization string, and if necessary change it to set the modem to answer after the second ring (**S0=2**).

✔ Make sure that you have Caller ID service from your telephone company.

9.1.10 FAX AND DATA SOFTWARE CAN'T RUN AT THE SAME TIME

✔ Communication devices can be accessed by only one application at a time.

Under DOS or Windows 3.1*x*, you can run either your fax software or your data communications software, but not both at the same time, unless you have a special communication device management application. In Windows 95 and higher, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.

9.2 Calling Black Box

If you determine that your Mini-Modem V.92 is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem;

- when the problem occurs;

- the components involved in the problem;

- any particular application that, when used, appears to create the problem or make it worse; and

- the results of any testing you've already done.

9.3 Shipping and Packaging

If you need to transport or ship your Mini-Modem V.92:

- Package it carefully. We recommend that you use the original container.

- If you are shipping it back to Black Box for repair or return, please include everything you received with it. Before you do so, contact us to get a Return Authorization (RA) number.

Appendix A: Loopback Tests

Each time you turn on your modem, it performs an automatic self-test to ensure proper operation. Your modem also has three diagnostic tests: local analog loopback, remote digital loopback, and local digital loopback. These ITU-T V.54 loopback tests isolate telephone circuit and transmission problems.

In a loopback test, data from your computer loops through the circuits of your modem and/or a remote modem before it appears on your monitor. When the loop has been completed, the data on your PC's monitor should match the original data.

The local analog loopback test allows you to verify that the modem's transmitter and receiver circuits are functioning properly.

The remote digital loopback test allows you to verify that the local computer or terminal, the serial ports, the local and remote modems, and the transmission line between them are functioning properly.

The local digital loopback test allows you to verify that the remote computer or terminal, the serial ports, the local and remote modems, and the transmission line between them are functioning properly.

A.1 Local Analog Loopback Test (V.54 Loop 3)

In this test, data from your computer or terminal is sent to your modem's transmitter, converted into analog form, looped back to the modem's receiver, converted into digital form, and then sent to your monitor for verification. No connection to the phone line is required.
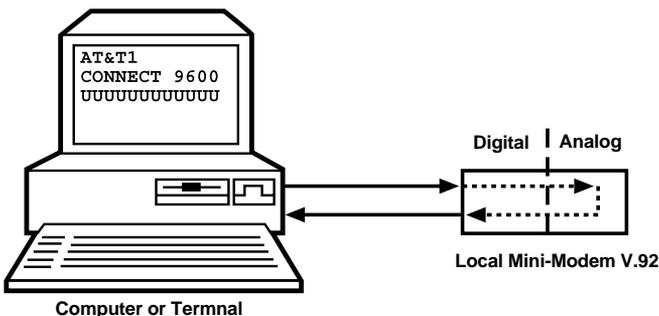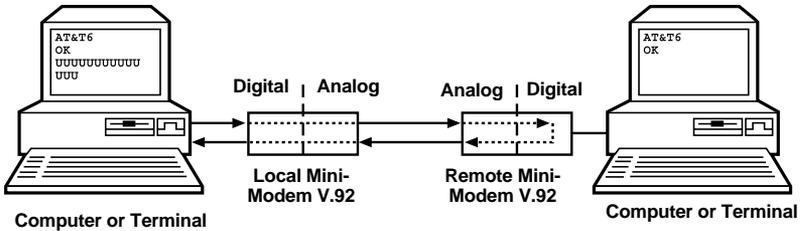

Figure A-1. Local analog loopback test.

TEST PROCEDURE

1. Connect the modem to your computer. Using your communication program, set the baud rate to 9600 and go into terminal mode.

2. Type **AT&T1** and press **ENTER**. This places your modem in analog loopback mode in the originate mode. A CONNECT message should appear on your display. The modem is now out of command mode and in a pseudo-on-line mode.

3. Note that the CD and TR indicators are on. If they are not on, there is a defect in your modem.

4. Enter characters from your keyboard. For this test, typing multiple uppercase U characters is a good way to send an alternating test pattern of binary ones and zeros. The characters entered should be displayed on your monitor.

5. To exit the test, type the escape sequence +++**AT** and press **ENTER**. This puts the modem in on-line command mode. Then type either **AT&T** or **ATH** to return to command mode.

6. Your modem passes this test if the data received on your monitor are the same as the data entered from your keyboard. If different data appear on your monitor, your modem is probably causing the problem, though it could also be your computer. If your modem passes this test, but you are receiving errors while on-line, the remote modem or the phone line could be at fault.

A.2 Digital Loopback Test (V.54 Loop 2)

The remote digital loopback test tests the phone lines and the circuits of both your local modem and a remote modem. In this test, your modem must be on-line with another modem that is set up to respond to a request for remote digital loopback. (Note that some modems might not support remote digital loopback or might have it disabled.) Data from your computer or terminal is transmitted through your modem and over the phone line to the remote modem, where it is then looped back to your modem.
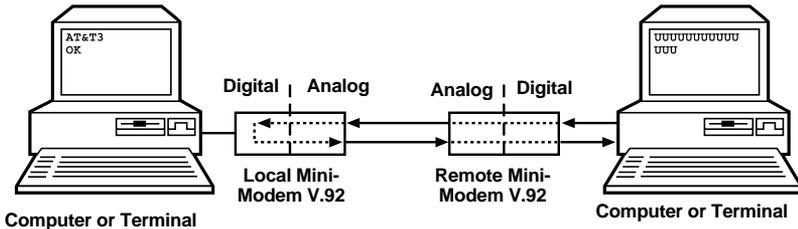
Figure A-2. Remote digital loopback test.

TEST PROCEDURE

1. Arrange to have **&T6** set on the remote test modem.

2. Using your communication program, set the baud rate to 9600 and go into terminal mode. Type **AT** and press **ENTER**; you should get an OK message. Type **AT\N** and press **ENTER** to disable error correction.

3. Dial the remote modem and establish your on-line connection.

4. Type the escape sequence +++**AT** and press **ENTER** to bring your modem into on-line command mode.

5. Type **AT&T6** and press **ENTER**. The local modem responds to this command by transmitting an unscrambled marking signal, which causes the remote modem to place itself in digital loopback mode. Then the local modem exits on-line command mode and enters data mode.

6. Enter data from your keyboard. For this test, typing multiple uppercase U characters is a good way to send an alternating test pattern of binary ones and zeroes. Data received by the remote modem enters its analog receiver, is converted to digital data, is reconverted into analog, and then is transmitted back to your modem. Your modem passes this test if the data received on your monitor is the same as the data entered from your keyboard.

7. To exit the test, type the escape sequence +++**AT** and press **ENTER**. This puts the modem in on-line command mode. The modem should respond with an OK message. If you wish to stay on-line with the remote modem for normal data transmission, type **AT&T** and press **ENTER** to exit the test, then type **ATO** and press **ENTER** to return on line. If you wish to terminate the call, type **ATH** and press **ENTER** to hang up.

A.3 Local Digital Loopback Test (V.54 Loop 2)

The local digital loopback test is identical to the remote digital loopback test with one exception. Instead of using your modem to signal a remote modem to place itself in digital loopback mode, your modem is placed in digital loopback mode while the remote modem is not. Data is entered and transmitted from the remote modem, sent across the phone line to your modem, and looped back to the remote modem.

Figure A-3. Local digital loopback test.

TEST PROCEDURE

1. Using your communication program, set the baud rate to 9600 and go into terminal mode. Type **AT** and press **ENTER**; you should get an OK message.

2. Dial the remote modem and establish your on-line connection.

3. Type the escape sequence +++**AT** and press **ENTER** to bring your modem into on-line command mode.

4. Type **AT&T3** and press **ENTER**. Once you receive an OK message from your modem (if responses are enabled), your modem is placed in digital loopback mode.

5. Have someone enter data from the remote keyboard. For this test, typing multiple uppercase U characters is a good way to send an alternating test pattern of binary ones and zeros. The data received by your modem enters its analog receiver, is converted to digital data, is reconverted into analog, and then is transmitted back to the remote modem. Your modem passes this test if the data received on the remote monitor is the same as the data entered from the remote keyboard.

6. To exit the test, type the escape sequence +++**AT** and press **ENTER**. This puts the modem in on-line command mode. The modem should respond with an OK message. If you wish to stay on-line with the remote modem for normal data transmission, type **AT&T** and press **ENTER** to exit the test, then type **ATO** and press **ENTER** to return on-line. If you wish to terminate the call, type **ATH** and press **ENTER** to hang up.

Appendix B: Installing a Modem Under Linux

This appendix explains how to install a modem on a computer operating under the Red Hat Linux 6.2 operating system. Other versions of Red Hat and other Linux operating systems should be similar. Briefly, in Linux, you do not need drivers for most standard external modems and most internal ISA bus modems. Programs in Linux commonly call upon the port, rather than the modem.

STANDARD LINUX SERIAL PORT DEFINITIONS

PC port	Linux port
COM1	ttyS0
COM2	ttyS1
COM3	ttyS2
COM4	ttyS3

INSTALLATION

Connect the external modem to an available serial port.

SETUP

This section describes how to make sure Linux can talk to the modem and be able to dial up to the Internet. Linux can use different programs and desktops depending on who made the Linux operating system and what version it is. The following procedures use the most commonly installed components of Red Hat 6.2. More information can be found in your Linux OS owner's manual.

Using the Terminal Program Minicom to Verify Operation

1. At the command prompt, type **minicom –s** and press **ENTER**.

2. Select **Serial Port Setup** and press **ENTER**.

3. From Serial Port Setup, use the A key to access Serial Device, and then press **ENTER**.

4. Press **ESC**.

5. You are now in the Minicom terminal. Type **AT** and press **ENTER**. The screen should display OK to verify the operation. Alternately, dial a phone number to verify line operation

6. To leave Minicom, press **CTRL + A**, and then press **Z**.

7. On the help menu, press **X** to exit.

Using the Modem to Call the Internet

Linux allows different graphic user interfaces (GUI). In the following steps, we'll use the Gnome Desktop GUI and assume that the Internet service provider (ISP) you are calling assigns you the Domain Name Service (DNS) and Internet Protocol (IP) addresses. For more information on DNS or IP, see the Linux OS owner's manual or contact your ISP.

1. On the task bar at the bottom of the screen, select the **Gnome Footprint**.

2. Select **Internet** from the menu.

3. Select **Dialup Configuration Tool**.

4. Select **Add**, and then click **Next**.

5. Enter the connection name and phone number, and then click **Next**.

6. Enter your user name and password, and then click **Next**.

7. Select **Normal ISP** if your ISP is not listed, and then click **Next**.

8. Click **Finish**.

Calling the ISP

1. On the task bar at the bottom of the screen, select the **Gnome Footprint**.

2. Select **Internet** from the menu.

3. Select **RH PPP Dialer**.

4. Select the connection name you entered in Step 5 of the previous section.

5. Click **OK**.

Answering Calls

To use the system for answering calls, Linux requires other programs to be installed, such as Mgetty, Mgetty+Sendfax, and others, depending on your requirements. Each vendor of Linux has more than adequate information on installing these programs.

Appendix C: Connecting to a Cisco Router

This appendix provides information on how to connect a Mini-Modem V.92 to a Cisco® router.

C.1 Connecting to a Cisco Router Console Port

The console port on the Cisco IOS® router is an asynchronous serial port configured as data communications equipment (DCE). For Cisco 1000, 1600, 2500, 2600, and 3600 series routers, the console port uses an RJ-45 connector.

WARNING

Do not connect the modem to the Cisco router's auxiliary port. This procedure and document apply only to the Cisco router's console port.

STEP 1: CONFIGURE THE MODEM FOR YOUR COUNTRY

Configure the modem defaults to match the requirements of the country in which it will be used. For information on how to do this, see **Section 3.6**.

STEP 2: CONFIGURE FOR CALLBACK SECURITY IN DIRECT CONNECT MODE

Callback security requires a caller to give a correct password before sending data to the system. If you do not plan to use this feature, skip to Step 3.

NOTE

Setting the modem for callback security in direct connect mode disables the remote configuration feature of the modem.

To Turn Direct Connect Callback Security On and Off

Callback security must be turned on to enter many callback security commands.

1. Using a terminal program such as HyperTerminal, type the command
   AT#S*xxxxxxxx*, where *xxxxxxxx* is your password (one to eight characters long), and press **ENTER**. The modem responds with OK if the setup password is correct, and ERROR if it is wrong. The default password is **MTSMODEM**.
   If you wish to change the password, then type the command **AT#S=***xxxxxxxx*, where *xxxxxxxx* is the new password (one to eight characters long), and press **ENTER**.

2. Type one of the following commands:

    - To turn on remote callback security only, type **AT#CBS2** and press **ENTER**.

    - To turn on both local and remote callback security, type **AT#CBS1** and press **ENTER**. When local security is turned on, you must enter the setup password before you can enter any AT command from a local terminal except the **AT**, **ATIn**, and **AT#S***xxxxxxx* commands.

3. Type **AT&W0** to store the above commands to nonvolatile memory.

NOTE
For other callback security modes of operation, see Chapter 7.

To Set the Parity of the Callback Security Messages

The parity of the modem's password prompt and messages must match the parity of the computer to which the modem is connected.

1. The default parity setting for your modem is no parity (**AT#CBP0**). To change the modem's prompt messages to use even parity, type **AT#CBP2** and press **ENTER**. For odd parity, type **AT#CBP1** and press **ENTER**.

2. To store the new parity value, type **AT&W** and press **ENTER**.

To Assign Callback Passwords

1. To store a callback password for the first callback memory location, type **AT#CBN0=***xxxxxxx*, where *xxxxxxx* is the first password, and press **ENTER**. The password must be unique, must be 6 to 10 characters in length, and must not contain a + or - character.

2. To store a callback password for the second callback memory location, type **AT#CBN1=***xxxxxxx*, where *xxxxxxx* is the second password, and press **ENTER**. Note that the memory location number in the command is incremented by one.

3. Repeat as many times as necessary, up to memory location 29, until all passwords have been entered.

4. To review your entries, type **AT&V** and press **ENTER**.

5. To set the modem for direct connect mode, type **AT%H1** and press **ENTER**.

To Call a Modem Configured for Callback Security

1. Using a terminal program and an originating modem, dial the number of the modem connected to the Cisco router, which we will call the "remote modem."

2. When the connection is established, the remote modem responds with the following message: `Password>`

3. Type a direct connection password, and press **ENTER**. You have three attempts or one minute to enter a valid password.

4. If the password is valid, the message OK Connecting appears, and the modems establish a working connection.

STEP 3: CONSOLE PORT FINAL SETUP

Send the following command string to the modem being connected to the console port of the Cisco router: **AT%R1&W0**

The **%R1** command sets **E0**, **Q1**, **&D0**, **&K0**, **$SB9600**, and **%S1**, and the **&W0** command stores the commands to memory.

The **%R1** command sets the following functions:

E0	Turns command echo off
Q1	Turns result codes off
&D0	Ignores DTR from the DTE
&K0	Selects no flow control
$SB9600	Sets the serial baud rate to 9600 bps.
%S1	Disables command mode at all serial speeds except 115200 bps.

The modem is now configured for use on the Cisco router console port.

Note that command echo and result codes have been turned off. If it becomes necessary to send additional AT commands to the modem after it has been so configured, there will be little feedback from the modem that it has received and acted upon the command. Only commands such as **ATI0** that request specific data from the modem will send any data to the DTE as an indication that the modem has accepted the command. Temporarily turning on command echo and result codes might ease reconfiguration of the modem.

When the modem is connected to the console port, turn the modem off and then on again. This will set the serial baud rate to 9600 bps as the **$SB9600** command is implemented.

C.2 Console Port Connections

To connect a personal computer to the console port, use the RJ-45-to-RJ-45 roll-over cable and either the RJ-45-to-DB25 female DTE adapter or the RJ-45-to-DB9 female DTE adapter (labeled "TERMINAL").

Table C-1. Cable Pinouts and Cabling Guide.

Console DTE Signal	Console Port RJ-45 Pin	Console Cable RJ-45 Pin	Adapter DB9 Pin	Adapter DB25 Pin	Modem (DCE) Signal
RTS	1	8	8	4	RTS
DTR	2	7	6	20	DTR
XMT	3	6	2	2	XMT
GND	4	5	5	7	GND
GND	5	4	5	7	GND
RCV	6	3	3	3	RCV
DSR	7	2	4	6	DSR
CTS	8	1	7	5	CTS

C.3 Remote Configuration

The configuration of the modem described in Step 3 of **Section C.1** contains the core settings that allow the modem to function properly on the console port of the Cisco router. Commands in this section may be done remotely by calling into the Mini-Modem V.92 attached to the console port with another modem.

NOTE

Setting country configuration and turning on callback security cannot be done remotely. Nor can all commands be executed remotely if the remote modem is set for callback security; remote configuration of a modem so configured is not recommended.

1. Establish a data connection with a remote Mini-Modem V.92.

2. Send three remote configuration escape characters followed by **AT** and the setup password, and then press **ENTER**. Example: **%%%ATMTSMODEM**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem may respond with OK.

NOTE

If the modem has previously been configured with command echo off and result codes off, it may be difficult to determine if the remote modem is responding to commands. The ATI command can be used for this purpose. Even with echo and result codes off, the modem will respond with the requested ID string if it is properly receiving the command.

3. You can now send AT commands to configure the remote modem.

4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0<CR>**, then type **ATO<CR>** to exit remote configuration. You can then break the connection in the normal way.

NOTE

This step is important to ensure that the connection is broken cleanly.

Appendix D. Country AT Result Codes

Country	AT Command (Hexadecimal)	Result Code (Decimal)
Argentina	AT%T19,0,34	52
Australia	AT%T19,0,01	1
Austria	AT%T19,0,34	52
Belgium	AT%T19,0,34	52
Brazil	AT%T19,0,34	52
Canada	AT%T19,0,34	52
China	AT%T19,0,34	52
Cyprus	AT%T19,0,34	52
Czech Republic	AT%T19,0,25	37
Denmark	AT%T19,0,34	52
Finland	AT%T19,0,34	52
France	AT%T19,0,34	52
Germany	AT%T19,0,34	52
Greece	AT%T19,0,34	52
Hong Kong	AT%T19,0,30	48
Hungary	AT%T19,0,30	48
Iceland	AT%T19,0,34	52
India	AT%T19,0,30	48
Indonesia	AT%T19,0,30	48
Ireland	AT%T19,0,34	52
Italy	AT%T19,0,34	52
Japan	AT%T19,0,10	16
Korea	AT%T19,0,30	48
Liechtenstein	AT%T19,0,34	52
Luxembourg	AT%T19,0,34	52
Mexico	AT%T19,0,34	52
Netherlands	AT%T19,0,34	52
New Zealand	AT%T19,0,09	9
Norway	AT%T19,0,34	52

Country	AT Command (Hexadecimal)	Result Code (Decimal)
Philippines	AT%T19,0,30	48
Poland	AT%T19,0,30	48
Portugal	AT%T19,0,34	52
Russia	AT%T19,0,34	52
Singapore	AT%T19,0,30	48
South Africa	AT%T19,0,35	53
Slovak Republic	AT%T19,0,34	52
Slovenia	AT%T19,0,30	48
Spain	AT%T19,0,34	52
Sweden	AT%T19,0,34	52
Switzerland	AT%T19,0,34	52
Turkey	AT%T19,0,34	52
U.K.	AT%T19,0,34	52
United States	AT%T19,0,34	52

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