

**Multi** *Modem<sup>II</sup>*™

# Model MT5600BA Model MT5600BL

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**Data/Fax Modem**

**User Guide**

**MultiTech**®  
Systems 

## MultiModemII User Guide

Models MT5600BA and MT5600BL

P/N 88302601 Revision B (7/9/99)

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### Record of Revisions

<i>Revision</i>	<i>Date</i>	<i>Description</i>
B	7/9/99	Manual revised.

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### Notice

Though these modems are capable of 56K bps download performance, line impairments, public telephone infrastructure and other external technological factors currently prevent maximum 56K bps connections.

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## **FCC Part 15**

**NOTE:** This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Plug the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

**WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## **Industry Canada**

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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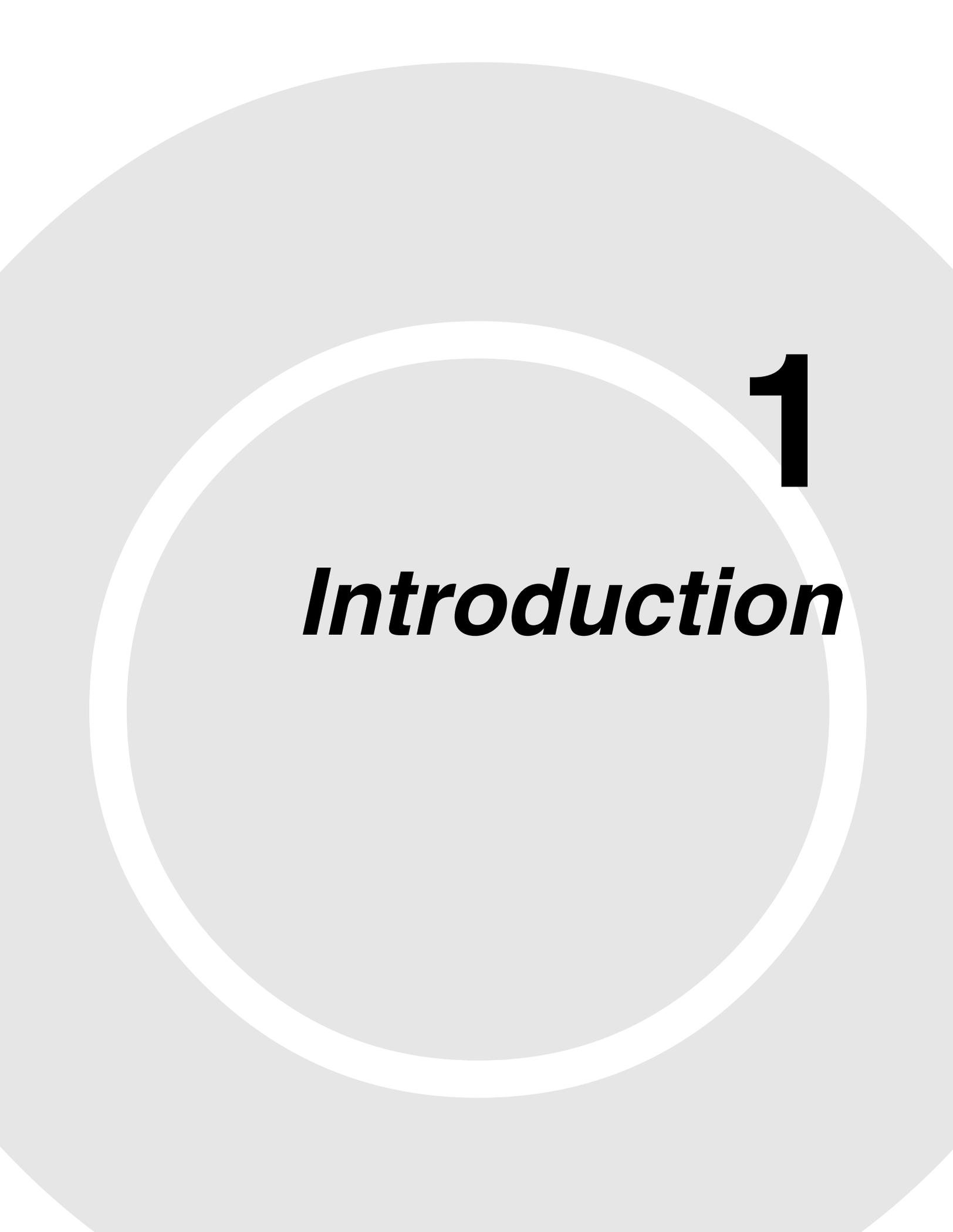
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**1**

***Introduction***

# Introduction

Congratulations on your purchase of the MultiModemII modem. You have acquired one of the finest intelligent data/fax modems available today from one of the world's oldest modem manufacturers: Multitech Systems, Inc. This user guide will help you install, configure, test and use your modem.

# Product Description

The MultiModemII MT5600BA and MT5600BL modems incorporate new modem technologies called K56flex™ and V.90, both of which enable Internet connections at data rates up to 53K bps\* over standard telephone lines. These protocols are able to send data downstream to your computer at high speeds by taking advantage of the fact that data on the telephone network normally is converted from digital to analog only once before it reaches your modem. Upstream transmissions and transmissions between client modems are limited to data rates of 33.6K bps, as are downstream transmissions that are converted more than once on the telephone network.

Both models support two-wire leased line operation. The MT5600BL model also supports four-wire leased line operation with dial backup and automatic leased line restoral. Please note that, because leased line operation consists of two client modems connected to each other, the maximum leased line data rate is 33.6K bps.

The MultiModemII offers interactive automatic dialing. You can store four command lines or telephone numbers of up to 30 characters each in the modem's nonvolatile memory. The modem pulse- or tone-dials, and recognizes dial tones and busy signals for reliable call-progress detection. It can also detect AT&T calling card tones. It is FCC-registered for connection to telephone networks without notification to the telephone company.

The MultiModemII front panel includes a liquid crystal display and four buttons that together can be used to display the current connection status of the modem or to configure the modem. The MultiModemII also can be configured through standard AT commands.

# Features

## *General*

- Complies with major ITU-T, TIA, and EIA international standards to ensure compatibility with other modems.
- Uses DTMF and tone detection to distinguish data and fax calls when used with software that supports these features.
- Supports serial port speeds to 230.4K bps with compatible serial ports
- Supports Caller ID (North American versions only).
- Displays status and configuration information on a front panel LCD.

\*Though this modem is capable of 56K bps download performance, line impairments, public telephone infrastructure, and other external technological factors currently prevent maximum 56K bps connections.

### *Data*

- Supports K56flex™ and ITU-T V.90 speeds plus 33.6K, 31.2K, 28.8K, 26.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9.6K, 7.2K, 4.8K, 2.4K, 1.2K, and 0–300 bps.

---

**Note:** Under the 56K bps standards, you can asymmetrically download data from an ISP at speeds up to 53K bps, but upload only at speeds up to 33.6K bps. Client-to-client operation, including leased line operation, is also limited to 33.6K bps.

---

- Supports automatic fallback to slower speeds in noisy line conditions, and fall-forward to faster speeds as conditions improve.
- Supports ITU-T V.42 LAP-M and MNP Class 3 and 4 error correction.
- Supports ITU-T V.42bis (4-to-1) and MNP 5 (2-to-1) data compression.
- Supports both synchronous and asynchronous data transfer.
- Both models support two-wire leased line operation. The BL model also supports four-wire leased line operation with dial backup and leased line restoral.
- Supports callback security and remote configuration.
- Automatically disables compression when transferring already-compressed files.
- Can autodial, redial, pulse (rotary) and touch-tone dial.
- Detects dial tones and busy signals for reliable call-progress detection.
- Compatible with the standard AT command set used by most communication programs.
- Supports the H.324 protocol (videophone ready).
- Supports Plug and Play (PnP).
- Can be flash upgraded.

### *Fax*

- Supports V.17, Class 1, Class 2, and Group 3 fax standards, allowing it to communicate with other fax modems as well as with fax machines.
- Sends and receives faxes from your computer at 14,400 bps, 9600 bps, 7200 bps, 4800 bps, 2400 bps, or 300 bps.

## What Is in Your Modem Package?

Your modem package has several components. Make sure you have them all before trying to operate your modem. Your package should include:

- An MT5600BA or MT5600 BL modem
- A wall mount transformer
- One (MT5600BA) or three (MT5600BL) modular telephone cables
- A printed *Quick Start Guide*
- This *User Guide* on disk
- An installation disk
- A CD containing Trio data and fax software

If any of these items are missing, please contact Multi-Tech Systems or your dealer/distributor (see Appendix D for information on contacting Multi-Tech via telephone, fax, bulletin board service, or the Internet).

## Related Manuals

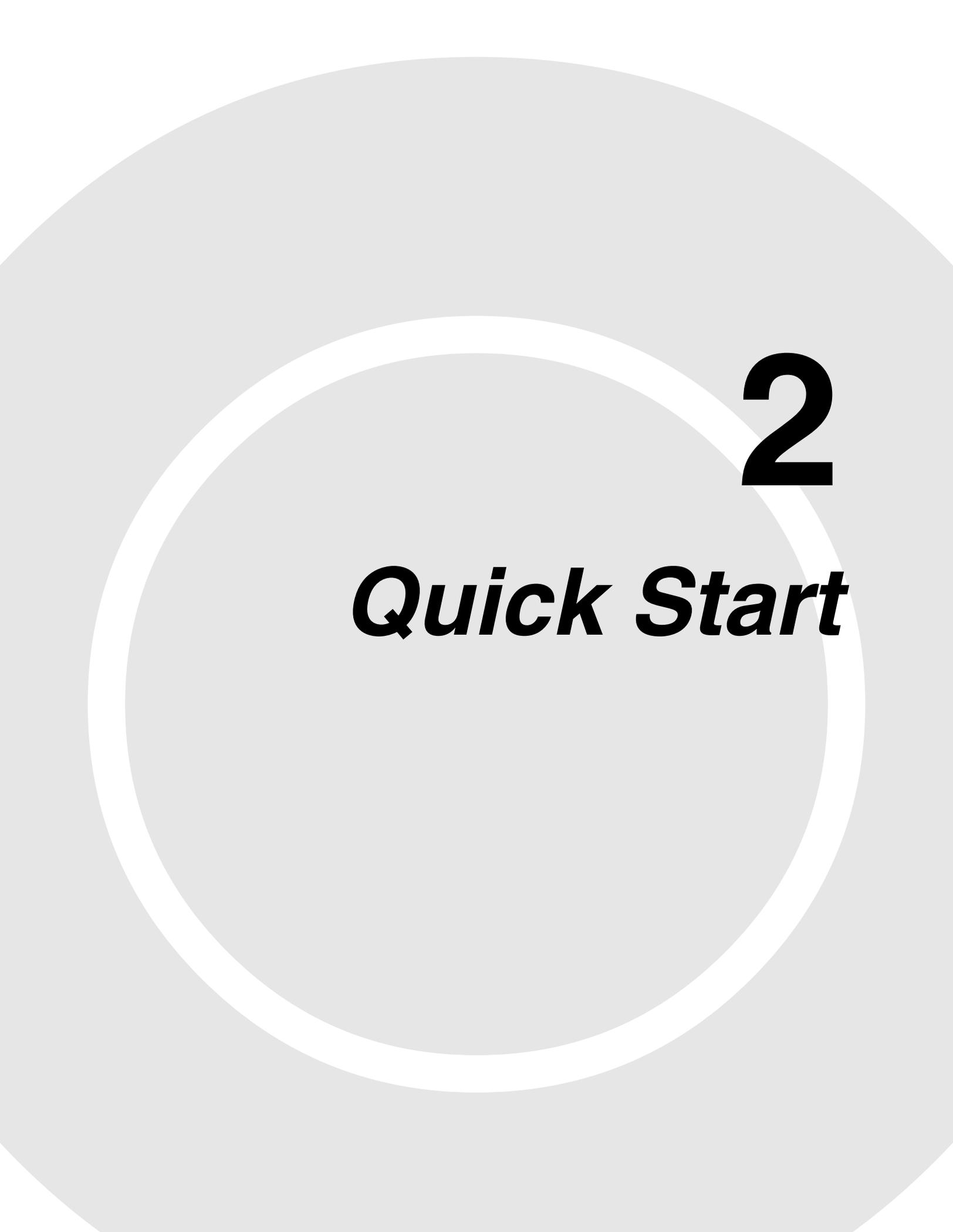
The following manuals are available from the Multi-Tech World Wide Web and FTP sites.

82076200 *MT56XX Fax Class 1 Developer's Guide*

<ftp://ftp.multitech.com/manuals/pdf/developers%20kits/5600fax.pdf>

82006502 *Fax Class 2 Developers's Kit*

<ftp://ftp.multitech.com/manuals/pdf/developers%20kits/82006502.pdf>



**2**

***Quick Start***

## Introduction

We know you are eager to get your MultiModemII up and running, so we'll show you step-by-step how to set it up, check it out, and make your first calls.

## What You Will Need

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

### ***We supply***

- ✓ An MT5600BA or MT5600 BL modem
- ✓ A wall mount transformer
- ✓ One (MT5600BA) or three (MT5600BL) modular telephone cables
- ✓ Trio communications software
- ✓ A *Quick Start Guide*
- ✓ This *User Guide* on disk
- ✓ An installation disk

### ***You supply***

- ✓ A computer with an unused serial port
- ✓ A shielded RS-232 serial cable with a male DB-25 connector on one end and a connector to match your computer's serial port on the other end
- ✓ A nearby AC power outlet
- ✓ A nearby telephone line jack
- ✓ A nearby leased line jack or terminals (optional)

## Safety Warnings

- Use this product only with UL- and CUL-listed computers.
- To reduce the risk of fire, use only 26 AWG 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 (other than a cordless type) 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.

## Step 1: Connect the Modem to Your System

Turn off your computer. Placing the modem in a convenient location, connect it to your computer's serial port, to the telephone line, to your leased line, to AC power, and, optionally, to your telephone.

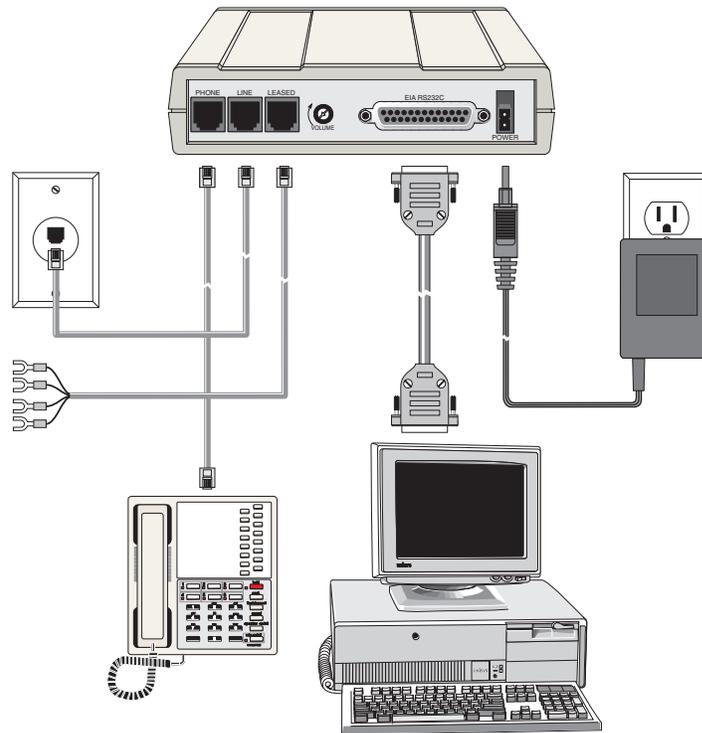


Figure 2-1. MT5600BL connections.

### **RS232 Connection**

Plug one end of the serial cable into the RS232 connector on the modem, and the other end into a serial port connector on your computer, such as COM1 or COM2.

### **Dialup Connection**

Plug one end of the modular phone cable into the modem's LINE jack, and the other end into a public switched telephone network (PSTN) wall jack.

---

**Note:** The LINE jack is not interchangeable with the PHONE jack. Do not plug the phone into the LINE jack or the line cable into the PHONE jack.

---

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

---

### ***Two-Wire Leased Line Connection***

MT5600BA: Plug one end of a two-wire phone cable into the modem's LINE jack, and connect the other end to a leased line wall jack or terminals.

MT5600BL: Plug one end of a two-wire phone cable into the modem's LEASED jack, and connect the other end to a leased line wall jack or terminals.

### ***Four-Wire Leased Line Connection***

On an MT5600BL only, plug one end of a four-wire phone cable into the modem's LEASED jack, and connect the other end to a four-wire leased line wall jack or terminals. For dial backup operation, plug one end of the modular phone cable into the modem's LINE jack, and the other end into a PSTN wall jack.

### ***Phone Connection***

For voice-only calls, plug a telephone into the modem's PHONE jack (optional).

### ***Power Connection***

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

---

**Note:** Use only the transformer supplied with the modem. Use of any other transformer voids the warranty and can damage the modem.

---

### ***Surge Protectors and Lightning***

Power surges and other transient voltages on power lines, such as those caused by lightning strikes, can damage or destroy your modem. 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 phone 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.

### ***Power-On Test***

Test the modem by turning it on (an on/off switch is located on the front panel). When you apply power, the modem performs a diagnostic self-test, indicated by the TM indicator lighting for a few seconds, after which the LCD 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 8, "Solving Problems."

## Step 2: Install the Modem in Windows

If you are using Windows 95, Windows 98, Windows NT 4.0, or Windows 2000, you must install the modem in the operating system. (If you are using another operating system, such as DOS or Windows 3.x, skip this step and go to step 3.)

### *Adding the Modem to Windows*

1. Click the **Start** button, point to **Settings**, and click **Control Panel**.
2. Double-click the Modems icon. If no modem is currently installed, the **Install New Modem** wizard appears. If a modem is already installed, the **Modems Properties** sheet appears; click **Add** to go to the **Install New Modem** wizard.
3. Click **Next** in the **Install New Modem** wizard. Windows searches for your new modem and asks you to verify its selection.

---

**Note:** If Windows cannot find a modem, your modem may be turned off, it may be plugged into the wrong connector on your computer, or the serial cable may be faulty. See “None of the LEDs Light When the Modem Is Turned On” and “The Modem Does Not Respond to Commands” in Chapter 8, “Solving Problems.”

---

4. If Windows identifies your modem correctly, click **Next** to install the modem. After the modem is installed, click **Finish** to exit.
5. If Windows cannot identify your modem (for instance, if it identifies your modem as a “Standard Modem”), click **Change**. A dialog box with a list of manufacturers and a list of modems appears.
6. Insert your modem’s setup disk into your floppy drive and click **Have Disk**.
7. In the **Install from Disk** dialog box, select the drive the installation disk is in and click **OK**.
8. A list of modems appears. Select your modem from the list, and click **Next**.
9. Windows NT 4.0 only: Select the port the modem is attached to, and click **Next**.
10. Windows installs and configures the modem.
11. Click **Finish** to exit.

### *Removing Your Old Modem from Windows*

When your new modem replaces another modem, the old modem installation remains in Windows, and the old modem is still selected in HyperTerminal and other Windows applications. Although 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 from Windows.

1. Click the **Start** button, point to **Settings**, and click **Control Panel**.
2. Double-click the Modems icon to open the **Modems Properties** sheet.
3. In the list box, select the old modem.
4. Click **Remove**, 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.

## **Step 3: Install and Configure Your Software**

Your Multi-Tech modem is controlled by communication software installed on your computer. If you wish to use software that is already installed, you should reconfigure it for your new modem; otherwise, install the Trio data and fax communications software provided with the modem.

1. Turn on your computer and run your communications software.
2. Find the dialog box or menu that lets you specify your modem. (In Windows Terminal select **Settings | Modem Commands**; in HyperTerminal select **File | Properties | Phone Number**; and in Trio select **View | Datacomm | Communications | Setup | Modem | Select from List**.)
3. Choose your modem from the software'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**. Note that the **Z** command must be in a command string by itself. For a Macintosh, 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 for a Macintosh computer that turns off autoanswer, type **AT&F&D0S0=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. Set the serial port baud rate to 115,200 bps if your computer has a high speed serial port with a 16550AFN UART or equivalent and Windows 95 or NT 4.0, or set it to 57,600 bps if it has Windows 3.1x. If you have an older computer with a 14550 UART, set it to 19,200 bps. Older Macintosh computers can use a serial port baud rate of 57,600 bps; newer ones can use a serial port baud rate of 115,200 bps or 230,400 bps.

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

7. If the software has an autobaud selection, make sure it is disabled. Autobaud applies only to older modems, and can cause problems if enabled.
8. If the software allows you to edit the no-connect messages (*NO CARRIER*, *BUSY*, *NO ANSWER*, *NO DIALTONE*), make sure there is no space between *DIAL* and *TONE* in *NO DIALTONE*.
9. Refer to the software manual or online help for other configuration choices; in most cases you can accept the default values.

## Step 4: Call the Multi-Tech BBS

You can test the modem's data functions by calling the Multi-Tech bulletin board system (BBS) and downloading REGISTER.DOC, if you have Microsoft Word 6.0 or later, or REGISTER.TXT if you do not.

### *Trio DataComm*

1. Click **Start**; then choose **Programs, Trio Applications**, and **Trio Datafax**.
2. Click the **DataComm** button. Trio DataComm starts.
3. In the Trio Datacomm **File** menu, click **Access Phonebook**. The Dialing Directory opens.
4. In the Dialing Directory, click **New Entry**. The **Edit/Create Host Information** dialog box opens.
5. In the **Name** box, type **Multi-Tech BBS** and click **OK**.
6. In the **Primary number** box, type **800-392-2432** if you are in North America. Type **612-785-3702** if you are a local or international user.
7. In the **Country** box, select the United States.
8. Select **Dial First Digit** and **Dial Prefix** as necessary.
9. Click **OK** to exit the **Edit/Create Host Information** dialog box.
10. In the Dialing Directory, dial the Multi-Tech BBS by double-clicking its entry.
11. When the BBS welcome screen appears, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.

12. Press **ENTER** until the main menu appears. From the main menu you have access to two areas: the File Menu and News. For help with menu commands, type **?**.
13. In the Main Menu, type **F** and press **ENTER** to access the File Menu, then type **D** and press **ENTER** to download.
14. At the file name prompt, if you have Microsoft Word 6.0 or later, type **register.doc** and press **ENTER**. If you do not have Microsoft Word, type **register.txt**, and then press **ENTER**.
15. Press **ENTER** twice more.
16. To select the Zmodem transfer protocol, type **Z** and press **ENTER**.
17. The download begins automatically. As the file is downloaded, a dialog box reports on the progress of the download. If the download fails, your baud rate may be set too high. Log off, set the COM port baud rate lower, and call again.
18. To log off the BBS, press **ENTER**, type **G** for "good-bye," and press **ENTER** twice more.

### Windows HyperTerminal

1. Click **Start**; then choose **Programs, Accessories, and HyperTerminal**.
2. Start HyperTerminal by double-clicking the Hypertrm icon. HyperTerminal asks for the name of the connection.
3. Type **Multi-Tech BBS** in the **Name** box, and then click **OK**.
4. In North America, type **800** in the **Area code** box and **392-2432** in the **Phone number** box. Local and international users, type **612** in the **Area code** box and **785-3702** in the **Phone number** box.
5. Verify that your modem is selected in the **Connect using** box, then click **OK**.
6. In the **Connect** dialog box, click **Dialing Properties**.
7. Make any necessary changes in the **Where I am** and the **How I dial from this location** boxes. If you must dial 9 to access an outside line, you should type **9** in both the local and the long distance boxes unless your phone system has a special requirement.
8. Click **OK**, then click **Dial**. You will know you have reached a modem by the harsh sounds of the modem handshake.
9. When the BBS welcome screen appears in the HyperTerminal window, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
10. Press **ENTER** until the main menu appears. From the main menu you have access to two areas: the File Menu and News. For help with menu commands, type **?**.
11. In the Main Menu, type **F** and press **ENTER** to access the File Menu, then type **D** and press **ENTER** to download.
12. At the file name prompt, if you have Microsoft Word 6.0 or later, type **register.doc** and press **ENTER**. If you do not have Microsoft Word, type **register.txt**, and then press **ENTER**.

13. Press **ENTER** twice more.
14. Type **Z** and press **ENTER** to select the Zmodem transfer protocol.
15. The download begins automatically. As the file is copied to the HyperTerminal folder, a dialog box reports on the progress of the download. If the download fails, your baud rate may be set too high. Log off, set the COM port baud rate lower, and call again.
16. To log off the BBS, press **ENTER**, type **G** for “good-bye,” and press **ENTER** twice more.
17. In the HyperTerminal window, click **File**, and then click **Save** to save the HyperTerminal connection description.

## **Windows Terminal**

1. Open the Accessories program group and double-click on the Terminal icon.
2. Select the **Settings** menu and make the following changes:
  - Phone Number:* Type **1-800-392-2432** if you are in North America, or type an overseas access code and **612-785-3702** if you are outside North America.
  - Communications:* Select the COM port the modem is connected to and change the following: **Baud rate** to **19200**; **Flow control** to **Hardware**; and **Carrier Detect** to **checked**.
  - Modem Commands:* Select **MultiTech**. If you must dial 9 to get an outside line, type **ATDT9**, in the **Dial prefix** box (include the comma).
3. Click **File**, then click **Save**, and save as **multibbs.trm**.
4. Click **Phone**, then click **Dial** to dial the BBS. You will know you have reached a modem by the harsh sounds of the modem handshake.
5. When the BBS welcome screen appears in the Terminal window, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
6. Press **ENTER** until the Main Menu appears. From the Main Menu you have access to two areas: the File Menu and News. For help with menu commands, type **?**.
7. In the Main Menu, type **F** and press **ENTER** to access the File Menu, then type **D** and press **ENTER** to download.
8. At the file name prompt, if you have Microsoft Word 6.0 or later, type **register.doc** and press **ENTER**. If you do not have Microsoft Word, type **register.txt** and press **ENTER**.
9. Press **ENTER** twice more.
10. Type **X** and press **ENTER** to select the Xmodem transfer protocol.
11. To begin the download in Terminal, click **Transfers**, then click **Receive binary file**. Next, select the destination directory, type the file name (**register.doc** or **register.txt**), and click **OK**. If the download fails, your baud rate may be set too high. Log off, set the COM port baud rate lower, and call again.

12. To log off the BBS, press **ENTER**, type **G** for "good-bye," and then press **ENTER** twice again.

## Step 5: Send a Fax

To test your modem's fax capabilities, send the completed registration file that you downloaded in "Step 4: Call the Multi-Tech BBS" to Multi-Tech or to a fax machine in your office.

### **Trio Fax**

1. Depending on which version of the registration file you downloaded, use either Microsoft Word or NotePad to open the registration file.
2. Fill out the registration form and save the file, but do not exit.
3. Select **Print** from the **File** menu.
4. In the **Name** box of the **Print** dialog box, select **Trio DataFax**, and then click **OK**. After a short pause, the Trio **Send Fax** dialog box opens.
5. If you are sending the registration form to your own fax machine or to another fax modem in your office, under **Temporary recipient**, type the destination name and phone number in the **Name** and **Number** boxes.  
  
If you are sending the registration form to our offices, type **Multi-Tech Systems** in the **Company** box, and **612 785-9874** in the **Number** box.
6. Click **Next Dialog**.
7. Select a cover sheet, and then click **Next Dialog**.
8. Type a cover sheet message, and then click **Next Dialog**. A preview window opens.
9. If the fax looks correct, click **Send**. A dialog box appears that shows the progress of the fax transmission.
10. When transmission is complete, exit Word or Notepad.

### **Microsoft Fax**

Microsoft Fax is installed in Windows 95 as part of the Microsoft Exchange option. To install it under Windows 98, you must locate the `\tools\oldwin95\message\us` folder on the Windows 98 compact disc. Then, double-click on `Wms.exe` to install Windows Messaging. Once you've installed Windows Messaging, double-click on `Awfax.exe` to add Microsoft Fax to Windows Messaging.

You can use Microsoft Fax either as a stand-alone fax program or to fax from within another application. In the following procedure you will test your fax modem by running Microsoft Fax as a stand-alone fax program.

1. Depending on which version of the registration file you downloaded, use either Microsoft Word or NotePad to open the registration file.
2. Fill out the registration form.
3. Save the file and exit Word or NotePad.

4. Select **Start | Programs | Accessories | Fax | Compose new fax**.
5. The **Compose New Fax** wizard appears. Click **Next**.
6. If you are sending the registration form to your own fax machine or to another fax modem in your office, type the destination name and phone number in the **To** and **Fax #** boxes.  
  
If you are sending the registration form to our offices, type **Multi-Tech Systems** in the **To** box, and **612 785-9874** in the **Fax #** boxes.
7. Click **Add to list**, then click **Next**.
8. Pick a cover page, then click **Next**.
9. Type a subject line (e.g., **MT5600BA registration**) and a note to go on the cover page, then click **Next**.
10. Click **Add file**. In the **Open a file to attach** dialog box, select the registration file and click **Open**. The registration file is added to the **Files to send** list box.
11. Click **Next**, then click **Finish**.
12. Microsoft Fax opens the registration file in Word or NotePad, prints it to the rendering system, then dials the recipient and sends the fax.
13. Exit Microsoft Fax when the **Status** dialog box says the fax has been successfully sent.

### **Other Ways to Access Microsoft Fax**

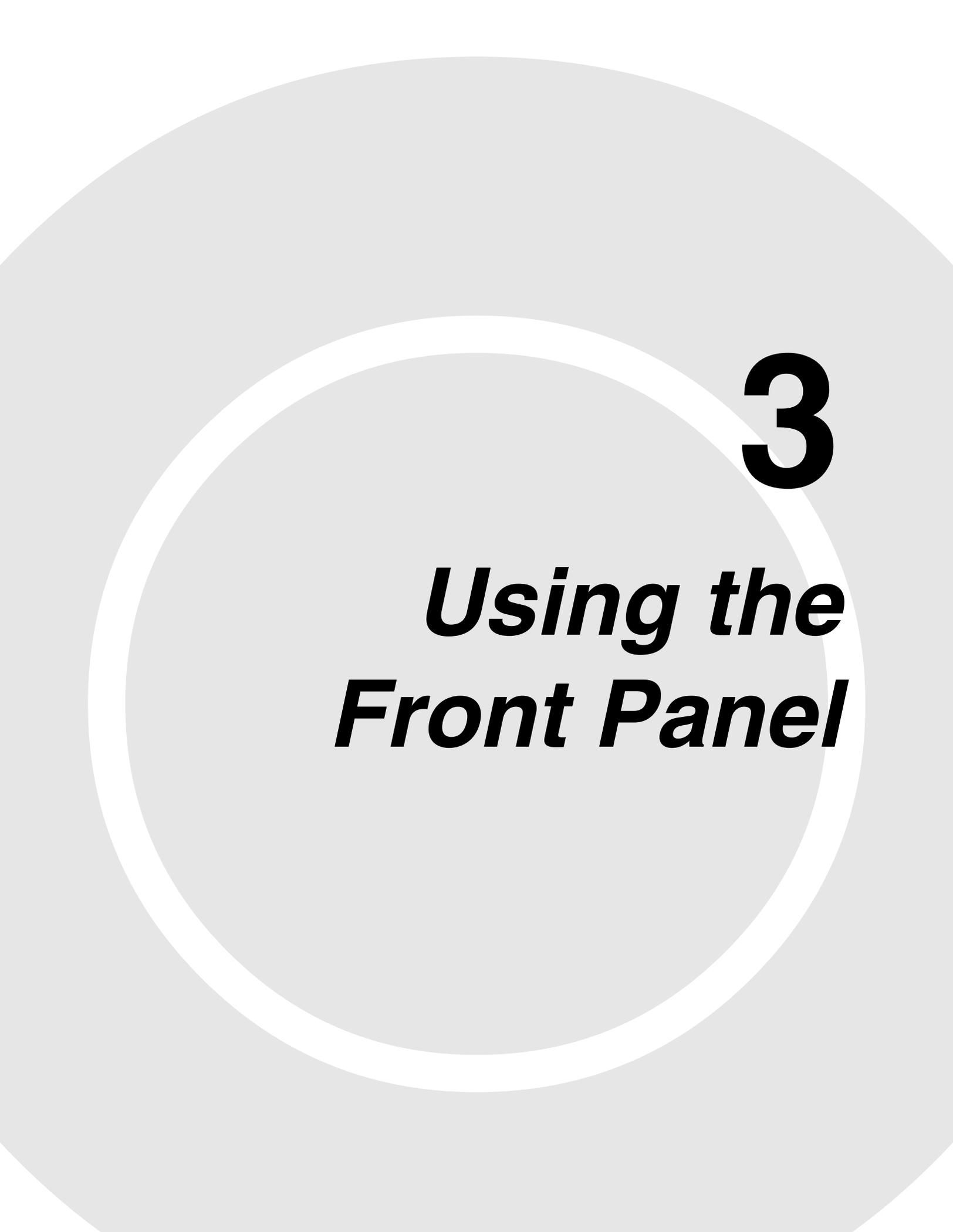
- In a Windows 3.1x or Windows 9x application, select **Print** from the **File** menu, and then select **Microsoft Fax** as the default printer.
- In a Windows 9x application, select **Send** from the **File** menu.
- In Microsoft Exchange, select **Compose**, and then select **New fax**.

## References

The World Wide Web is an excellent source of information about modems in general and modem installation, configuration, and troubleshooting in particular. The following Web sites are good places to start:

- Costmo's Other Resources Page:  
<http://modems.rosenet.net/or/>
- Curt's High Speed Modem Page:  
<http://elaine.teleport.com/~curt/modems.html>
- Data Communications FAQ:  
<http://www.best.com/~malch/comfaq.html>
- Multi-Tech Systems, Inc.:  
<http://www.multitech.com/>





**3**

***Using the  
Front Panel***

## Introduction

Like any modem, your Multi-Tech modem operates only under the control of a communication program, such as the Trio DataFax program included with the modem. It also operates under other general-purpose data communication programs, such as Windows Terminal and HyperTerminal. For information on how to use the modem with the communication program of your choice, please refer to the program's documentation.

## Modem Configuration

Your modem normally is configured through Windows or through the communication program you are using. The default settings work best for most purposes. See "Step 3: Install and Configure Your Software" in Chapter 2 for help in setting up your communication program.

You also can configure your modem either through the front panel or by sending AT commands to the modem. This chapter describes how to configure it using the front panel. To configure it using AT commands, see Chapter 4.

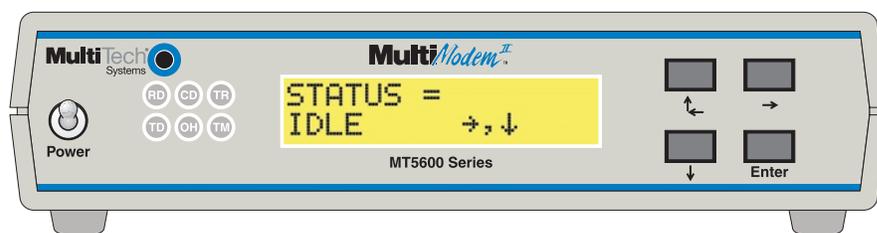


Figure 3-1. Front panel

## LED Indicators

The MT5600BA/BL has six LED indicators on the front panel that indicate status and activity:

- RD** **Receive Data.** The RD indicator flashes when the modem is receiving data.
- TD** **Transmit Data.** The TD indicator flashes when the modem is transmitting data.
- 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.
- OH** **Off-Hook.** The OH indicator lights when the modem is off-hook, which occurs when the modem is dialing, online, or answering a call. The LED flashes when the modem pulse-dials.

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

**TM** **Test Mode.** The TM indicator lights when the modem is in test mode.

## Liquid Crystal Display (LCD)

The MultiModemII's backlit liquid crystal display (LCD) has two functions: to display the current status of the modem and to display configuration menus, which are selected using the four pushbuttons on the front panel.

### Option Selection

To select most configuration options, simply display the option in the LCD, and then press the **Enter** button to select it. An **OPTION SET** message appears to confirm the selection. To exit the **OPTION SET** message, press any button.

Some options, such as password options and phone number options, require you to enter a character string. To select a character, press the  $\uparrow\leftarrow$  and  $\downarrow$  buttons. To go to the next character position, press the  $\rightarrow$  button. To backspace, press the  $\rightarrow$  button before selecting a character. To exit without saving, press the  $\rightarrow$  button several times. To save a character string, press the **Enter** button.

### Menu Structure

The LCD menus have a tree structure with multiple trunks, limbs, branches, and twigs. For a schematic view, refer to the menu map on the next page.

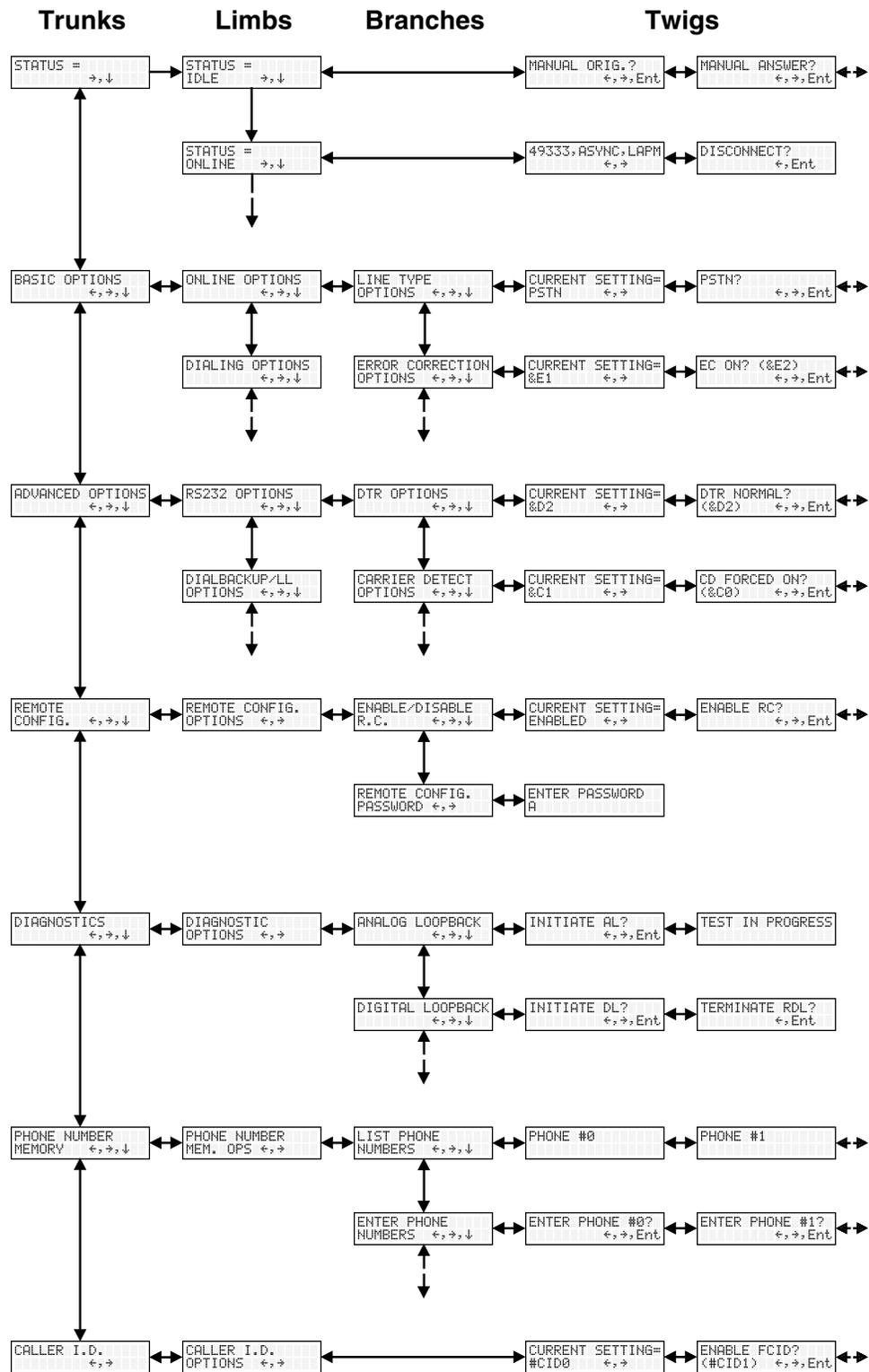
**Trunks** are the major divisions of the menu tree. There are seven trunks: Status, Basic Options, Advanced Options, Remote Configuration, Diagnostics, Phone Number Memory, and Caller ID. Use the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to move between trunks.

**Limbs** are subdivisions of trunks. Use the  $\rightarrow$  button to move from a trunk onto its first limb, and the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to move between limbs on the trunk.

**Branches** are subdivisions of limbs. Use the  $\rightarrow$  button to move from a limb onto its first branch, and the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to move between branches on the limb.

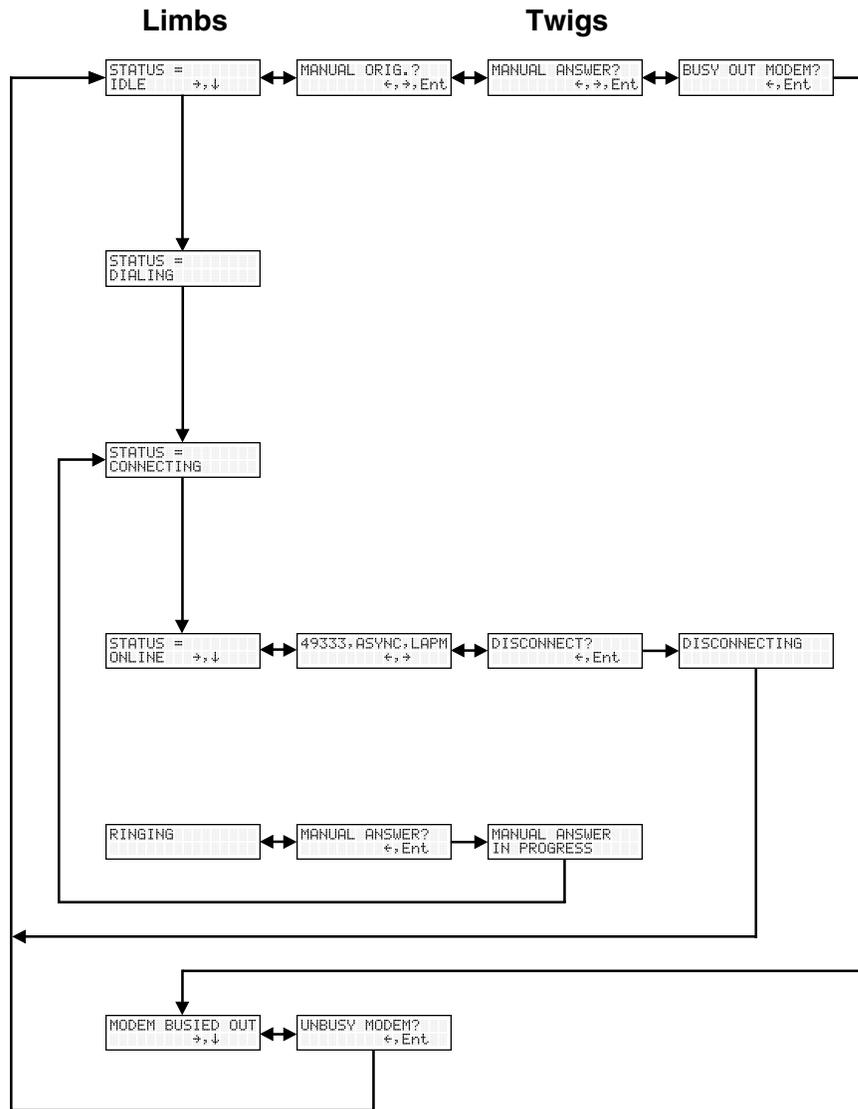
**Twigs** are status screens and options that are accessible only from branches. Use the  $\rightarrow$  button to move from a branch to its first status screen or option; then press the  $\leftarrow$  and  $\rightarrow$  buttons to move between options, and press the **Enter** button to select an option.

Menu Overview



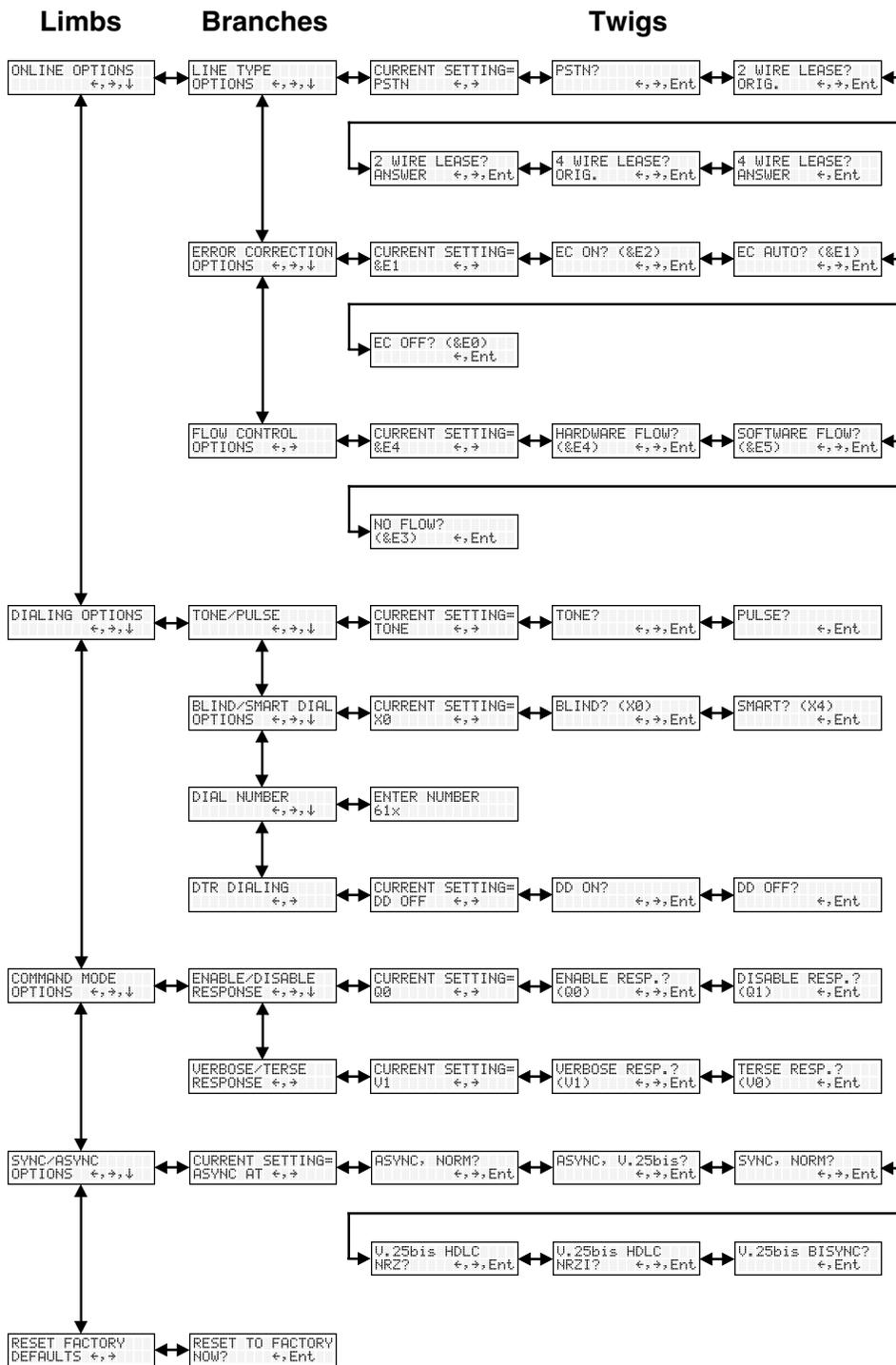
**Status Trunk**

The Status Trunk shows the current operating status of the modem. Limb changes are automatic, but certain options can be accessed by pressing the → button. Note that when the modem is online, pressing the → button shows the connect status, including the data speed, connection type, and compression type.



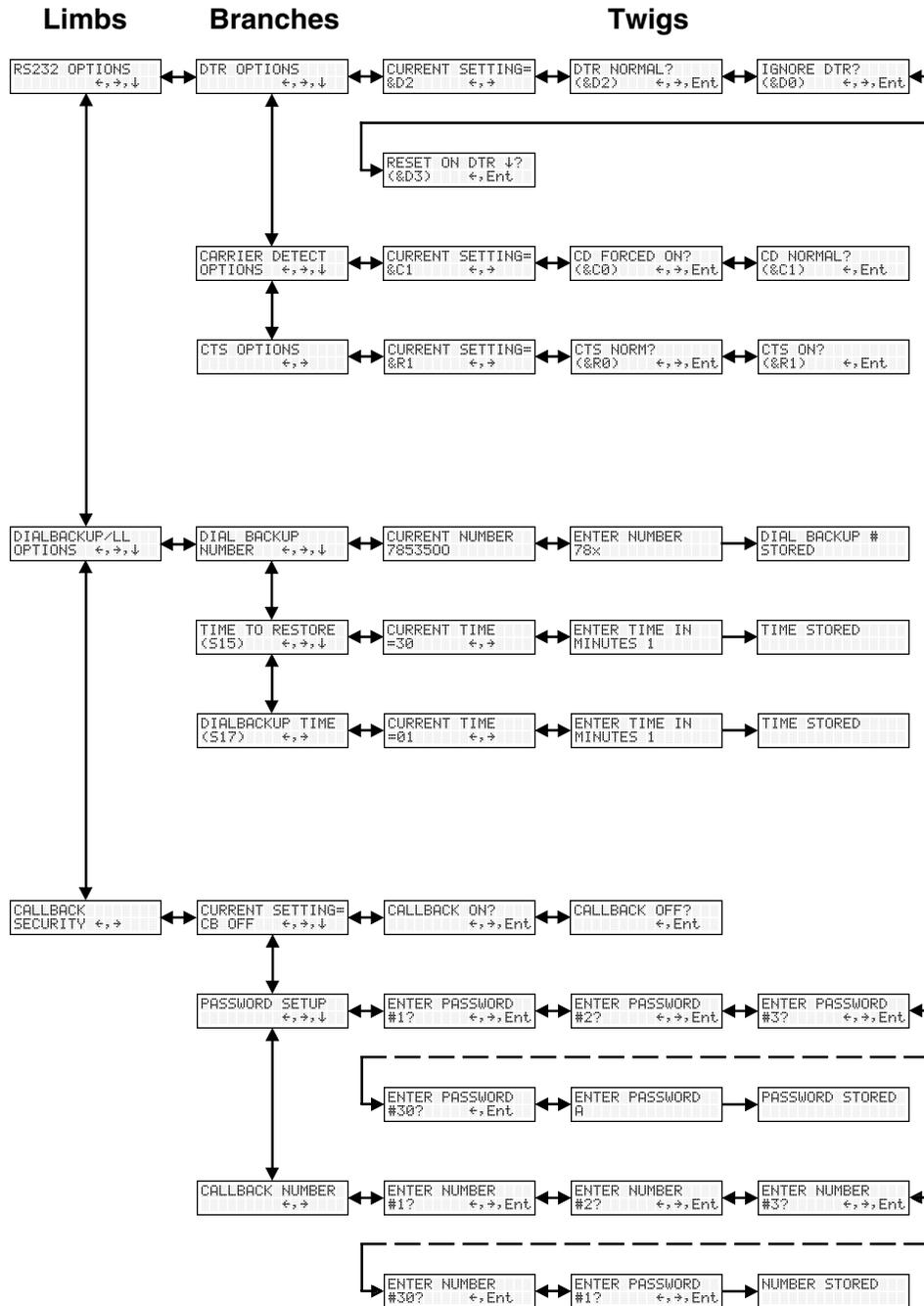
Basic Options Trunk

Use the Basic Options Trunk to configure the modem's basic operating conditions. When entering a number, use the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to scroll through a list of digits and characters. To go to the next position, press the  $\rightarrow$  button. To back up or to exit without dialing, press the  $\rightarrow$  button several times.



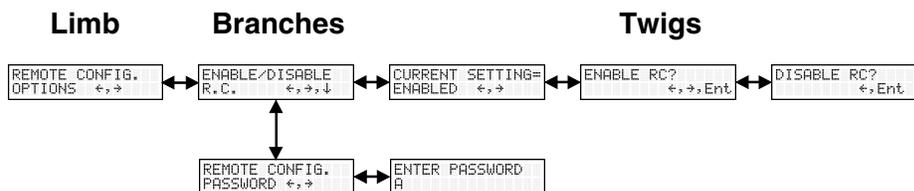
**Advanced Options Trunk**

Use the Advanced Options Trunk to configure RS-232, dial backup, and callback security options. When entering a number or password, use the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to select a character or digit. To go to the next position, press the  $\rightarrow$  button. To back-space or to exit, press the  $\rightarrow$  button several times.



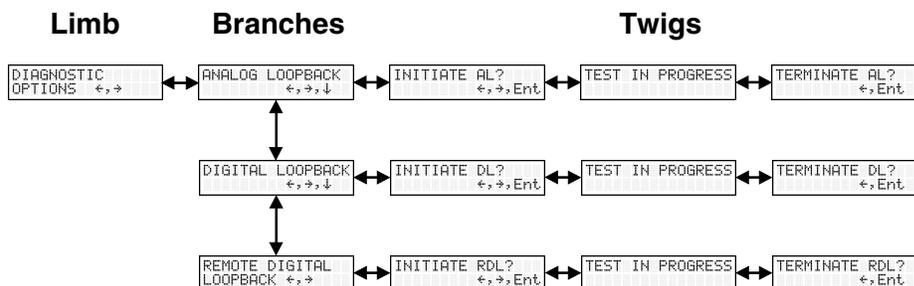
### **Remote Configuration Options Trunk**

Use the Remote Configuration Options Trunk to enable or disable remote configuration on the modem, and to change the password. When entering the password, use the  $\uparrow$  and  $\downarrow$  buttons to scroll through the alphabet. To go to the next character position, press the  $\rightarrow$  button. To backspace or to exit, press the  $\rightarrow$  button several times.



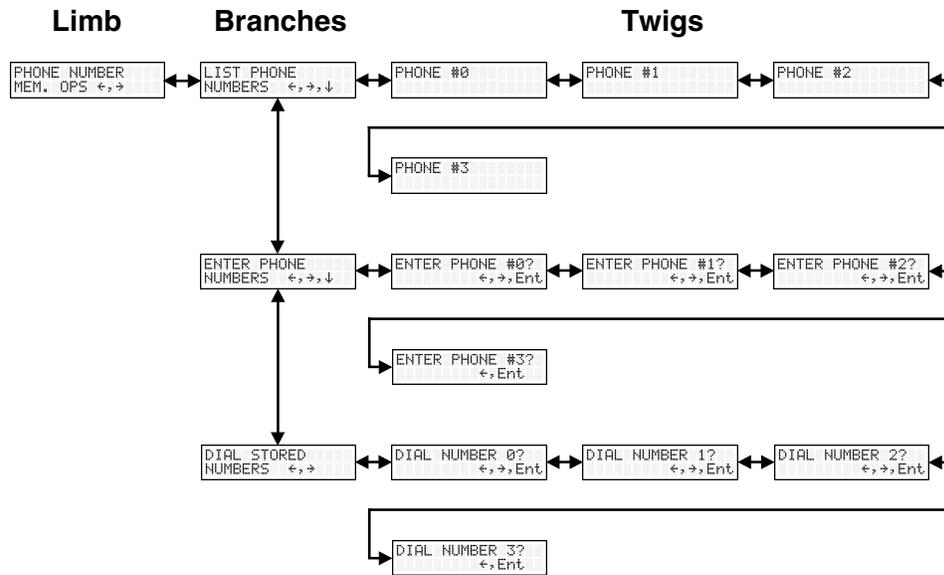
### **Diagnostic Options Trunk**

Use the Diagnostic Options Trunk to run loopback tests on the modem. When a test is in progress, the TM indicator lights.



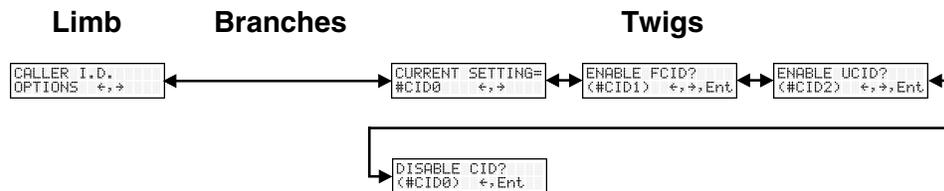
### Phone Number Memory Options Trunk

The MultiModemII can store up to four telephone numbers for speed dialing. Use the Phone Number Memory Options Trunk to store, list, and dial these numbers. When entering a number, use the  $\uparrow\leftarrow$  and  $\downarrow$  buttons to scroll through the available digits and dialing commands. To go to the next position, press the  $\rightarrow$  button. To backspace or to exit, press the  $\rightarrow$  button several times.



### Caller ID Options Trunk

Use the Caller ID Options Trunk to enable or disable Caller ID operation.



## Menu Options

This section describes important LCD screens and options. Many, but by no means all, of the options have AT command equivalents.

### Status

Status screens display the current status of the modem. Though limb changes are automatic, certain options can be selected by pressing the → button.

```
STATUS =
IDLE    →,↓
```

**STATUS = IDLE.** The modem is ready but inactive. This screen appears when the modem is first turned on, and is the starting point for accessing all other screens.

Three options are available from this screen by pressing the → button:

```
MANUAL ORIG.?
←,→,Ent
```

**MANUAL ORIG.?** Places the modem in originate mode for the time specified by register S7. Use this option to connect to a remote modem by manually dialing the number on a phone connected to the local modem. When the remote modem answers, press the **Enter** button to establish a connection with the remote modem. You can also use this option to temporarily place the modem in originate mode for back-to-back testing.

```
MANUAL ANSWER?
←,→,Ent
```

**MANUAL ANSWER?** Places the modem in answer mode for the time specified by register S7. You can use this option to temporarily place the modem in answer mode for back-to-back testing.

```
BUSY OUT MODEM?
←,Ent
```

**BUSY OUT MODEM?** Takes the modem out of service by putting it into an off-hook state so that a calling modem receives a busy signal.

```
MODEM BUSIED OUT
→,↓
```

**MODEM BUSIED OUT.** Shows that the modem is busied out. To return the modem to normal service, press →, **Enter**.

```
STATUS =
ONLINE  →,↓
```

**STATUS = ONLINE.** The modem is connected to another modem. Two options are available from this screen by pressing the → button:

```
49333,ASYNC,LAPM
←,→
```

**Connect Status.** Shows the connect speed, connection type, and error correction being used.

```
DISCONNECT?
←,Ent
```

**DISCONNECT?** Press the **Enter** button to force the modem to hang up. Same as the **ATH** command.

```
RINGING
```

**RINGING.** A remote modem or caller is attempting to establish a connection. One option is available from this screen by pressing the → button:

```
MANUAL ANSWER?
←,Ent
```

**MANUAL ANSWER?** Forces the modem to answer the phone. You can use this option to establish a connection if autoanswer is turned off (**S0=0**). Same as the **ATA** command.

## Basic Options

The following screens are used to configure the modem's basic operating conditions.

```
ONLINE OPTIONS
  ←, →, ↓
```

**ONLINE OPTIONS.** The following screens are used to configure the online operation of the modem:

```
LINE TYPE
OPTIONS  ←, →, ↓
```

**LINE TYPE OPTIONS.** Use the → and **Enter** buttons to select from the following line types: dial-up (PSTN), two-wire leased line originate or answer, and four-wire leased line originate or answer.

```
ERROR CORRECTION
OPTIONS  ←, →, ↓
```

**ERROR CORRECTION OPTIONS.** Use the → and **Enter** buttons to turn error correction on or off, or to select automatic error correction. Same as the **&E0**, **&E1**, and **&E2** commands.

```
FLOW CONTROL
OPTIONS  ←, →
```

**FLOW CONTROL OPTIONS.** Use the → and **Enter** buttons to select no flow control, hardware flow control, or software flow control. Same as the **&E3**, **&E4**, and **&E5** commands.

```
DIALING OPTIONS
  ←, →, ↓
```

**DIALING OPTIONS.** The following screens are used to configure dialing options or to dial manually.

```
TONE/PULSE
  ←, →, ↓
```

**TONE/PULSE.** Use the → and **Enter** buttons to select between DTMF tone dialing and pulse dialing. Same as the **T** and **P** commands.

```
BLIND/SMART DIAL
OPTIONS  ←, →, ↓
```

**BLIND/SMART DIAL OPTIONS.** Use the → and **Enter** buttons to select blind dialing, in which the modem sends the **OK**, **CONNECT**, **RING**, **NO CARRIER**, **ERROR** and **NO ANSWER** messages to the computer and does not look for a dial tone or busy signal, or smart dialing, in which the modem sends all messages to the computer, including **NO DIALTONE** and **BUSY**. Same as the **X0** and **X4** commands.

```
DIAL NUMBER
  ←, →, ↓
```

**DIAL NUMBER.** Use the front panel buttons to enter a phone number and dial it. To scroll through a list of digits and characters, press the ↑← and ↓ buttons. To go to the next position, press the → button. To back up or to exit without dialing, press the → button several times. To dial the number, press the **Enter** button. Same as the **D** command.

```
DTR DIALING
  ←, →
```

**DTR DIALING.** Use the → and **Enter** buttons to enable or disable DTR dialing. DTR dialing is popular in synchronous applications. In DTR dialing, the modem automatically dials the number stored in memory location 3 when it detects a high DTR (Data Terminal Ready) signal on the RS-232 interface. The DTR signal must remain high for the duration of the call. To store the DTR dialing number, use the **&Z3=** command or the **ENTER PHONE #3** menu option.

---

**Note:** Plug and Play does not function if DTR dialing is enabled. DTR is used during Plug and Play, and DTR dialing interferes with it.

---

```
COMMAND MODE
OPTIONS ←,→,↓
```

**COMMAND MODE OPTIONS.** The following screens are used to configure result code responses.

```
ENABLE/DISABLE
RESPONSE ←,→,↓
```

**ENABLE/DISABLE RESPONSE.** Use the → and **Enter** buttons to enable or disable the sending of result codes to the computer. Same as the **Q0** and **Q1** commands.

```
VERBOSE/TERSE
RESPONSE ←,→
```

**VERBOSE/TERSE RESPONSE.** Use the → and **Enter** buttons to select verbose or terse result codes. Same as the **V0** and **V1** commands.

```
SYNC/ASYNC
OPTIONS ←,→,↓
```

**SYNC/ASYNC OPTIONS.** Use the → and **Enter** buttons to select the method of data transmission.

```
ASYNC, NORM?
←,→,Ent
```

**ASYNC, NORM?** Normal asynchronous transmission using the AT command set.

```
ASYNC, V.25bis?
←,→,Ent
```

**ASYNC, V.25bis?** Asynchronous transmission using the V.25bis command set.

```
SYNC, NORM?
←,→,Ent
```

**SYNC, NORM?** Normal synchronous transmission using any command set.

```
V.25bis HDLC
NRZ? ←,→,Ent
```

**V.25bis HDLC NRZ?** V.25bis synchronous transmission using NRZ encoding. *Not implemented.*

```
V.25bis HDLC
NRZI? ←,→,Ent
```

**V.25bis HDLC NRZI?** V.25bis synchronous transmission using NRZI encoding. *Not implemented.*

```
V.25bis BISYNC?
←,Ent
```

**V.25bis BISYNC?** V.25bis bisynchronous transmission. *Not implemented.*

```
RESET FACTORY
DEFAULTS ←,→
```

**RESET FACTORY DEFAULTS.** Use the → and **Enter** buttons to reset Profile 0 and the modem's active configuration to the factory defaults. Same as the **AT&F&W** command string.

## Advanced Options

```
RS232 OPTIONS
←,→,↓
```

**RS232 OPTIONS.** The following screens are used to configure the RS-232 interface.

```
DTR OPTIONS
←,→,↓
```

**DTR OPTIONS.** Use the → and **Enter** buttons to select how the modem responds to the high to low transition of the DTR signal sent by the computer. **DTR NORMAL** causes the modem to hang up; **IGNORE DTR** allows operation with computers that do not provide DTR; and **RESET ON DTR ↓** causes the modem to perform a soft reset as if the **Z** command were received. Same as the **&D0**, **&D2**, and **&D3** commands.

```
CARRIER DETECT
OPTIONS ←,→,↓
```

**CARRIER DETECT OPTIONS.** Use the → and **Enter** buttons to select whether CD will be forced high (**CD FORCED ON**) or whether it will go high when the remote modem's carrier signal is detected, and go low when the carrier signal is not detected (**CD NORMAL**). Same as the **&C0** and **&C1** commands.

```
CTS OPTIONS
←,→
```

**CTS OPTIONS.** Use the → and **Enter** buttons to select whether the CTS state will follow the RTS state when on line (**CTS NORM**) or whether CTS will always be high (**CTS ON**). Same as the **&R0** and **&R1** commands.

```
DIALBACKUP/LL
OPTIONS ←,→,↓
```

**DIALBACKUP/LL OPTIONS.** The following screens are used to configure dial backup for four-wire leased line operation. For more information, see Chapter 7, "Leased Line Operation."

```
DIAL BACKUP
NUMBER ←,→,↓
```

**DIAL BACKUP NUMBER.** Use to enter a dial backup number. To scroll through a list of digits and characters, press the ↑← and ↓ buttons. To go to the next position, press the → button. To back up or to exit without saving, press the → button several times. To save the number, press the **Enter** button.

```
TIME TO RESTORE
(S15) ←,→,↓
```

**TIME TO RESTORE (S15).** Use to set how frequently leased line restoral attempts occur when the modems are in dial backup mode. The restore time interval can be set from 10 to 255 minutes in one minute increments. Same as the **S15=** command.

```
DIALBACKUP TIME
(S17) ←,→
```

**DIALBACKUP TIME (S17).** Use to set how long the modem waits after a leased line failure before it attempts a dial backup connection. The timer can be set from 1 to 255 minutes in one minute increments. Same as the **S17=** command.

```
CALLBACK
SECURITY ←,→
```

**CALLBACK SECURITY.** Use the → and **Enter** buttons to turn callback security on or off. Same as the **#DB0** and **#DB1** commands. For more information about callback security, see Chapter 6, "Callback Security."

```
PASSWORD SETUP
←,→,↓
```

**PASSWORD SETUP.** Use to enter callback security passwords in memory locations 1–30. Each password must be six to ten characters in length. To scroll through a list of digits and characters, press the ↑← and ↓ buttons. To go to the next position, press the → button. To back up or to exit without saving, press the → button several times. To save the password, press the **Enter** button. Same as the **#CBP=** command.

```
CALLBACK NUMBER
←,→
```

**CALLBACK NUMBER.** Use to enter callback security phone numbers in memory locations 1–30. Each number can be up to 30 characters long. Same as the **#CBN=** command.

### Remote Configuration Options

```
REMOTE CONFIG.
OPTIONS ←,→
```

The following screens are used to configure remote configuration options. For more information about remote configuration, see Chapter 5, "Remote Configuration."

```
ENABLE/DISABLE
R.C. ←,→,↓
```

**ENABLE/DISABLE R.C.** Use the → and **Enter** buttons to turn remoteconfiguration on or off.

```
REMOTE CONFIG.
PASSWORD ←,→
```

**REMOTE CONFIG. PASSWORD.** Use to enter the remote configuration password. To scroll through a list of digits and characters, press the ↑← and ↓ buttons. To go to the next position, press the → button. To back up or to exit without saving, press the → button several times. To save the password, press the **Enter** button.

### Diagnostic Options

```
DIAGNOSTIC
OPTIONS  ←,→
```

Use the following screens to turn loopback tests on and off. For information about how to apply these tests, see Appendix C, "Loopback Tests."

```
ANALOG LOOPBACK
←,→,↓
```

**ANALOG LOOPBACK.** Press the → and **Enter** buttons to start the analog loopback test. The **TEST IN PROGRESS** screen appears. To stop the test, press the → and **Enter** buttons again.

```
DIGITAL LOOPBACK
←,→,↓
```

**DIGITAL LOOPBACK.** Press the → and **Enter** buttons to start the local digital loopback test. The **TEST IN PROGRESS** screen appears. To stop the test, press the → and **Enter** buttons again. Same as the **&T3** command.

```
REMOTE DIGITAL
LOOPBACK ←,→
```

**REMOTE DIGITAL LOOPBACK.** Press the → and **Enter** buttons to start the remote digital loopback test. The **TEST IN PROGRESS** screen appears. To stop the test, press the → and **Enter** buttons again. Same as the **&T6** command.

### Phone Number Memory Options

```
PHONE NUMBER
MEM. OPS ←,→
```

Use the following screens to list, enter, and dial stored phone numbers. Up to four phone numbers can be stored. The number in memory location 3 is used for DTR dialing, if DTR dialing is enabled.

```
LIST PHONE
NUMBERS ←,→,↓
```

**LIST PHONE NUMBERS.** Press the → button several times to display the phone number stored in each memory location.

```
ENTER PHONE
NUMBERS ←,→,↓
```

**ENTER PHONE NUMBERS.** Use to store up to four phone numbers in memory locations 0–3. Each number can have up to 30 characters. To scroll through a list of digits and characters, press the ↑← and ↓ buttons. To go to the next position, press the → button. To back up or to exit without saving, press the → button several times. To save the number, press the **Enter** button. Same as the **&Z=** commands.

```
DIAL STORED
NUMBERS ←,→
```

**DIAL STORED NUMBERS.** Press the → and **Enter** buttons to dial a stored phone number. Same as the **DS=** commands.

### Caller ID Options

```
CALLER I.D.
OPTIONS ←,→
```

Press the → and **Enter** buttons to enable formatted (**FCID**) or unformatted (**UCID**) Caller ID, or to disable Caller ID altogether. Same as the **#CID=0**, **#CID=1**, and **#CID=2** commands.

---

**Note:** Since Caller ID information is sent between the first and second ring, register **S0** must be set to 2 or more rings for the modem to receive Caller ID information.

---

# 4

## ***AT Commands, S-Registers & Result Codes***

## Introduction

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 *AT*tention of the modem.

AT commands can be issued only when the modem is in command mode or online command mode. The modem is in *command mode* whenever it is not connected to another modem. The modem is in *data mode* whenever it is connected to another modem and ready to exchange data. *Online 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 online command mode from data mode, you must issue an *escape sequence* (+++) followed immediately by the *AT* characters and the command, e.g., +++ATH to hang up the modem. To return to data mode from online command mode, you must issue the command ATO.

To send AT commands to the modem you must use a communications program, such as the HyperTerminal applet in Windows 95, 98, and NT 4.0, or the Trio communications program included with your modem. 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, e.g., to turn autoanswer on or off.

The format for entering an AT command is **ATXn**, 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 the "AT Commands" section, which begins on the next page.

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 "Result Codes" at the end of this chapter.

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.

## 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.

MANUAL ANSWER?  
 ↵, Ent

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: **Bn** **Communication Standard Setting**  
 Values:  $n = 0$  or  $1$   
 Default:  $1$   
 Description: B0 Selects ITU-T V.22 mode when the modem is at 300 or 1200 bps.  
 B1 Selects Bell 212A when the modem is at 300 or 1200 bps.

ENTER NUMBER  
 0-9

Command: **Ds** **Dial**  
 Values:  $s =$  dial string (phone number and dial modifiers)  
 Default: none  
 Description: Dials telephone number  $s$ , where  $s$  may up to 40 characters long and include the following dial string modifiers. Spaces, parentheses, and hyphens are ignored.

- 0–9** Digits 0 through 9
- \*** The “star” digit (tone dialing only)
- #** The “pound” digit (tone dialing only)
- A–D** A, B, C, and D tone digits. Country specific; some countries may prohibit these digits.
- 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** or **X4** 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 the time specified in **S29**, then off-hook again .
- @** Wait for silence. Causes the modem to wait for 5 seconds of

silence before processing the next part of the command. If silence is not detected within the time set in register *S7*, the modem returns a NO ANSWER or BUSY code.

- ^ Toggle data calling tone on or off. Applies only to current dialing attempt.
- \$ Detect credit card “bong” tone. If the tone is not detected within the time specified by *S7* (US models), the modem aborts the rest of the sequence and hangs up. The character should follow the phone number and precede the user’s call card number, e.g., **ATDT1028806127853500\$123456789**.

DIAL NUMBER 0? ←, →, Ent
DIAL NUMBER 1? ←, →, Ent
DIAL NUMBER 2? ←, →, Ent
DIAL NUMBER 3? ←, Ent

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

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

DISCONNECT? ←, Ent
-----------------------

Command: **Hn Hook Control**  
 Values: *n* = 0 or 1  
 Default: 0  
 Description: H0 Go on-hook (hang up) and terminate any **&T** test that is in progress.  
 H1 Go off-hook (make the phone line busy) and enter command mode.

Command: **In Information Request**  
 Values: *n* = 0–6  
 Default: None  
 Description: I0 Display the product code. Example: *MT5600BA*.  
 I1 Calculate the ROM checksum and display the least significant byte in decimal format.  
 I2 Calculate the ROM checksum and compare it to the prestored checksum, displaying *OK* if they match, or *ERROR* if they do not.  
 I3 Display the controller firmware version (F), the basic model (V90), the application code (A), and the interface type code (I) in the format *VF.FFF-V90\_AI*. The application codes are *D* for desk-top and *L* for low power (PCMCIA). The interface codes are *S* for serial and *P* for parallel. Example: *V2.210-V90\_2M\_DLS*.  
 I4 Display the OEM-defined identifier string in either binary or ASCII format.  
 I5 Display the country code. Example: *022*.  
 I6 Display the modem data pump model and internal code version. Example: *RCV56DPF-PLL L8571A Rev 29.00/29.00*.

Command: **Ln Monitor Speaker Volume**

Values:  $n = 0, 1, 2, \text{ or } 3$

Default: 1

Description: L0 Select low volume.  
 L1 Select low volume.  
 L2 Select medium volume.  
 L3 Select high volume.

Command: **Mn Monitor Speaker Mode**

Values:  $n = 0, 1, 2, \text{ or } 3$

Default: 1

Description: M0 Speaker is always off.  
 M1 Speaker is on until the carrier signal is detected.  
 M2 Speaker is always on when the modem is off-hook.  
 M3 Speaker is off when receiving carrier and during dialing, but on during answering.

Command: **Nn Modulation Handshake**

Values:  $n = 0 \text{ or } 1$

Default: 1

Description: N0 Disables automode. The modem attempts a handshake at the speed set by S37 or, if S37=0, at the most recently sensed serial port speed.  
 N1 Enables automode. The modem attempts a handshake at the speed set by S37 or, if S37=0, at the highest possible speed. During the handshake, fallback to a lower speed can occur.

**Note:** Setting the *N* command automatically sets the *<automode>* parameter of the *+MS* command. *N* and *S37* are provided only for compatibility with existing software. *+MS* is the recommended command.

Command: **On Return Online to Data Mode**

Values: 0 or 1

Default: None

Description: O0 Exit online command mode and return to online data mode without a retrain. Normally used after a +++ escape (see +++AT<CR> escape sequence).  
 O1 Exit online command mode and return to online data mode after a retrain.

PULSE?	↵, Ent
--------	--------

Command: **P Pulse Dialing**

Values: P, T

Default: T

Description: Forces pulse (non-touch-tone) dialing until a *T* command or *T* dial modifier is received.

ENABLE RESP.?	↵, ↵, Ent
---------------	-----------

Command: **Qn Result Codes Enable/Disable**

Values:  $n = 0 \text{ or } 1$

Default: 0

Description: Q0 Enable result codes.  
 Q1 Disable result codes.

DISABLE RESP.?	↵, Ent
----------------	--------

Command: **Sr**    **Select Register**  
 Values:             $r =$  S-register number  
 Default:           None  
 Description:       Selects register  $Sr$  as the last register accessed. E.g., **S0**. The command **AT?** can then be used to read the register, and the command **AT= $n$**  can then be used to set the register to value  $n$ .

Command: **Sr= $n$**     **Set Register Value**  
 Values:             $r =$  S-register number;  $n$  varies  
 Default:           None  
 Description:       Sets value of register  $Sr$  to  $n$ , where  $n$  is entered in decimal format. E.g., **S0=1**. If the short form **AT= $n$**  is used, the value is written to the last accessed S-register.

Command: **Sr?**    **Read Register Value**  
 Values:             $r =$  S-register number  
 Default:           None  
 Description:       Reads value of register  $Sr$  and display it in 3-digit decimal format. E.g., **S2?** gives the response *043*. If the short form **AT?** is used, the last accessed S-register is read.

```
TONE?
  ↵, →, Ent
```

Command: **T**    **Tone Dialing**  
 Values:            P, T  
 Default:           T  
 Description:       Forces DTMF (touch-tone) dialing until a **P** command or **P** dial modifier is received.

```
TERSE RESP.?
(U0) ↵, Ent
VERBOSE RESP.?
(U1) ↵, →, Ent
```

Command: **Vn**    **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: **Wn**    **Connect Message Control**  
 Values:             $n = 0, 1,$  or  $2$   
 Default:            $0$   
 Description:       W0 The **CONNECT** result code reports the serial port speed. Other responses are disabled.  
                      W1 The **CONNECT** result code reports the line speed, the error correction protocol, and the serial port speed, respectively. Other responses are disabled.  
                      W2 The **CONNECT** result code reports the line speed only. Other responses are disabled.

---

**Note:** See also the **\V** command

---

Command: **Xn**    **Result Code Selection**  
 Values:             $n = 0-4$   
 Default:            4  
 Description:        This command selects which subset of the result messages will be used by the modem to inform the computer of the results of commands.

```
BLIND? (X0)
        ↵,↵,Ent
```

- X0 Sends *OK*, *CONNECT*, *RING*, *NO CARRIER*, *ERROR* and *NO ANSWER*; does not look for dial tone or busy signal.
- X1 Sends *X0* messages and connect speed; does not look for dial tone or busy signal.
- X2 Sends *X1* messages with *NO DIALTONE*; does not look for busy signal.
- X3 Sends *X1* messages with *BUSY*; does not look for dial tone.
- X4 Sends all messages, including *NO DIALTONE* and *BUSY*.

```
SMART? (X4)
        ↵,↵,Ent
```

---

**Note:** If the modem is in fax mode, the only message sent to indicate a connection is *CONNECT* without a speed indication. See also the *\V* command.

---

Command: **Yn**    **Long Space Disconnect**  
 Values:             $n = 0$  or  $1$   
 Default:            0  
 Description:        Y0 Disables sending or responding to a long space break signal on disconnect.  
                       Y1 Enables long space disconnect. In non-error correction mode, the modem sends a long space of four seconds prior to going on-hook. In non-error correction mode, the modem responds to the receipt of a long space (i.e., a break signal greater than 1.6 seconds) by going on-hook.

Command: **Zn**    **Modem Reset**  
 Values:             $n = 0$  or  $1$   
 Default:            None  
 Description:        The modem performs a soft reset and restores (recalls) the configuration profile according to the parameter supplied. If no parameter is specified, zero is assumed.  
                       Z0 Resets modem and restores Profile 0.  
                       Z1 Resets modem and restores Profile 1.

---

**Note:** See also the *&F* and *&W* commands.

---

```
CD FORCED ON?
(&C0)        ↵,↵,Ent
```

```
CD NORMAL?
(&C1)        ↵,↵,Ent
```

Command: **&Cn**    **Data Carrier Detect (DCD) Control**  
 Values:             $n = 0$  or  $1$   
 Default:            1  
 Description:        &C0 Forces the DCD circuit to always be high.  
                       &C1 DCD goes high when the remote modem's carrier signal is detected, and goes low when the carrier signal is not detected.

IGNORE DTR? (&D0)	←,→,Ent
DTR NORMAL? (&D2)	←,→,Ent
RESET ON DTR ↓? (&D3)	←,Ent

Command: **&Dn Data Terminal Ready (DTR) Control**  
 Values:  $n = 0, 1, 2, \text{ or } 3$   
 Default: 2  
 Description: This command interprets the high to low transition of the DTR signal sent by the computer according to the supplied parameter. The action taken depends on the current **&Q** setting.

**&D0** **&Q0, &Q5, &Q6:** DTR is ignored (assumed high). Allows operation with computers that do not provide DTR.  
**&Q1, &Q4:** DTR drop causes the modem to hang up. Autoanswer is not affected.  
**&Q2, &Q3:** DTR drop causes the modem to hang up. Autoanswer is inhibited.

**&D1** **&Q0, &Q1, &Q4, &Q5, &Q6:** DTR drop is interpreted by the modem as if the asynchronous escape sequence had been entered. The modem returns to asynchronous command state without disconnecting.  
**&Q2, &Q3:** DTR drop causes the modem to hang up. Autoanswer is inhibited.

**&D2** **&Q0–&Q6:** DTR drop causes the modem to hang up. Autoanswer is inhibited.

**&D3** **&Q0, &Q1, &Q4, &Q5, &Q6:** DTR drop causes the modem to perform a soft reset as if the **Z** command were received. The **&Y** setting determines which profile is loaded.  
**&Q2, &Q3:** DTR drop causes the modem to hang up. Autoanswer is inhibited.  
**&Q5 or &Q6 and +FCLASS=1 or +FCLASS=2:** Same as for **&Q0**.

EC OFF? (&E0)	←,Ent
EC AUTO? (&E1)	←,→,Ent
EC ON? (&E2)	←,→,Ent

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

NO FLOW? (&E3)	←,Ent
HARDWARE FLOW? (&E4)	←,→,Ent
SOFTWARE FLOW? (&E5)	←,→,Ent

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

---

**Note:** See also the **&K** command.

---

Command: **&Fn Load Factory Settings**  
 Values:  $n = 0 \text{ or } 1$   
 Default: None  
 Description: **&F0** Load factory configuration 0.  
**&F1** Load factory configuration 1.

---

**Note:** See also the **Z** command.

---

Command: **&Gn V.22bis Guard Tone Control**  
Values:  $n = 0, 1, \text{ or } 2$   
Default: 0 (North America), 2 (elsewhere)  
Description: &G0 Disables guard tone.  
&G1 Sets guard tone to 550 Hz.  
&G2 Sets guard tone to 1800 Hz.

---

**Note:** The &G command is not used in North America, and may not be permitted in some countries.

---

Command: **&Kn Flow Control Selection**  
Values:  $n = 0, 3, 4, 5, \text{ or } 6$   
Defaults: 3 (data modem mode)  
6 (fax modem and voice modes)  
Description: &K0 Disables flow control.  
&K3 Enables CTS/RTS hardware flow control.  
&K4 Enables XON/XOFF software flow control.  
&K5 Enables transparent XON/XOFF flow control.  
&K6 Enables both RTS/CTS and XON/XOFF flow control.

---

**Note:** See also the &E command

---

Command: **&Mn Communications Mode**  
Values:  $n = 0-3$   
Default: 0  
Description: This command determines the DTR operating mode. The modem treats the &M command as a subset of the &Q command.  
&M0 Selects direct asynchronous operation. Note that the command sequence &M0\N0 selects normal buffered mode, but the command sequence \N0&M0 selects direct mode. This is because the \N0 command is analogous to the &Q6 command.  
&M1 Selects synchronous connect mode with asynchronous offline command mode.  
&M2 Selects synchronous connect mode with asynchronous offline command mode. Same as &M1 except that &M2 enables DTR dialing of directory slot 3. The modem disconnects if DTR is low for more than the period stored in S25.  
&M3 Selects synchronous connect mode. This mode allows DTR to act as a talk/data switch. The call is manually initiated while DTR is inactive. When DTR becomes active, the handshake proceeds in originate or answer mode according to S14 bit 7.

Command: **&Qn Sync/Async Mode**  
 Values:  $n = 0-3, 5, 6$   
 Default: 5  
 Description: This command is an extension of the **&M** command, and is used to control which connection modes are permitted. It is used in conjunction with **S36** and **S48**. (See also the **\N** command.)

&Q0 Selects direct asynchronous operation. See **&M0**.  
 &Q1 Selects synchronous connect mode with asynchronous offline command mode. See **&M1**. (Serial interface operation only.)  
 &Q2 Selects synchronous connect mode with asynchronous offline command mode and enables DTR dialing of directory 3. See **&M2**. (Serial interface operation only.)  
 &Q3 Selects synchronous connect mode with asynchronous offline command mode and enables DTR to act as a talk/data switch. See **&M3**. (Serial interface operation only.)  
 &Q5 The modem will try to negotiate an error-corrected link. The modem can be configured using **S36** to determine whether a failure will result in the modem disconnecting or falling back to a non-error-correction connection. See also **\N3**.  
 &Q6 Selects asynchronous operation with speed buffering and no error correction. Same as **\N0**.

CTS NORM? (&R0)	←, →, Ent
CTS ON? (&R1)	←, Ent

Command: **&Rn Clear to Send (CTS) Control**  
 Values:  $n = 0$  or 1  
 Default: 1  
 Description: &R0 Let the CTS state follow the RTS state when online..  
 &R1 Force CTS high (ON).

Command: **&Sn Data Set Ready (DSR) Control**  
 Values:  $n = 0$  or 1  
 Default: 0  
 Description: &S0 Force DSR high (on) at all times.  
 &S1 Let DSR go high only during a connection.

INITIATE AL? ←, →, Ent
TERMINATE AL? ←, Ent
INITIATE DL? ←, →, Ent
TERMINATE DL? ←, Ent
INITIATE RDL? ←, →, Ent
TERMINATE RDL? ←, Ent

Command: **&Tn V.54 Test Commands**  
 Values:  $n = 0, 1, 3, 4, 5, 6, 7,$  or 8  
 Default: None  
 Description: The modem can perform selected test and diagnostic functions. A test can be run only when the modem is in asynchronous operation in non-error-correction mode (normal or direct mode). For tests 3, 6, and 7, a connection between the two modems must first be established. To terminate a test in progress, the escape sequence (+++) must be entered first, except for parameters 7 and 8. If **S18** is non-zero, a test terminates automatically after the time specified by **S18** and displays the **OK** message.

&T0 Abort. Stop any test in progress.  
 &T1 Start local analog loopback, V.54 Loop 3. If a connection exists when this command is issued, the modem hangs up. A **CONNECT** message is displayed at the start of the test.  
 &T3 Start local digital loopback, V.54 Loop 2. If no connection exists, **ERROR** is returned.

- &T4 Enables acknowledgment for remote digital loopback request.
- &T5 Ignores acknowledgment for remote digital loopback request.
- &T6 Requests a remote digital loopback, V.54 Loop 2, without self-test. If no connection exists, *ERROR* is returned. The *CONNECT XXXX* message is displayed at the start of the test.
- &T7 Requests a remote digital loopback, V.54 Loop 2, with self-test. (In self-test, a test pattern is looped back and checked by the modem.) If no connection exists, *ERROR* is returned. When the test is terminated, the number of detected errors is reported to the computer.
- &T8 Starts local analog loopback, V.54 Loop 3, with self-test. If a connection exists, the modem hangs up before the test begins. When the test is terminated, the number of detected errors is reported to the computer.

Command: **&V0 Display Current Configuration**  
Values: 0  
Default: None  
Description: Displays the current (active) configuration.

Command: **&V1 Display Last Connection Statistics**  
Values: 1  
Default: None  
Description: Displays statistics for the last connection.

Command: **&Wn Store Current Configuration**  
Values:  $n = 0$  or  $1$   
Default: None  
Description: &W0 Stores current modem settings in nonvolatile memory as Profile 0. Profile 0 is loaded instead of the factory defaults at power-on (if &Y0 is set) and by the **ATZ** command.  
&W1 Stores current modem settings in nonvolatile memory as Profile 1. Profile 1 is loaded instead of the factory defaults at power-on (if &Y1 is set) and by the **ATZ1** command.

---

**Note:** See also the **Z**, **&F**, and **&Y** commands.

---

Command: **&Xn Synchronous Clock Source**  
Values:  $n = 0, 1,$  or  $2$   
Default: 0  
Description: Selects the source of the transmit clock for synchronous mode. In asynchronous mode, the transmit and receive clocks are turned off. In synchronous mode, the clocks are turned on with a frequency of 1200 Hz or faster corresponding to the speed that is selected for modem operation.  
&X0 Selects internal timing. The modem generates the transmit clock signal and applies it to the TXCLK output at the serial interface.  
&X1 Selects external timing. The local DTE sources the transmit clock signal on the XTCLK input of the serial interface. The modem applies this clock to the TXCLK output at the serial interface

&X2 Selects slave receive timing. The modem derives the transmit clock signal from the incoming carrier and applies it to the TXCLK output at the serial interface

Command: **&Yn Select Profile for Hard Reset**  
 Values:  $n = 0$  or  $1$   
 Default: None  
 Description: &Y0 Select profile 0 to be loaded on power-up.  
 &Y1 Select profile 1 to be loaded on power-up.

---

**Note:** See also the &W and Z commands.

---

ENTER PHONE #0? *,*,Ent
ENTER PHONE #1? *,*,Ent
ENTER PHONE #2? *,*,Ent
ENTER PHONE #3? *,Ent

Command: **&Zy=x Store Telephone Number**  
 Values:  $y = 0-3$   
 $x =$  Dialing command  
 Default: None  
 Description: Stores telephone dial string  $x$  in memory location  $y$ . Each telephone number dial string can contain up to 30 digits. Dial the stored number using the *DS=y* command.

---

**Note:** DTR dialing uses the number stored in memory location 3.

---

Command: **%Cn Data Compression Control**  
 Values:  $n = 0, 1, 2,$  or  $3$   
 Default: 3  
 Description: Enables or disables data compression negotiation. The modem can only perform data compression on an error-corrected link.

%C0 Disables data compression.  
 %C1 Enables MNP 5 data compression negotiation.  
 %C2 Enables V.42bis data compression negotiation.  
 %C3 Enables both V.42bis and MNP 5 data compression negotiation.

Command: **%En Line Quality Monitor**  
 Values:  $n = 0, 1,$  or  $2$   
 Default: 2  
 Description: Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back to a lower speed when line quality is insufficient and fall forward to a faster speed when line quality is sufficient (%E2).

%E0 Disable line quality monitor and auto-retrain.  
 %E1 Enable line quality monitor and auto-retrain.  
 %E2 Enable line quality monitor and fallback/fall forward.

Command: **%L Line Signal Level**  
 Values: None  
 Default: None  
 Description: %L Returns a value that indicates the received signal level in dBm. The value returned is a direct indication (DAA-dependent) of the receive level at the MDP, not at the telephone line connector. Examples: 009 = -9 dBm, 043 = -43 dBm, and so on.

**Command:** **%Q** **Line Signal Quality**  
**Values:** None  
**Default:** None  
**Description:** %Q Reports line signal quality (DAA-dependent) as a three-digit number. Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2.

**Command:** **%U** **PCM Code Selection**  
**Values:** n = 0 or 1  
**Default:** 0  
**Description:** Specifies the PCM code type for 56K modulation. Note, however, that the modem automatically selects the code type if the server sends the proper ID.  
 %U0 Selects  $\mu$ -Law coding—used in North America and Japan.  
 %U1 Selects A-Law coding—used outside North America and Japan.

---

**Note:** See also the +MS= command.

---

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

**Command:** **\Bn** **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:** **\Kn** **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 Enter online command mode; no break sent to the remote modem.  
 \K1 Clear data buffers and send break to the remote modem.  
 \K2 Same as \K0.  
 \K3 Send break immediately to the remote modem .  
 \K4 Same as \K0.  
 \K5 Send break to the remote modem in sequence with the transmitted data.

**Data mode.** The modem receives the break from the remote modem during a non-error-corrected connection:

- \K0 Clear data buffers and send break to the computer.
- \K1 Same as \K0.
- \K2 Send break immediately to the computer.
- \K3 Same as \K2.
- \K4 Send break to the computer in sequence with the received data.
- \K5 Same as \K4.

**Online command mode.** The modem receives a `\Bn` command from the computer:

- \K0 Clear data buffers and send break to the remote modem.
- \K1 Same as \K0.
- \K2 Send break immediately to the remote modem.
- \K3 Same as \K2.
- \K4 Send break to the remote modem in sequence with the transmitted data.
- \K5 Same as \K4.

Command: **\Nn Error Correction Mode Selection**

Values:  $n = 0-5$

Default: 3

- Description:
- \N0 Normal (non-error correction) mode with data buffering. (Forces `&Q6`.)
  - \N1 Direct mode. Equivalent of `&M0` and `&Q0` modes. (Forces `&Q0`.)
  - \N2 V.42/MNP reliable (error-correction) mode. The modem attempts first a V.42 connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces `&Q5`, `S36=4`, and `S48=7`.)
  - \N3 V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 mode, then in MNP mode, and finally in non-error-correction mode with data buffering. (Forces `&Q5`, `S36=7`, and `S48=7`.)
  - \N4 V.42 (LAPM) reliable mode. If the modem cannot make a V.42 connection, it disconnects. (Forces `&Q5` and `S48=0`.) Note: The `-K1` command can override the `\N4` command.
  - \N5 MNP reliable mode. If the modem cannot make an MNP connection, it disconnects. (Forces `&Q5`, `S36=4`, and `S48=128`.)

Command: **\Wn Single Line Connect Message**

Values:  $n = 0$  or  $1$

Default: 0

- Description:
- \V0 Disables single line connect message. Connect messages are controlled by the `X`, `W`, and `S95` settings.
  - \V1 Enables single line connect messages in the format: `CONNECT <Serial Port Speed></Modulation></Protocol></Compression></Line Speed>/<Voice and Data>`. Connect messages are displayed in the single line format subject to the commands `V` and `Q`. In non-verbose mode (`V0`), single line connect messages are disabled and a single numeric result code is generated for `CONNECT`.

- Command: **+MS= Modulation Selection**  
Values: See description.  
Default: See description.  
Description: This extended-format command selects modulation and, optionally, enables or disables automode, specifies the lowest and highest connection rates, selects  $\mu$ -Law or A-Law codec type, and specifies the highest transmit rate using one to five subparameters.
- The command format is  
**+MS=[*mod*][,*automode*][,*min\_RX\_rate*][,*max\_RX\_rate*][,*x\_law*][,*reserved*][,*max\_TX\_rate*]]]]]]<CR>**  
Subparameters that are not entered retain their current value. Commas separate optional subparameters, and should be inserted to skip a subparameter. Example: **+MS=,0,<CR>** disables automode and keeps all other settings at their current values.
- +MS?** Reports current options in the format  
*mod,automode,min\_RX\_rate,max\_RX\_rate,x\_law,reserved,max\_TX\_rate*.  
Example: 56,1,300,56000,0,0,33600.
- +MS=?** Reports supported options in the format (list of supported *mod* values),(list of supported *automode* values),(list of supported *min\_RX\_rate* values),(list of supported *max\_RX\_rate* values),(list of supported *x\_law* values),(list of supported *reserved* values),(list of supported *max\_TX\_rate* values).  
Example: (0,1,2,3,9,10,11,56,64,69),(0,1),(300-33600),(300-56000),(0,1),(0,1),(300-33600).

### Subparameters

***mod*** A decimal number that specifies the preferred modulation (automode enabled) or the modulation to use in originating or answering a connection (automode disabled). See the table on the next page.

***automode*** An optional numeric value that enables or disables automatic modulation negotiation using V.8 bis/V.8 or V.32 bis Annex A. The options are:

0 = Disable automode

1 = Enable automode (default)

***min\_RX\_rate*** An optional number that specifies the lowest rate at which the modem may establish a receive connection. The value is decimal coded in units of bps, e.g., 2400 specifies the lowest rate to be 2400 bps. See "Possible rates" in the *mod* table. The default is 300 for 300 bps.

***max\_RX\_rate*** An optional number that specifies the highest rate at which the modem may establish a receive connection. The value is decimal coded in units of bps, e.g., 28800 specifies the highest rate to be 28800 bps. See "Possible rates" in the *mod* table. The default is 56000, for 56000 bps.

<mod>	Modulation	Possible rates (bps) <sup>1</sup>
0	V.21	300
1	V.22	1200
2	V.22bis	2400 or 1200
3	V.23	1200
9	V.32	9600 or 4800
10	V.32bis	14400, 12000, 9600, 7200, or 4800
11	V.34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400
12 <sup>2</sup>	V.90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, or 28000
56 <sup>3</sup>	K56flex	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, or 32000
64	Bell 103	300
69	Bell212	1200

Notes:

1. See optional <automode>, <min\_RX\_rate>, <max\_RX\_rate>, and <max\_TX\_rate> subparameters.
2. Selects V.90 modulation as first priority. If a V.90 connection cannot be established, the modem attempts K56flex, V.34, V.32bis, etc. (Default.)
3. Selects K56flex modulation as first priority. If a K56flex connection cannot be established, the modem attempts V.90, V.34, V.32bis, etc.

***x\_law*** An optional number that specifies the PCM code type for 56K modulation. The options are:  
 0 =  $\mu$ -Law—used in North America and Japan (default)  
 1 = A-Law—used outside North America and Japan  
 The modem automatically selects A-Law or  $\mu$ -Law if the server sends the Rockwell ID. Note that the **ATZ** command restores the *x\_law* value from NVRAM. You can also manually select A-Law or  $\mu$ -Law using the **%U** command.

***reserved*** Must not be changed from the default value of 0.

***max\_TX\_rate*** An optional number that specifies the highest rate at which the modem may establish a transmit connection. The value is decimal coded in units of bps, e.g., 33600 specifies the highest rate to be 33600 bps. See “Possible rates” in the *mod* table. The default is 33600, for 33600 bps.

Command: **-Kn MNP Extended Services**  
 Values: *n* = 0, 1, or 2  
 Default: 0  
 Description: Enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection.

-K0 Disables V.42 LAPM to MNP 10 conversion.  
 -K1 Enables V.42 LAPM to MNP 10 conversion.  
 -K2 Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.

Command: **-SDR=*n* Distinctive Ring Control**

Values: 0–7

Default: 0

Description: This command enables or disables detection and reporting of distinctive ring. One, two, or three distinctive ring types can be simultaneously enabled depending upon the value of *n*. The detected ring type is reported in the verbose result code by appending the ring type number to the end of the *RING* message.

-SDR=0 Disables distinctive ring. Any valid ring detected is reported as *RING*.

-SDR=1 Enables distinctive ring type 1.

-SDR=2 Enables distinctive ring type 2.

-SDR=3 Enables distinctive ring types 1 and 2.

-SDR=4 Enables distinctive ring type 3.

-SDR=5 Enables distinctive ring types 1 and 3.

-SDR=6 Enables distinctive ring types 2 and 3.

-SDR=7 Enables distinctive ring types 1, 2, and 3.

The supported ring types and ring cadence detection criteria are shown in the following table:

Distinctive ring type	Ring cadence detection criteria
1	2.0 sec. on, 4.0 sec. off
2	0.8 sec. on, 0.4 sec. off, 0.8 sec. on, 0.4 sec. off
3	0.4 sec. on, 0.2 sec. off, 0.4 sec. on, 0.2 sec. off, 0.8 sec. on, 0.4 sec. off

Command: **\*\**n* Flash Memory Download**

Values: *n* = 0, 1, or 2

Description: \*\*0 Initiate download to flash memory at the last sensed speed.

\*\*1 Initiate download to flash memory at 38.4K bps.

\*\*2 Initiate download to flash memory at 57.6K bps.

ENTER NUMBER  
#1? ←,→,Ent

Command: **#CBN $y$ = $x$  Store Callback Number**

Values:  $y$  = 01–30  
 $x$  = dialing string

Default: None

Description: Stores dialing string  $x$  in memory location  $y$ . The dialing string can include the digits 0 through 9 and any of the following characters: #, \*, comma (,), semicolon (;), *W*, *A*, *B*, *C*, and *D*. Up to 30 characters can be used. Example:

**AT#CBN01=9,16127853000.**

ENTER PASSWORD  
#1? ←,→,Ent

Command: **#CBP $y$ = $x$  Store Callback Password**

Values:  $y$  = 01–30  
 $x$  = password (6–10 characters)

Default: None

Description: Stores callback security password  $x$  in memory location  $y$ . The password must have 6 to 10 characters. Example:

**AT#CBP01=gilgamesh.**

DISABLE CID? (#CID0) ←,Ent
ENABLE FCID? (#CID1) ←,→,Ent
ENABLE UCID? (#CID2) ←,→,Ent

Command: **#CID=*n* Caller ID**

Values: *n* = 0, 1, or 2

Default: 0

Description: Enables or disables Caller ID recognition and reporting.

#CID=0 Disables Caller ID.

#CID=1 Enables formatted Caller ID reporting of ICLID SDM (Single Data Message) and MDM (Multiple Data Message) packets.

#CID=2 Enables unformatted Caller ID reporting of any ICLID packet received after the first *RING* cycle, including SDM, MDM, or call waiting packets.

#CID? Retrieves the current Caller ID mode from the modem.

#CID=? Returns the mode capabilities of the modem in a list with each element separated by commas.

CALLBACK OFF? ←,Ent
CALLBACK ON? ←,→,Ent

Command: **#DB*n* Callback Enable/Disable**

Values: *n* = 0 or 1

Default: 0

Description: Enables or disables callback security. 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 1–30. The phone number memory locations and their contents are restored when callback security is disabled.

#DB0 Disables callback security.

#DB1 Enables callback security.

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 19200 bps.
- \$SB38400 Set serial port to 38400 bps.
- \$SB57600 Set serial port to 57600 bps.
- \$SB115200 Set serial port to 115200 bps.
- \$SB230400 Set serial port to 230400 bps.

Command: **+++AT<CR> Escape Sequence**

Values: n/a

Description: Puts the modem in command mode (and optionally issues a command) while remaining online. Type **+++AT** and up to ten command characters, and then press **ENTER**. Used mostly to issue the hang-up command: **+++ATH<CR>**.

## S-Registers

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

Register	Unit	Range	Default	Description
<i>S0</i>	1 ring	0, 1–255	1	Sets the number of rings before the modem answers. <b>ATS0=0</b> disables autoanswer completely.
<i>S1</i>	1 ring	0–255	0	Counts the rings that have occurred.
<i>S2</i>	decimal	0–127 128–255	43 (+)	Sets ASCII code for the escape sequence character. Values greater than 127 disable escape.
<i>S3</i>	decimal	0–127	13 (^M)	Sets the ASCII code for the carriage return character.
<i>S4</i>	decimal	0–127	10 (^J)	Sets the ASCII code for the line feed character.
<i>S5</i>	decimal	0–32 33–127	8 (^H)	Sets the ASCII code for the backspace character. Values greater than 32 disable backspace.
<i>S6</i>	seconds	2–255	2	Sets the time the modem waits after it goes off-hook before it begins to dial the phone number.
<i>S7</i>	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, and the time the modem waits for the dial tone after encountering <i>W</i> in the dial string.
<i>S8</i>	seconds	0–255	2	Sets the length of the pause caused by a comma character in a dialing command.
<i>S9</i>	100 ms	1–255	6	Sets the time, in tenths of a second, that the carrier must be present before the modem considers it valid.
<i>S10</i>	100 ms	1–255	14	Sets how long a carrier signal must be lost before the modem disconnects.
<i>S11</i>	1 ms	50–255	95	Sets spacing and duration of dialing tones.
<i>S12</i>	20 ms	0–255	50	Defines the maximum period, in fiftieths of second, allowed between receipt of the last character of the three escape character sequence from the computer and the sending of the OK result code to the computer. (Escape code guard time).

	<b>Register</b>	<b>Unit</b>	<b>Range</b>	<b>Default</b>	<b>Description</b>
	<i>S13</i>	decimal	0, 1–127	42 (*)	Sets the ASCII code for the remote configuration escape character. <b>ATS13=0&amp;W</b> disables remote configuration.
<div style="border: 1px solid black; padding: 2px; width: fit-content;">TIME TO RESTORE (S15) ←, →, ↓</div>	<i>S15</i>	minutes	10–255	30	Sets the length of time the modem waits after making a dial-up connection before it checks the lease line for restoral.
<div style="border: 1px solid black; padding: 2px; width: fit-content;">DIALBACKUP TIME (S17) ←, →</div>	<i>S17</i>	minutes	0–255	1	Sets the length of time the modem waits after after a lease line fails before it attempts a dial-up connection.
	<i>S18</i>	seconds	0–255	0	Sets the number of seconds that the modem conducts an <b>&amp;T</b> test before it returns to the command mode. If the value is zero, the test must be terminated from command mode by issuing an <b>&amp;T0</b> or <b>H</b> command. When <i>S18</i> is non-zero, the modem returns the <b>OK</b> message upon test termination.
	<i>S24</i>	seconds	0–255	0	Sets the number of seconds that the modem operates in normal mode with no detected telephone or serial port activity before it enters low-power sleep mode. The timer is reset upon any serial port or telephone line activity.
	<i>S25</i>	10 ms (async) 1 ms (sync)	0–255	5	Sets the length of time that the modem ignores DTR while taking the action specified by <b>&amp;D</b> .
	<i>S26</i>	10 ms	0–255	1	When <b>&amp;R0</b> is commanded, sets the time after detecting an OFF-to-ON transition on RTS before the modem turns CTS ON. Applies to synchronous operation only.
	<i>S29</i>	10 ms	0–255	70	Sets the length of time that the modem goes on-hook when it encounters a flash dial modifier (!) in the dial string.
	<i>S30</i>	10 ms	0, 1–255	0	Sets the length of time that the modem waits before disconnecting when no data is sent or received. A value of zero disables the timer. Applies to asynchronous operation only.
	<i>S32</i>	decimal	0–255	17	Sets the ASCII code for the XON character.
	<i>S33</i>	decimal	0–255	19	Sets the ASCII code for the XOFF character.
	<i>S35</i>	decimal	0–1	0	0 disables, 1 enables the V.25 data calling tone, which allows remote data/fax/voice discrimination.

Register	Unit	Range	Default	Description
S36	decimal	0–7	7	<p>LAPM Failure Control. Specifies the fall-back action to take in the event of an LAPM negotiation failure. These fallback options are initiated immediately upon connection if <i>S48</i> is set to 128. If an invalid number is entered, <i>S36</i> acts as if the default value has been entered. (See <i>S48</i>.)</p> <ul style="list-style-type: none"> <li>0 Modem disconnects.</li> <li>1 Modem stays online and a direct mode connection is established.</li> <li>2 Reserved.</li> <li>3 Modem stays on-line and a normal mode connection is established.</li> <li>4 An MNP connection is attempted and if it fails, the modem disconnects.</li> <li>5 An MNP connection is attempted and if it fails, a direct mode connection is established.</li> <li>6 Reserved.</li> <li>7 An MNP connection is attempted and if it fails, a normal modem connection is established.</li> </ul>
S37	decimal	0–12	0	<p>Sets the maximum V.34 speed at which the modem attempts to connect. The default value attempts an automode connection. If <i>N0</i> is active, connection is attempted at the most recently sensed serial port speed (<i>+MS=</i> command settings are updated to the appropriate values). If <i>N1</i> is active, connection is attempted at the highest possible speed. (<i>+MS=</i> settings are updated to 11,1,300,33600 to reflect V.34, automode, 300 bps minimum speed, and 33600 bps maximum speed). Supported only for compatibility with existing software; use the <i>+MS=</i> command instead.</p>
S38	seconds	0–254, 255	20	<p>Sets the delay between the modem's receipt of the <i>H</i> command to disconnect (or high-to-low transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applies only to error-correction connections. This register can be used to ensure that data in the modem buffer is sent before the modem disconnects. If <i>S38</i> is set to a value between 0 and 254, the modem waits for the remote modem to acknowledge all data in the modem buffer before disconnecting. If <i>S38</i> is set to 255, the modem does not time out, and continues to</p>

<b>Register</b>	<b>Unit</b>	<b>Range</b>	<b>Default</b>	<b>Description</b>
				attempt to deliver data in the buffer until the connection is lost or the data is delivered.
<i>S46</i>	decimal	136, 138	138	Enables or disables data compression: 136 Error correction without compression. 138 Error correction with compression.
<i>S48</i>	decimal	0, 7, 128	7	Enables or disables LAPM negotiation. An invalid value is treated as a 128 value. 0 Disables negotiation and proceeds with LAPM. 7 Enables negotiation. 128 Disables negotiation and proceeds at once with the fallback action specified in <i>S36</i> . Can be used to force MNP.
<i>S86</i>	decimal	0, 4, 5, 9, 12, 13, 14	n/a	When the modem issues a <i>NO CARRIER</i> result code, a value is written to this register to help determine the reason for the failed connection. <i>S86</i> records the first event that contributes to a <i>NO CARRIER</i> message. Use the <i>S86?</i> command to read the value. 0 Normal disconnect; no error occurred. 4 Loss of carrier. 5 V.42 negotiation failed to detect an error-correction modem at the other end. 9 The modems could not find a common protocol. 12 Normal disconnect initiated by the remote modem. 13 Remote modem does not respond after 10 retransmissions of the same message. 14 Protocol violation.
<i>S95</i>	decimal	0–15	0	The bits in this register can be set to override some of the <i>W</i> command options. A bit set to a 1 in this register enables the corresponding result code regardless of the <i>W</i> setting. Bit 0 <i>CONNECT</i> result code indicates DCE speed instead of DTE speed. Bit 1 Append <i>/ARQ</i> to <i>CONNECT XXX</i> result code in error-correction mode. Bit 2 Enable <i>CARRIER XXXX</i> result code. Bit 3 Enable <i>PROTOCOL XXXX</i> result code. Bit 4 Reserved. Bit 5 Enable <i>COMPRESSION</i> result code. Bit 6 Reserved. Bit 7 Reserved.

## Result Codes

In command mode your modem can send the following 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
9	CONNECT 0600	Connected at 600 bps
10	CONNECT 2400	Connected at 2400 bps
11	CONNECT 4800	Connected at 4800 bps
12	CONNECT 9600	Connected at 9600 bps
13	CONNECT 7200	Connected at 7200 bps
14	CONNECT 12000	Connected at 12000 bps
15	CONNECT 14400	Connected at 14400 bps
16	CONNECT 19200	Connected at 19200 bps
17	CONNECT 38400	Connected at 38400 bps
18	CONNECT 57600	Connected at 57600 bps
19	CONNECT 115200	Connected at 115200 bps
20	CONNECT 230400	Connected at 230400 bps
22	CONNECT 75TX/1200RX	V.23 connection in originate mode
23	CONNECT 1200TX/75RX	V.23 connection in answer mode
24	DELAYED	Delay is in effect for the dialed number
32	BLACKLISTED	Dialed number is blacklisted
33	FAX	Connected in fax mode
35	DATA	Connected in data mode
40	CARRIER 300	0-300 bps data carrier detected
44	CARRIER 1200/75	V.23 backward channel detected
45	CARRIER 75/1200	V.23 forward channel detected
46	CARRIER 1200	1200 bps data carrier detected
47	CARRIER 2400	2400 bps data carrier detected
48	CARRIER 4800	4800 bps data carrier detected
49	CARRIER 7200	7200 bps data carrier detected
50	CARRIER 9600	9600 bps data carrier detected
51	CARRIER 12000	12000 bps data carrier detected
52	CARRIER 14400	14400 bps data carrier detected
53	CARRIER 16800	16800 bps data carrier detected
54	CARRIER 19200	19200 bps data carrier detected
55	CARRIER 21600	21600 bps data carrier detected
56	CARRIER 24000	24000 bps data carrier detected
57	CARRIER 26400	26400 bps data carrier detected
58	CARRIER 28800	28800 bps data carrier detected
59	CONNECT 16800	Connected at 16800 bps
61	CONNECT 21600	Connected at 21600 bps

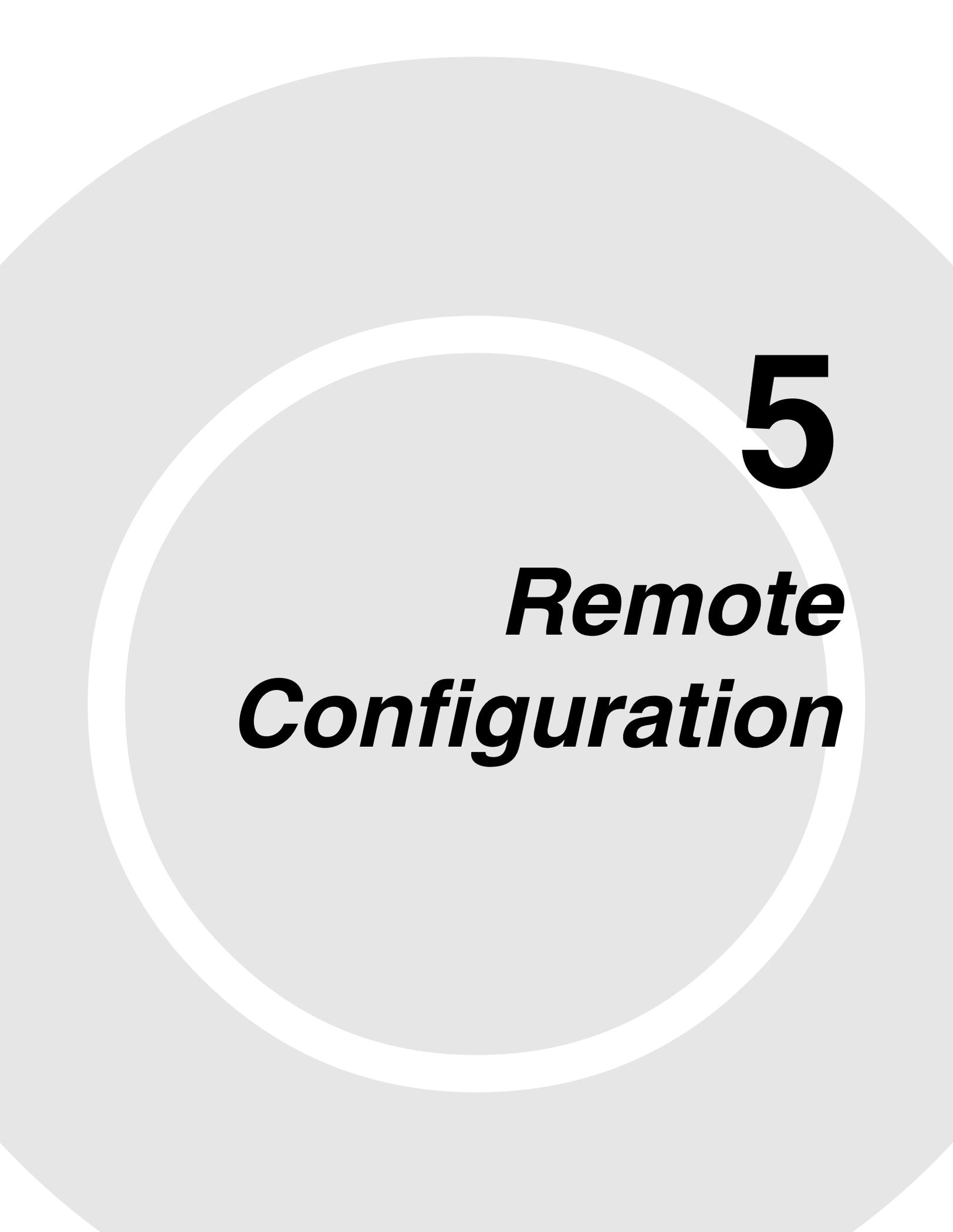
<b>Terse</b>	<b>Verbose</b>	<b>Description</b>
62	CONNECT 24000	Connected at 24000 bps
63	CONNECT 26400	Connected at 26400 bps
64	CONNECT 28800	Connected at 28800 bps
66	COMPRESSION CLASS 5	Connected with MNP Class 5 data compression
67	COMPRESSION V.42 bis	Connected with V.42 bis data compression
69	COMPRESSION NONE	Connected without data compression
70	PROTOCOL NONE	Connected without any protocol
77	PROTOCOL LAPM	Connected in V.42 LAPM mode
78	CARRIER 31200	56000 bps data carrier detected
79	CARRIER 33600	33600 bps data carrier detected
80	PROTOCOL ALT	Connected in MNP mode
81	PROTOCOL ALT-CELLULAR	Connected in MNP 10 mode
84	CONNECT 33600	Connected at 33600 bps
91	CONNECT 31200	Connected at 31200 bps
150	CARRIER 32000	32000 bps data carrier detected
151	CARRIER 34000	34000 bps data carrier detected
152	CARRIER 36000	36000 bps data carrier detected
153	CARRIER 38000	38000 bps data carrier detected
154	CARRIER 40000	40000 bps data carrier detected
155	CARRIER 42000	42000 bps data carrier detected
156	CARRIER 44000	44000 bps data carrier detected
157	CARRIER 46000	46000 bps data carrier detected
158	CARRIER 48000	48000 bps data carrier detected
159	CARRIER 50000	50000 bps data carrier detected
160	CARRIER 52000	52000 bps data carrier detected
161	CARRIER 54000	54000 bps data carrier detected
162	CARRIER 56000	56000 bps data carrier detected
165	CONNECT 32000	Connected at 32000 bps
166	CONNECT 34000	Connected at 34000 bps
167	CONNECT 36000	Connected at 36000 bps
168	CONNECT 38000	Connected at 38000 bps
169	CONNECT 40000	Connected at 40000 bps
170	CONNECT 42000	Connected at 42000 bps
171	CONNECT 44000	Connected at 44000 bps
172	CONNECT 46000	Connected at 46000 bps
173	CONNECT 48000	Connected at 48000 bps
174	CONNECT 50000	Connected at 50000 bps
175	CONNECT 52000	Connected at 52000 bps
176	CONNECT 54000	Connected at 54000 bps
177	CONNECT 56000	Connected at 56000 bps
180	CONNECT 28000	Connected at 28000 bps (V.90 mode)
180	CARRIER 28000	28000 bps data carrier detected (V.90 mode)
181	CONNECT 29333	Connected at 29333 bps (V.90 mode)
181	CARRIER 29333	29333 bps data carrier detected (V.90 mode)
182	CONNECT 30667	Connected at 30667 bps (V.90 mode)
182	CARRIER 30667	30667 bps data carrier detected (V.90 mode)
183	CONNECT 33333	Connected at 33333 bps (V.90 mode)
183	CARRIER 33333	33333 bps data carrier detected (V.90 mode)
184	CONNECT 34667	Connected at 34667 bps (V.90 mode)
184	CARRIER 34667	34667 bps data carrier detected (V.90 mode)

## 4 AT Commands, S-Registers, and Result Codes

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<b>Terse</b>	<b>Verbose</b>	<b>Description</b>
185	CONNECT 37333	Connected at 37333 bps (V.90 mode)
185	CARRIER 37333	37333 bps data carrier detected (V.90 mode)
186	CONNECT 38667	Connected at 38667 bps (V.90 mode)
186	CARRIER 38667	38667 bps data carrier detected (V.90 mode)
187	CONNECT 41333	Connected at 41333 bps (V.90)
187	CARRIER 41333	41333 bps data carrier detected (V.90)
188	CONNECT 42667	Connected at 42667 bps (V.90)
188	CARRIER 42667	42667 bps data carrier detected (V.90)
189	CONNECT 45333	Connected at 45333 bps (V.90)
189	CARRIER 45333	45333 bps data carrier detected (V.90)
190	CONNECT 46667	Connected at 46667 bps (V.90)
190	CARRIER 46667	46667 bps data carrier detected (V.90)
191	CONNECT 49333	Connected at 49333 bps (V.90)
191	CARRIER 49333	49333 bps data carrier detected (V.90)
192	CONNECT 50667	Connected at 50667 bps (V.90)
192	CARRIER 50667	50667 bps data carrier detected (V.90)
193	CONNECT 53333	Connected at 53333 bps (V.90)
193	CARRIER 53333	53333 bps data carrier detected (V.90)
194	CONNECT 54667	Connected at 54667 bps (V.90)
194	CARRIER 54667	54667 bps data carrier detected (V.90)
+F4	+FCERROR	V.21 signal received/high speed fax expected (V.27, V.29, V.33 or V.17).





**5**

***Remote  
Configuration***

## Introduction

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 MultiModemII modem for maintenance or troubleshooting as if you were on-site.

## Basic Procedure

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

1. Establish a data connection with a remote MT5600BA or MT5600BL modem.
2. Send three asterisks to initiate remote configuration. The remote modem responds:  

```
Online Remote Access  
Remote password:
```
3. Type the remote configuration password, and then press ENTER. The default is "MULTITECH." It is not case-sensitive.
  - If the password is incorrect, the word `CONNECT` appears, and the local modem is returned to online mode.
  - If the password is correct, an `>AT_` command prompt appears.
4. Type AT commands to configure the remote modem. It is not necessary to precede the commands with "AT."
5. When you have finished configuring the remote modem, type `*E` and press ENTER to exit remote configuration mode and return to online data mode. You can now break the connection in the normal way.

---

**Note:** The dialing command is not allowed in remote configuration mode.

---

## Setup

Multi-Tech modems are shipped with a default setup password (MULTITECH). Because anyone who has an owner's manual knows the default setup password, for security you should change the password and possibly also the remote configuration escape character.

### ***Changing the Remote Configuration Password***

The remote configuration password can be changed only from the front panel of the modem:

1. Turn on the modem.
2. Starting at the **STATUS** screen, press `↓ ↓ ↓ → → ↓ →` to access the **ENTER PASSWORD** screen.

```
ENTER PASSWORD
A
```

3. To change the password, press  $\uparrow$  $\leftarrow$  or  $\downarrow$  to select the first character of the password, and then press  $\rightarrow$  to go to the next character. Repeat until you have entered the entire password.
4. To cancel the new password, press  $\rightarrow$  until the password is erased. To save the new password, press the **Enter** button. The next time you remotely configure the modem you must use the new password.

### **Changing the Remote Escape Character**

To improve security, you can change a remote modem's remote configuration escape character. The remote configuration escape character is stored in register *S13*. The factory default is 42, which is the ASCII code for the asterisk character (\*). Setting *S13* to 0 (zero) disables remote configuration entirely—but 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 "Basic Procedure."
2. Type **ATS13=*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<CR>** to exit remote configuration.





**6**

***Callback  
Security***

## Introduction

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 the password is invalid, the caller can try twice more before the modem hangs up. If the password is valid, the modem hangs up and returns the call by dialing the phone number associated with the password.

The modem can store up to 30 callback phone numbers and 30 callback passwords. Phone numbers can be up to 30 characters long and can contain the pause (,) and wait (W) characters in addition to the digits and characters normally found on a touch-tone keypad. Passwords can be up to 10 characters long.

Callback phone numbers are associated with callback passwords by being assigned to the same callback memory location. Thus, if you assign the password "APRICOT" to memory location 16 and, in a separate operation, also assign phone number 6127853000 to memory location 16, when the modem receives the password "APRICOT," it calls phone number 6127853000.

Because there is no way to examine the passwords and phone numbers stored in the modem, it is important to write them down as you enter them. A form that you can print out for this purpose is provided on the last page of this chapter.

## Setup Procedures

### ***Turning Callback Security On and Off***

---

**Note:** Autoanswer must be enabled (**S0=1** or **S0=2**) for callback security to work.

---

#### ***AT Command Method***

1. Open a terminal program, such as HyperTerminal.
2. In the terminal window, type one of the following commands:
  - To turn on callback security, type **AT#DB1** and press **ENTER**. With remote callback security turned on, each caller is asked to enter a password, then is disconnected and called back by the modem. Also, dialing number locations 0–3, for use with the **DS=y** dialing command, are replaced by callback dialing number locations 1–30.
  - To turn off callback security, type **AT#DB0** and press **ENTER**. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and stored dialing number locations 0–3 become available.

**Front Panel Method**

1. Turn on the modem.
2. Starting at the **STATUS** screen, press the following buttons on the front panel to turn callback security on and off:

```
CALLBACK ON?
←, →, Ent
```

- To turn on callback security, press ↓, ↓, →, ↓, ↓, →, → to display the **CALLBACK ON?** option, and then press the **Enter** button to select the option. When remote callback security is turned on, each caller is asked to enter a password, then is disconnected and called back by the modem. Also, dialing number locations 0–3, for use with the **DS=y** dialing command, are replaced by callback dialing number locations 1–30.

```
CALLBACK OFF?
←, →, Ent
```

- To turn off callback security, press ↓, ↓, →, ↓, ↓, →, →, → to display the **CALLBACK OFF?** option, and then press the **Enter** button to select the option. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and stored dialing number locations 0–3 become available.

**Assigning Callback Passwords****At Command Method**

1. Open a terminal program, such as HyperTerminal.
2. To store a callback password for the first callback memory location, type **AT#CBP01=xxxxxxxx**, where **xxxxxxxx** is the first password, and press **ENTER**. The password must be six to ten characters in length.
3. To store a callback password for the second callback memory location, type **AT#CBP02=xxxxxxxx**, where **xxxxxxxx** is the second password, and press **ENTER**. Note that the memory location number in the command is incremented by one.
4. Repeat as many times as necessary, up to memory location 30, until all passwords have been entered.

**Front Panel Method**

1. Turn on the modem.
2. Starting at the **STATUS** screen, press the following buttons on the front panel: ↓, ↓, →, ↓, ↓, →, ↓, →. The **ENTER PASSWORD #1?** screen appears.
3. Press the **Enter** button on the front panel to select callback memory location 1. The **ENTER PASSWORD** screen appears.
4. Press the ↑← or ↓ button several times to select the first letter in the password.
5. Press the → button to go to the next letter in the password.

```
ENTER PASSWORD
#1? ←, →, Ent
```

```
ENTER PASSWORD
A
```

---

**Note:** To backspace or to cancel an entry, press → several times.

---

```
PASSWORD STORED
```

6. The password must be six to ten characters in length. Repeat steps 4 and 5 until the password is entered, and then press the **Enter** button to store it. The **PASSWORD STORED** screen should appear.

```
PASSWORD SETUP
←, →, ↓
```

7. Press the **Enter** button again to go to the **PASSWORD SETUP** screen.
8. Press →, → to go to the **ENTER PASSWORD #2?** screen.
9. Repeat steps 3–7 to enter the next password.
10. Repeat as many times as necessary, up to memory location 30, until all passwords have been entered.

---

**Warning:** There is no way to review an entry to confirm that it has been entered correctly. If you attempt to look at a password entry by pressing the **Enter** button for an **ENTER PASSWORD #n?** screen, it is possible to accidentally erase the entry.

---

## Assigning Callback Phone Numbers

### At Command Method

1. Open a data communication program, such as HyperTerminal.
2. To store a callback phone number in the first memory location, type **AT#CBN01=xxxxxxxx**, where *xxxxxxxx* is the dialing string, and press **ENTER**. The dialing string can include the digits 0 through 9 and any of the following characters: #, \*, comma (,), semicolon (;), W, A, B, C, and D. Up to 30 characters can be used. Example: **AT#CBN01=9,16127853000**.
3. To store a callback phone number in the second memory location, type **AT#CBN02=xxxxxxxx**, where *xxxxxxxx* is the dialing string, and press **ENTER**. Note that the memory location number in the command is incremented by one.
4. Repeat as many times as necessary, through memory location 30, until all dialing strings have been entered.

### Front Panel Method

```
ENTER NUMBER
#1? ←, →, Ent
```

```
ENTER NUMBER
78x
```

1. Turn on the modem.
2. Starting at the **STATUS** screen, press the following buttons on the front panel: ↓, ↓, →, ↓, ↓, →, ↓, ↓, →. The **ENTER NUMBER #1?** screen appears.
3. Press the **Enter** button on the front panel to select memory location 1. The **ENTER NUMBER** screen appears.
4. Press the ↑← or ↓ button several times to select the first digit in the number.
5. Press the → button to go to the next digit in the number.

---

**Note:** To backspace or to cancel an entry, press → several times.

---

```
NUMBER STORED
```

```
CALLBACK NUMBER
←, →
```

6. The number can be up to 30 characters in length. Repeat steps 4 and 5 until the number is entered, and then press the **Enter** button to store it. The **NUMBER STORED** screen should appear.
7. Press the **Enter** button again to go to the **CALLBACK NUMBER** screen.
8. Press →, → to go to the **ENTER NUMBER #2?** screen.
9. Repeat steps 3–7 to enter the next number.

- Repeat as many times as necessary, up to memory location 30, until all numbers have been entered.

---

**Warning:** There is no way to review an entry to confirm that it has been entered correctly. If you attempt to look at a number entry by pressing the **Enter** button for an **ENTER NUMBER #n?** screen, it is possible for you to accidentally erase the entry.

---

## Calling Procedure

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

---

**Note:** Autoanswer must be enabled on the calling modem (**S0=1** or **S0=2**).

---

- Using a data communication program such as HyperTerminal, dial the number of the callback modem.
- When the connection is established, the callback modem responds with a request for a password.
- Type the password for your modem, and then press **ENTER**. You have three attempts to enter a valid password or be disconnected.
- If the password is valid, the callback modem disconnects. Then, after a short delay, it calls the number associated with the password and establishes a working connection.

## Callback Security Commands

The following AT commands are used with callback security.

```
CALLBACK ON?
←,→,Ent
CALLBACK OFF?
←,Ent
```

Command: **#DBn Callback Enable/Disable**

Values:  $n = 0$  or  $1$

Default:  $0$

Description: Enables or disables callback security. 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 1–30. The phone number memory locations and their contents are restored when callback security is disabled.

#DB0 Disables callback security.

#DB1 Enables callback security.

```
ENTER NUMBER
#1? ←,→,Ent
```

Command: **#CBNy=x Store Callback Number**

Values:  $y = 01-30$   
 $x =$  dialing string

Default: None

Description: Stores dialing string  $x$  in memory location  $y$ . The dialing string can include the digits 0 through 9 and any of the following characters: #, \*, comma (,), semicolon (;), W, A, B, C, and D. Up to 30 characters can be used. Example: **AT#CBN01=9,16127853000**.

ENTER PASSWORD #1?      ←, →, Ent
--------------------------------------

Command: **#CBP $y$ = $x$  Store Callback Password**

Values:             $y$  = 01–30  
                      $x$  = password (6–10 characters)

Defaults:         None

Description:      Stores callback security password  $x$  in memory location  $y$ . The password must have 6 to 10 characters.

## Callback Assignments

Location	Password	Phone number
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		





**7**

***Leased Line  
Operation***

## Introduction

This chapter describes how to use the MultiModemII modem on a leased line.

A leased line is a private, permanent, telephone connection between two points. Unlike normal dialup 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. The MT5600BL modem also supports dial backup, which enables the modem to automatically switch to a dial-up connection if the leased line goes down.

The MT5600BA modem supports two-wire leased-line operation, while the MT5600BL modem supports both two-wire and four-wire leased line operation.

## Two-Wire Setup

1. For two-wire leased line operation on the MT5600BA modem, connect the provided modular telephone cable to the LINE jack. For two-wire leased line operation on the MT5600BL modem, connect the provided modular telephone cable to the LEASED jack. Connect the other end of the cable to the two-wire leased line jack or terminals supplied by the telephone company.
2. Turn on the modem.
3. Starting at the **STATUS** screen, press the following buttons on the front panel:  $\downarrow$ ,  $\rightarrow$ ,  $\downarrow$ ,  $\downarrow$ ,  $\downarrow$ ,  $\rightarrow$ . The **CURRENT SETTING=** screen appears.
4. If the **CURRENT SETTING=** screen shows **ASYNC AT**, press  $\uparrow$  and go to step 7. If it shows anything else, press  $\rightarrow$  to go to the **ASYNC, NORM?** screen.
5. Press the **Enter** button to select normal asynchronous operation.
6. The **OPTION SET** screen appears. Press  $\uparrow$  to exit to the **SYNC/ASYNC OPTIONS** screen.
7. Press  $\uparrow$ ,  $\uparrow$ ,  $\uparrow$ ,  $\rightarrow$ ,  $\rightarrow$ ,  $\rightarrow$ ,  $\rightarrow$ . The **2 WIRE LEASE? ORIG** screen appears.
8. Choose one of two actions:
  - To set up the modem as the originate modem, press the **Enter** button.
  - To set up the modem as the answer modem, press  $\rightarrow$  to display the **2 WIRE LEASE? ANSWER** screen, and then press the **Enter** button.

```
CURRENT SETTING=
ASYNC AT ←,→
```

```
ASYNC, NORM?
←,→,Ent
```

```
OPTION SET
←,→
```

```
2 WIRE LEASE?
ORIG. ←,→,Ent
```

```
2 WIRE LEASE?
ANSWER ←,→,Ent
```

---

**Note:** One of the modems in a leased line pair must be configured as the originate modem, and the other as the answer modem, but it does not matter which is which.

---

```
OPTION SET
←,→
```

9. The **OPTION SET** screen appears. Press  $\uparrow$  to exit to the **ONLINE OPTIONS** screen, or  $\rightarrow$  to exit to the **CURRENT SETTING=** screen to verify the selection.
10. Configuration for two-wire leased line operation is now complete. 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.

## Four-Wire Setup

```
SYNC, NORM?
←, →, Ent
```

```
OPTION SET
←, →
```

```
4 WIRE LEASE?
ORIG. ←, →, Ent
```

```
4 WIRE LEASE?
ANSWER ←, →, Ent
```

```
OPTION SET
←, →
```

1. For four-wire leased line operation, connect one of the provided four-wire cables to the LEASED jack on the back of the MT5600BL modem. Connect the other end of the cable to a four-wire leased line jack or terminals supplied by the telephone company.
2. Turn on the modem.
3. Starting at the **STATUS** screen, press the following buttons on the front panel: ↓, →, ↓, ↓, ↓, →, →, →, →. The **SYNC, NORM?** screen appears.
4. Press the **Enter** button to select normal synchronous operation.
5. The **OPTION SET** screen appears. Press ↑← to exit to the **SYNC/ASYNCOPTIONS** screen.
6. Press ↑←, ↑←, ↑←, →, →, →, →, →, →. The **4 WIRE LEASE? ORIG** screen appears.
7. Choose one of two actions:
  - To set up the modem as the originate modem, press the **Enter** button.
  - To set up the modem as the answer modem, press → to display the **4 WIRE LEASE? ANSWER** screen, and then press the **Enter** button.

---

**Note:** One of the modems in a leased line pair must be configured as the originate modem, and the other as the answer modem, but it does not matter which is which.

---

8. The **OPTION SET** screen appears. Press ↑← to exit to the **ONLINE OPTIONS** screen, or → to exit to the **CURRENT SETTING=** screen.
9. Configuration for four-wire leased line operation is complete. 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 four-wire leased line operation, you may turn off the local modem until the remote one is ready.

## Dial Backup and Leased Line Restoral

For four-wire leased line operation, the MT5600BL modem has dial backup, in which the modem is connected to a standard dial-up line as well as to the leased line. If the leased line fails, the originate modem automatically dials and connects to the answer modem through the standard telephone network. While it is in dial backup mode, the MT5600BL periodically checks the leased line to see if it is operational. If the line is operational, the modem then attempts to restore the leased line.

The dial-back timer, register *S17*, determines how long the modem waits after a leased line failure before it attempts a dial backup connection. The *S17* default setting is one minute. During that minute, the originate modem tries to establish the leased line link. If the leased line is established during that time, the *S17* timer is cleared and everything is back to normal. If the timer expires, the modem attempts a dial backup connection. The purpose of the timer for the answer modem is to determine when it can accept a dial-up call. Dial-back starts only when both timers have expired and the leased line is still down.

The restore timer, register *S15*, determines how frequently restoral attempts occur when the modems are in dial backup mode. *S15* can be set from 10 to 255 minutes in one minute increments. The default value is 30 minutes.

---

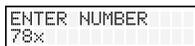
**Note:** Register *S15* must be set identically on both the local and remote modems.

---

The dial backup number must be set from the front panel of the modem.

## Dial Backup and Leased Line Restoral Setup

1. Connect a modular telephone cable to the LINE jack of an MT5600BL modem set up for four-wire leased line operation. Connect the other end of the cable to a standard dialup line jack.
2. Turn on the modem.
3. Starting at the **STATUS** screen, press the following buttons on the front panel: ↓, ↓, →, ↓, →, →, →. The **ENTER NUMBER** screen appears.
4. Press the ↑↵ or ↓ button several times to select the first digit in the dial backup telephone number.
5. Press the → button to go to the next digit in the number.

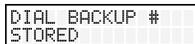


ENTER NUMBER  
78x

---

**Note:** To backspace or to cancel an entry, press → several times.

---



DIAL BACKUP #  
STORED

6. The number can be up to 30 characters in length. Repeat steps 4 and 5 until the number is entered, and then press the **Enter** button to store it. The **DIAL BACKUP # STORED** screen appears.
7. Press the **Enter** button again to go to the **DIAL BACKUP NUMBER** screen.



DIAL BACKUP  
NUMBER ←, →, ↓

---

**Note:** Steps 8 through 15 are optional.

---



ENTER TIME IN  
MINUTES 1

8. To change the default restore time, press ↓, →, →. The **ENTER TIME IN MINUTES** screen appears.

```
TIME STORED
```

```
TIME TO RESTORE  
(S15) ←,→,↓
```

```
ENTER TIME IN  
MINUTES 1
```

```
TIME STORED
```

```
DIALBACKUP TIME  
(S17) ←,→
```

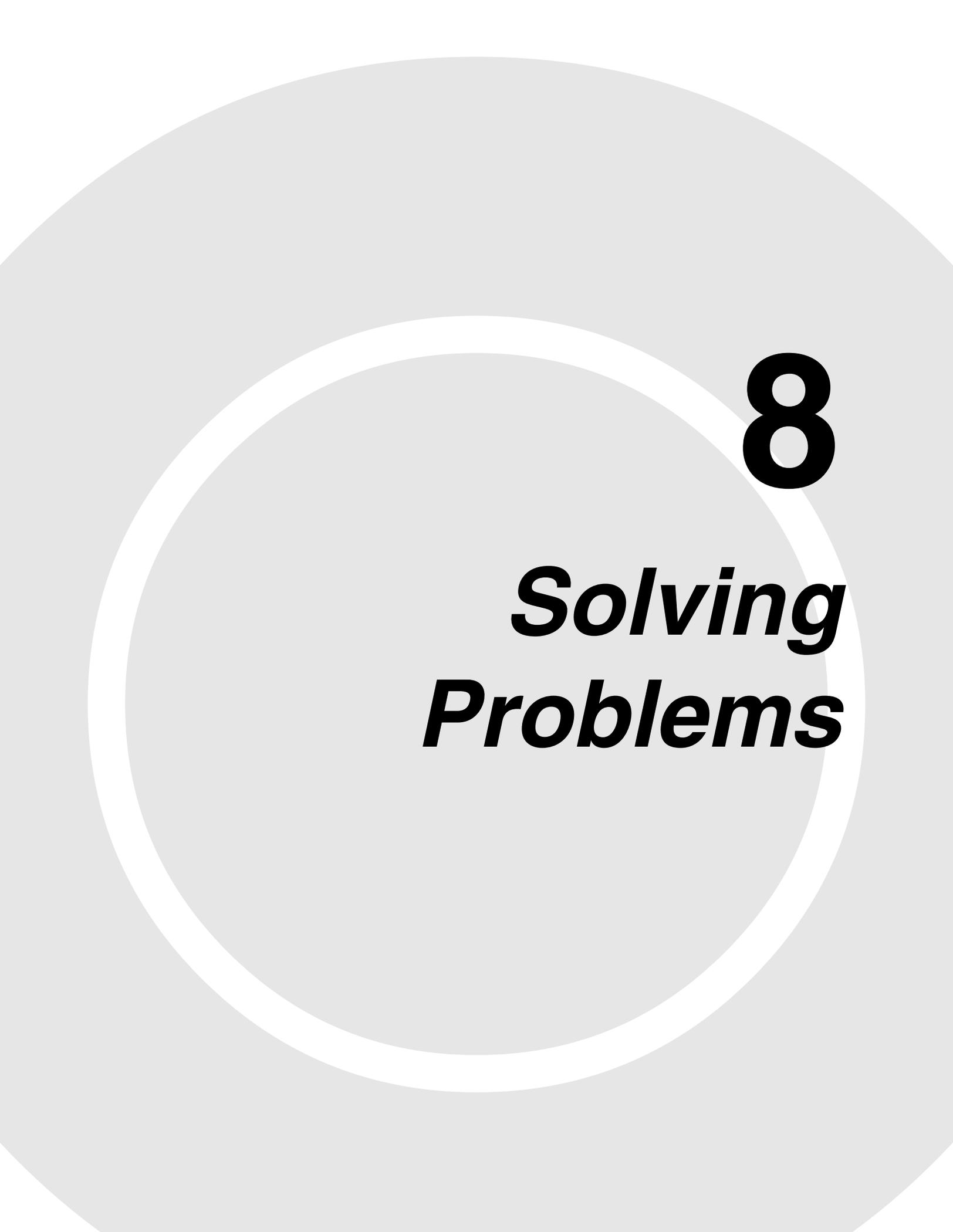
9. Press the  $\uparrow\leftarrow$  or  $\downarrow$  button several times to select the first digit in the number.
10. Press the  $\rightarrow$  button to go to the next digit in the number.
11. Repeat steps 9 and 10 until you have entered a value between 10 and 255, and then press the **Enter** button to store it. The **TIME STORED** screen appears.
12. Press the **Enter** button to go to the **TIME TO RESTORE (S15)** screen.
13. To change the default dial backup time, press  $\downarrow$ ,  $\rightarrow$ ,  $\rightarrow$ . The **ENTER TIME IN MINUTES** screen appears.
14. Repeat steps 9 and 10 until you have entered a value between 0 and 255, and then press the **Enter** button to store it. The **TIME STORED** screen appears.
15. Press the **Enter** button again to go to the **DIAL BACKUP TIME (S17)** screen.
16. Dial backup and leased line restoral setup is complete.

---

**Note:** Registers *S15* and *S17* can also be changed using the *Sr=n* AT command. See Chapter 4.

---





**8**

***Solving  
Problems***

## Introduction

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 dials but is unable to make a connection.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer is slower than it should be.
- 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 Technical Support (see Appendix D).

## 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, and the liquid crystal display (LCD) should light. If the LEDs and LCD 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 transformer module is firmly connected to the modem and to the wall outlet or power strip.
- ✓ If the power strip is on and the modem switch is on, try moving the modem power supply to another outlet on the power strip.
- ✓ Test that the outlet is live by plugging another device, such as a lamp, into it.
- ✓ The modem or transformer module may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem or transformer module may be defective. Call Technical Support for assistance.

---

**CAUTION:** Do not under any circumstances replace the transformer module with one designed for another product; doing so can damage the modem and void your warranty.

---

## The Modem Does Not Respond to Commands

- ✓ Make sure the modem is plugged in and turned on. (See “None of the Indicators Light.”)
- ✓ 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.

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

To change a port address or IRQ in Windows 3.1x, double-click the Control Panel icon, then the Ports icon. Click on the port you want to change, click **Settings**,

click **Advanced**, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

**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.

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

## The Modem Dials But Cannot Connect

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.

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, e.g., **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 95 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.

## The Modem Disconnects While Online

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

You can automatically disable Call Waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT\*70**,—note the comma, which inserts a pause before the number is dialed). To change the dial prefix in Windows Terminal, select **Settings | Modem Commands**. To change it in 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.

- ✓ 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.
- ✓ If you were online with a BBS or an online service like CompuServe, it 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.

## The Modem Cannot Connect When Answering

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

## File Transfer Is Slower Than It Should Be

- ✓ You might have an older UART. For best throughput, install a 16550AFN UART or a Multi-Tech ISI serial port card. See the "Quick Start" chapter for information on how to identify your UART.
- ✓ If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, `COMM.DRV`, to take full advantage of the UART's speed.
- ✓ If you are using a slow transfer protocol, such as Xmodem, try Zmodem or Ymodem/G instead.
- ✓ Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.
- ✓ Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.
- ✓ 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 K56flex or the V.90 protocol, depending on which one the ISP modem is using. If your ISP uses the X2 protocol, the maximum speed you will be able to connect at is 33,600 bps. Check with your ISP to see which protocols it supports, and check the Multi-Tech Web site for the latest developments in V.90.
- ✓ Try entering the `&V1` command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

## Data Is Being Lost

- ✓ If you are using data compression and a high speed serial port, set the serial port baud rate to four times the data rate.
- ✓ Your UART might not be reliable at serial port speeds over 9600 bps or 19,200 bps. Turn off data compression, reset your serial port speed to a lower rate, or replace your serial port with a faster one.
- ✓ Make sure the flow control method you selected in software matches the method selected in the modem. If you are using the modem with a Macintosh, you might have the wrong cable for hardware flow control.
- ✓ If you are running under Windows 3.1 and have a 16550AFN UART, you might need to turn on the 16550's data buffers and/or replace the Windows serial driver, COMM.DRV.
- ✓ Try entering the **&V1** command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

## There Are Garbage Characters on the Monitor

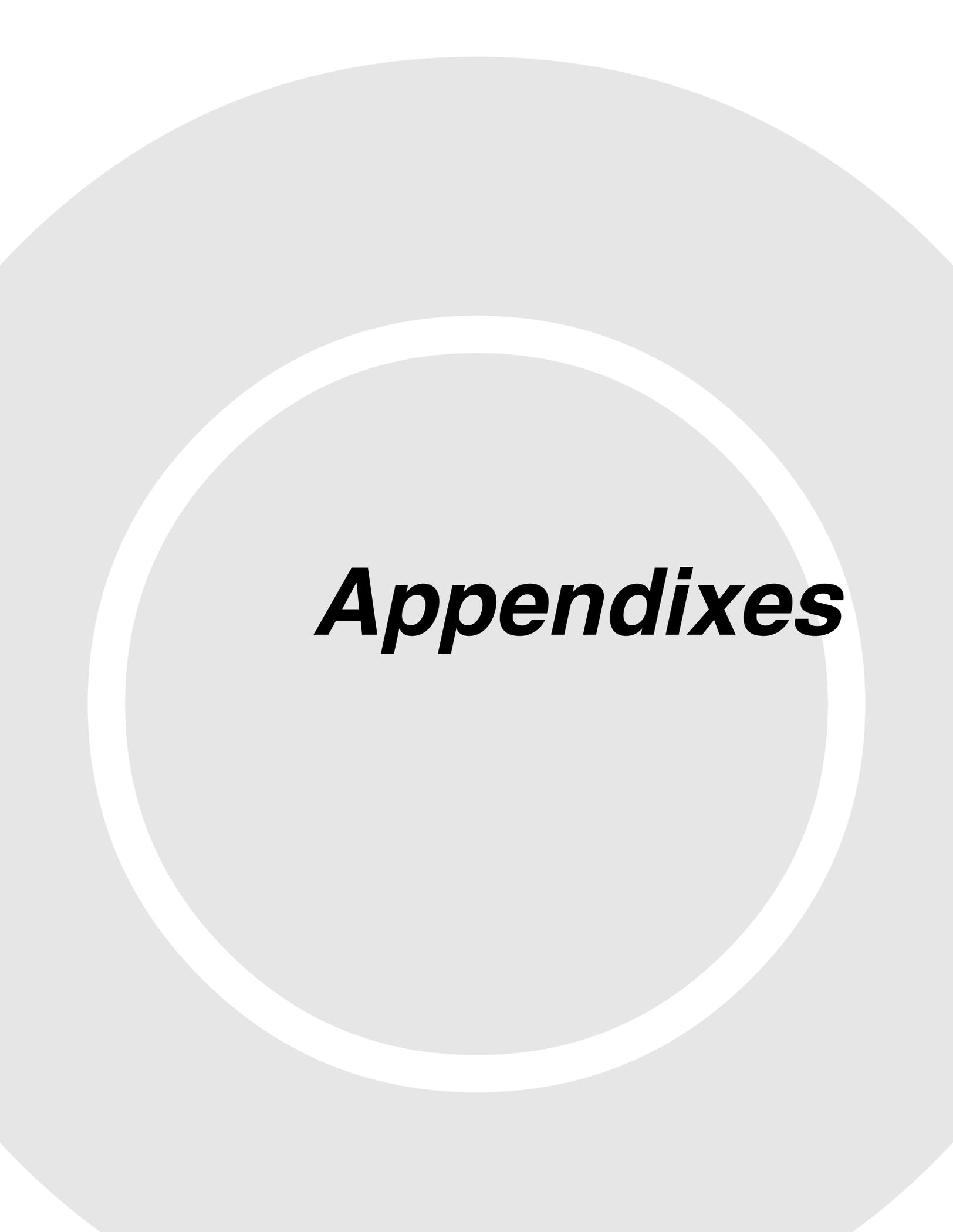
- ✓ Your computer and the remote computer might be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communication software.
- ✓ You might be experiencing line noise. Enable error correction, if it is disabled, or hang 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 **&V1** command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

## 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.

## **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 3.1x, you can run either your fax software or your datacomm software, but not both at the same time, unless you have a special communication device management application. In Windows 95, 98, and NT 4.0, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.



# ***Appendixes***

# Appendix A: Regulatory Compliance

## FCC Part 68 Telecom

1. This equipment complies with part 68 of the Federal Communications Commission Rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number. This information must be provided to the telephone company.
2. The suitable USOC jack (Universal Service Order Code connecting arrangement) for this equipment is shown below. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.
3. An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. See installation instructions for details.
4. The ringer equivalence number (REN) is used to determine the number of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all, areas the sum of the RENs should not exceed 5.0. To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the local telephone company.
5. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
6. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.
7. If trouble is experienced with this equipment (the model of which is indicated below) please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have repairs made. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
8. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.
9. This equipment should not be used on party lines or coin lines.
10. If so required, this equipment is hearing-aid compatible.

Manufacturer:	Multi-Tech Systems, Inc.
Trade Name	MultiModemII
Model Number:	MT5600BA or MT5600BL
FCC Registration No:	AU7USA-33378-M5-E
Ringer Equivalence No:	0.1A
Modular Jack (USOC):	RJ11C or RJ11W (single line)
Service Center in USA:	Multi-Tech Systems, Inc. 2205 Woodale Drive Mounds View, MN 55112 (612) 785-3500 (612) 785-9874 Fax

## **Fax Branding Statement**

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains the following information:

- Date and time the message is sent
- Identification of the business or other entity, or other individual sending the message
- Telephone number of the sending machine or such business, other entity, or individual

This information is to appear in a margin at the top or bottom of each transmitted page or on the first page of the transmission. (Adding this information in the margin is referred to as *fax branding*.)

Since any number of fax software packages can be used with this product, the user must refer to the fax software manual for setup details. Typically the fax branding information must be entered via the configuration menu of the software.

## Canadian Limitations Notice

**Notice:** The ringer equivalence number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5.

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

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment or equipment malfunctions may give the telecommunications company cause to request the user to disconnect the equipment.

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

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

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## International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

## Commission Decision CTR21

The equipment has been approved to Commission Decision CTR21 for pan-European single terminal connection to the public switched telephone network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN network termination point. In the event of problems, you should contact your equipment supplier in the first instance.

## EMC, Safety, and Terminal Directive Compliance

 The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

- Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;  
and
- Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;  
and
- Council Directive 98/13/EEC of 12 March 1998 on the approximation of the laws of Member States concerning telecommunications terminal and Satellite earth station equipment.

## New Zealand Telecom Warning Notice

Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should NOT contact the Telecom Faults Service.

The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.

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**Warning Notice:** No '111' or other calls can be made from this device during a mains power failure.

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## Appendix B: Technical Specifications

Your MultiModemII modem meets the following specifications:

<i>Trade Name</i>	MultiModemII™
<i>Model Number</i>	MT5600BA and MT5600BL
<i>Server-to-Client Data Rates</i>	K56flex or V.90 speeds when accessing a K56flex or V.90 server (actual speed depends on server capabilities and line conditions)*
<i>Client-to-Client Data Rates</i>	33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
<i>Fax Data Rates</i>	14,400, 9600, 7200, 4800, 2400, 300 bps
<i>Data Format</i>	Serial, binary, synchronous and asynchronous
<i>Commands</i>	AT, V.25bis, TIA/EIA TR.29 Class 2
<i>Command Buffer</i>	40 characters
<i>Modem Compatibility</i>	ITU-T V.90; K56flex; ITU-T V.34 enhanced, V.34, V.32terbo, V.32bis, V.32, V.25bis, V.22bis, V.22; Bell 212A and 103/113; ITU-T V.29, V.42, V.42bis; ITU-T V.21 & V.23 in international versions
<i>Fax Compatibility</i>	ITU-T Group 3, Class 1 and 2, T.4, T.30, V.21, V.27ter, V.29, V.17, and TIA/EIA TR29.2
<i>Error Correction</i>	ITU-T V.42 (LAP-M or MNP 3 and 4)
<i>Data Compression</i>	ITU-T V.42bis (4:1 throughput), MNP 5 (2:1 throughput)
<i>Speed Conversion</i>	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400 bps
<i>Mode of Operation</i>	Fax online modes; full duplex over dial-up and two-wire leased lines; AT command mode
<i>Flow Control</i>	XON/XOFF (software), RTS/CTS (hardware)
<i>Intelligent Features</i>	Plug and play; AT command compatible; autodial, redial, repeat dial; pulse or tone dial; dial pauses; auto answer; caller ID; remote configuration; adaptive line probing; automatic symbol and carrier frequency during start-up, retrain, and rate renegotiation; DTMF detection; call status display, auto-parity and data rate selection; keyboard- and front panel-controlled modem options; monitor and LCD displays for modem options; non-volatile memory; storage of up to four command strings or telephone numbers of up to 30 characters each

\*Though these modems are capable of 56K bps download performance, line impairments, public telephone infrastructure and other external technological factors currently prevent maximum 56K bps connections.

<i>Data Modulation</i>	FSK at 300 bps, PSK at 1200 bps, QAM at 2400, 4800, and 9600 bps (non-trellis), QAM with trellis-coded modulation (TCM) at 9600, 12,000, 14,400, 16,800, 19,200, 21,600, 24,000, 26,400, 28,800, 31,200, 33,600, and 56,000 bps
<i>Fax Modulation</i>	V.21 CH2 FSK at 300 bps (half duplex) V.27ter DPSK at 4800 and 2400 bps V.29 QAM at 9600 and 7200 bps V.17TCM at 14400, 12000, 9600, and 7200 bps
<i>Carrier Frequencies ITU-T V.34</i>	1600, 1646, 1680, 1800, 1829, 1867, 1920, 1959, 2000 Hz
<i>Carrier Frequencies AT&amp;T V.32 terbo/ ITU-T V.32bis/V.32</i>	1800 Hz
<i>Carrier Frequencies V.22bis/V.22 or Bell 212A Standard (2400 &amp; 1200 bps)</i>	Transmit originate: 1200 Hz Transmit answer: 2400 Hz Receive originate: 2400 Hz Receive answer: 1200 Hz
<i>Carrier Frequencies ITU-T V.23 (1200 bps)</i>	Transmit originate: 390 Hz mark 450 Hz space Receive originate: 1300 Hz mark 2100 Hz space Transmit answer: 1300 Hz mark 2100 Hz space Receive answer: 390 Hz mark 450 Hz space
<i>Carrier Frequencies ITU-T V.21 (0–300 bps)</i>	Transmit originate: 980 Hz mark 1180 Hz space Receive originate: 1650 Hz mark 1850 Hz space Transmit answer: 1650 Hz mark 1850 Hz space Receive answer: 980 Hz mark 1180 Hz space
<i>Carrier Frequencies Bell 103/113 (0–300 bps)</i>	Transmit originate: 1270 Hz mark 1070 Hz space Receive originate: 2225 Hz mark 2025 Hz space Transmit answer: 2225 Hz mark 2025 Hz space Receive answer: 1270 Hz mark 1070 Hz space
<i>Fax Carrier Frequencies</i>	V.21 Ch2 (half duplex): 1650 Hz mark, 1850 Hz space for transmit originate 1650 Hz mark, 1850 Hz space for transmit answer V.27ter: 1800 Hz originate/answer V.29 QAM: 1800 Hz originate/answer V.17 TCM: 1800 Hz originate/answer
<i>Transmission Level</i>	-11 dBm (dial-up), -9 dBm (leased-line)
<i>Frequency Stability</i>	±0.01%

<i>Receiver Sensitivity</i>	-43 dBm under worst-case conditions
<i>AGC Dynamic Range</i>	43 dB
<i>Interface</i>	TIA/EIA RS-232C/ITU-T V.24/V.28
<i>Connectors</i>	DB25F RS-232C connector; two RJ-11 phone jacks (BA model) or three RJ-11 phone jacks (BL model); power connector
<i>Cables</i>	One 14-foot RJ-11 phone cable (USA); country-specific cord for UK and International models; external power transformer and cord
<hr/> <b>Note:</b> Any cables connected to the computer should be shielded to reduce interference. <hr/>	
<i>Diagnostics</i>	Power-on self test, local analog loop, local digital loop, remote digital loop
<i>Indicators</i>	32-character backlit LCD for status and configuration information; LEDs for Transmit Data, Receive Data, Carrier Detect, Off Hook, Terminal Ready, and Test Mode
<i>Speaker</i>	1-inch speaker for call progress monitoring
<i>Manual Controls</i>	Power switch, speaker volume control, four LCD control buttons
<i>Environmental</i>	Temperature range 0°–50°C (32°–120°F); humidity range 20–90% (non-condensing)
<i>Power Requirement</i>	120 VAC, 60 Hz, 16 W; 230V/50 Hz optional (international)
<i>Power Consumption</i>	12 W @ 0.1 A
<i>Dimensions</i>	15.8 cm wide × 22.9 cm long × 3.6 cm high (6.2" × 9.0" × 1.4")
<i>Weight</i>	0.9 kg (2 lb.)
<i>Limited Warranty</i>	10 years

# Appendix C: Loopback Tests

## Introduction

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 local digital loopback allows you to verify that the local computer or terminal, the two modems, and the transmission line between them are functioning properly.

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

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**Note:** All loopback tests operate at all speeds except 300 bps.

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## 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.

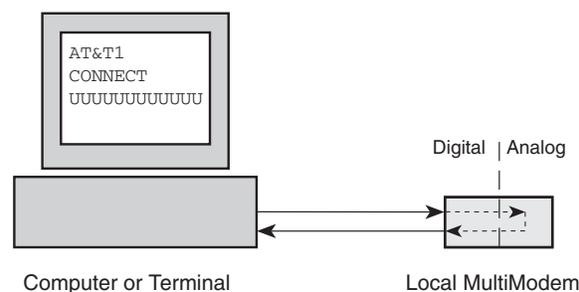


Figure C-1. Local analog loopback test.

### Test procedure

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

3. 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-online mode.
4. Note that the CD and TM indicators are on. If they are not on, there is a defect in your modem.
5. 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. The TD and RD LEDs should flash when a character is entered.
6. To exit the test, type the escape sequence **+++AT** and press **ENTER**. This puts the modem in online command mode. Then type either **AT&T** or **ATH** to return to command mode.
7. 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.

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**Note:** You can also start and stop an analog loopback test by using the front panel LCD and buttons. See "Diagnostic Options Trunk" in Chapter 3.

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## Remote Digital Loopback Test (V.54 Loop 2)

The remote digital loopback test tests the phone lines and the circuits of both your 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.

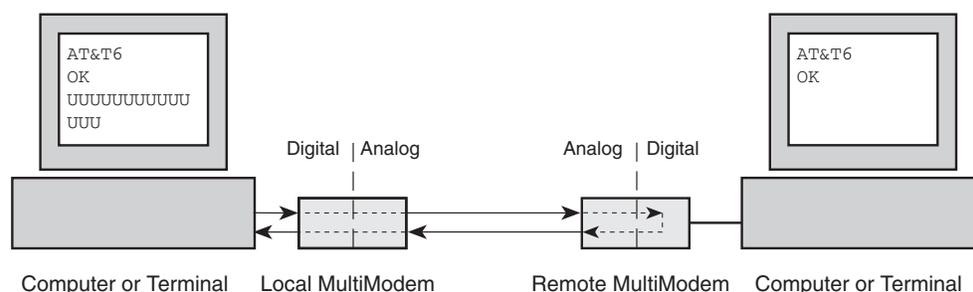


Figure C-2. Remote digital loopback test.

### Test procedure

1. Arrange to have **&T6** set on the remote test modem.
2. Open your communications software 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 online connection.
4. Type the escape sequence `+++AT` and press `ENTER` to bring your modem into online 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 online 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 online 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.

---

**Note:** You can also start and stop a remote digital loopback test by using the front panel LCD and buttons. See “Diagnostic Options Trunk” in Chapter 3.

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## 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.

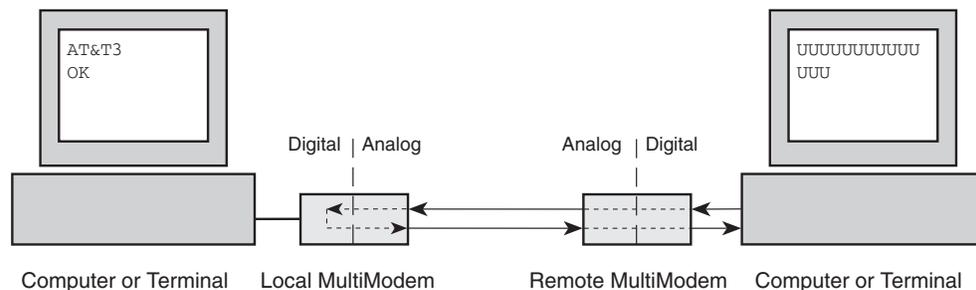


Figure C-3. Local digital loopback test.

### Test procedure

1. Open your communications software 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.

2. Dial the remote modem and establish your online connection.
3. Type the escape sequence `+++AT` and press `ENTER` to bring your modem into online 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, turn off the modems.

---

**Note:** You can also start and stop a local digital loopback test by using the front panel LCD and buttons. See "Diagnostic Options Trunk" in Chapter 3.

---

## Back-to-Back Test

This test verifies proper operation by connecting two MT5600BLs back to back using an RJ-11 cable. By using an MT5600BL that is known to be good, you can test a second MT5600BL that is suspect.

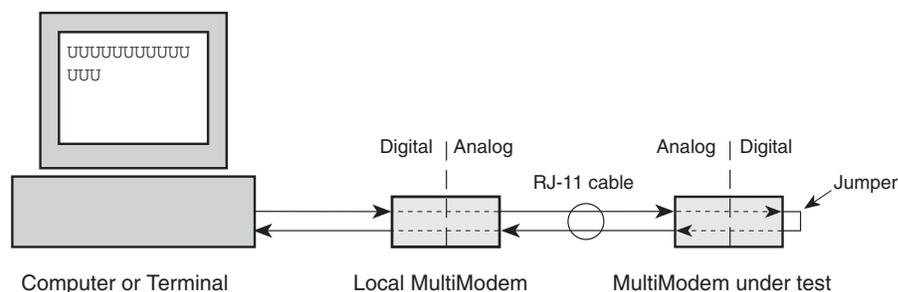


Figure C-4. Back-to-back test.

1. Connect two MT5600BLs by plugging an RJ-11 cable into their LEASED jacks.
2. Set the terminal and modems to the same serial port speed. For instance, if you are using a terminal that is limited to 9600 bps, set the modems to 9600 bps by sending the command `AT$SB9600&W0` to each modem.
3. Following the instructions in Chapter 7, set both modems to two-wire leased-line mode. One should be set as the originate modem and the other as the answer modem, but it does not matter which is which.
4. Turn on both units and wait for carrier detect (CD).
5. On the modem under test, short pins 2 and 3 of the RS-232C connector with a paper clip or other metal device.

6. Enter data from your keyboard. 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, turn off the modems.

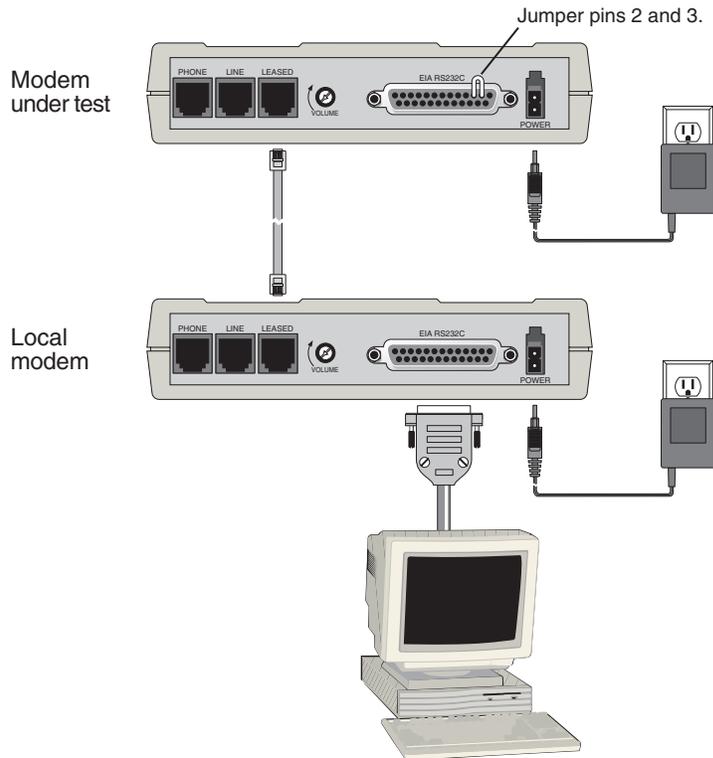


Figure C-5. Back-to-back test connections.

# Appendix D: Warranty, Service, and Technical Support

## Limited Warranty

Multi-Tech Systems, Inc. (MTS) warrants that this product will be free from defects in material or workmanship for a period of ten years from the date of purchase or, if date of purchase is not provided, ten years from the date of shipment (limited to customers in the U.S., Canada, Mexico, and United Kingdom). For customers in all other countries, due to certain legal restrictions, MTS warrants that this product will be free from defects in material or workmanship for a period of five years from the date of purchase or, if date of purchase is not provided, five years from the date of shipment, unless otherwise limited or prohibited by law.

MTS MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products that have been damaged by lightning storms, water, or power surges, or that have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by the customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products that prove to be defective within the warranty period, or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory with transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS.

## Service

If you are outside the USA, your local distributor of Multi-Tech products usually offers the quickest and most economical repair option. If necessary, you may send your modem to our Mounds View factory in the USA. A modem that is shipped to us from outside the USA must have a Returned Materials Authorization (RMA) and shipping instructions. To return a modem for repair from inside the USA, no RMA is required; simply send it to us freight prepaid. Include a description of the problem, a return shipping address, and a check or purchase order for out-of-warranty repairs.

Please send modems that require repair to the following address:

**Multi-Tech Systems, Inc.**  
**2205 Woodale Drive**  
**Mounds View, MN 55112**  
*Attn: Repair*

If you are shipping from outside the USA, please contact our Repair Department for an RMA prior to your shipment. You can contact us by telephone at +612 785-3500 or by fax at +612 785-9874.

## Technical Support

Multi-Tech Systems has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, please call 800 972-2439 (USA and Canada) or 612 785-3500 (international and local). Please have modem information available. You can also contact Technical Support via the following URL:

[http://www.multitech.com/\\_forms/email\\_tech\\_support.htm](http://www.multitech.com/_forms/email_tech_support.htm)

## Online Warranty Registration

If you have access to the World Wide Web, you can register your Multi-Tech product online at the following URL:

<http://www.multitech.com/register/>

## The Multi-Tech BBS

For customers who do not have Internet access, Multi-Tech maintains a bulletin board system (BBS) that mirrors its FTP site. Information available from the BBS includes new product information, product upgrade files, and problem-solving tips. The phone number for the Multi-Tech BBS is 800 392-2432 (USA and Canada) or 612 785-3702 (international and local).

The BBS can be accessed by any asynchronous modem operating at 1200 bps to 33,600 bps at a setting of 8 bits, no parity, and 1 stop bit (8-N-1).

### **To Log on to the Multi-Tech BBS**

1. Set your communication program to **8-N-1**.
2. Dial our BBS at 800 392-2432 (USA and Canada) or 612 785-3702 (international and local).
3. At the prompts, type your first name, last name, and password; then press **ENTER**. If you are a first time caller, the BBS asks if your name is spelled correctly. If you answer yes, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
4. Press **ENTER** until the Main Menu appears. From the Main Menu you have access to two areas: the Files Menu and News. For help on menu commands, type **?**.

### **To Download a File**

#### **If you know the file name**

1. From the Main Menu, type **F** to access the Files Menu, and then type **D**.
2. Enter the name of the file you want to download from the BBS.
3. If a password is required, enter the password.
4. Answer **Y** or **N** to the automatic logoff question.

5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
6. If you select Zmodem, the transfer begins automatically. If you select another protocol, you might have to initiate the transfer yourself. (In most communication programs, the PAGE DOWN key initiates the download.)
7. When the download is complete, press ENTER to return to the File Menu.
8. To exit the BBS, type **G** and press ENTER.

### **If you don't know the file name**

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L**, press ENTER, then type **L** and press ENTER again. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark each file area you would like to examine by typing its list number and pressing ENTER.
3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list and **P** to go back.
4. To mark one or more files for download, type **M**, press ENTER, type the list numbers of the files, and then press ENTER again.
5. Enter **D** to see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.
6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the transfer begins automatically. If you select another protocol, you might have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, press ENTER to return to the File Menu.
9. To exit the BBS, type **G** and press ENTER.

## About the Internet

Multi-Tech is a commercial provider on the Internet. Multi-Tech has a Web site at

<http://www.multitech.com>

and an ftp site at

<ftp://ftp.multitech.com>

To receive support via the Web, contact Technical Support at

[http://www.multitech.com/\\_forms/email\\_tech\\_support.htm](http://www.multitech.com/_forms/email_tech_support.htm)

## Ordering Modem Accessories

SupplyNet, Inc., can supply you with replacement transformers, cables and connectors for select Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax or the Internet at the following addresses:

Mail: SupplyNet, Inc.  
614 Corporate Way  
Valley Cottage, NY 10989  
Phone: (800) 826-0279  
Fax: (914) 267-2420  
Email: [info@thesupplynet.com](mailto:info@thesupplynet.com)  
Internet: <http://www.thesupplynet.com>

### SupplyNet Online Ordering Instructions

1. Browse to <http://www.thesupplynet.com>. In the **Browse by Manufacturer** list, select **Multi-Tech**, and then click .
2. To order, type the quantity, and then click .
3. To change your order, click .
4. When you have finished selecting your items, click  to finalize the order. The SupplyNet site uses Verisign's Secure Socket Layer (SSL) technology to ensure complete shopping security.

# Appendix E: Upgrading the Modem

## Introduction

Your modem is controlled by semi-permanent software, called *firmware*, that is stored in flash memory. Firmware is nonvolatile; that is, it remains stored in memory when the modem is turned off. However, it can be changed by either the manufacturer or the user as bugs are fixed or new features are added.

Since the firmware in your modem is stored in flash memory, you can upgrade it yourself in a few minutes by using the following procedures.

## Upgrade Overview

The upgrade procedure consists of the following steps, which are described in greater detail in the following sections.

1. Identify the model number and firmware version of your modem.
2. Identify the current version of the firmware at the Multi-Tech Web site or BBS. If your modem already has the current firmware, there is no need to update it.
3. Download the upgrade file for your modem.
4. Extract the upgrade files from the file you downloaded.
5. Set the modem to the factory defaults.
6. Upgrade the modem's firmware.
7. Restore your parameters.

## Step 1: Identify the Modem Firmware

You must know the model number and firmware version of your Multi-Tech modem to know whether you should update it.

1. Run your favorite terminal program. If you are using Windows 9x or Windows NT 4.0, you can use HyperTerminal. If you are using Windows 3.11, you can use Windows Terminal.
2. In the program's terminal window, type **AT&F**. Even if you cannot see the **AT&F** command on your screen, be sure to type it completely and then press ENTER.
3. Now type **ATI3** and record your results. The firmware version should appear first in the results, and look similar to the following:

```
V2.210-V90_2M_DLS
```

## Step 2: Identify the Current Firmware Version

Identify the current version of the firmware at the Multi-Tech Web site or BBS. If your modem already has the current firmware, there is no need to update it.

### **Multi-Tech Web Site**

1. Using your favorite Web browser, go to <http://www.multitech.com/support/firmware/>.
2. Scroll down to the table with your modem model number (non-USA firmware must be obtained directly from the [ftp site](#) or BBS at this time).
3. Look at the Current Revision number for your modem.
4. If the Current Revision number matches the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has the current firmware version and does not need to be updated.
5. If the Current Revision number is larger than the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has an older firmware version. Continue with “Step 3: Download the Upgrade File.”

### **Multi-Tech BBS**

1. Run your favorite terminal program, and dial in to the Multi-Tech BBS at 800 392-2432 (North America) or 612 785-3702 (local and international). If you followed the download test in the “Quick Start” chapter, your terminal program should already be configured for the Multi-Tech BBS.
2. When the BBS welcome screen appears, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
3. Press **ENTER** until the main menu appears. From the main menu you have access to two areas: the Files Menu and News. For help with menu commands, type **?**.
4. In the Main Menu, type **F** and press **ENTER** to access the Files Menu.
5. In the Files Menu, type **L** and press **ENTER**, then type **L** and press **ENTER** again. A two-column list of file areas appears.
6. Press **ENTER** until the modem firmware area for your country is listed.
7. Type the number of the modem firmware area for your country and press **ENTER**.
8. Type **L** and press **ENTER** to list the files in the selected area.
9. Press **ENTER** until your modem model number appears.
10. Look at the version number for your modem.
11. If the version number matches the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has the current firmware version and does not need to be updated.
12. If the version number is larger than the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has an older firmware version. Continue with “Step 3: Download the Upgrade File.”

## Step 3: Download the Upgrade File

### *Multi-Tech Web Site*

1. If you are not already at the Firmware page of the Multi-Tech Web site, follow the procedure in "Step 2: Identify the Current Firmware."
2. Click on the upgrade file name for your modem, and save the file to a temporary location on your hard disk.

### *Multi-Tech BBS*

1. If you have not already found the upgrade file for your modem on the Multi-Tech BBS, follow the procedure in "Step 2: Identify the Current Firmware."
2. Type the number of the upgrade file for your modem, and then press **ENTER**.
3. Type **D** and press **ENTER** to list the file to be downloaded.
4. If the correct file is listed, press **ENTER**; otherwise use the **Q** command to return to the previous menu.
5. Type **Z** and press **ENTER** to select the Zmodem transfer protocol.
6. The download begins automatically. As the file is copied to your hard disk, a dialog box reports on the progress of the download.
7. To log off the BBS, press **ENTER**, type **G** for "good-bye," and then press **ENTER** twice more.

## Step 4: Extract the Upgrade Files

1. Move the downloaded upgrade file to a temporary directory or folder on your hard disk.
2. The file is a self-extracting archive. Extract the files by typing the upgrade file name in DOS or double-clicking it in Windows.

## Step 5: Set the Modem to the Factory Defaults

Before you flash your modem, it is important that you issue the **AT&F** command to set it to the factory default parameters. You should also record the parameters that are currently stored in your modem so you can reprogram it after flashing.

1. Run your favorite terminal program. If you are using Windows 95 or Windows NT, you can use HyperTerminal. If you are using Windows 3.11, you can use Windows Terminal.
2. In the program's terminal window, type **AT&V** and press **ENTER** to list your modem's current parameters.
3. Record your parameters by saving the screens and sending them to your printer.
4. Type **AT&F** and press **ENTER** to reset your modem to the factory defaults.
5. Close the terminal program.

## Step 6: Upgrade the Modem's Firmware

Before you begin the following procedure, read the README.TXT file extracted from the upgrade archive file. Note the file name for the boot code (e.g., 2MBPFL11.S37) and the file name for the new firmware (e.g., 5600BA.S37).

1. Run a terminal program, such as HyperTerminal. The program must be able to send a file as ASCII text.
2. Make sure hardware flow control is selected. In HyperTerminal, select **File | Properties | Configure | Connection | Advanced**, and make sure both **Use flow control** and **Hardware (RTS/CTS)** are selected.
3. In the terminal window, type **AT** and press ENTER. An **OK** response should appear, and the TR indicator on the modem should light. If the TR indicator does not light, check your cable, make sure the modem is powered on, and double-check the terminal program's settings.
4. Type **ATI3** and press ENTER. The first number in the response is the firmware version that is currently in your modem (2.210 in this example):  

```
V2.210-V90_2M_DLS
```
5. Type **AT\*\*** and press ENTER. Your modem is now ready to accept a flash file.
6. In HyperTerminal, select **Send Text File** from the **Transfer** menu.
7. In the **Send Text File** dialog box, find the temporary directory or folder in which you unarchived the upgrade file, select **All files (\*.\*)** in the **Files of type** box, and double-click the name of the boot code file, e.g., **2MBPFL11.S37**. You should see activity on the screen, and your modem's TD indicator should flash.

---

**Warning:** Do not abort at this point. The modem is being reprogrammed, and the process must not be interrupted.

---

This is the boot code portion of the update. When the boot code has all been sent to the modem, the following message appears:

```
Download Flash Code..
```

8. When you see the `Download Flash Code..` message, select **Send Text File** from the **Transfer** menu.
9. In the **Send Text File** dialog box, select **All files (\*.\*)** in the **Files of type** box, and double-click the name of the firmware code file, e.g., **5600BL.S37**.

The firmware code is now sent to your modem. Wait until you receive a message stating that the modem has been successfully programmed.

10. Once modem activity has stopped and you see a `Device Successfully Programmed` message, type **ATI3** and press ENTER. If the upgrade was successful, your modem should display the new firmware version.

## Step 7: Restore Your Parameters

Your modem has been updated. You can now open your terminal program to reprogram your modem parameters or to confirm the update by typing **ATI3** in the terminal window and pressing ENTER.

# Appendix F: Cable Pinouts

## RS-232 Pinouts

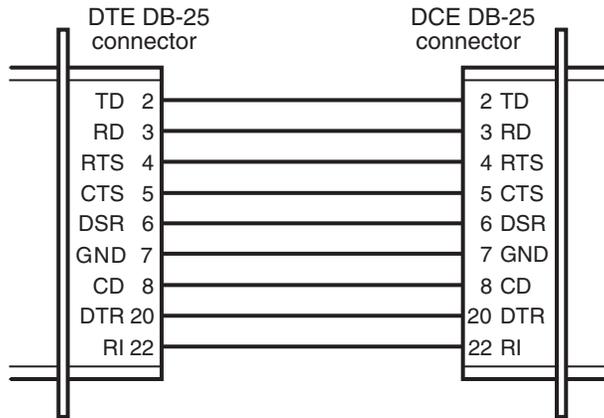


Figure F-1. 25-pin to 25-pin RS-232 cable.

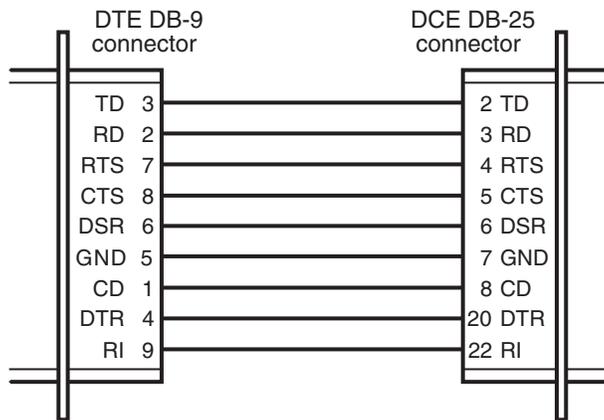


Figure F-2. 9-pin to 25-pin RS-232 cable.

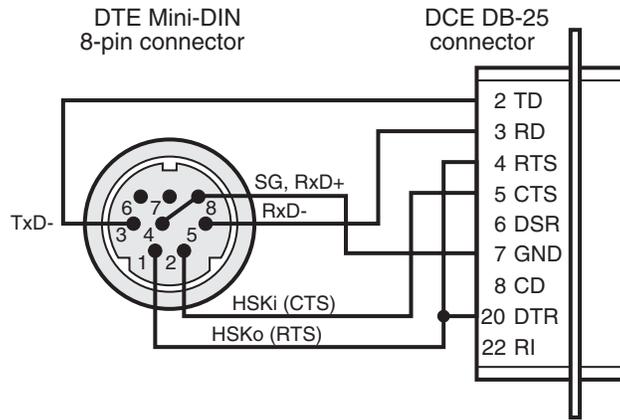


Figure F-3. Macintosh cable.

## Leased Line Pinouts

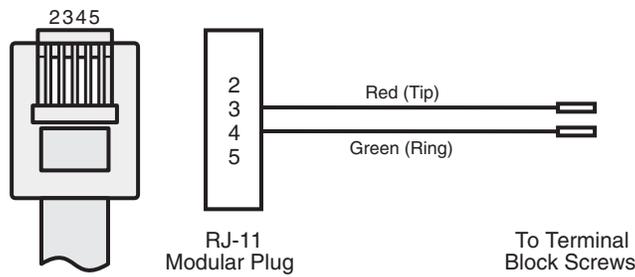


Figure F-4. Two-wire leased line cable.

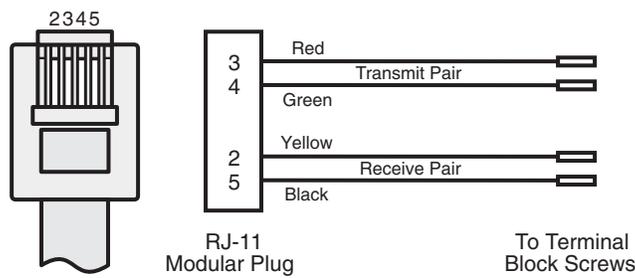
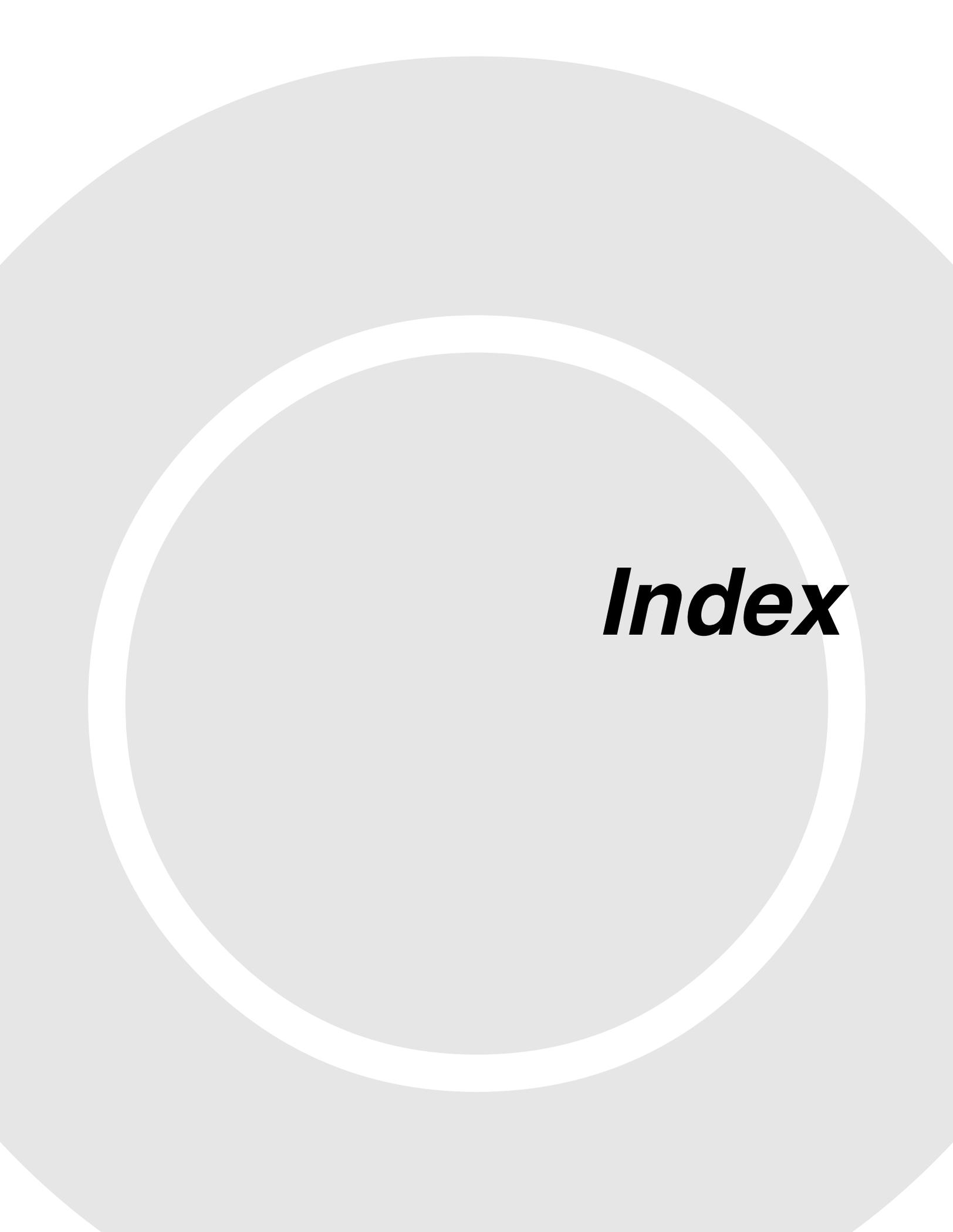


Figure F-5. Four-wire leased line cable.

# Appendix G: ASCII Character Map

Ctrl	Code	Hex	Dec									
@	NUL	00	0	SP	20	32	@	40	64	`	60	96
A	SOH	01	1	!	21	33	A	41	65	a	61	97
B	STX	02	2	"	22	34	B	42	66	b	62	98
C	ETX	03	3	#	23	35	C	43	67	c	63	99
D	EOT	04	4	\$	24	36	D	44	68	d	64	100
E	ENQ	05	5	%	25	37	E	45	69	e	65	101
F	ACK	06	6	&	26	38	F	46	70	f	66	102
G	BEL	07	7	'	27	39	G	47	71	g	67	103
H	BS	08	8	(	28	40	H	48	72	h	68	104
I	HT	09	9	)	29	41	I	49	73	i	69	105
J	LF	0A	10	*	2A	42	J	4A	74	j	6A	106
K	VT	0B	11	+	2B	43	K	4B	75	k	6B	107
L	FF	0C	12	,	2C	44	L	4C	76	l	6C	108
M	CR	0D	13	-	2D	45	M	4D	77	m	6D	109
N	SO	0E	14	.	2E	46	N	4E	78	n	6E	110
O	SI	0F	15	/	2F	47	O	4F	79	o	6F	111
P	DLE	10	16	0	30	48	P	50	80	p	70	112
Q	DC1	11	17	1	31	49	Q	51	81	q	71	113
R	DC2	12	18	2	32	50	R	52	82	r	72	114
S	DC3	13	19	3	33	51	S	53	83	s	73	115
T	DC4	14	20	4	34	52	T	54	84	t	74	116
U	NAK	15	21	5	35	53	U	55	85	u	75	117
V	SYN	16	22	6	36	54	V	56	86	v	76	118
W	ETB	17	23	7	37	55	W	57	87	w	77	119
X	CAN	18	24	8	38	56	X	58	88	x	78	120
Y	EM	19	25	9	39	57	Y	59	89	y	79	121
Z	SUB	1A	26	:	3A	58	Z	5A	90	z	7A	122
[	ESC	1B	27	;	3B	59	[	5B	91	{	7B	123
\	FS	1C	28	<	3C	60	\	5C	92		7C	124
]	GS	1D	29	=	3D	61	]	5D	93	}	7D	125
^	RS	1E	30	>	3E	62	^	5E	94	~	7E	126
_	US	1F	31	?	3F	63	_	5F	95	DEL	7F	127

NUL	Null, or all zeros	VT	Vertical Tab	SYN	Sync.
SOH	Start of Header	FF	Form Feed	ETB	End Transmission Block
STX	Start of Text	CR	Carriage Return	CAN	Cancel
ETX	End of Text	SO	Shift Out	EM	End of Medium
EOT	End of Transmission	SI	Shift In	SUB	Substitute
ENQ	Enquiry	DLE	Data Link Escape	ESC	Escape
ACK	Acknowledge	DC1	Device Control 1	FS	File Separator
BEL	Bell or Alarm	DC2	Device Control 2	GS	Group Separator
BS	Backspace	DC3	Device Control 3	RS	Record Separator
HT	Horizontal Tab	DC4	Device Control 4	US	Unit Separator
LF	Line Feed	NAK	Negative Acknowledge	DEL	Delete



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