

MT5634ZPX-PCI-V92

Internal V.92 Data/Super G3 Fax/Voice Modem

User Guide

MultiModemZPX User Guide

MT5634ZPX-PCI-V92

P/N S0000197 Revision A

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Patents

This device is covered by one or more of the following patents: 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; D394,250; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; D374,222; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; D361,764; D355,658; D355,653; D353,598; D353,144; 5,355,365; 5,309,562; 5,301,274. Other patents pending.

Notice

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.

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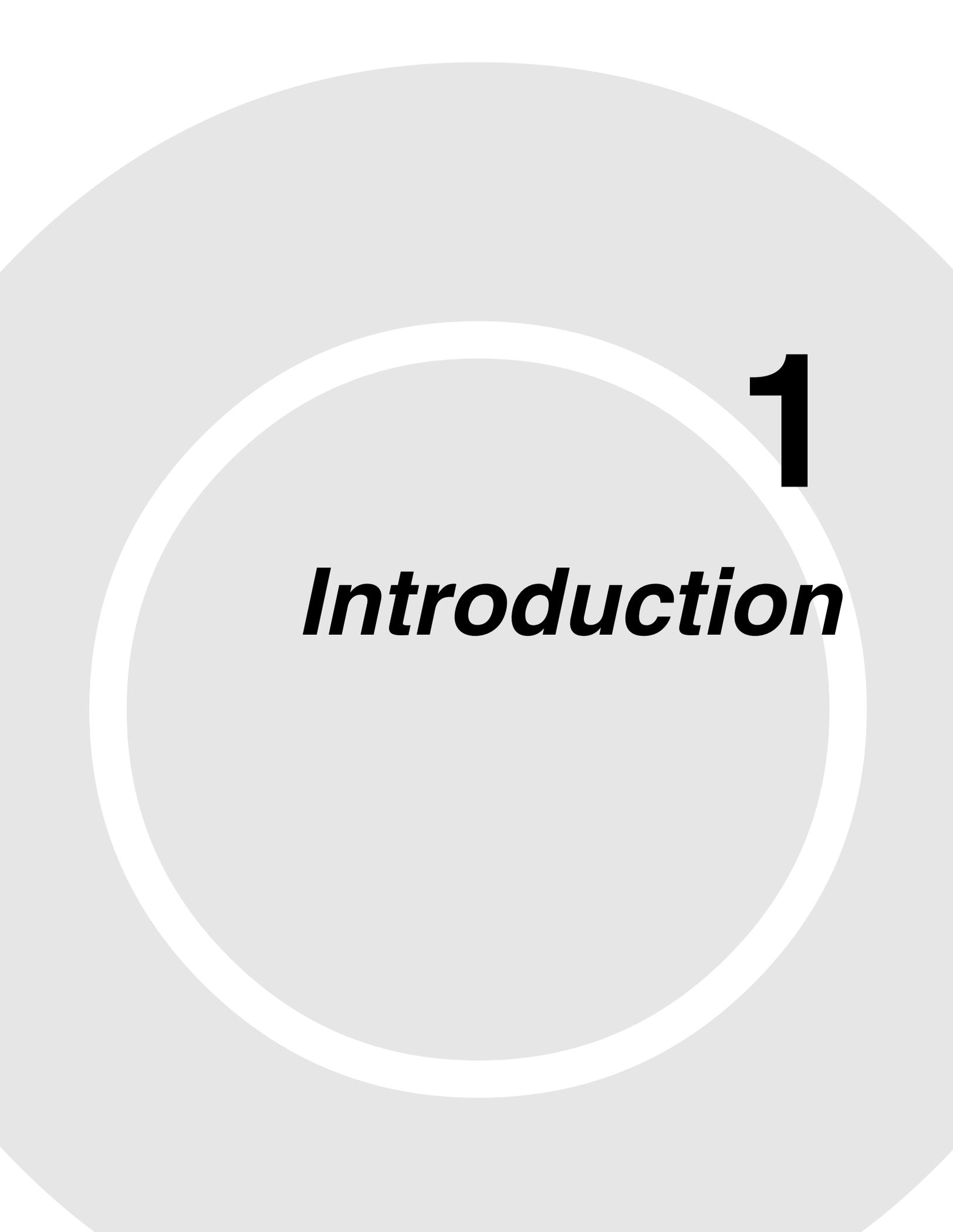
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1

Introduction

Introduction

Congratulations on your purchase of the MultiModemZPX. You have acquired one of the finest internal V.92 data/fax/voice modems available today from one of the world's oldest modem manufacturers: Multitech Systems, Inc. This user guide will help you to install, configure, test, and use your modem.

Product Description

The MultiModemZPX is a full-featured internal data/fax/voice modem designed for Pentium computers in Windows Plug and Play™ environments. Its half-length card can be plugged into any available PCI slot.

The MultiModemZPX provides high-speed data transfer and fax capabilities for small businesses, telecommuters, and SOHO users. Its compatibility with the new ITU-T V.92 protocol provides quick connections, downstream transmissions at speeds up to 56K bps*, and upstream transmissions at speeds up to 48K bps when connected to V.92-compatible Internet service providers. Transmissions between the MultiModemZPX and other client modems are limited to 33.6K bps, as are upstream transmissions to non-V.92-compatible ISPs and downstream transmissions that are converted more than once on the telephone network.

The MultiModemZPX also supports "Super G3" ITU-T V.34 fax communications at speeds up to 33.6K bps with Class 2.1 fax commands.

Modem features include Plug and Play operation, callback security, and remote configuration. In standard mode, you can store up to four command lines or telephone numbers of up to 40 characters each in the modems' nonvolatile memory. In callback security mode, you can store up to 30 passwords and dialing strings. Other modem capabilities include voice operation using the included software, AT&T calling card tone detection, pulse and tone dialing, adaptive answer, DTR dialing, U.S. Caller ID reporting, two-wire leased-line operation, 11-bit operation, V.42 error correction, and V.42bis and V.44 data compression.

What Is in Your Modem Package?

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

- ✓ An MT5634ZPX-PCI-V92 data/fax/voice modem
- ✓ An RJ-11 telephone cable
- ✓ A printed *Quick Start Guide*
- ✓ A MultiModemZPX CD containing the modem driver and this *User Guide*
- ✓ A CD containing data communications and other programs

If any item is missing, please contact Multi-Tech Systems or your dealer/distributor (see Appendix D for information on contacting Multi-Tech via telephone, fax, or the Internet).

*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.



2

Installation

Introduction

This chapter shows you step-by-step how to set up your MultiModemZPX data/fax/voice modem and make your first calls.

What You Will Need

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

We supply

- ✓ An MT5634ZPX-PCI-V92 data/fax/voice modem
- ✓ An RJ-11 telephone cable
- ✓ A printed *Quick Start Guide*
- ✓ An installation CD containing a modem driver and this *User Guide*
- ✓ A CD containing data communications and other programs

You supply

- ✓ A 100-MHz or faster Pentium personal computer with an unused PCI expansion slot. For video conferencing, we recommend a 166-MHz or faster computer.
- ✓ Windows 95, 98, NT, 2000, or Linux (2.2.x kernel) operating system installed
- ✓ A CD-ROM drive
- ✓ Tools to open your computer
- ✓ The computer's manual
- ✓ A nearby telephone line jack
- ✓ A 3.58mm (9/64-inch) plug male-to-male stereo patch cord (optional)
- ✓ An external speaker or headphone (optional)
- ✓ An external microphone (optional)

Safety Warnings

- Use this product only with UL- and CUL-listed computers (U.S.A.)
- To reduce the risk of fire, use only 26 AWG (.41mm) or larger telephone wiring.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone during an electrical storm; there is a risk of electrical shock from lightning.
- Do not use a telephone in the vicinity of a gas leak.

Step 1: Install the MultiModemZPX in your Computer

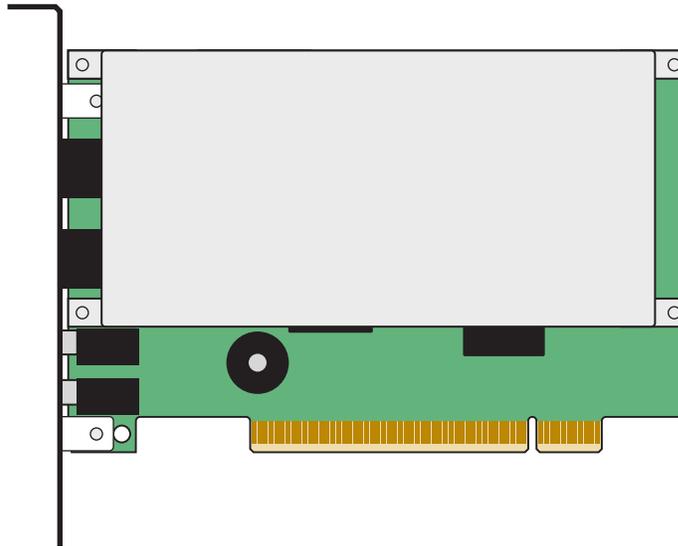


Figure 2-1. The MultiModemZPX.

Installing the MultiModemZPX requires you to open your computer. Please consult your computer manual in addition to the following instructions.

1. Turn off the computer and unplug it. Failure to do so may result in damage to both the MultiModemZPX and the computer. Do not turn on the computer until the instructions tell you to do so.
2. Remove the cover from the computer as instructed in the computer manual.
3. Select an empty PCI expansion slot. Remove the expansion slot cover and save the retaining screw.
4. Before handling the MultiModemZPX, discharge static in your body by touching a metal piece of the computer chassis. Carefully remove the MultiModemZPX from its antistatic bag, handling it only by the mounting bracket and edges. Do not touch the gold-plated connectors along the bottom edge.
5. Place the MultiModemZPX directly above the expansion slot and gently, but firmly, push it into the connector until the card's retaining bracket is flush against the computer chassis.
6. Fasten the retaining bracket to the computer chassis with the screw saved in step 3.
7. Replace the cover of the computer.

Step 2: Make the External Connections

Now connect the MultiModemZPX to the telephone line and, optionally, to your telephone. For voice mail or speakerphone use, you can also connect it to a microphone and an external speaker, headphone, or sound card. The microphone can be used for recording answering machine messages or for speakerphone use. The speaker or headphone can be used for playing back messages or as a speakerphone.

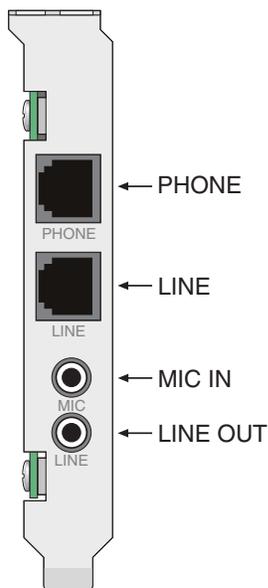


Figure 2-2. MT5634ZPX-PCI-V92 connectors.

Line Connection

Plug one end of the provided telephone cable into the modem's LINE jack, and the other end into a telephone wall jack. This is the only required connection.

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) and Industry Canada impose certain restrictions on equipment connected to public telephone systems. For more information, see Appendix A.

Phone Connection

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

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

Microphone Connection

For voice mail or speakerphone applications, plug an unamplified microphone into the MIC jack. The microphone should have a stereo 3.58mm (9/64-inch) mini plug. Do not use a monophonic microphone.

Sound Card and Speaker Connections

For voice mail or speakerphone applications, use a 3.58mm (9/64-inch) plug male-to-male stereo patch cord to connect the LINE OUT jack on the modem to the LINE IN jack on your sound card. If your sound card does not have a LINE IN jack, use its MIC jack.

This will allow you to hear modem activity whether it is originating or answering a call, or playing a recorded message. If you do not have a sound card, you can plug an amplified speaker into the LINE OUT jack.

Step 3: Install the Modem Driver

If you use Windows 95 or newer, you must install the modem driver. The modem driver tells Windows how to control the modem. If you use a Linux operating system, please see Appendix F for installation instructions. If you use the SCO OpenServer operating system, please see Appendix G.

Windows 95

1. After installing the MultiModemZPX into your computer, turn the computer on and allow Windows 95 to start. As the computer starts, it automatically detects the new modem, and the **New Hardware Found** wizard appears.
2. Insert the MultiModemZPX CD into your computer's CD-ROM drive, and then click **Next**. Windows begins searching for the driver.
3. When Windows says it has found an updated driver for the Multi-Tech MT5634ZPX-PCI-V92, click **Finish** to complete the modem driver installation.
4. When Windows says it has found the driver for the Voice Modem, click **Next**.
5. When prompted, click **Finish** to complete the installation.
6. After completing the hardware and driver installation, you must configure your modem for country-specific operation. See "Step 4: Configure the Modem for Your Country" for configuration instructions.
7. After setting up your modem for country-specific operation, you'll want to configure your communications software or Windows Dial-Up Networking. Information about configuring your communications software can be found in Step 5.

Windows 98/Me

1. After installing the MultiModemZPX into your computer, turn the computer on and allow Windows to start. As the computer starts, it automatically detects the new modem, and the **New Hardware Found** wizard appears.
2. Click **Next** to begin the installation.
3. When the wizard asks, "**What do you want Windows to do?**" Select **Search for the best driver for your device**, and then click **Next**.
4. When the wizard says, "Windows will search for new drivers in its driver database on your hard drive and in any of the following selected locations," insert the MultiModemZPX CD into your computer's CD-ROM drive, and then select **CD-ROM drive**. Click **Next**.
5. When prompted, select the driver for the Multi-Tech MT5634ZPX-PCI-V92, and then click **Next**.
6. If the **Insert Disk** dialog box says that the file *56ZPX.CAT* cannot be found, click **Skip File** to continue the installation.
7. When prompted, click **Finish** to complete the modem driver installation.

8. When the **Add New Hardware** wizard says it will search for new drivers for the Wave device for the voice modem, click **Next**.
9. Select **Search for the best driver for your device**, and then click **Next**.
10. Select **CD-ROM drive**, and then click **Next**.
11. When Windows says it has found the driver for the voice modem, click **Next** to continue.
12. When prompted, click **Finish** to complete the installation.
13. After completing the hardware and driver installation, you must configure your modem for country-specific operation. See “Step 4: Configure the Modem for Your Country” for configuration instructions.
14. After setting up your modem for country-specific operation, you’ll want to configure your communications software or Windows Dial-Up Networking. Information about configuring your communications software can be found in Step 5.

Changing the Windows 95/98/Me COM port assignment

Unlike an external modem, the MultiModemZPX contains its own serial port. When Windows detects the MultiModemZPX, it assigns the next available COM port to it. Since COM1 through COM4 are standard serial ports in Windows computers, Windows typically assigns COM5 to the modem’s serial port.

If Windows assigns the modem to a COM port higher than 4, then certain legacy software applications will not recognize the modem. To correct this situation, Multi-Tech Systems provides two additional driver files on the MultiModemZPX CD that may be used to reassign the modem to either COM3 or COM4. To reassign the COM port:

1. Insert the MultiModemZPX CD into your computer’s CD-ROM drive.
2. Click **Start | Settings | Control Panel**. Double-click the **System** icon.
3. Select the **Device Manager** tab, and double-click the **Modem** icon.
4. Double-click **MT5634ZPX-PCI-V92** to go to the **Properties** dialog box.
5. Select the **Driver** tab. Click the **Update Driver** button and follow the **Update Device Driver** wizard prompts. The wizard requests you to specify the path of the new driver. If you’d like to reassign your modem to COM3, type **D:\COM-3\pcicom3.inf**, where D: is the drive letter associated with your computer’s CD-ROM drive. If you want to reassign your modem to COM4, type **D:\COM-4\pcicom4.inf** and continue with the wizard’s instructions.
6. When the wizard completes its installation, your modem should be reassigned to the new COM port.

Verifying the Windows 95/98/Me Configuration

Windows assigns an interrupt request (IRQ) number for your modem. Because the number of IRQs is limited, a computer with several accessories may not have an available IRQ for your new modem. In that case, you may have to decide which of your other accessories you can modify or do without.

Be aware that resource settings should be changed only by users with expert knowledge of computer hardware and hardware configurations.

Note: Changing resource settings improperly can disable your hardware and can cause your computer to malfunction or be inoperable.

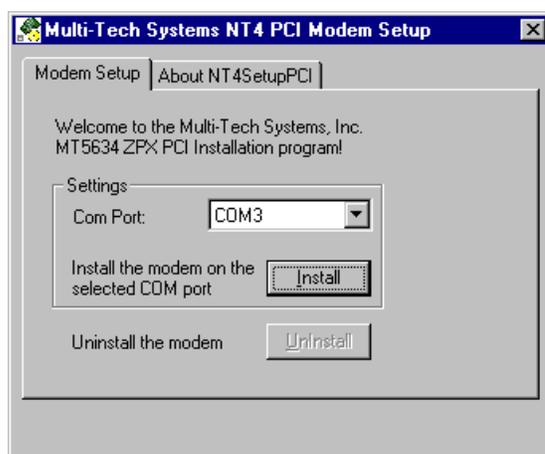
Use the following procedure to check the assignments Windows has made for your modem:

1. Click **Start | Settings | Control Panel**. Double-click the **System** icon.
2. When the **System Properties** dialog box appears, click the **Device Manager** tab. A list of device types appears.
3. Double-click **Modem** to display a list of modems installed in your computer.
4. Double-click **Multi-Tech Systems MT5634ZPX-PCI-V92**. The **Modem Properties** dialog box appears.
5. Click the **Resources** tab and note the **Conflicting Device** list. If there is a conflict between your modem and another device in your computer, the information appears here. For help in resolving a conflict, click **Start | Help**, and then search the Help index for the Hardware Conflict Troubleshooter. When finished, click **OK** to exit the **System Properties** dialog box.
6. In **Control Panel**, double-click the **Modems** icon.
7. When the **Modems Properties** dialog box appears, click the **Diagnostics** tab. A list of ports and devices appears.
8. Highlight the COM port associated with the MT5634ZPX-PCI-V92. Click **More Info**. Clicking **More Info** causes Windows to send commands to and receive responses from the modem. The system also displays information about the modem's COM port.
9. Write down the modem's port, interrupt, address, and highest speed. You will need this information to configure any *legacy* (nonWindows) communications software you install.
Port: COM _____ Interrupt: _____ Address: _____ Speed: _____
10. Click the **General** tab. Select **Multi-Tech Systems MT5634ZPX-PCI-V92**, and click **Properties** to review the modem's default communications settings. Do not change any settings unless you have special requirements.
11. Click **Dialing Properties** and review your dialing settings. If you are required to dial 9 to get an outside line, type 9 in the local and long distance boxes. If you have Call Waiting service, disable Call Waiting to prevent it from interrupting a data or fax transmission. When you are finished, click **OK** to exit the dialog box.

Windows NT 4.0

Before you begin a Windows NT installation, make sure Windows NT Service Pack 3 or newer is installed on the computer. Also, to add and remove devices you must be logged on with Administrator privileges.

1. After installing the MultiModemZPX modem into your computer, turn the computer on and allow Windows NT to start.
2. Insert the MultiModemZPX CD into your computer's CD-ROM drive.
3. When the **MT5634ZPX-PCI Autorun** menu appears, choose **Windows NT Setup**.
4. The **Multi-Tech Systems NT4 PCI Modem Setup** dialog box shows the COM port assigned to the modem. You can change the COM port assignment by clicking the down arrow and selecting an unused COM port.



5. Now click **Install**. The MT5634ZPX-PCI-V92 driver is installed on the selected COM port.
6. When a message asking you to restart the computer appears, remove the CD from the CD-ROM drive, and then click **OK** to restart the computer.

Remote Access Setup

Before you can use your modem, Dial-Up Networking must be installed, and the new modem must be selected as the Remote Access Service device.

If Dial-Up Networking is not installed

1. Double-click the My Computer icon, and then double-click the Dial-Up Networking icon. If Dial-Up Networking is not installed, you will see an **Install** button in the **Dial-Up Networking** dialog box.
2. Insert the Windows NT 4.0 compact disc into the CD-ROM drive.
3. Click **Install** in the **Dial-Up Networking** dialog box.
4. In the **Add RAS Device** dialog box, choose **Multi-Tech Systems MT5634ZPX-PCI-V92**, and then click **OK**.
5. In the **Remote Access Setup** dialog box, click **Configure**.

6. In the **Configure Port Usage** dialog box, select **Dial out only, Receive calls only**, or **Dial out and receive calls**, depending upon how the phone line will be used. Click **OK**.
7. In the **Remote Access Setup** dialog box, click **Network**.
8. In the **Network Configuration** dialog box, make sure that only **TCP/IP** is selected, and then click **OK**.
9. If there is a network interface card that does not have TCP/IP bound to it, the Microsoft TCP/IP Properties window appears. Click **Cancel** to close the window.
10. Click **Continue**, and then click **Restart** to finish the installation.
11. After completing the hardware and driver installation, you must configure your modem for country-specific operation. See "Step 4: Configure the Modem for Your Country" for configuration instructions.
12. After setting up your modem for country-specific operation, you'll want to configure your communications software or Windows Dial-Up Networking. Information about configuring your communications software can be found in Step 5.

If Dial-Up Networking is already installed

1. Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.
2. In the **Network** dialog box, click the **Services** tab, and then double-click Remote Access Service.
3. In the **Remote Access Setup** dialog box, a list of modems is displayed. Click **Add**.
4. In the **Add RAS Device** dialog box, choose **Multi-Tech Systems MT5634ZPX-PCI-V92**, and then click **OK**.
5. In the **Remote Access Setup** dialog box, click **Configure**.
6. In the **Configure Port Usage** dialog box, select **Dial out only, Receive calls only**, or **Dial out and receive calls**, depending upon how the phone line will be used. Click **OK**.
7. In the **Remote Access Setup** dialog box, click **Continue**.
8. The system processes the new information and the **Network Settings Change** dialog box appears. Select **Yes** to restart your computer.
9. After completing the hardware and driver installation, you must configure your modem for country-specific operation. See "Step 4: Configure the Modem for Your Country" for configuration instructions.
10. After setting up your modem for country-specific operation, you'll want to configure your communications software or Windows Dial-Up Networking. Information about configuring your communications software can be found in Step 5.

Verifying the Windows NT Configuration

To verify your modem configuration in Windows NT:

1. Click **Start | Settings | Control Panel**. Double-click **Modems**.
2. The **Modem Properties** dialog box appears, showing the COM port associated with the modem.
3. Click **Properties**. View the **General** tab to display information about modem speed. Click the **Connection** tab to see information about connection and call preferences.

You can also view configuration information under NT's Remote Access Services, by clicking **Start | Settings | Control Panel**. Double-click the **Network** tab. Click the **Services** tab, Highlight **Remote Access Services** and then click **Properties**. The list of modems and associated COM ports appears.

Windows 2000

1. After installing the MultiModemZPX into your computer, turn the computer on and allow Windows 2000 to start. As the computer boots, it automatically detects the new modem, and the **Found New Hardware** wizard appears.
2. Click **Next** to begin the driver installation.

Note: If a *Digital Signature Not Found* message appears at any point during the installation process, select **Yes** to continue the installation.

3. In the **Install Hardware Device Drivers** dialog box, select **Search for a suitable driver for my device**, and then click **Next**.
4. In the **Driver Files Search Results** dialog box, select **CD-ROM drives**.
5. Insert the MultiModemZPX CD into the CD-ROM drive, and then click **Next**.
6. When the **Driver Files Search Results** dialog box says Windows has found a driver, click **Next**.
7. When the **Completing the Found New Hardware Wizard** dialog box says Windows has finished installing the software for this device, click **Finish**.
8. After completing the hardware and driver installation, you must configure your modem for country-specific operation. See "Step 4: Configure the Modem for Your Country" for configuration instructions.
9. After setting up your modem for country-specific operation, you'll want to configure your communications software or Windows Dial-Up Networking. Information about configuring your communications software can be found in Step 5.

Verifying the Windows 2000 Configuration

To verify your modem adapter configuration in Windows 2000:

1. Click **Start | Settings | Control Panel**. Double-click **Phone and Modem Properties**.
2. In the **Phone and Modem Properties** dialog box, click the **Modems** tab.

3. In the **Modem** tab, select **Multi-Tech Systems MT5634ZPX-PCI-V92**, and then click the **Properties** button to display information about your modem settings.

- Extra AT commands (see Chapter 4) may be entered in the **Extra initialization commands** field.
- To change port assignments, click **Advanced Port Settings**. Use the COM Port number list to select an unused COM port.

Windows 2000 automatically configures Plug and Play devices such as the Multi-ModemZPX to work properly with other devices installed in your computer.

If you are using non-Plug and Play devices in your computer and a resource conflict occurs that requires manual resource configuration, consult the instruction manual supplied with the device in question.

Be aware that resource settings should be changed only by users with expert knowledge of computer hardware and hardware configurations. Changing resource settings improperly can disable your hardware and can cause your computer to malfunction or become inoperable.

Viewing system resources

1. Click **Start | Settings | Control Panel**.
2. Double-click **System**, and then click the **Hardware** tab.
3. Click **Device Manager**.
4. Click the **Action** tab to display information about Device Manager options.

Removing Previous Modems from Windows 2000

1. To remove a modem adapter from Windows 2000, click **Start | Settings | Control Panel**. Double-click **Add/Remove Hardware**.
2. The **Add/Remove Hardware Wizard** displays. Click **Next**.
3. When the **Choose Hardware Task** dialog box displays, select **Uninstall/Unplug a device**.
4. In the **Choose a Removal Task** dialog box, select **Uninstall a device**, and then click **Next**.
5. The **Installed devices on your computer** dialog box provides a list of devices installed on your computer. Select the device you want to uninstall from the list. Click **Next**.
6. In the **Uninstall a Device** dialog box, verify that the correct device is highlighted, and then select **Yes**. Click **Next** to continue.
7. When the **Completing the Add/Remove Hardware** dialog box indicates Windows has successfully uninstalled the device, click **Finish**.

Note: If you are removing a Plug and Play device from Windows 2000, you must physically remove the device from the computer or Windows 2000 will request driver installation each time the system starts.

Step 4: Configure the Modem for Your Country

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

The Global Wizard Utility

The Global Wizard configuration utility is recommended for computers running Windows 95 or newer.

1. Insert the MultiModemZPX CD into the CD-ROM drive. The **Autorun** menu should appear.
2. Click **Initial Setup and Country Selection**.
3. In the **Global Wizard** dialog box, select either **Run from CD** or **Install on your PC**. Choose the former to configure your modem without installing the Global Wizard on your computer. Choose the latter to install the Global Wizard on your computer and Start menu.
4. Click **Next**. The Global Wizard searches for your modem and identifies it.
5. Click **Next**.
6. Select the country in which the modem will be used, and then click **Next**.
7. Review your choice of country. If it is correct, click **Next** to configure the modem.
8. When Global Wizard announces that the parameters have been set, click **Finish** to exit.

AT Commands

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

1. Run your favorite communication program, and open the program's terminal window.
2. To configure the modem for a specific country, type **AT%T19,0,nn**, where *nn* is the country code in hexadecimal notation, and then press Enter.
3. To verify the change, type **ATI9**, and then press Enter. The country code is displayed in decimal format.

Example of country, command and result codes

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

A complete list of country codes can be found on the Multi-Tech Web site at <http://www.multitech.com/GlobalModem/config>.

Step 5: Install and Configure Your Software

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

1. Install and run your communication program.
2. Find the dialog box or menu that lets you select your modem. (In Windows HyperTerminal select **File | Properties | Phone Number**; in PhoneTools select **Configure | General Configuration | Communication | Change Modem**.)
3. Choose your modem from the program's modem list. If it isn't listed, choose a generic modem and modify the settings as necessary.
4. Change the modem initialization string, if necessary. The factory default configuration works well for most purposes. To load the factory default configuration, use **AT&F**. To load a custom configuration that was saved using the **&W** command, use **ATZ**. If you do not want the modem to always answer the phone, add **S0=0** to the string. To use Caller ID with the modem, add **S0=2** to the string (Caller ID information is sent between the first and second rings, so the phone must ring at least twice before the modem picks up the line). Depending on the software, you might have to end the string with a carriage return character (**^M**).

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

5. Select the port the modem is connected to.
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 to six times the modem's maximum transmission speed or faster; however, few files can be compressed enough to require speeds that high, and not all serial ports can handle speeds that high.
7. If the communication program has an autobaud selection, make sure it is disabled. Autobaud applies only to older modems, and can cause problems if enabled.
8. If the program allows you to edit the no-connect messages (*NO CARRIER*, *BUSY*, *NO ANSWER*, *NO DIALTONE*), make sure there is no space between *DIAL* and *TONE* in *NO DIALTONE*.
9. Refer to the program manual or online help for other configuration choices. In most cases you can accept the default values.



3

Operation

Introduction

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

Configuring the Modem

Your modem normally is configured either through Windows or through the communication program you are using. The default settings work best for most purposes. For help in setting up your communication program, see "Step 5: Install and Configure Your Software" in Chapter 2.

You can also configure your modem directly by typing AT commands in the terminal window of a communication program. See Chapter 4 for descriptions of the modem's AT commands.

PhoneTools Features

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

- Upload and download data files.
- Send faxes at preset times.
- Store incoming voice messages and faxes.
- Retrieve stored messages, faxes, and telephone numbers (telephone number retrieval requires Caller ID service from your phone company).
- Print a received fax.

For detailed information about operating your modem under PhoneTools, please refer to the PhoneTools online documentation.

Connecting to the Internet

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

- User name (also called user ID)
- Password
- Access number (the number you call to connect to the server)
- Host name and/or domain name
- Domain Name Server (DNS) server address

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

- E-mail or POP mail address
- POP server address
- Mail or SMTP address
- News or NNT server address

Dial-Up Networking

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

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

Sending a Fax

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

1. Install PhoneTools if it is not already installed.
2. Create a document in a Windows application, such as a word processor, graphic editor, or spreadsheet. To fax the document, keep the document open and select the **Print** command from the **File** menu.
3. Select **CAPTURE FAX BVRP** as the printer driver, and then click **OK**. The **Send Fax** wizard appears.
4. In the **Recipient** section, type the required information or extract it from the Phone Book by clicking .
5. In the **Template** section, optionally select a cover page and type a cover message.
6. Select the document to be sent. The default file when sending from within a Windows application is **Capture.dgr**.
7. Select the date and time to send the document, if you do not want to send it immediately.
8. Click **Finish** to start the transmission.

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/>
- Data Communications FAQ:
<http://www.best.com/~malch/comfaq.html>
- Modemsite.com:
<http://808hi.com/56k/index.htm>
- Vee90.net:
<http://www.vee90.net/>

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 HyperTerminal or the PhoneTools 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; for example, 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 the ENTER key (abbreviated <CR>, for *carriage return*) 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. This action is frequently abbreviated <CR> . |
| 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: | | $n = 0-3, 15, 16$ |
| Default: | | 1 and 16 |
| Description: | B0 | Select ITU-T V.22 mode when modem is at 1200 bps. |
| | B1 | Select Bell 212A when modem is at 1200 bps. |
| | B2 | Deselect V.23 reverse channel (same as B3). |
| | B3 | Deselect V.23 reverse channel (same as B2). |
| | B15 | Select V.21 when the modem is at 300 bps. |
| | B16 | Select Bell 103J when the modem is at 300 bps. |
| Command: | Ds | Dial |
| Values: | | $s =$ dial string (phone number and dial modifiers) |
| Default: | | none |
| Description: | | Dial telephone number s , where s may up to 40 characters long and include the 0-9, *, #, A, B, C, and D characters, and the L, P, T, W, S, comma (,), semicolon (;), !, @, ^ and \$ dial string modifiers. |
| | | <i>Dial string modifiers:</i> |
| | L | Redial last number. (Must be placed immediately after ATD .) |
| | P | Select pulse-dialing until a T is encountered. Affects current and subsequent dialing. |
| | T | Select tone-dialing until a P is encountered. Affects current and subsequent dialing. |
| | W | Wait for a new dial tone before continuing to dial. (X2 , X4 , X5 , X6 , or X7 must be selected.) |
| | , | Pause during dialing for time set in register S8 . |
| | ; | Return to command mode after dialing. Place at end of dial string. |
| | ! | Hook flash. Causes the modem to go on-hook for one-half second, then off-hook again. |

- @ Wait for quiet answer. Causes modem to wait for a ring back, then 5 seconds of silence, before processing next part of command. If silence is not detected, the modem returns a NO ANSWER code.
- ^ Disable data calling tone transmission.
- \$ Detect AT&T call card "bong" tone. The character should follow the phone number and precede the user's call card number: `ATDT1028806127853500$123456789`.

Command: **DS=*n* Dial Stored Telephone Number**

Values: *n* = 0, 1

Default: none

Description: Dials a number previously stored in directory number *y* by the `&Zn=x` command. Example: `ATDS=1`.

Command: **En Echo Command Mode Characters**

Values: *n* = 0 or 1

Default: 1

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

Command: **F*n* Echo Online Data Characters**

Values: *n* = 1

Default: 1

Description: F0 Enables online data character echo. (Not supported.)
F1 Disables online data character echo (included for backward compatibility with some software).

Command: **H*n* Hook Control**

Values: *n* = 0 or 1

Default: 0

Description: H0 Goes on-hook (hangs up).
H1 Goes off-hook (makes the phone line busy).

Command: **I*n* Information Request**

Values: *n* = 0–5, 9, 11

Default: None

Description: I0 Displays default speed and controller firmware version.
I1 Calculates and displays ROM checksum (e.g., `B399`).
I2 Checks ROM and verifies the checksum, displaying `OK` or `ERROR`.
I3 Displays default speed and controller firmware version.
I4 Displays firmware version for data pump (e.g., `17`).
I5 Displays the board ID: software version, hardware version, and the country ID in hexadecimal format (e.g., `s0503a01V, 0, 34`).
I9 Displays the country code in decimal format (e.g., `52`).
I11 Displays diagnostic information for the last modem connection, such as DSP and firmware version, link type, line speed, serial speed, type of error correction/data compression, number of past retrains, etc.

| | | |
|--------------|-------------|---|
| Command: | Mn | Monitor Speaker Mode |
| Values: | | $n = 0, 1, 2, \text{ or } 3$ |
| Default: | | 1 |
| Description: | M0 | Speaker always off. |
| | M1 | Speaker on until carrier signal detected. |
| | M2 | Speaker always on when modem is off-hook. |
| | M3 | Speaker on until carrier is detected, except while dialing. |
| Command: | Nn | Modulation Handshake |
| Values: | | $n = 0 \text{ or } 1$ |
| Default: | | 1 |
| Description: | N0 | Modem performs handshake only at communication standard specified by S37 and the B command. |
| | N1 | Modem begins handshake at communication standard specified by S37 and the B command. During handshake, fallback to a lower speed can occur. |
| Command: | On | Return Online to Data Mode |
| Values: | | 0, 1, 3 |
| Default: | | None |
| Description: | O0 | Exits online command mode and returns to data mode (see +++AT<CR> escape sequence). |
| | O1 | Issues a retrain and returns to online data mode. |
| | O3 | Issues a rate renegotiation and returns to data mode. |
| Command: | P | Pulse Dialing |
| Values: | | P, T |
| Default: | | T |
| Description: | | Configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a T command or dial modifier is received. |
| Command: | Qn | Result Codes Enable/Disable |
| Values: | | $n = 0 \text{ or } 1$ |
| Default: | | 0 |
| Description: | Q0 | Enables result codes. |
| | Q1 | Disables result codes. |
| | Q2 | Returns an <i>OK</i> for backward compatibility with some software. |
| Command: | Sr=n | Set Register Value |
| Values: | | $r = \text{S-register number}; n \text{ varies}$ |
| Default: | | None |
| Description: | | Sets the value of register Sr to the value of n , where n is entered in decimal format. Example: S0=1 . |
| Command: | Sr? | Read Register Value |
| Values: | | $r = \text{S-register number}$ |
| Default: | | None |
| Description: | | Reads the value of register Sr and displays it in 3-digit decimal form. For example, S2? gives the response <i>043</i> . |

| | | |
|--------------|----------------|--|
| Command: | T | Tone Dialing |
| Values: | | P, T |
| Default: | | T |
| Description: | | Configures the modem for DTMF (touch-tone) dialing. Dialed digits are tone dialed until a P command or dial modifier is received. |
| 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 | Result Code Options |
| Values: | | $n = 0, 1,$ or 2 |
| Default: | | 2 |
| Description: | W0 | <i>CONNECT</i> result code reports DTE (serial port) speed, disables protocol result codes. |
| | W1 | <i>CONNECT</i> result code reports DTE (serial port) speed, enables protocol result codes. |
| | W2 | <i>CONNECT</i> result code reports DCE (line) speed, enables protocol result codes. |
| Command: | Xn | Result Code Selection |
| Values: | | $n = 0-7$ |
| Default: | | 4 |
| Description: | X0 | Basic result codes (e.g., <i>CONNECT</i>); does not look for dial tone or busy signal. |
| | X1 | Extended result codes (e.g., <i>CONNECT 46000 V42bis</i>); does not look for dial tone or busy signal. |
| | X2 | Extended result codes with <i>NO DIALTONE</i> ; does not look for busy signal. |
| | X3 | Extended result codes with <i>BUSY</i> ; does not look for dial tone. |
| | X4 | Extended result codes with <i>NO DIALTONE</i> and <i>BUSY</i> . |
| | X5 | Extended result codes with <i>NO DIALTONE</i> and <i>BUSY</i> . |
| | X6 | Extended result codes with <i>NO DIALTONE</i> and <i>BUSY</i> . |
| | X7 | Basic result codes with <i>NO DIALTONE</i> and <i>BUSY</i> . |
| Command: | Zn | Modem Reset |
| Values: | | $n = 0$ or 1 |
| Default: | | None |
| Description: | Z0 | Resets modem to profile saved by the last &W command. |
| | Z1 | Same as Z0 . |
| Command: | &Cn | Data Carrier Detect (DCD) Control |
| Values: | | $n = 0, 1,$ or 2 |
| Default: | | 1 |
| Description: | &C0 | Forces the DCD circuit to be always high. |
| | &C1 | DCD goes high when the remote modem's carrier signal is detected, and goes low when the carrier signal is not detected. |

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

Command: **&En XON/XOFF Pacing Control**
Values: $n = 12 \text{ or } 13$
Default: 12
Description: &E12 Disables XON/XOFF pacing.
&E13 Enables XON/XOFF pacing. (&K4 must also be set.)

Note: &E13 has no effect if hardware control (&K3) is selected.

Command: **&Fn Load Factory Settings**
Values: $n = 0$
Default: None
Description: &F0 Loads factory settings as active configuration.

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

Command: **&Gn V.22bis Guard Tone Control**
Values: $n = 0, 1, \text{ or } 2$
Default: 0
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.

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

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

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

Command: **&Tn V.54 Test Commands**
Values: $n = 0, 1, 3$ or 6
Default: None
Description: &T0 Abort. Stops any test in progress.
&T1 Initiates local analog loopback test.
&T3 Initiates local digital loopback test.
&T6 Initiates remote digital loopback test.

Note: To stop a test, you must use the escape sequence (+++AT) before typing &T0.

Command: **&V Display Current Settings**
Values: n/a
Description: Displays the active modem settings.

Command: **&Wn Store Current Configuration**
Values: $n = 0, 1$
Default: None
Description: &W0 Stores current modem settings in nonvolatile memory and causes them to be loaded in place of the factory defaults at power-on or following the ATZ command. See also the &F command.
&W1 Clears user default settings from nonvolatile memory and causes the factory defaults to be loaded at power-on or following the ATZ command.

Command: **&Zn=x Store Dialing Command**
Values: $n = 0, 1$
 $x =$ Dialing command string
Default: None
Description: Stores dialing command x in memory location y . Dial the stored number using the command ATDS= n .

Command: **&&S Speaker Codec Loopback**
Values: n/a
Description: Provides a loopback from the microphone to the speaker. *For testing and debugging only.*

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

- Command: **\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: **\Jn Data Buffer Control**
 Values: $n = 0$
 Default: 0
 Description: **\J0** Enables data buffer—DTE (serial port) speed is independent of connect speed.
- 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** Enters online command mode, no break sent to the remote modem.
 - \K1** Clears data buffers and send break to the remote modem.
 - \K2** Same as **\K0**.
 - \K3** Sends break immediately to the remote modem .
 - \K4** Same as **\K0**.
 - \K5** Sends break to the remote modem in sequence with the transmitted data.
- Data mode.** The modem receives the break from the remote modem:
- \K0** Clears data buffers and sends break to the computer.
 - \K1** Same as **\K0**.
 - \K2** Sends break immediately to the computer.
 - \K3** Same as **\K2**.
 - \K4** Sends break to the computer in sequence with the received data.
 - \K5** Same as **\K4**.
- Online command mode.** The modem receives a **\Bn** command from the computer:
- \K0** Clears data buffers and sends break to the remote modem.
 - \K1** Same as **\K0**.
 - \K2** Sends break immediately to the remote modem.
 - \K3** Same as **\K2**.
 - \K4** Sends break to the remote modem in sequence with the transmitted data.
 - \K5** Same as **\K4**.

Command: **\Nn Error Correction Mode Selection**
Values: $n = 0-5, \text{ or } 7$
Default: 3
Description: \N0 Non-error correction mode with data buffering (buffer mode; same as **&Q6**).
\N1 Direct mode.
\N2 MNP reliable mode. If the modem cannot make an MNP connection, it disconnects.
\N3 V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 error correction mode, then in MNP mode, and finally in non-error-correction (buffer) mode with continued operation.
\N4 V.42 reliable mode. If the modem cannot make a V.42 connection, it disconnects.
\N5 V.42, MNP, or non-error correction (same as \N3).
\N7 V.42, MNP, or non-error correction (same as \N3).

Command: **\Qn Flow Control Selection**
Values: $n = 0, 1, \text{ or } 3$
Default: 3
Description: \Q0 Disables flow control (same as **&K0**).
\Q1 XON/XOFF software flow control (same as **&K4**).
\Q3 RTS/CTS hardware flow control (same as **&K3**).

Command: **\Tn Inactivity Timer**
Values: $n = 0, 1-255$
Default: 0
Description: \Tn Sets the time (in minutes) that the modem waits after the last character is sent or received before it disconnects. A value of zero disables the timer. Applies only in buffer mode.

Note: You can also set the inactivity timer by changing the value of **S30**.

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

Command: **\Xn XON/XOFF Pass-Through**
Values: $n = 0 \text{ or } 1$
Defaults: 0
Description: \X0 Modem responds to and discards XON/XOFF characters.

Command: **-Cn Data Calling Tone**
Values: $n = 0$ or 1
Defaults: 0
Description: -C0 Disables V.25 data calling tone to deny remote data/fax/voice discrimination.
-C1 Enables V.25 data calling tone to allow remote data/fax/voice discrimination.

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

Note: For descriptions of the **+FAA=** and other fax commands, see the *Multi-Tech Fax Class 2.1 Developer's Guide*.

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

Command: **%Cn V.42bis Compression Control**
Values: $n = 0$ or 1
Default: 1
Description: %C0 Disable sV.42bis/MNP 5 data compression.
%C1 Enables V.42bis/MNP 5 data compression.

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

Command: +DCS=*x,y* Select V.44 Data Compression

Values: *x* = 0 or 1 (V.42bis)
y = 0, 1, or 2 (V.44)

Default: 1,2

Description: Selects V.42bis/V.44 data compression.

- +DCS=0,0 V.42bis and V.44 data compression are both disabled.
- +DCS=0,1 V.42bis is disabled; V.44 data compression is acceptable.
- +DCS=0,2 V.42bis is disabled; V.44 only when connected to a V.92 server.
- +DCS=1,0 V.42bis is acceptable; V.44 data compression is disabled.
- +DCS=1,1 V.42bis is acceptable; V.44 data compression is acceptable.
- +DCS=1,2 V.42bis is acceptable; V.44 only when connected to a V.92 server.
- +DCS=? Displays the allowed values.
- +DCS? Displays the current value.

Command: +DR=*n* V.44 Data Compression Reporting

Values: *n* = 0 or 1

Default: 0

Description: Enables or disables the V.44 data compression report. If the compression report is enabled, the +DR:<*type*> intermediate result code reports the current DCE-DCE data compression type. It is issued after the Error Control Report (+ER) and before the final result code (e.g., CONNECT). The intermediate result code descriptions are shown after the command descriptions.

- +DR=0 Disables the V.44 compression report.
- +DR=1 Enables the V.44 compression report.
- +DR=? Displays the allowed values.
- +DR? Displays the current value.

- +DR: NONE Data compression not in use.
- +DR: V42B V.42bis is in use in both directions.
- +DR: V44 V.44 is in use in both directions.

Command: +DS44=*n* V.44 Data Compression

Values: See description

Default: See description

Description: Controls the V.44 data compression function.

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

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

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

Subparameters

- direction* Specifies the DTE direction of the data compression.
 - 0 No compression.
 - 3 Compression in both directions (default).
- max_codewords_tx* Specifies the maximum number of code words to be negotiated in the transmit direction.
 - 1024 Default.
 - 256–2048 Maximum number of code words in transmit direction.
- max_codewords_rx* Specifies the maximum number of code words to be negotiated in the receive direction.
 - 1024 Default.
 - 256–2048 Maximum number of code words in receive direction.
- max_string_tx* Specifies the maximum string length to be negotiated in the transmit direction.
 - 255 Default.
 - 31–255 Maximum string length in transmit direction.
- max_string_rx* Specifies the maximum string length to be negotiated in the receivedirection.
 - 255 Default.
 - 31–255 Maximum string length in receivedirection.
- max_history_tx* Specifies the maximum length of the history buffer to be negotiated in the transmit direction.
 - 5120 Default.
 - 512–11008 History buffer size in transmit direction.
- max_history_rx* Specifies the maximum length of the history buffer to be negotiated in the receive direction.
 - 4096 Default.
 - 512–11008 History buffer size in receive direction.

Command: **+ES=*n*** **Enable Synchronous Buffered Mode**

Values: *n* = 6

Default: None

Description: Allows an H.324 video application direct access to the synchronous data channel. On underflow, the modem sends HDLC flag idle (0x7E) to the remote modem. This special error control mode is overridden by any of the following commands: **&F**, **&M**, **&Q**, or **\N**.

- +ES=6 Enables direct access to the synchronous data channel.
- +ES=? Displays the allowed values.
- +ES? Displays the current value.

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

The command syntax is

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

Subparameters that are not entered retain their current value.

Commas separate optional subparameters, and must be inserted to skip a subparameter. Example: **+MS=,0,<CR>** disables automode and keeps all other settings at their current values.

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

+MS? Reports current options in the format *mod, automode, 0, max_rate, 0, max_rx_rate*. Example: **+MS: V92, 1, 0, 33600, 0, 56000**.

Subparameters

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

| <i>mod</i> | Modulation | Possible rates (bps) ¹ |
|------------------|------------|---|
| V92 ² | V.92 | 56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, or 28000 |
| V90 ³ | 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 |
| V34 | V.34 | 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400 |
| V32B | V.32bis | 14400, 12000, 9600, 7200, or 4800 |
| V32 | V.32 | 9600 or 4800 |
| V22B | V.22bis | 2400 or 1200 |
| V22 | V.22 | 1200 |
| V23C | V.23 | 1200 |
| V21 | V.21 | 300 |
| Bell212A | Bell 212A | 1200 |
| Bell103 | Bell 103 | 300 |

Notes:

1. See optional <*automode*>, <*max_rate*>, and <*max_RX_rate*> subparameters.
2. Selects V.92 modulation as first priority. If a V.92 connection cannot be established, the modem attempts V.90, V.34, V.32bis, etc.
3. Selects V.90 modulation as first priority. If a V.90 connection cannot be established, the modem attempts V.34, V.32bis, etc.

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

- 0 Disable automode
- 1 Enable automode (default)

max_rate An optional number that specifies the highest rate at which the modem may establish an upstream (transmit) connection. The value is decimal coded in units of bps, for example, 33600 specifies the highest rate to be 33600 bps.

- 0 Maximum rate determined by the modulation selected in *mod* (default).
- 300–33600 Maximum rate value limited by the modulation selected in *mod*. For valid *max_rate* values for each *mod* value, see the following table.

| <i>mod</i> value | Valid <i>max_rate</i> values (bps) |
|---------------------|--|
| V92, V90, V34 | 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400 |
| V32B | 19200, 16800, 14400, 12000, 9600, 7200, 4800 |
| V32 | 14400, 12000, 9600, 7200, 4800 |
| V22B | 2400 |
| V22, V23C, Bell212A | 1200 |
| V21, Bell103 | 300 |

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

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

Command: +PCW=*n* Call Waiting Enable

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

Default: 0

Description: Controls the action to be taken upon detection of a call waiting tone in V.92 mode. Values specified by this command are not modified when an AT&F command is issued.

- +PCW=0 Toggles V.24 Circuit 125 and collects Caller ID if enabled by +VCID
- +PCW=1 Hangs up
- +PCW=2 Ignores V.92 call waiting
- +PCW=? Displays the allowed values
- +PCW? Displays the current value

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

+PIG=0 Disables PCM upstream
+PIG=1 Enables PCM upstream
+PIG=? Displays the allowed values
+PIG? Displays the current value

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

+PMH=0 Enables V.92 modem on hold
+PMH=1 Disables V.92 modem on hold
+PMH=? Displays the allowed values
+PMH? Displays the current value

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

Command: **+PMHR=*n*** **Modem on Hold Initiate**
Values: *n* = 0–13
Default: 0
Description: Determines if the modem will accept a V.92 Modem on Hold (MOH) request and will set the MoH timeout. Valid only if MOH is enabled and the modem is off-hook or in data mode. Otherwise, *ERROR* will be returned.

+PMHR=0 Deny MOH request
+PMHR=1 Grant MOH request with 10 second timeout
+PMHR=2 Grant MOH request with 20 second timeout
+PMHR=3 Grant MOH request with 30 second timeout
+PMHR=4 Grant MOH request with 40 second timeout
+PMHR=5 Grant MOH request with 1 minute timeout
+PMHR=6 Grant MOH request with 2 minute timeout
+PMHR=7 Grant MOH request with 3 minute timeout
+PMHR=8 Grant MOH request with 4 minute timeout
+PMHR=9 Grant MOH request with 6 minute timeout
+PMHR=10 Grant MOH request with 8 minute timeout
+PMHR=11 Grant MOH request with 12 minute timeout

- +PMHR=12 Grant MOH request with 16 minute timeout
- +PMHR=13 Grant MOH request with indefinite timeout
- +PMHR=? Displays the allowed values
- +PMHR? Displays the current value

Command: **+PMHT=*n* Modem on Hold Timer**

Values: *n* = 0–13

Default: 0

Description: Determines if the modem will accept a V.92 Modem on Hold (MOH) request and will set the MoH timeout.

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

Command: **+PQC=*n* Quick Connect Control**

Values: *n* = 0, 1, 2, or 3

Default: 0

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

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

Command: **+VCID=*n* Caller ID Selection**

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

Default: 0

Description: Enables Caller ID detection and configures the reporting and presentation of the Caller ID data that is detected after the first ring. The reported data includes the date and time of the call, the caller's name and number, and a message. Set S0=2.

+VCID=0 Disables Caller ID

+VCID=1 Enables Caller ID with formatted data

+VCID=2 Enables Caller ID with unformatted data

+VCID=? Displays the allowed values

+VCID? Displays the current value

Command: **+VDR=*x*, *y* Distinctive Ring Report**

Values: *x* = 0, 1 *Distinctive Ring report control. See description.*

y = 0–255 *Minimum ring interval in 100 ms units. See description.*

Default: 0, 0

Description: Enables reporting of ring cadence information to the DTE and specifies the minimum ring cadence that will be reported.

The report format is one line per silence period and one line per ring period. The length of the silence period is in the form *DROF=number in units of 100 ms<CR><LF>*, and the length of the ring is in the form *DRON=number in units of 100 ms<CR><LF>*. The modem may produce a Ring event code after the DRON message if enabled by the *y* parameter. The *y* parameter must be set to a value equal to or smaller than the expected ring cadence in order to pass the report to the DTE.

+VDR=0, *n/a* Disables Distinctive Ring cadence reporting.

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

+VDR=1, >0 Enables Distinctive Ring cadence reporting. The *RING* result code is reported after the falling edge of the ring pulse (i.e., after the DRON report).

+VDR=? Displays the allowed values.

+VDR? Displays the current value.

Command: **#S*x* Enter Setup Password**

Values: *x* = password (1–8 characters, case sensitive)

Default: MTSMODEM

Description: Enters the remote configuration setup password.

Command: **#S=*x* Store Setup Password**

Values: *x* = password (1–8 characters, case sensitive)

Default: MTSMODEM

Description: Stores a new remote configuration setup password.

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

Values: n/a

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

Command: **%%AT<CR> Remote Configuration Escape Sequence**

Values: n/a

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

S-Registers

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

| Register | Unit | Range | Default | Description |
|------------|----------|-----------------|---------|---|
| S0 | 1 ring | 0, 1–255 | 0 | Sets the number of rings until the modem answers. ATS0=0 disables autoanswer completely. Range varies by country. Set S0=2 for Caller ID. |
| S1 | 1 ring | 0–255 | 0 | Counts the rings that have occurred. |
| S2 | decimal | 0–255 | 43 (+) | Sets ASCII code for the escape sequence character. Values greater than 127 disable escape. |
| S3 | decimal | 0–127 | 13 (^M) | Sets the ASCII code for the carriage return character. |
| S4 | decimal | 0–127 | 10 (^J) | Sets the ASCII code for the line feed character. |
| S5 | decimal | 0–32, 33–127 | 8 (^H) | Sets the ASCII code for the backspace character. Values over 32 disable backspace. |
| S6 | seconds | 2–65* | 2* | Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number. |
| S7 | seconds | 1–255* | 50* | Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait-for-silence time for the @ dial modifier. |
| S8 | seconds | 2–65 | 2 | Sets the length of a pause caused by a comma character in a dialing command. |
| S9 | decimal | 0, 1–127 | 37 (%) | Sets ASCII code for remote configuration escape character. S9=0 disables remote configuration. |
| S10 | 100 ms | 20–255 | 20 | Sets how long a carrier signal must be lost before the modem disconnects. |
| S11 | 1 ms | 50–150* | 95* | Sets spacing and duration of dialing tones. |
| S28 | decimal | 0, 1–255 | 1 | 0 disables, 1–255 enables V.34 modulation. |
| S30 | 1 minute | 0, 1–255 | 0 | Sets the time the modem waits before it disconnects when no data is sent or received. A value of zero disables the timer. See also the \T command |
| S35 | decimal | 0–1 | 0 | 0 disables, 1 enables the V.25 data calling tone, which allows remote data/fax/voice discrimination. |
| S36 | decimal | 0–7 | 7 | Specifies the action to take in the event of a negotiation failure when error control is selected. See S48 . |

* These values may be different outside North America.

| Register | Unit | Range | Default | Description |
|----------|---------|-------|---------|---|
| S37 | decimal | 0–19 | 0 | <p>Sets the maximum V.34 “upstream” speed at which the modem attempts to connect.</p> <p>Value Speed</p> <p>0 maximum modem speed</p> <p>1 reserved</p> <p>2 1200/75 bps</p> <p>3 300 bps</p> <p>4 reserved</p> <p>5 1200 bps</p> <p>6 2400 bps</p> <p>7 4800 bps</p> <p>8 7200 bps</p> <p>9 9600 bps</p> <p>10 12000 bps</p> <p>11 14400 bps</p> <p>12 16800 bps</p> <p>13 19200 bps</p> <p>14 21600 bps</p> <p>15 24000 bps</p> <p>16 26400 bps</p> <p>17 28800 bps</p> <p>18 31200 bps</p> <p>19 33600 bps</p> |
| S38 | decimal | 0–23 | 1 | <p>Sets the maximum 56K “downstream” speed at which the modem attempts to connect. The default maximum speed is 56K bps.</p> <p>Note: When using V.34 or V.32 client-to-client connections in poor conditions, setting S38=0 may result in better performance.</p> <p>Value Rate</p> <p>0 56K disabled</p> <p>1 56K autorate</p> <p>2 28000 bps</p> <p>3 29333 bps</p> <p>4 30666 bps</p> <p>5 32000 bps</p> <p>6 33333 bps</p> <p>7 34666 bps</p> <p>8 36000 bps</p> <p>9 37333 bps</p> <p>10 38666 bps</p> <p>11 40000 bps</p> <p>12 41333 bps</p> <p>13 42666 bps</p> <p>14 44000 bps</p> <p>15 45333 bps</p> <p>16 46666 bps</p> <p>17 48000 bps</p> <p>18 49333 bps</p> |

| Register | Unit | Range | Default | Description | | | | | | | | | | | | | | | |
|--|----------------------|--------------------|---------|--|--|-------|---------|----------|----------------|------------|----------|---------------|-------|----------|----------------------|---------------|----------|---------------------|--------------|
| | | | | 19 50666 bps | | | | | | | | | | | | | | | |
| | | | | 20 52000 bps | | | | | | | | | | | | | | | |
| | | | | 21 53333 bps | | | | | | | | | | | | | | | |
| | | | | 22 54666 bps | | | | | | | | | | | | | | | |
| | | | | 23 56000 bps | | | | | | | | | | | | | | | |
| S42 | decimal | 0-1 | 1 | Enables/disables the 56K auto rate. When 56K auto is disabled, fallback to V.34 is also disabled. 0 = disable; 1 = enable. | | | | | | | | | | | | | | | |
| S48 | decimal | 7 or 128 | 7 | Enables (7) or disables (128) LAPM negotiation. The following table lists the S36 and S48 configuration settings for certain types of connections. | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th></th> <th>S48=7</th> <th>S48=128</th> </tr> </thead> <tbody> <tr> <td>S36=0, 2</td> <td>LAPM or hangup</td> <td>Do not use</td> </tr> <tr> <td>S36=1, 3</td> <td>LAPM or async</td> <td>Async</td> </tr> <tr> <td>S36=4, 6</td> <td>LAPM, MNP, or hangup</td> <td>MNP or hangup</td> </tr> <tr> <td>S36=5, 7</td> <td>LAPM, MNP, or aysnc</td> <td>MNP or async</td> </tr> </tbody> </table> | | | | | | S48=7 | S48=128 | S36=0, 2 | LAPM or hangup | Do not use | S36=1, 3 | LAPM or async | Async | S36=4, 6 | LAPM, MNP, or hangup | MNP or hangup | S36=5, 7 | LAPM, MNP, or aysnc | MNP or async |
| | S48=7 | S48=128 | | | | | | | | | | | | | | | | | |
| S36=0, 2 | LAPM or hangup | Do not use | | | | | | | | | | | | | | | | | |
| S36=1, 3 | LAPM or async | Async | | | | | | | | | | | | | | | | | |
| S36=4, 6 | LAPM, MNP, or hangup | MNP or hangup | | | | | | | | | | | | | | | | | |
| S36=5, 7 | LAPM, MNP, or aysnc | MNP or async | | | | | | | | | | | | | | | | | |
| S89 | seconds | 0, 5-255 | 0 | Sets the inactivity time in the off-line command mode before the modem goes into standby mode. A value of 0 disables standby mode; values of 1-4 set the value to 5. | | | | | | | | | | | | | | | |
| S108 | decimal | 0-3, 6, 7 | 6 | <p>Selects the 56K digital loss if using the modem thru a PBX line. The default value is -6 dB loss, the value used when calling from a typical POTS line long distance.</p> <p>Value Digital loss</p> <p>0 -0 dB digital loss, no robbed-bit signaling</p> <p>1 -3 dB PBX digital loss</p> <p>2 -2 dB digital loss</p> <p>3 -3 dB digital loss</p> <p>6 -6 dB digital loss</p> <p>7 -0 dB digital loss with robbed-bit signaling</p> | | | | | | | | | | | | | | | |
| S109 | decimal | 0-62, even numbers | 18 | <p>Selects the PCM (56K) operating mode. Interactive with the +PQC= command.</p> <p>Bit 56K mode</p> <p>0 Reserved—always 0</p> <p>1 Enable V.90</p> <p>2 Enable quick connect (phase 1)</p> <p>3 Enable PCM upstream</p> <p>4 Enable V.92</p> <p>5 Enable quick connect (phase 2)</p> | | | | | | | | | | | | | | | |

Result Codes

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

| Terse | Verbose | Description |
|-------|-----------------|-------------------------------------|
| 0 | OK | Command executed |
| 1 | CONNECT | Modem connected to line |
| 2 | RING | Ring signal detected |
| 3 | NO CARRIER | Carrier signal lost or not detected |
| 4 | ERROR | Invalid command |
| 5 | CONNECT 1200 * | Connected at 1200 bps |
| 6 | NO DIALTONE | No dial tone detected |
| 7 | BUSY | Busy signal detected |
| 8 | NO ANSWER | No answer at remote end |
| 10 | CONNECT 2400 * | Connected at 2400 bps |
| 11 | CONNECT 4800 * | Connected at 4800 bps |
| 12 | CONNECT 9600 * | Connected at 9600 bps |
| 13 | CONNECT 14400 * | Connected at 14400 bps |
| 14 | CONNECT 19200 * | Connected at 19200 bps |
| 24 | CONNECT 7200 * | Connected at 7200 bps |
| 25 | CONNECT 12000 * | Connected at 12000 bps |
| 26 | CONNECT 16800 * | Connected at 16800 bps |
| 40 | CONNECT 300 * | Connected at 300 bps |
| 55 | CONNECT 21600 * | Connected at 21600 bps |
| 56 | CONNECT 24000 * | Connected at 24000 bps |
| 57 | CONNECT 26400 * | Connected at 26400 bps |
| 58 | CONNECT 28800 * | Connected at 28800 bps |
| 59 | CONNECT 31200 * | Connected at 31200 bps |
| 60 | CONNECT 33600 * | Connected at 33600 bps |
| 70 | CONNECT 32000 * | Connected at 32000 bps, 56K rate |
| 71 | CONNECT 34000 * | Connected at 34000 bps, 56K rate |
| 72 | CONNECT 36000 * | Connected at 36000 bps, 56K rate |
| 73 | CONNECT 38000 * | Connected at 38000 bps, 56K rate |
| 74 | CONNECT 40000 * | Connected at 40000 bps, 56K rate |
| 75 | CONNECT 42000 * | Connected at 42000 bps, 56K rate |
| 76 | CONNECT 44000 * | Connected at 44000 bps, 56K rate |
| 77 | CONNECT 46000 * | Connected at 46000 bps, 56K rate |
| 78 | CONNECT 48000 * | Connected at 48000 bps, 56K rate |
| 79 | CONNECT 50000 * | Connected at 50000 bps, 56K rate |
| 80 | CONNECT 52000 * | Connected at 52000 bps, 56K rate |
| 81 | CONNECT 54000 * | Connected at 54000 bps, 56K rate |
| 82 | CONNECT 56000 * | Connected at 56000 bps, 56K rate |

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

V42bis – V.42 error control (LAP-M) and V.42bis data compression

V42 – V.42 error control (LAP-M) only

MNP5 – MNP 4 error control and MNP 5 data compression

MNP4 – MNP 4 error control only

NoEC – No error control protocol

| Terse | Verbose | Description |
|--------------|------------------------|--|
| 88 | <i>DELAYED</i> | Delay is in effect for the dialed number |
| 89 | <i>BLACKLISTED</i> | Dialed number is blacklisted |
| 90 | <i>BLACKLIST FULL</i> | Blacklist is full |
| 100 | <i>CONNECT 28000 *</i> | Connected at 28000 bps, 56K rate |
| 101 | <i>CONNECT 29333 *</i> | Connected at 29333 bps, 56K rate |
| 102 | <i>CONNECT 30666 *</i> | Connected at 30666 bps, 56K rate |
| 103 | <i>CONNECT 33333 *</i> | Connected at 33333 bps, 56K rate |
| 104 | <i>CONNECT 34666 *</i> | Connected at 34666 bps, 56K rate |
| 105 | <i>CONNECT 37333 *</i> | Connected at 37333 bps, 56K rate |
| 106 | <i>CONNECT 38666 *</i> | Connected at 38666 bps, 56K rate |
| 107 | <i>CONNECT 41333 *</i> | Connected at 41333 bps, 56K rate |
| 108 | <i>CONNECT 42666 *</i> | Connected at 42666 bps, 56K rate |
| 109 | <i>CONNECT 45333 *</i> | Connected at 45333 bps, 56K rate |
| 110 | <i>CONNECT 46666 *</i> | Connected at 46666 bps, 56K rate |
| 111 | <i>CONNECT 49333 *</i> | Connected at 49333 bps, 56K rate |
| 112 | <i>CONNECT 50666 *</i> | Connected at 50666 bps, 56K rate |
| 113 | <i>CONNECT 53333 *</i> | Connected at 53333 bps, 56K rate |
| 114 | <i>CONNECT 54666 *</i> | Connected at 54666 bps, 56K rate |

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

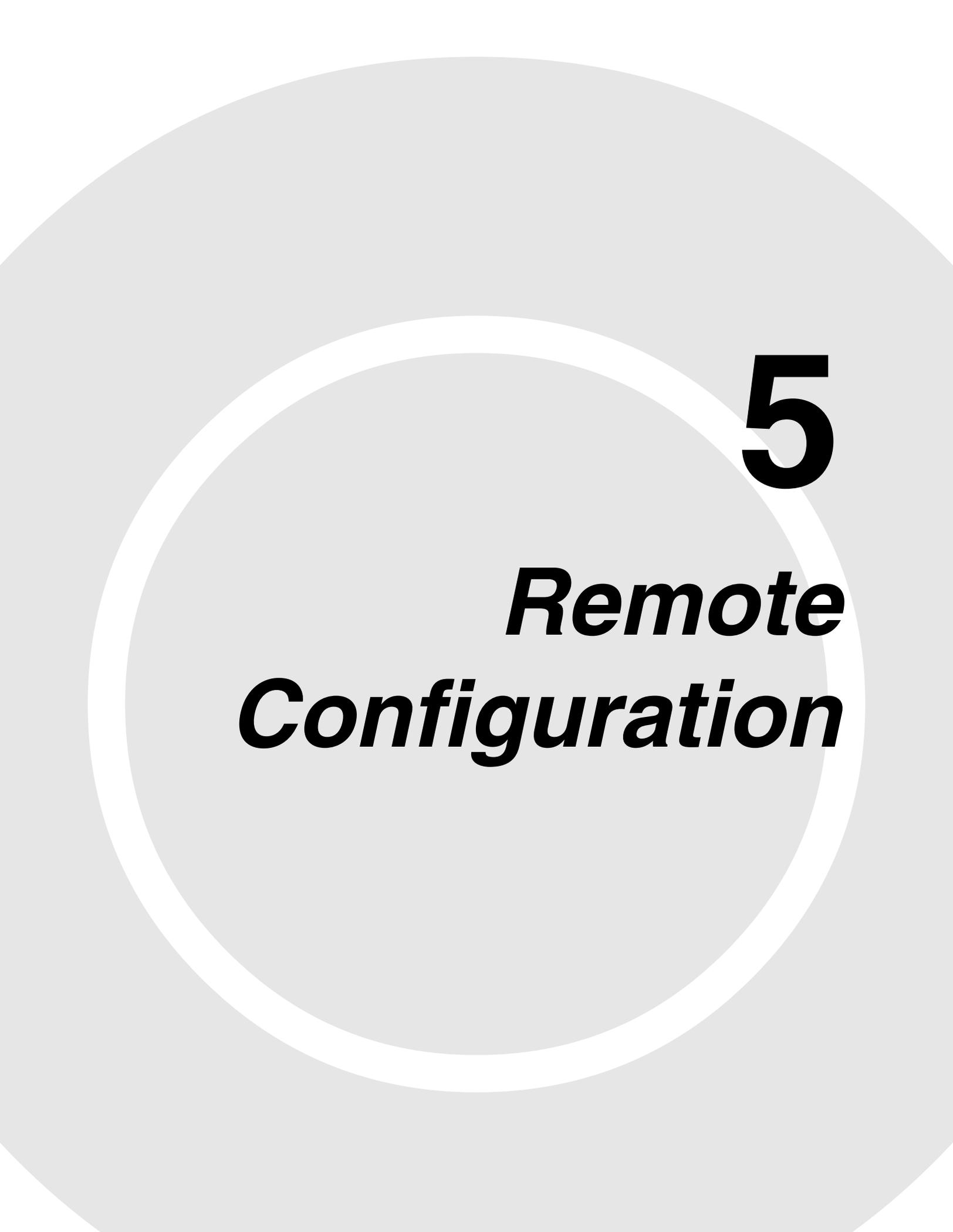
V42bis – V.42 error control (LAP-M) and V.42bis data compression

V42 – V.42 error control (LAP-M) only

MNP5 – MNP 4 error control and MNP 5 data compression

MNP4 – MNP 4 error control only

NoEC – No error control protocol



5

***Remote
Configuration***

Introduction

Remote configuration is a network management tool that allows you to configure MT5634ZPX and MT5634ZBA modems anywhere in your network from one location. With password-protected remote configuration, you can issue **AT** commands to a remote modem for maintenance or troubleshooting as if you were on site.

Basic Procedure

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

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

1. Establish a data connection with a remote MT5634ZPX or MT5634ZBA modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and press **ENTER**. Example: **%%%ATMTSMODEM**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with **OK**.
3. Type **AT** commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0** and pressing **ENTER**.
5. Type **ATO** and press **ENTER** to exit remote configuration. You can now break the connection in the normal way.

Setup

Multi-Tech modems are shipped with a default setup password (MTSMODEM). Because anyone who has the *User Guide* knows the default setup password, you should change the password and possibly also the remote configuration escape character.

To Change the Setup Password

1. Open a data communications program such as HyperTerminal or PhoneTools.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxx** if you have replaced the MTSMODEM password with *xxxxxxx*) and press **ENTER**. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. To change the password, type **AT#S=xxxxxxx**, where *xxxxxxx* stands for the password, and then press **ENTER**. The password can include any keyboard character, and can be up to eight characters long. The modem responds with **OK**.

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

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

To Change the Remote Escape Character

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

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

1. Establish a remote configuration link with the remote modem as described in "Basic Procedure."
2. Type **ATS9=*n***, where *n* is the ASCII code for the new remote configuration escape character, and then press **ENTER**.
3. Save the new value by typing **AT&W** and pressing **ENTER**.
4. Type **ATO** and press **ENTER** to exit remote configuration.



6

***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:

- The modem does not respond to commands.
- The modem cannot connect when dialing.
- 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.
- The voice functions don't work.

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

The Modem Does Not Respond to Commands

- ✓ Make sure you are issuing the modem commands from data communications 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 communications 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 communications software.
- ✓ If you don't get an *OK*, make sure you have properly configured the port in your communications program. Most legacy (prior to Windows 95) communications programs connect to the COM port when the software loads and remain connected until the program terminates. Some programs can disconnect without exiting the program. If this is the case, try issuing the software's connection command. If more than one communications program is open, they may conflict with each other. Make sure all other communications programs are closed, and then try to make the connection again.
- ✓ 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.
- ✓ Your communication software settings might not match the port the modem is connected to. Make sure the COM port you chose during setup matches the COM port set in your communications software. See Chapter 2 for more information.

- ✓ Another expansion card, such as a sound or game card, might be using the same COM port, memory address, or interrupt request (IRQ) as your modem. See Chapter 2 for information on verifying the configuration for your operating system. Look for conflicts with other devices installed on your computer. Resources are assigned at power-up by the computer's BIOS. If the resources assigned to the MultiModemZPX-PCI conflict with the resources of another device, the resources of the second device have to be changed. Select the port the conflicting device is on and change it to resolve the conflict. If you need to change switches or jumpers on the conflicting device, refer to the device's documentation.
- ✓ If you have another MultiModemZPX-PCI, install it and try to make a connection.
- ✓ The modem might have a problem beyond the scope of this user guide. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, call Technical Support for assistance (see Appendix D).

The Modem Cannot Connect When Dialing

Reasons why the MultiModemZPX-PCI may fail to connect include:

- lack of a physical connection to the telephone line.
 - a wrong dial tone.
 - a busy signal.
 - a wrong number.
 - no modem at the other end.
 - a faulty modem, computer, or software at the other end.
 - incompatibility between modems
- poor line conditions.

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

- ✓ If the modem reports *NO DIALTONE*, check that the modem's telephone line cable is connected to both the modem's **LINE** jack (not the **PHONE** jack) and the telephone wall jack. If the cable looks secure, try replacing it.

If that doesn't work, the problem might be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a corporate phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone and might treat it as an error. Check with your PBX personnel or the PBX system 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. Try again later. *BUSY* can also indicate that you 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 using legacy software 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 HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, and type **9** in the local and long distance boxes.

- ✓ 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 there is a modem at the other end. In that case, the modems might be having problems negotiating because of incompatibilities or line noise. Try the call again, connecting at a lower speed by setting register S37 to a lower rate (for example, by typing **ATS37=11** in the terminal window and pressing ENTER).
- ✓ Poor line conditions can also affect the connection. When using V.34 or V.32 client-to-client connections in poor conditions, setting **S38=0** may result in better performance.

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** (but first check with your local telephone company).

You can automatically disable Call Waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT*70,**—note the comma, which inserts a pause before the number is dialed). For example, in Windows select **Start | Settings | Control Panel**, and then **Modems**. In the **Modems Properties** dialog box, select **Multi-Tech MT5634ZPX-PCI**, and then click **Dialing Properties**. Check **This location has call waiting**, and then 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 that the phone cord between the modem's LINE jack and the wall jack is undamaged and firmly connected to both.
- ✓ You might have had a poor connection because of line conditions or the problem might have originated on the other end of the line. Try again.
- ✓ Your ISP might have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

The Modem Cannot Connect When Answering

- ✓ The default DTR Control command (&D2) inhibits autoanswer. To enable autoanswer, change DTR Control to &D0, and make sure &Q0, &Q5, or &Q6 is also set. For more information, see the &D command in Chapter 4. For information on changing the modem's default configuration, see "Step 5: Install and Configure Your Software" in Chapter 2.
- ✓ Autoanswer might be disabled. Turn on autoanswer in your communications program or send the command `ATS0=1` (`ATS0=2` if you have Caller ID service) to your modem in terminal mode.

File Transfer Is Slower Than It Should Be

- ✓ If you are using a slow transfer protocol, such as Xmodem, try Zmodem or Ymodem/G instead.
- ✓ Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.
- ✓ If you are downloading a compressed file with MNP 5 hardware compression enabled, try disabling data compression. The transfer may be marginally slower with data compression enabled, because hardware data compression cannot compress a file already compressed by an archiving program.
- ✓ Does your Internet service provider (ISP) use the same 56K protocol as your modem? The default setting of your modem is to connect using either the V.92 or the V.90 protocol, depending on which one the ISP's modem is using. If your ISP uses the V.90 protocol, the maximum speed you will be able to upload at is 33,600 bps. Check with your ISP to see which protocols it supports.
- ✓ Are you trying to send a file to another client modem? If so, then your maximum possible connect speed is 33,600 bps. You can upload at speeds greater than 33,600 bps only when connected to an ISP that supports the V.92 protocol.
- ✓ Try entering the `I11` command in online mode or the &V command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

Data Is Being Lost

- ✓ If you are using data compression, set the serial port baud rate to two to six times the data rate.
- ✓ Make sure the flow control method you selected in your software matches the method selected in the modem (see AT commands &K and \Q.)
- ✓ Enter the `I11` command in online mode or the &V command in command mode to display information about the last connection. Then make a screen print of the connection statistics, and look for unacceptable parameters.

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.)
- ✓ Enter the **I11** command in online mode or the **&V** command in command mode to display information about the last connection. Then make a screen print of the connection statistics, and look for unacceptable parameters.

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 data communications software, but not both at the same time, unless you have a special communication device management application. In Windows 95 and higher, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.

The Voice Functions Don't Work

There are several tests that you can perform to verify the voice circuits of the Multi-ModemZPX. First, make sure all connecting cables—telephone, microphone, and speaker—are undamaged and firmly connected to the correct jacks. Then retry whatever action was not working. If the problem persists, try the voice mail test; if that doesn't work, and if you have a microphone and speaker connected to the MultiModemZPX, try the loopback and speakerphone tests, which do not require special software.

Voice Mail Test

Test the MultiModemZPX's voice function by using the included software to set up the MultiModemZPX for voice mail. Have an acquaintance call and leave a message, and then play it back.

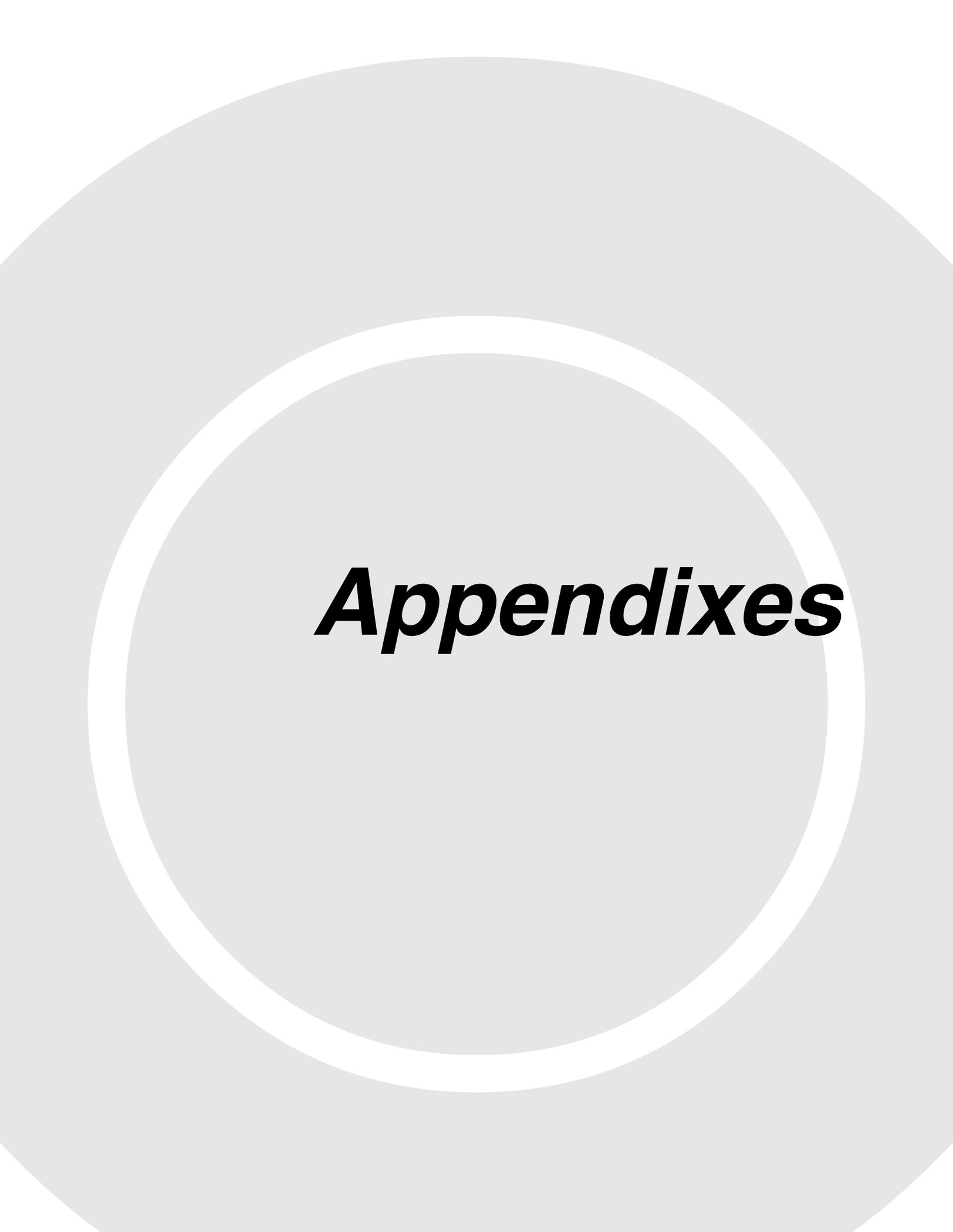
If your modem does not play sound files in voice mode, go to Windows Control Panel and double-click the Multimedia icon. Under the **Audio** tab, select **Modem Wave Driver** as your preferred device for both playback and recording, then try again.

Loopback Test

1. Connect a microphone and speaker to the MultiModemZPX. To avoid feedback, make sure the microphone and speaker are well separated; better yet, use a headphone instead of a speaker.
2. Select **Start**, point to **Programs**, point to **Accessories**, and click **HyperTerminal**.
3. Click **Cancel** in the **Connection Description** dialog box.
4. In the HyperTerminal terminal window, type **AT&&S** and press **ENTER**. This command causes input from the microphone to be looped back to the speaker.
5. Speak into the microphone; you should hear your voice on the speaker or headphone.
6. Type **ATZ** and press **ENTER** to reset the modem.

Speakerphone Test

1. Connect a microphone and speaker to the MultiModemZPX.
2. Select **Start**, point to **Programs**, point to **Accessories**, and click **HyperTerminal**.
3. Click **Cancel** in the **Connection Description** dialog box.
4. In the HyperTerminal terminal window, type
AT+FCLASS=8
AT+VLS=7
ATDTxxxxxxx (for *xxxxxxx* substitute a telephone number)
5. Speak into the microphone to talk to the person on the other end of the line, and listen over the speaker.
6. Type **+++ATH** and press **ENTER** to hang up.
7. Type **ATZ** and press **ENTER** to reset the modem.



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 | MultiModemZPX |
| Model Number: | MT5634ZPX-PCI |
| FCC Registration No: | AU7USA-27014-M5-E |
| Ringer Equivalence No: | 0.4A |
| Modular Jack (USOC): | RJ11C |

Service Center in USA: Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112
U.S.A.
(763) 785-3500
(763) 785-9874 Fax

FCC Part 15

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.

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.

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

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 Canadien sur le matériel brouilleur.

Protection Against Contact with TNV Circuit

The protective cover is fastened to the modem card by means that will only allow a tool to remove the cover.

Warning: Removal of the protective cover will affect product safety and user safety requirements.

EMC, Safety, and R&TTE 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 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

New Zealand Telecom Warning Notice

1. The grant of a Telepermit for any item of terminal equipment indicates only that Telecom has accepted that the item complies with minimum conditions for connection to its network. It indicates no endorsement of the product by Telecom, nor does it provide any sort of warranty. Above all, it provides no assurance that any item will work correctly in all respects with another item of Telepermitted equipment of a different make or model, nor does it imply that any product is compatible with all of Telecom's network services.

This equipment is not capable under all operating conditions of correct operation at the higher speed which it is designated. 33.6 kbps and 56 kbps connections are likely to be restricted to lower bit rates when connected to some PSTN implementations. Telecom will accept no responsibility should difficulties arise in such circumstances.

2. Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.
3. This modem shall not be used in any manner which could constitute a nuisance to other Telecom customers.
4. This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing.

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.

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

6. This equipment may not provide for the effective hand-over of a call to another device connected to the same line.
7. Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:

For repeat calls to the same number:

- There shall be no more than 10 call attempts to the same number within any 30-minute period for any single manual call initiation, and
- The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.

For automatic calls to different numbers:

- The equipment shall be set to ensure that automatic calls to different numbers are spaced such that there is no less than 5 seconds between the end of one call attempt and the beginning of another.

For automatically answered incoming calls:

- The equipment shall be set to ensure that calls are answered between 3 and 30 seconds of receipt of ringing.

8. For correct operation, total of the RNs of all devices connected to a single line at any time should not exceed 5.

South African Notice

This modem must be used in conjunction with an approved surge protection device.

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.

Appendix B: Technical Specifications

The MultiModemZPX modem meets the following specifications:

| | |
|------------------------------------|--|
| <i>Trade Name</i> | MultiModemZPX™ |
| <i>Model Number</i> | MT5634ZPX-PCI |
| <i>Build Number</i> | MT5634ZPX-PCI-V92 |
| <i>Server-to-Client Data Rates</i> | 56K speeds when accessing a V.90 or V.92 server (actual speed depends on server capabilities and line conditions)* |
| <i>Client-to-Server Data Rates</i> | Up to 48Kbps when accessing a V.92 server (actual speed depends on server capabilities and line conditions); otherwise the same as client-to-client data rates. |
| <i>Client-to-Client Data Rates</i> | 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 0-300 bps |
| <i>Fax Data Rates</i> | 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 300 bps |
| <i>Data Format</i> | Serial, binary, asynchronous |
| <i>Modem Compatibility</i> | ITU-T V.92, V.90, V.34 enhanced, V.34, V.32bis, V.32, V.22bis, V.22; Bell 212A and 103/113; ITU-T V.21 & V.23; V.42, V.42bis, V.44 |
| <i>Fax Compatibility</i> | ITU-T "Super" Group 3, Class 1.0, 2.0, 2.1, T.4, T.30, V.21, V.27ter, V.29, V.34, V.17; TIA/EIA 578 Class 1, 2; TR29.2 |
| <i>Video Compatibility</i> | ITU-T V.80 for H.324 video conferencing |
| <i>Voice Compatibility</i> | AT+V/TAM command set |
| <i>Voice Mode Sampling</i> | Up to 44.100 kHz (down-sampled to 11.025 kHz) |
| <i>Error Correction</i> | ITU-T V.42 (LAP-M or MNP 4) |
| <i>Data Compression</i> | ITU-T V.44 (6:1 throughput), V.42bis (4:1 throughput), MNP 5 (2:1 throughput) |
| <i>Speed Detection</i> | Automatic speed detection and switching between available speeds |
| <i>Speed Conversion</i> | Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, and 115,200 bps |
| <i>Modes of Operation</i> | Fax online modes; full duplex data over dial-up lines; voice |
| <i>Flow Control</i> | XON/XOFF (software), RTS/CTS (hardware) |
| <i>Intelligent Features</i> | Plug and play; fully AT command compatible; autodial, redial, repeat dial; pulse or tone dial; dial pauses; auto answer; adaptive answer; EIA extended automode; adaptive line probing; automatic symbol and carrier frequency during start-up, retrain, and rate renegotiation; DTMF detection; |

*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.

| | |
|--|---|
| | call status display, auto-parity and data rate selections; keyboard-controlled modem options; non-volatile memory; remote configuration; DTR dialing; callback security; A-law support in 56K modes; 11-bit support; real-time fax compression conversion; U.S. Caller ID reporting; quick-connect startup. |
| <i>Command Buffer</i> | 40 characters |
| <i>Transmit Level</i> | -11 dBm (North America and Pan Euro)—varies by country setting |
| <i>Frequency Stability</i> | ±0.01% |
| <i>Receiver Sensitivity</i> | -43 dBm under worst-case conditions |
| <i>AGC Dynamic Range</i> | 43 dB |
| <i>Bus Type</i> | PCI 2.1 |
| <i>Connectors</i> | Two RJ-11 phone jacks, one microphone jack, and one speaker jack |
| <i>Cables</i> | One RJ-11 phone cable |
| <hr/> | |
| Note: Any cables connected to the computer should be shielded to reduce interference. | |
| <hr/> | |
| <i>Diagnostics</i> | Power-on self-test (POST) and local analog loop |
| <i>Environmental</i> | Temperature range 0°–50°C (32°–120°F); humidity range 20–90% (non-condensing) |
| <i>Storage Temperature</i> | -10° to +85°C (14°–185°F) |
| <i>Power Requirements</i> | 150 mA @ -5 VDC |
| <i>Dimensions</i> | 1.8 cm wide × 14.7 cm long × 12.2 cm high (0.7" × 5.8" × 4.8") |
| <i>Operating Systems</i> | Tested for use with Windows 95, 98, NT, and 2000, and Linux (2.2.x kernel). |
| <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 remote digital loopback test allows you to verify that the *local* computer or terminal, the serial ports, the local and remote modems, and the transmission line between them are functioning properly.

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

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.

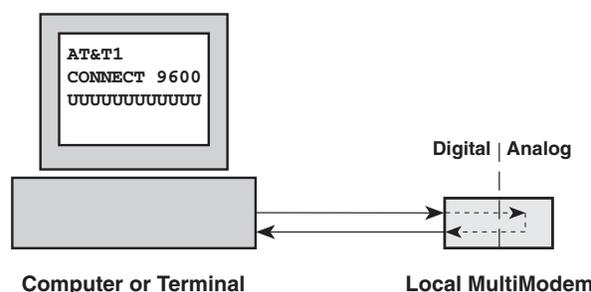


Figure C-1. Local analog loopback test.

Test procedure

1. Using a communications program, set the baud rate to 9600 and go into terminal mode.
2. Type `AT&T1` and press ENTER. This places your modem in analog loopback mode in the originate mode. A `CONNECT` message should appear on your display. The modem is now out of command mode and in a pseudo-online mode.

3. 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.
4. 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.
5. Your modem passes this test if the characters received on your monitor are the same as the characters entered from your keyboard. If different characters 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.

Remote Digital Loopback Test (V.54 Loop 2)

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

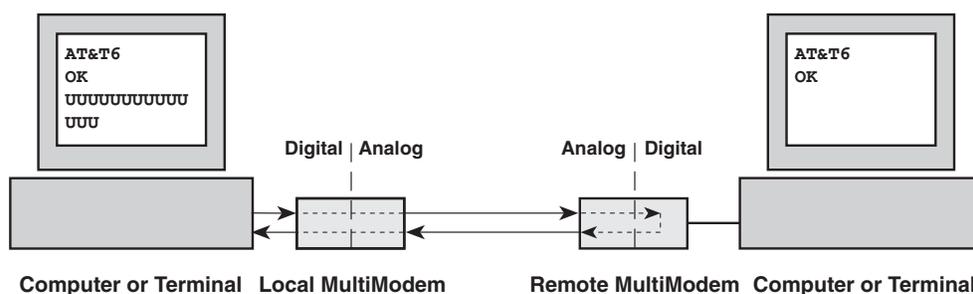


Figure C-2. Remote digital loopback test.

Test procedure

1. Arrange to have `&T6` set on the remote test modem.
2. Using your communication program, set the baud rate to 9600 and go into terminal mode. Type `AT` and press `ENTER`; you should get an `OK` message. Type `AT\N` and press `ENTER` to disable error correction.
3. Dial the remote modem and establish your 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 characters received on your monitor are the same as the characters 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.

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.

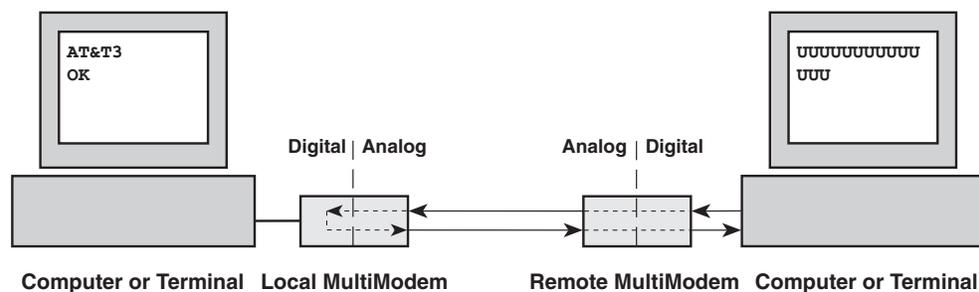


Figure C-3. Local digital loopback test.

Test procedure

1. Using your communication program, set the baud rate to 9600 and go into terminal mode. Type `AT` and press `ENTER`; you should get an `OK` message.
2. Dial the remote modem and establish your 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 characters received on the remote monitor are the same as the characters entered from the remote keyboard.

6. 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.

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.

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 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.

Online Warranty Registration

If you have access to the World Wide Web, you can register your Multi-Tech product online at <http://www.multitech.com/register/>.

Service

U.S. and Canadian Customers

In the event that service is required, products may be shipped, freight prepaid, to our Mounds View, Minnesota, factory:

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112
Attn: Repairs, Serial # _____

A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS. Please include inside the shipping box a description of the problem, a return shipping address (must have street address, not P.O. Box), a telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

For out of warranty repair charges, go to <http://www.multitech.com/documents/warranties>.

Extended two-year overnight replacement agreements are available for selected products. Please call MTS at 888 288-5470, extension 5308, or visit our web site at <http://www.multitech.com/PROGRAMS/orc/> for details on rates and coverages.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at 800 972-2439 or e-mail tsupport@multitech.com.

Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at 800 328-9717 or +763 785-3500, or e-mail mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

International Customers (outside U.S.A. and Canada)

Your original point of purchase reseller may offer the quickest and most economical repair option for your Multi-Tech product. You may also contact any Multi-Tech sales office for information about the nearest distributor or other repair service for your Multi-Tech product: <http://www.multitech.com/COMPANY/offices/DEFAULT.ASP>.

In the event that factory service is required, products may be shipped, freight prepaid, to our Mounds View, Minnesota, factory. Recommended international shipment methods are via Federal Express, UPS or DHL courier services, or by airmail parcel post; shipments made by any other method will be refused. A Returned Materials Authorization (RMA) is required for products shipped from outside the U.S.A. and Canada. Please contact us for return authorization and shipping instructions on any international shipments to the U.S.A. Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check drawn on a U.S. bank or your company's purchase order for repair charges. Repaired units will be shipped freight collect, unless other arrangements are made in advance.

Please direct questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you, as listed at <http://www.multitech.com/COMPANY/offices/DEFAULT.ASP>, or e-mail tsupport@multitech.com. When calling the U.S., please direct questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +763 717-5631 in the U.S.A., or e-mail mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

International Distributors

Procedures for international distributors of Multi-Tech products are on the Distributor Web site at <http://www.multitech.com/PARTNERS/login/>.

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 763 785-3500 (international and local). Please have modem information available. You can also contact Technical Support by e-mail at the following addresses:

| Country | Email | Telephone |
|----------------|--|---------------------|
| France: | support@multitech.fr | +(33) 1-64 61 09 81 |
| India: | support@multitechindia.com | +91 (124) 6340778 |
| U.K.: | support@multitech.co.uk | +(44) 118 959 7774 |
| U.S.A., Canada | tsupport@multitech.com | 800 972-2439 |
| Rest of world: | tsupport@multitech.com | +763 717-5863 |

Before placing a call to our Technical Support staff, please record the following information about your Multi-Tech modem:

Model no.: _____

Serial no.: _____

Firmware version: _____

Software version: _____

COM port no.: _____

IRQ setting: _____

The modem model and serial numbers are silk-screened on your modem. To display the modem firmware version, type **ATI<CR>** in terminal mode.

Please note the status of the modem before contacting Technical Support. Status information can include screen messages, diagnostic test results, problems with a specific application, etc.

Internet Sites

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>

Appendix E: Upgrading the Modem

Introduction

Your modem is controlled by semi-permanent software, called *firmware*, which 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 and the appropriate Flash Wizard for your modem.
4. Install the Flash Wizard and extract the firmware .HEX file from the file you downloaded.
5. Document and clear your stored parameters.
6. Upgrade the modem's firmware using the .HEX file and the Flash Wizard.
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 or not you should update it.

1. Run your favorite terminal program. If you are using Windows 95 or above, you can use HyperTerminal.
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. If the modem does not respond with *OK*, repeat the **AT&F** command.
3. Now type **ATI**, press ENTER, and record your results. The model number and firmware version should appear similar to that shown below.

```
LT V.92 1.0 MT5634ZPX-PCI-V92 Serial Data/Fax Modem Version 1.25a
```

Step 2: Identify the Current Firmware Version

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

1. Using your favorite Web browser, go to <http://www.multitech.com/SUP-PORT/MultiModemZPX/firmware.asp>.
2. Scroll down to your modem model number.
3. Look at the firmware version number for your modem.
4. If the firmware 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.
5. If the firmware version number is greater 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."

Warning: The first digit of the new firmware must match the first digit of the old firmware, or the modem may not work properly. E.g., if your current firmware version is 4.16, replace it only with 4.xx firmware, not 6.xx firmware.

Step 3: Download the Upgrade File

1. If you are not already at the [MultiModemZPX Firmware page](#) of the Multi-Tech Web site, follow the procedure in "Step 2: Identify the Current Firmware."
2. Download the upgrade file for your modem by clicking its name, and save the file in a temporary folder on your hard disk.
3. In the same section of the Web page, download the Flash Wizard utility by clicking it, and save it in the same folder. Alternately, install the Flash wizard from the MultiModemZPX compact disc.

Step 4: Extract the Upgrade Files

1. Install the Flash Wizard utility by double-clicking the Flash Wizard file name in Windows Explorer.
2. Extract the upgrade files by double-clicking the file name. The extracted files include a .HEX file, which contains the upgrade data, and a Readme file.
3. Copy the upgrade .HEX file into the Flash Wizard folder, which, in a default installation, is at C:\Program Files\MultiTech Systems\Flash Wizard\.

Step 5: Document and Clear Your Stored Parameters

Before you flash your modem, you should record the parameters that are currently stored in it so you can reprogram it after flashing. After you have recorded them, send the **AT&WIZ** command to the the modem to clear the stored parameters.

1. Run your favorite terminal program.

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&W1Z** and press **ENTER** to clear your stored parameters and reset your modem to factory default.
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 new firmware (example: ARQG125A.HEX). Also, if you are using Windows NT, you must disable Windows RAS and Microsoft Fax Service before upgrading the modem's firmware. To disable RAS and your Fax service, Click **Start | Settings | Control Panel**, and then double-click **Services**. Select **Remote Access Server**, and then click the **Startup** button. Select **Manual** as the startup type, and then click **OK**. Do the same for any fax service.

WARNING: Never install an older version of firmware over a newer version. Doing this WILL DESTROY THE FLASH PROM! If the flash PROM is destroyed, the modem must be sent in for repair.

1. Run Flash Wizard by double-clicking its icon or file name, or by selecting it from the Start menu. The program begins by identifying devices attached to your computer.
2. Select the modem to be upgraded, and then click **Next** to proceed.
3. Select the port to be upgraded from the **Port** list, select the appropriate .HEX file from the **Hex File** list, and then click **Next** to continue.

Note: Do not use FLASHLDR.HEX. This file is used internally by Flash Wizard.

4. The **Progress** dialog box now displays the progress of the upgrade.

Caution: Any disruption of the program during this stage of the upgrade can cause your modem to become inoperable. Wait for the **Next** button to become active before proceeding.

5. When the flash upgrade is complete, the message *Programming Complete* appears. Click **Next** to continue.
6. The **Results** dialog box appears next. Click **Finish** to exit Flash Wizard.

Note: If you are using Windows NT, be certain to enable RAS and your fax service when the operating system restarts.

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 **ATI** in the terminal window and pressing **ENTER**.

Appendix F: Installing Under Linux

Introduction

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

Standard Linux Serial Port Definitions

| PC port | Linux port |
|---------|------------|
| Com1 | ttyS0 |
| Com2 | ttyS1 |
| Com3 | ttyS2 |
| Com4 | ttyS3 |

Installation

Install the MultiModemZPX in the computer as described in Chapter 2.

Setup

1. Turn on the computer and allow the computer to boot to the command prompt.
2. Log on as **root**.
3. Determine the resources the modem is using by typing the command **cat /proc/pci** or the command **less /proc/pci**. Look for the entry listing **vendor id=11c1** and **device id=480**. Note the IRQ the device uses as well as the first I/O address listed.

Output example:

```
Non-prefetchable 32 bit memory at 0x00000000
Bus 0, device 17, function 0:
Communication controller:Unknown vendor Unknown device (rev 0)
Vendor id=11c1 Device id=480
Medium devsel. Fast back-to-back capable. IRQ 11. Master
Capable. No bursts.
Min GNT=252. Max lat=14
Non-prefetchable 32 bit memory at 0xe4000000
I/O at 0x6400
I/O at 0x6800
I/O at 0x6c00
```

4. Using the IRQ and first I/O address from the output obtained in step 3, type the command **setserial /dev/ttySx uart 16550A port y irq z**, where *x* is the serial device you want to use, *y* is the I/O address, and *z* is the IRQ. Example: **setserial /dev/ttyS2 uart 16550A port 0x6400 irq 11**.

Note: The preceding example places the modem on COM3. Your IRQ and port may vary. Substitute the IRQ and port values in the example with the values for your computer as listed in the results of the command issued in step 3. To set Linux to configure the modem at boot-up, use an editor such as “jed” and add the **setserial** command to the end of the rc.local file.

5. Once you’ve completed your installation, you must configure your modem for country-specific operation. See Chapter 2 for information on using AT commands to configure your modem for use in your country.

Using the Terminal Program Minicom to Verify Operation

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

1. At the command prompt, type **minicom -s** and press ENTER.
2. Select **Serial port setup** and press ENTER.
3. From **Serial port setup**, use the A key to access **Serial Device**, and then press ENTER.
4. Press ESC.
5. You are now in the Minicom terminal. Type **AT** and press ENTER. The screen should display **OK** to verify the operation. Alternately, dial a phone number to verify line operation
6. To leave Minicom, press CTRL + A, and then press Z.
7. On the help menu, press X to exit.

Using the Modem to Call the Internet

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

1. On the Task Bar at the bottom of the screen, select the Gnome Footprint.
2. Select **Internet** from the menu.
3. Select **Dialup Configuration Tool**.
4. Select **Add**, and then click **Next**.
5. Enter the connection name and phone number, and then click **Next**.
6. Enter your user name and password, and then click **Next**.
7. Select **Normal ISP** if your ISP is not listed, and then click **Next**.
8. Click **Finish**.

Calling the ISP

1. On the Task Bar at the bottom of the screen, select the Gnome Footprint.
2. Select **Internet** from the menu.
3. Select **RH PPP Dialer**.
4. Select the connection name you entered in step 5 of the previous section.
5. Click **OK**.

Answering Calls

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

Appendix G: Installing Under SCO OpenServer

Introduction

This appendix explains how to install a modem on a computer operating under the SCO OpenServer 5.0.x operating system. Briefly, in SCO OpenServer, you do not need drivers for most modems. Programs in SCO OpenServer commonly call upon the port, rather than the modem.

Installation

Install the MultiModemZPX in the computer as described in Chapter 2.

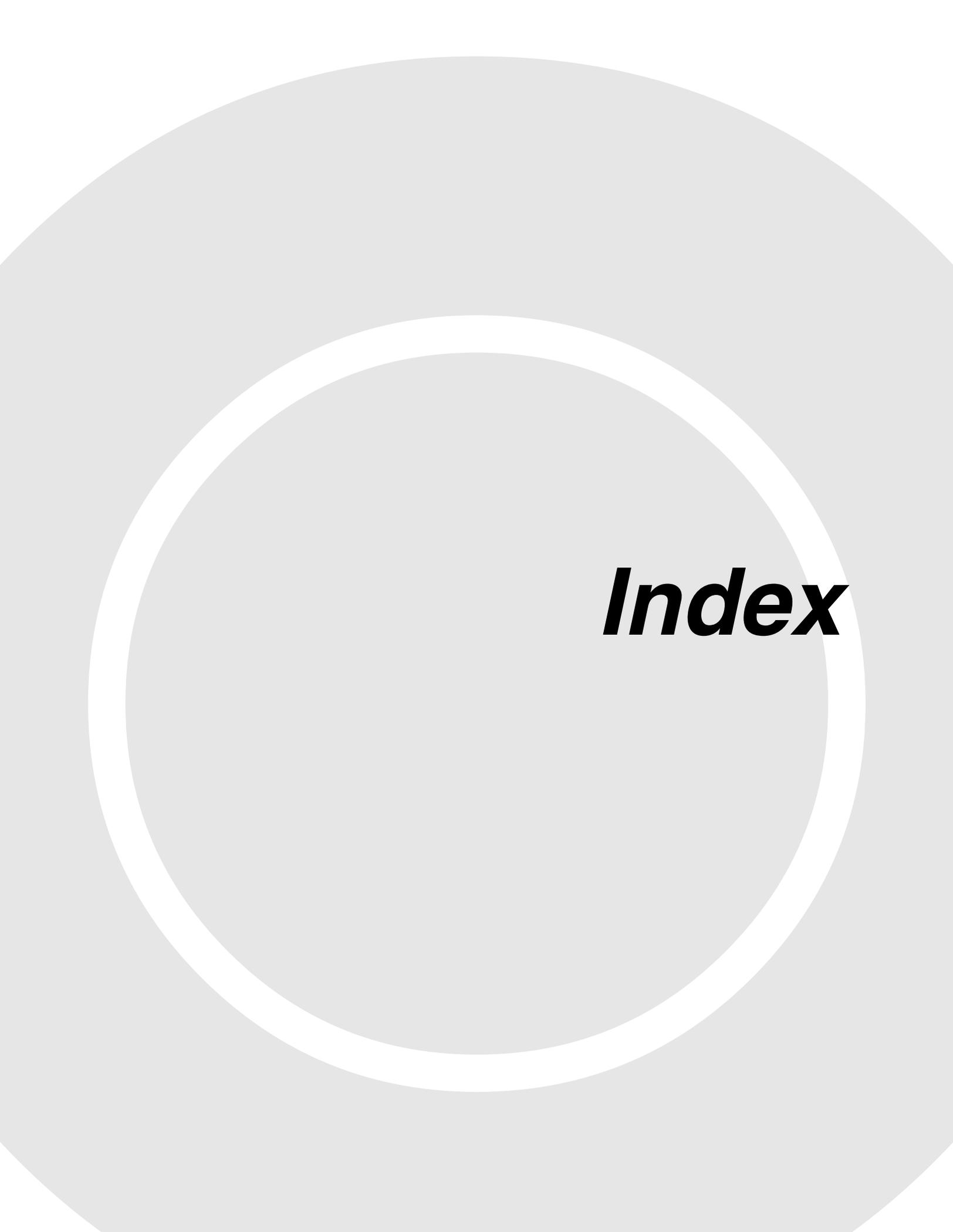
Setup

1. Turn on the computer and allow the computer to boot to the command prompt.
2. Log in as **root**.
3. Determine the port address and IRQ for the modem by typing: **hw -r pci**
To output the port address and IRQ information to a file, type: **hw -r pci>pci.txt**

Caution: If you choose to output the information to a file, make sure the output file name includes the .txt extension. While logged on as "root", the possibility exists that the system file "pci" will be overwritten. By default, UNIX does not ask if you want to overwrite a file.

4. Look at the **ClassCode: 0x078000** (other communications device) section of the output. The MultiModemZPX is identified as **SubSystemID: 0x0480**.
5. Use the first I/O address listed as the port address. In the output, look for:
BaseAddr [x]: I/O NxNNNN
where *x* is the first I/O base address (not memory) and *NxNNN* is the I/O address.
6. Use Serial Manager (or **mkdev serial**) to add a serial port. Choose **IBM Com X** for the new port, where *X* is the number of the new port. Use the first I/O address listed in the output file created in step 3 (**BaseAddr [x]:**) as the port address.
7. Use the IRQ listed in the **InterruptLine** of the output file created in step 3.
8. Once the serial port has been added, the system will require the kernal to be relinked. After the relinking is complete, restart the system to activate the changes.
9. Log back on as **root**.
10. At this point, you may configure the modem as needed on the new port and add required entries to Devices.
11. Once you've completed your hardware installation and system setup, you must configure your modem for country-specific operation. Refer to Chapter 2 for information on using AT commands to configure the modem for use in your country.

Note: If you are using the modem to dial out, a dialer may be needed.



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